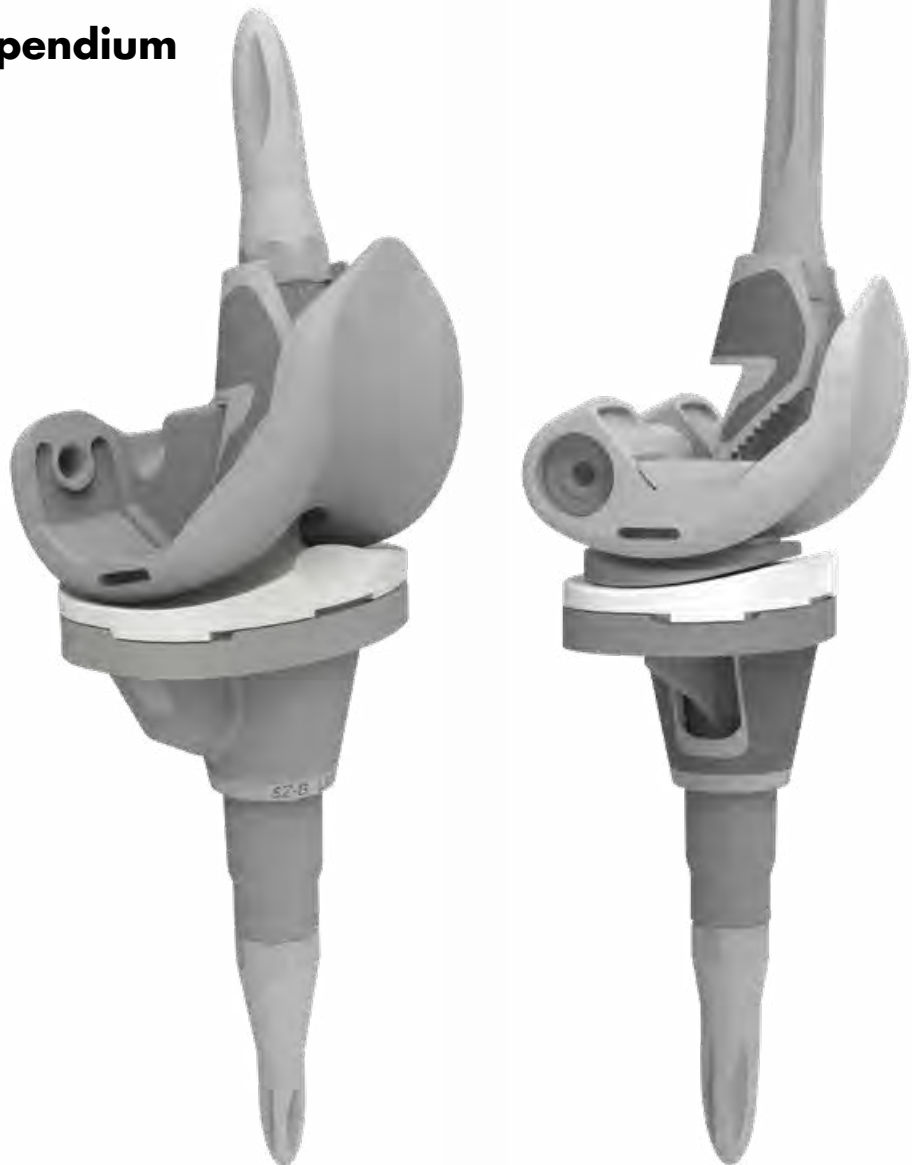


# Triathlon<sup>®</sup> Revision

## Baseplate and Hinge Knee System

**Surgical protocol compendium**



## Product overview

The Triathlon Revision Baseplate and Hinge System consists of Triathlon TS femurs, Triathlon Hinge femurs, Revision Baseplate, Triathlon Tritanium Cone Augments and a variety of stem and augmentation options. It has been designed to be a single platform for revision and limb salvage surgeries in patients with significant bone loss and/or ligament deficiencies. The Triathlon Revision Baseplate is also compatible with the Global Modular Replacement System (GMRS) Distal Femur and Modular Rotating Hinge (MRH) Knee Femoral components.

### System compatibility

		Revision Baseplate	Triathlon TS Femur	Triathlon Hinge Femur
Femur types	Triathlon TS Femur	✓	N/A	N/A
	Triathlon Hinge Femur	✓	N/A	N/A
Insert types	Triathlon TS Insert	✗	✓	✗
	Triathlon Revision Insert	✓	✓	✗
	Triathlon Hinge Insert	✓	✗	✓
Stem types	Fluted Stems	✓	✓	✓†
	Cemented Stems	✓	✓	✓†
	Offset Adaptors	✗	✓	✗
	Stem Extenders	✓*	✓	✓
Cone types	Symmetric Tibial Cone	✓**	N/A	N/A
	Asymmetric Tibial Cone	✓**	N/A	N/A
	Central Femoral Cone	N/A	✓	✓**
	Femoral Cone	N/A	✓	✗
Patella types	Asymmetric	N/A	✓	✓
	Asymmetric metal-backed	N/A	✓	✓
	Symmetric metal-backed	N/A	✓	✓
	Symmetric	N/A	✓	✓

\* The 50mm Stem Extender cannot be used with the Triathlon Revision Tibial Baseplate Components (5612-B-X00) when used with a 150mm Triathlon Cemented or Fluted Stem.

\*\* See detailed table within the protocol for Tibial Cone and Central Femoral Cone size compatibility.

† The Triathlon Hinge Knee Femoral Component requires a 100mm or longer Cemented or Fluted Stem.



## Construct selection

Please use the tiles below to navigate to each specific construct. Note that there are technique-specific addendums listed as well.



**Triathlon TS  
Femur and  
Revision Baseplate**  
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**Triathlon Hinge  
Femur and  
Revision Baseplate**  
pg 104 – pg 194



**GMRS Distal Femur  
and Revision  
Baseplate**  
pg 195 – pg 261



**MRH Femur  
and Revision  
Baseplate**  
pg 262 – pg 317

# Triathlon® TS Femur and Revision Baseplate



**Surgical protocol**

**Instruments**

**Implants**

## Surgical protocol

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## Indications and contraindications

### Indications

General Total Knee Arthroplasty (TKR) indications:

- Painful, disabling joint disease of the knee resulting from: noninflammatory degenerative joint disease (including osteoarthritis, traumatic arthritis, or avascular necrosis), rheumatoid arthritis or post-traumatic arthritis.
- Post-traumatic loss of knee joint configuration and function.
- Moderate varus, valgus, or flexion deformity in which the ligamentous structures can be returned to adequate function and stability.
- Revision of previous unsuccessful knee replacement or other procedure.
- Fracture of the distal femur and/or proximal tibia that cannot be stabilized by standard fracture-management techniques.

Additional Indications for Total Stabilizer (TS) Components:

- Ligamentous instability requiring implant bearing surface geometries with increased constraint.
- Absent or non-functioning posterior cruciate ligament.
- Severe anteroposterior instability of the knee joint.
- Severe instability of the knee secondary to compromised collateral ligament integrity or function.

For Triathlon Revision Baseplate Indications and Contraindications see, Instruction For Use QIN 4435. For Triathlon Revision Insert Indications and Contraindications, see Instruction for Use QIN 4443.

### Contraindications

- Any active or suspected latent infection in or about the knee joint.
- Distant foci of infection which may cause hematogenous spread to the implant site.
- Any mental or neuromuscular disorder which would create an unacceptable risk of prosthesis instability, prosthesis fixation failure, or complications in postoperative care.
- Bone stock compromised by disease, infection or prior implantation which cannot provide adequate support and/or fixation to the prosthesis.
- Skeletal immaturity.
- Severe instability of the knee joint secondary to the absence of collateral ligament integrity and function.

See package insert for warnings, precautions, adverse effects, information for patients and other essential product information. Before using Triathlon instrumentation, verify:

- Instruments have been properly disassembled prior to cleaning and sterilization.
- Instruments have been properly assembled post-sterilization.
- Instruments have maintained design integrity.
- Proper size configurations are available.

For Instructions for Cleaning, Sterilization, Inspection and Maintenance of Orthopaedic Medical Devices, refer to LSTPI-B and SLI0001.

**System compatibility**

		Revision Baseplate	Triathlon TS Femur
Femur types	Triathlon TS Femur	✓	N/A
	Triathlon Hinge Femur	✓	N/A
Insert types	Triathlon TS Insert	✗	✓
	Triathlon Revision Insert	✓	✓
	Triathlon Hinge Insert	✓	✗
Stem types	Fluted Stems	✓	✓
	Cemented Stems	✓	✓
	Offset Adapters	✗	✓
	Stem Extenders	✓*	✓
Cone types	Symmetric Tibial Cone	✓**	N/A
	Asymmetric Tibial Cone	✓**	N/A
	Central Femoral Cone	N/A	✓**
	Femoral Cone	N/A	✓
Patella types	Asymmetric	N/A	✓
	Asymmetric metal-backed	N/A	✓
	Symmetric metal-backed	N/A	✓
	Symmetric	N/A	✓

\* The 50mm Stem Extender cannot be used with the Triathlon Revision Tibial Baseplate Components (5612-B-X00) when used with a 150mm Triathlon Cemented or Fluted Stem.

\*\*See detailed table within the protocol for Tibial Cone and Central Femoral Cone size compatibility

**Compatibility**

This compatibility chart applies to the Triathlon Revision Baseplate and Triathlon TS Femur implant construct.

Tibial insert/baseplate compatibility

**Size matching:** Size specific, e.g., size 4 insert to be used only with size 4 baseplate.

- **Note:** The Revision insert can only be used with the cemented Revision Baseplate.

Femoral component/insert compatibility

**Size matching:** One up, one down, e.g., size 5 femur with size 4, 5 or 6 insert/baseplate.

Femoral component/patella compatibility

**Size matching:** Every patella is designed to articulate with every femur due to a common radius across all sizes.

Triathlon TS Augments (for Triathlon TS cemented femurs only)

Distal Augments are for use with both the medial and lateral portions of the side indicated, e.g., #4 right is used for medial and lateral compartments on a right femur.

Posterior Augments are universal size specific, e.g., size 4 posterior augments are for the size 4 TS femur.

Triathlon Revision Baseplate Augments

Tibial Augments come in left medial/right lateral or right medial/left lateral configurations.

Tibial Augments are size specific, e.g., size 4 tibial augments are for the size 4 Revision Baseplate and Universal Baseplate. For Universal Baseplate part numbers see TRITS-SP-2.

Tritanium Tibial Cone Augments

Size A tibial cone is not compatible with the Revision Baseplate due to the boss diameter.

Size B is the minimum size for tibial cone augment compatibility.

Triathlon TS Stems

The Triathlon Revision Tibial Baseplate (5612-B-X00) requires a 50mm or longer Stem Extension. A 50mm Stem Extender cannot be used when a 150mm is used.



**Figure 1**

## Preoperative templates

The surgeon may overlay the outlines on the following implant surgical templates to an X-ray image to assist in preoperative sizing.

LTEMK39      Triathlon TS X-Ray Templates

LTEMK45      Triathlon Tritanium Cones X-Ray Templates

## Exposure

A standard anterior mid-line incision is utilized. Any previous incision can be used or incorporated to decrease the risk of skin slough (**Figure 1**).

The capsule is entered through a medial parapatellar approach.

## Component removal

When removing the components to be revised, great care must be taken to preserve as much of the remaining bone stock as possible and to avoid the risk of fracture of the residual bone. Bone preservation can usually be facilitated through the use of small flexible osteotomes, saws and high-speed burring instruments.



## Tibial preparation: Revision Baseplate

### Revision Baseplate with Cemented Stems

Cemented stems come in 9, 12, and 15mm diameters in 50, 100 and 150mm lengths.

If Fluted stems are preferred, use the technique described in the Fluted stem section. Revision Baseplate with Fluted stems.

If the tibial preparation is on a native tibia, removal of the anterior portion of the central eminence will be required after IM reaming to allow the Resection Guide Tower to fully seat. General surgical instruments can be used to remove the necessary bone (**Figure 2**). Alternatively, the Triathlon Primary IM referencing tibial resection instruments can be used, see the Addendum 1: Revision Baseplate Tibial Preparation with Primary tibial instrumentation portion of this protocol.

- ▶ **Attention:** The Revision Baseplate is not indicated for use with Size A Tibial Cones. The smallest compatible size is Size B.



Figure 2

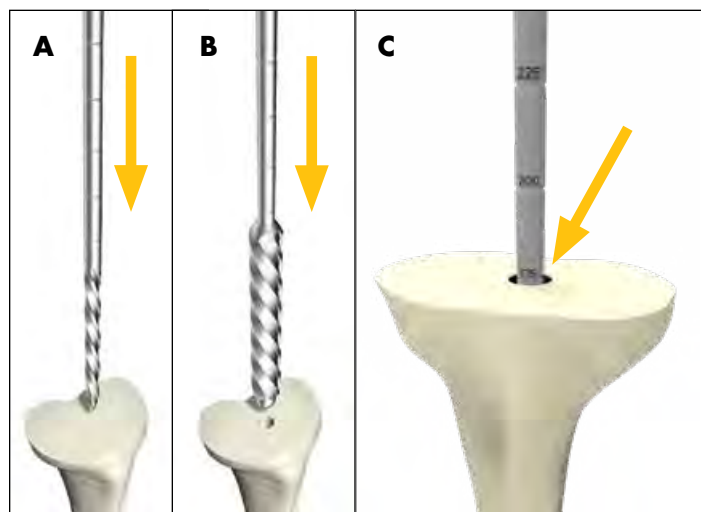


Figure 3

### Revision Baseplate: Intramedullary tibial preparation

Assemble the 8mm Starter Awl to either the T-handle or power unit using the Universal Driver.

Ream the tibial intramedullary canal (**Figure 3A**).

#### Technical points

If determining the appropriate pilot hole is challenging, consider using AP and lateral x-rays to determine the appropriate starting point.

Referencing the desired tibial resection, ream to desired stem depth (refer to depth chart) or to a length of fixation preferred for tibial alignment. Grooves along the shank of the reamer indicate the depth of the reamer in the canal (**Figure 3C**).

- ▶ **Note:** If Cone Augment usage is anticipated, a 175mm reamer depth will be required.

Progressively ream, increasing diameter in 1mm increments until adequate purchase is achieved, and leave the final reamer in the canal (**Figure 3B**). Tap the final reamer gently with a mallet to assure that it is firmly seated.

#### Depth markings: Cemented Stem components

Stem length	Depth marking
50mm	125
100mm	175
150mm	225

- ▶ **Note:** The Revision Baseplate is not compatible with offset adapters.
- ▶ **Note:** If using stem extender implants (5571-S-025 and 5571-S-050), ream an additional 25mm or 50mm accordingly. Note that the stem extender implants have a 16mm diameter; ream accordingly based on desired stem type. **The 50mm Stem Extender cannot be used with the Triathlon Revision Tibial Baseplate Components (5612-B-X00) when used with a 150mm Triathlon TS Stem.**

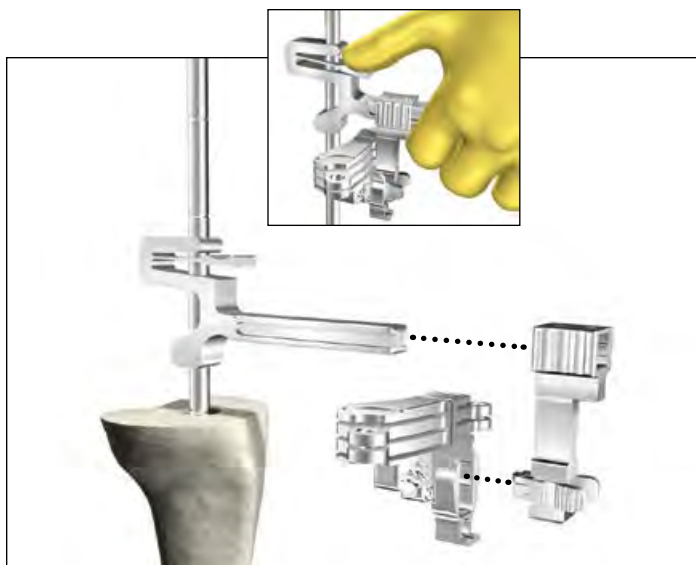


Figure 4A



Figure 4B



Figure 4C

### Technical points

- **Attention:** Tibial offsetting with the Revision baseplate is not possible.

If Tibial Augments are to be used, ream until the depth marking is flush with the expected augment cut. Use the bottom of the line marking as the depth reference.

When using a cemented stem, it is not necessary to gain cortical chatter as cancellous bone may be unnecessarily removed.

Be sure to completely remove cement and sclerotic bone from the center of the canal.

### Revision Baseplate: Proximal tibial resection

Slide the Resection Guide Tower over top of the IM Reamer by depressing the finger tab as shown (**Figure 4A**). Assemble the Revision Tibial Resection Guide to the Support Arm. Slide the assembly on to the Resection Guide Tower.

Depress the finger tab on the Resection Guide Tower and slide the assembly to the desired distal/proximal position on the IM Reamer.

Use the Blade Runner through the cutting slot to approximate the resection level.

- When determining the tibial resection depth, consider any impact to joint line and patella tracking in the case a future revision of the femur to a Triathlon Hinge Femur is required.
- In a revision procedure a **2mm cleanup** resection cut can be performed. 2mm of bone will be resected with the initial proximal resection when using the “2” end of the Triathlon Stylus on the lowest level of the unaffected compartment.
- In a native joint for a **Revision Insert**, to maintain the joint line, the minimum tibial resection from the **native joint line is 9mm**. 9mm of bone will be resected with the initial proximal resection when using the “9” end of the Triathlon Stylus on the lowest level of the unaffected compartment.

Use the Blade Runner through the cutting slots to approximate any augment resection level and rotational alignment of the guide when planning for an augment on one side of the tibia (**Figure 4C**).

The Universal Alignment Rod can be used to aid in setting the final component position by inserting it through the Universal Alignment Handle and assembling the Universal Alignment Handle to the Revision Tibial Resection Guide (**Figure 4B**).

- **Note:** In a bowed tibia, a surgeon may need to retract the reamer from 175mm depth to set the proper tibial cut slope.



Figure 5A

**Technical points**

If using the Hinge Tibial Stylus, the “11” end of the stylus can also be used if the guide is shifted 2mm proximally on the fixation pins (**Figure 5A**).

► **Considerations for future revisions:**

In a native joint for a **Triathlon Hinge procedure**, to maintain the joint line, the minimum tibial resection from the **native joint line is 16mm**. 16mm of bone will be resected with the initial proximal resection when using the “16” end of the Hinge Tibial Stylus.

- The “11” end of the Hinge Tibial Stylus may be used for a reduced resection in either a Triathlon Revision Insert or Triathlon Hinge procedure. 11mm of bone will be resected with the initial proximal resection when using the “11” end of the Hinge Stylus.

Pin the Revision Tibial Resection Guide to the proximal tibia when the resection level has been determined.

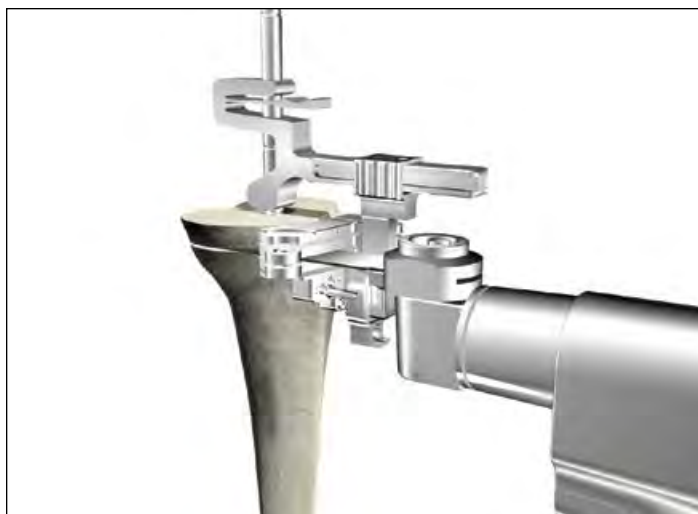


Figure 5B

**Technical points**

- **Tip:** To help facilitate easy removal of the Resection Guide Tower and Support Arm, place pins perpendicular to the bone.

Make a cut to produce a resected surface with a neutral slope (**Figure 5B**).

Tibial augment resections can be made at this point with the Revision Tibial Resection Guide using a narrow, 15mm-wide, 0.050” thick oscillating saw blade.

Make a 5mm or 10mm augment resection as appropriate.

After completing the cut around the reamer shaft, remove the Support Arm (**Figure 5C**), Resection Guide Tower (**Figure 5D**) and IM Reamer before completing the tibial resection. To do so, depress the tabs on the Support Arm to disengage it from the Revision Tibial Resection Guide. Slide the Support Arm anterior. Depress the tab on the Resection Guide Tower and slide it off the IM Reamer. Use a T-handle to remove the IM Reamer.

Once the IM reamer is removed, an additional cross pin can be added to the Revision Tibial Resection Guide.

Using a reciprocating saw blade through the Revision Tibial Resection Guide, complete the sagittal augment resection (**Figure 5E**).

Remove the pins and Tibial Resection Guide.



Figure 5C



Figure 5D

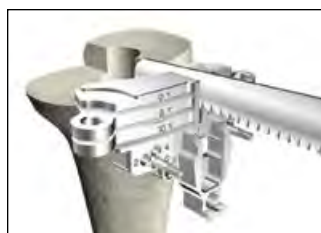


Figure 5E



Figure 6A

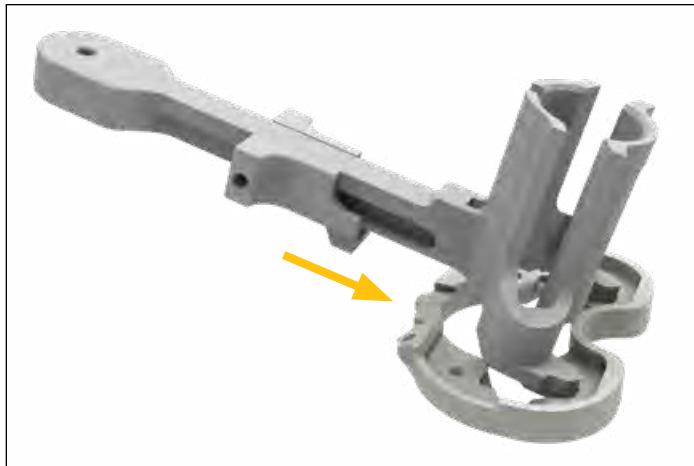


Figure 6B



Figure 6C

### Technical points

Surgeons who prefer a non-captured cut can use the top of the resection guide. The 0mm and 5mm slots can then be used for 5mm and 10mm augment resections, respectively.

- ▶ **Note:** The 10mm slot should not be used if executing a non-captured cut.
- ▶ **Note:** If a tibial stylus is used to ascertain resection depth the depth will not correspond with the non-captured top surface.

### Revision Baseplate: Tibial Template sizing and positioning

- ▶ **Attention:** Tibial offsetting with the Revision Baseplate is not possible.

Size the proximal tibia with a Universal Tibial Template (**Figure 6A**).

- Attach Tibial Augment Trials (if tibial augment cuts were made) to the underside of the Universal Tibial Template.

The Tibial Alignment Handle can be attached to the Universal Tibial Template if desired for tibial sizing.

Rotational alignment of the Universal Tibial Template should be checked. An alignment rod can be used to aid in setting the final component position. To check alignment, attach the Revision Keel Punch Guide to the Universal Tibial Template ensuring the slider is engaged (**Figure 6B**). Insert the Universal Alignment Rod through the hole in the Revision Keel Punch Guide (**Figure 6C**).

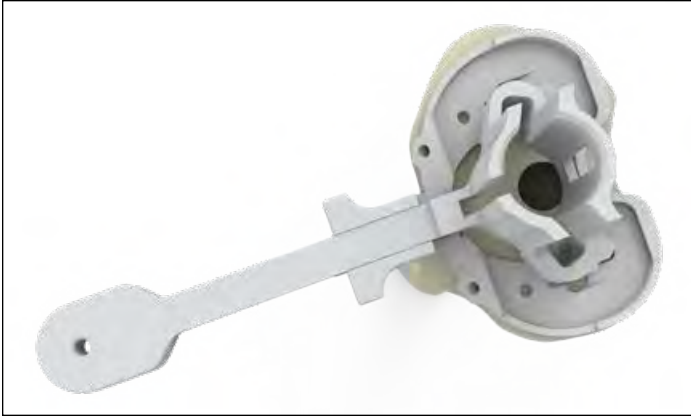


Figure 7



Figure 8

### Technical points

Offsetting is not possible with the Revision Baseplate. In some tibias, especially small tibias, prior to pinning the template it is recommended to visually assess if downsizing and/or repositioning the tibial template or downsizing the stem may be required to avoid impingement with the anterior cortices in subsequent reaming or keel punching steps. In order to assess this, complete the steps as follows:

- Insert last size reamer into the canal and lightly tap to seat it.
- Assemble the appropriately sized tibial template and keel punch guide. Assemble the template and guide over the shaft of the reamer onto the resected tibia.
- The magnitude of the offset observed between the IM reamer and the diameter of the keel punch guide should be used as a reference to determine if downsizing and/or repositioning the template may be required.

When adequate coverage and position is attained, pin the Universal Tibial Template to the proximal tibia using headed pins in the anterior template tray pin holes or headless pins in the anterior angled pin holes (**Figure 7**).

### Technical points

If additional fixation is needed for the Universal Tibial Template to the proximal tibia, remove the Revision Keel Punch Guide from the template (if assembled) and place headed nails into the posterior template pin holes. Once completed, reassemble the Revision Keel Punch Guide (**Figure 9**).

It is optional to mark the anterior surface of the tibia. Align the marks to the two engravings on the template to help ensure that rotation in subsequent steps matches the planned rotation (**Figure 8**).

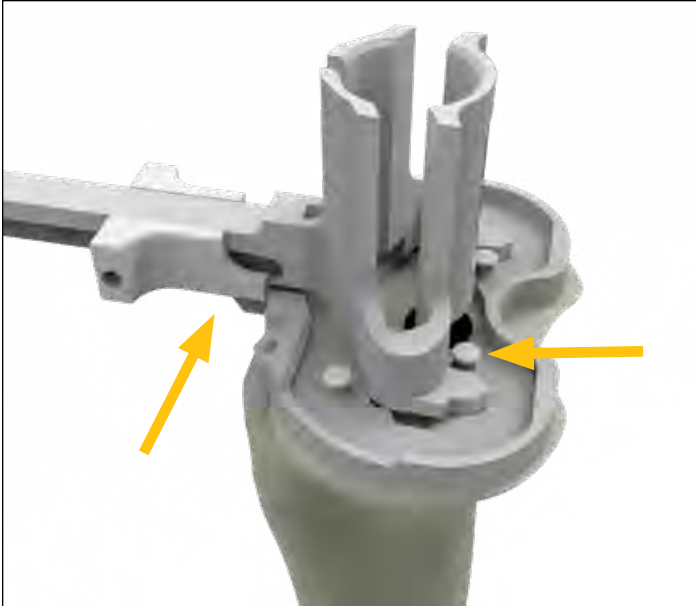


Figure 9



Figure 10



Figure 11A



Figure 11B

### Revision Baseplate: Boss preparation

If not already assembled, assemble the Revision Keel Punch Guide to the Universal Tibial Template. Ensure the slider is engaged with the tibial template (**Figure 9**).

Attach the Modular T-Handle to the Revision Boss Reamer and ream by hand until the physical stop is reached (**Figure 10**). If fully seating the reamer is difficult, the Revision Boss Reamer may be attached to power only if the solid cylinder of the boss reamer has engaged the Revision Keel Punch Guide (**Figure 11**). Attach the Revision Boss Reamer to the power unit using the Universal Driver.

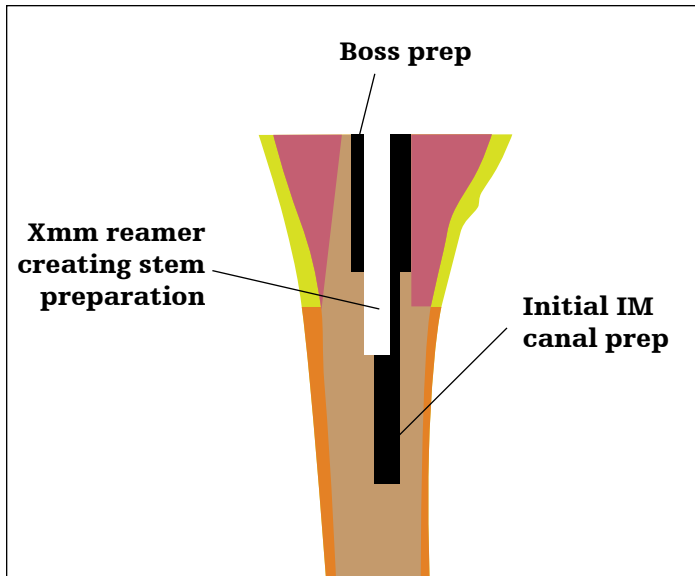
- ▶ **Attention:** Caution should be used to avoid perforating the anterior cortices during reaming.

Remove Revision Boss Reamer.

### Technical points

- ▶ **Attention:** If the Revision Boss Reamer engages cortical bone or the pinned template begins to lift off the tibia, consider downsizing and/or repositioning the tibial template. In this position, the boss of the Revision Baseplate may prevent the baseplate from fully seating. This may happen in small tibias or tibias with a significant bow. Caution should be used to avoid perforating the anterior cortices.

In sclerotic bone, the use of a saw prior to the Revision Keel Punch may be advisable.



**Figure 12**

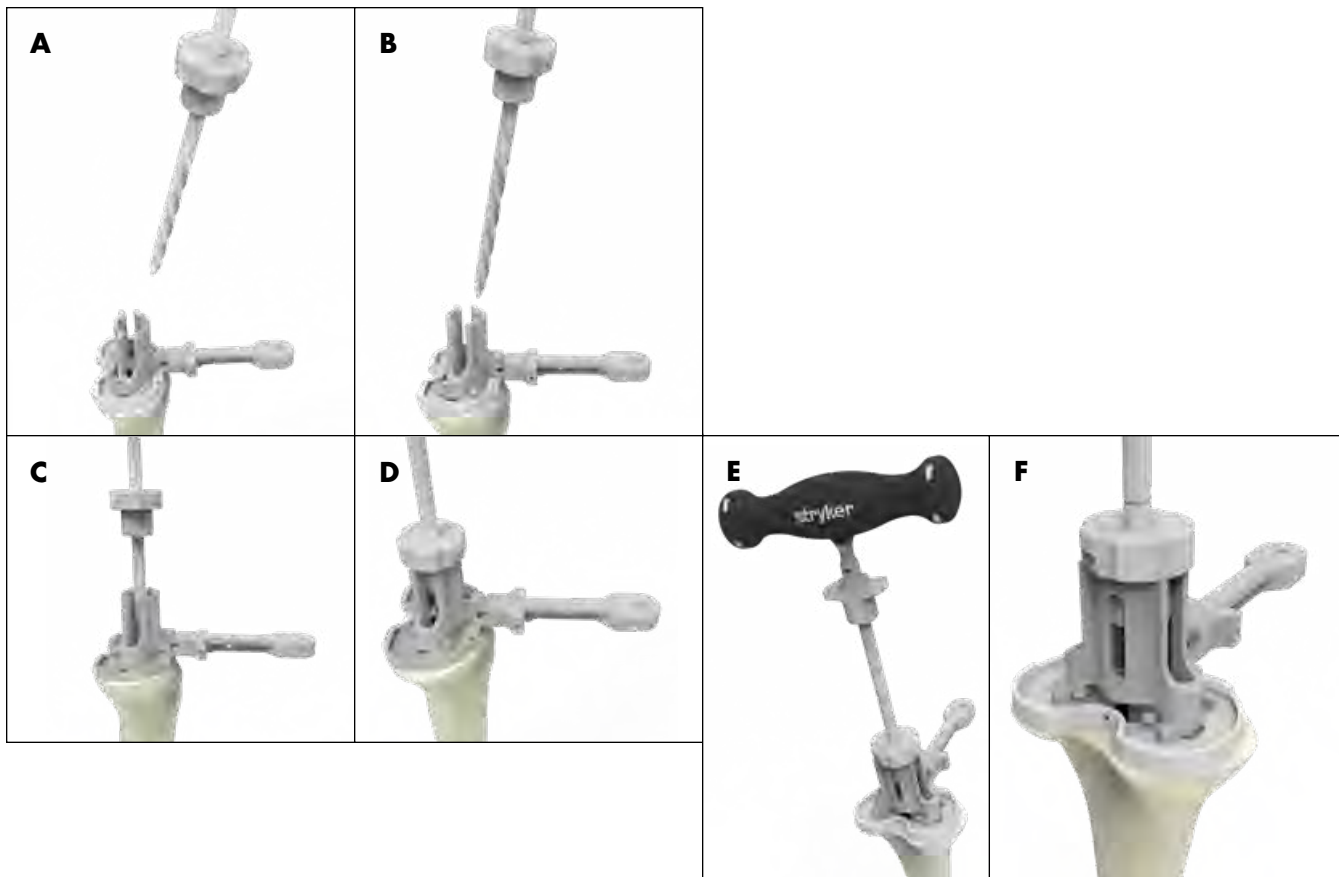
### Revision Baseplate: Cemented Stem preparation

To help facilitate proper stem preparation coaxial to the boss preparation (**Figure 12**), the Neutral Bushing Guide should be used to ream for the stem.

Assemble the Neutral Bushing Guide to the 8mm Starter Awl (or downsized reamer size of choice) and insert the reamer through the Keel Punch Guide. Once the reamer is seated in the boss preparation allow the Neutral Bushing Guide to bottom out in the Revision Keel Punch Guide (**Figure 13**). This will help ensure that the stem preparation will be coaxial to the Revision Boss Reamer preparation.

► **Note:** Do not impact the Neutral Bushing Guide into the Keel Punch Guide.

Ream using the T-handle or power unit attached to the Universal Driver.



**Figure 13**

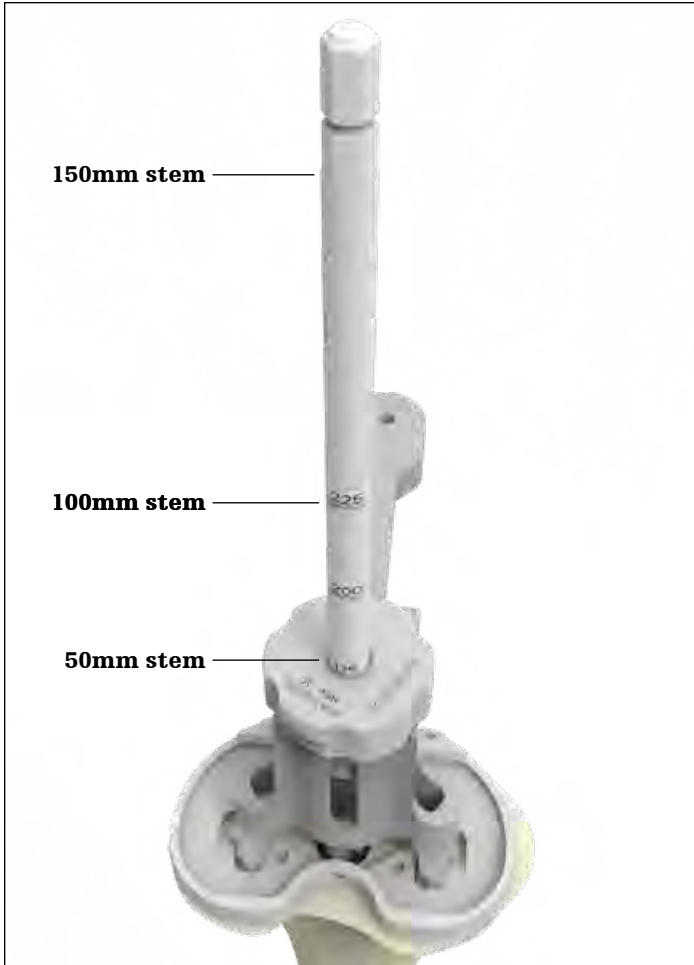


Figure 14

For a 50mm stem, ream until the 175mm marker on the IM reamer is flush with the proximal surface of the Neutral Bushing Guide (**Figure 14**). For other stem lengths refer to table below. Incrementally ream until the desired stem diameter and cement mantle is reached.

**Technical point**

If the reamer cannot reach 175mm, consider downsizing and/or repositioning the tibial baseplate. In this position, the stem may prevent the baseplate from fully seating. If repositioning is desired, preparation of the bone will be required again.

**Depth markings: Cemented Stem components**

Stem length	Depth marking
50mm	175
100mm	225
150mm	Bottom of the power tool where it attaches to the reamer

- ▶ **Note:** The Revision Baseplate is not compatible with offset adapters.
- ▶ **Note:** If using stem extender implants (5571-S-025 and 5571-S-050), ream an additional 25mm or 50mm. Note that the stem extender implants have a 16mm diameter; ream accordingly based on desired stem type. **The 50mm Stem Extender cannot be used with the Triathlon Revision Tibial Baseplate Components (5612-B-X00) when used with a 150mm Triathlon TS Stem.**

Remove the reamer.





**Figure 15**

### Keel preparation

Place the appropriate Revision Keel Punch into the Revision Keel Punch Guide. Ensure the tab is engaged with the guide. Use a mallet to impact the punch. Advance the Revision Keel Punch until it seats fully in the Revision Keel Punch Guide (**Figure 15**).

To extract the Revision Keel Punch, lift the Revision Keel Punch handle slightly proximal and rotate the handle anteriorly, engaging the anterior tab of the Revision Keel Punch Guide, to cantilever the Revision Keel Punch out of the tibia (**Figure 16**).

Remove the Revision Keel Punch Guide, Keel Punch and Universal Tibial Template.

If desired, a Trial Baseplate and Stem trial can be used to confirm the tibial preparation is appropriate for the desired construct.

If using cones proceed to the Triathlon Tritanium Tibial Cone Augment Preparation section of this protocol. If cones are not being used proceed to the Femoral Preparation: Hinge Femur section of this protocol.



**Figure 16**



Figure 17

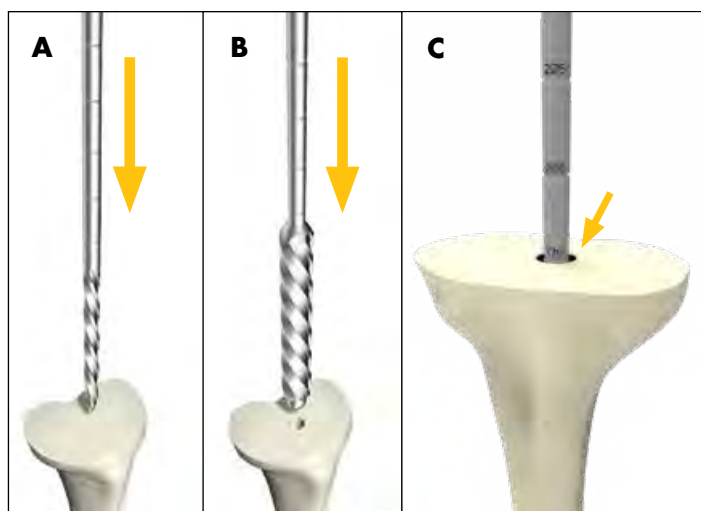


Figure 18

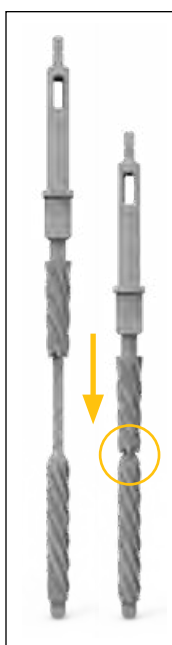


Figure 19

### Revision Baseplate with Fluted Stems

- ▶ **Attention:** Tibial offsetting with the Revision baseplate is not possible. In clinical scenarios where baseplate overhang may occur, consider using cemented stems.

If the tibial preparation is on a native tibia, removal of the anterior portion of the central eminence will be required after IM reaming to allow the Resection Guide Tower to fully seat. General surgical instruments can be used to remove the necessary bone (**Figure 17**). Alternatively, the Triathlon Primary IM referencing tibial resection instruments can be used. See the Addendum 1: Revision Baseplate Tibial Preparation with Primary tibial instrumentation portion of this protocol.

- ▶ **Attention:** The Revision Baseplate is not indicated for use with Size A Tibial Cones. The smallest compatible size is Size B.

### Revision Baseplate: Intramedullary tibial preparation

Assemble the 8mm Starter Awl to either the T-Handle or power unit using the Universal Driver.

Ream the tibial intramedullary canal (**Figure 18A**).

#### Technical points

If determining the appropriate pilot hole is challenging, considering using AP and lateral x-rays to determine the appropriate starting point.

Referencing the desired tibial resection, ream to the desired stem depth (refer to depth chart) or to a length of fixation preferred for tibial alignment. Grooves along the shank of the reamer indicate the depth of the reamer in the canal (**Figure 18C**).

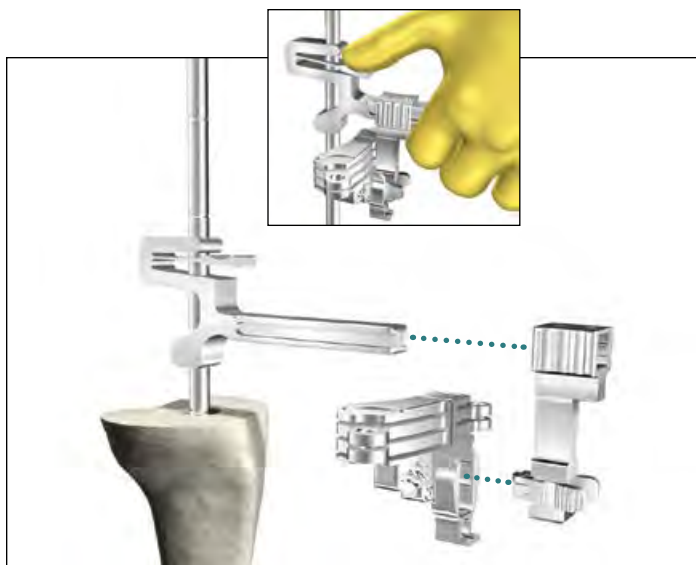
Progressively ream, increasing diameter in 1mm increments until adequate purchase is achieved, and leave the final reamer in the canal (**Figure 18B**). Tap the final reamer gently with a mallet to assure that it is firmly seated.

#### Ream depth (mm): Fluted Stem components

Stem length	Depth marking
100mm	175*
Tibial Cone	175*
150mm	225

\* If the final IM reamer is 16-18mm in diameter, an additional 25mm of reaming is required, resulting in a 200mm ream depth. This is required to avoid interference between the Revision Boss Reamer and the IM reamer cutting flutes (**Figure 19**).

- ▶ **Note:** The Revision Baseplate is not compatible with offset adapters.
- ▶ **Note:** When reaming for stem extenders (5571-S-025 and 5571-S-050), ream an additional 25mm or 50mm accordingly. Note that the stem extender implants have a 16mm diameter; ream accordingly based on desired stem type. **The 50mm Stem Extender cannot be used with the Triathlon Revision Tibial Baseplate Components (5612-B-X00) when used with a 150mm Triathlon TS Stem.**



**Figure 20**



**Figure 21**



**Figure 22**

### Technical points

If Tibial Augments are to be used, ream until the depth marking is flush with the expected augment cut. Use the bottom of the line marking as the depth reference.

Be sure to completely remove cement and sclerotic bone from the center of the canal.

### Revision Baseplate: Proximal tibial resection

Slide the Resection Guide Tower over top of the IM Reamer by depressing the finger tab as shown (**Figure 20**). Assemble the Revision Tibial Resection Guide to the Support Arm. Slide the assembly on to the Resection Guide Tower.

Depress the finger tab on the Resection Guide Tower and slide the assembly to the desired distal/proximal position on the IM Reamer.

Use the Blade Runner through the cutting slot to approximate the resection level.

- When determining the tibial resection depth, consider any impact to joint line and patella tracking in case a future revision of the femur to a Triathlon Hinge Femur is required.
- In a revision procedure a **2mm cleanup** resection cut can be performed. 2mm of bone will be resected with the initial proximal resection when using the “2” end of the Triathlon Stylus on the lowest level of the unaffected compartment.
- In a native joint for a **Revision Insert**, to maintain the joint line, the minimum tibial resection from the **native joint line is 9mm**. 9mm of bone will be resected with the initial proximal resection when using the “9” end of the Triathlon Stylus on the lowest level of the unaffected compartment.

Use the Blade Runner through the cutting slots to approximate any augment resection level and rotational alignment of the guide when planning for an augment on one side of the tibia (**Figure 22**).

The Universal Alignment Rod can be used to aid in setting the final component position by inserting it through the Universal Alignment Handle and assembling the Universal Alignment Handle to the Revision Tibial Resection Guide (**Figure 21**).

- ▶ **Note:** In a bowed tibia, a surgeon may need to retract the reamer from 175mm depth to set the proper tibial cut slope.



Figure 23

**Technical points**

The Triathlon Stylus is provided with 2mm and 9mm indications. The Hinge Tibial Stylus 11mm indication can also be used if the guide is shifted 2mm proximally on the fixation pins (Figure 23).

- ▶ **Considerations for future revisions:** In a native joint for a **Triathlon Hinge procedure**, to maintain the joint line, the minimum tibial resection from the **native joint line is 16mm**. 16mm of bone will be resected with the initial proximal resection when using the “16” end of the Hinge Tibial Stylus.
  - The “11” end of the Hinge Tibial Stylus may be used for a reduced resection in either a Triathlon Revision Insert or Triathlon Hinge procedure. 11mm of bone will be resected with the initial proximal resection when using the “11” end of the Hinge.

Pin the Revision Tibial Resection Guide to the proximal tibia when the resection level and rotational alignment has been determined.

**Technical points**

- ▶ **Tip:** To help facilitate easy removal of the Resection Guide Tower and Support Arm, place pins perpendicular to the bone.

Make a cut to produce a resected surface with a neutral slope.

After completing the cut around the reamer shaft, remove the Support Arm (Figure 24), Resection Guide Tower (Figure 25), and IM Reamer before completing the tibial resection. To do so, depress the tabs on the Support Arm to disengage it from the Revision Tibial Resection Guide. Slide the Support Arm anterior. Depress the tab on the Resection Guide Tower and slide it off the IM Reamer. Use a T-handle to remove the IM Reamer.

Once the IM reamer is removed, an additional cross pin can be added to the Revision Tibial Resection Guide.

Tibial augment resections can be made at this point with the Revision Tibial Resection Guide using a narrow, 15mm-wide, 0.050” thick oscillating saw blade. Make a 5mm or 10mm augment resection as appropriate.

Using a reciprocating saw blade through the Revision Tibial Resection Guide, complete the sagittal augment resection (Figure 26).

Remove the pins and Tibial Resection Guide.

**Technical points**

Surgeons who prefer a non-captured cut can use the top of the resection guide. The 0mm and 5mm slots can then be used for 5mm and 10mm augment resections, respectively.

- ▶ **Note:** The 10mm slot should not be used if executing a non-captured cut.
- ▶ **Note:** If a tibial stylus is used to ascertain resection depth the depth will not correspond with the non-captured top surface.



Figure 24

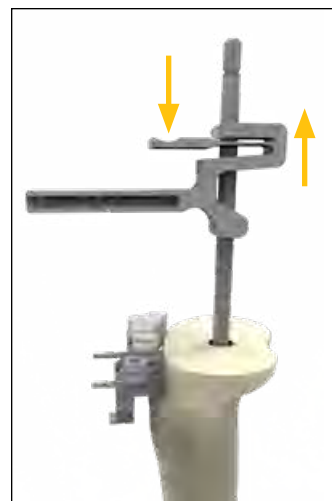


Figure 25

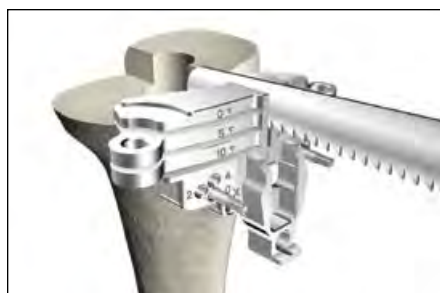


Figure 26

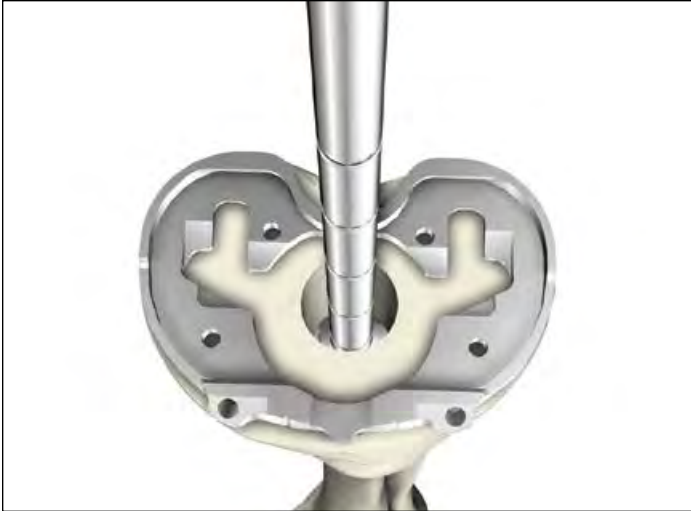


Figure 27



Figure 28

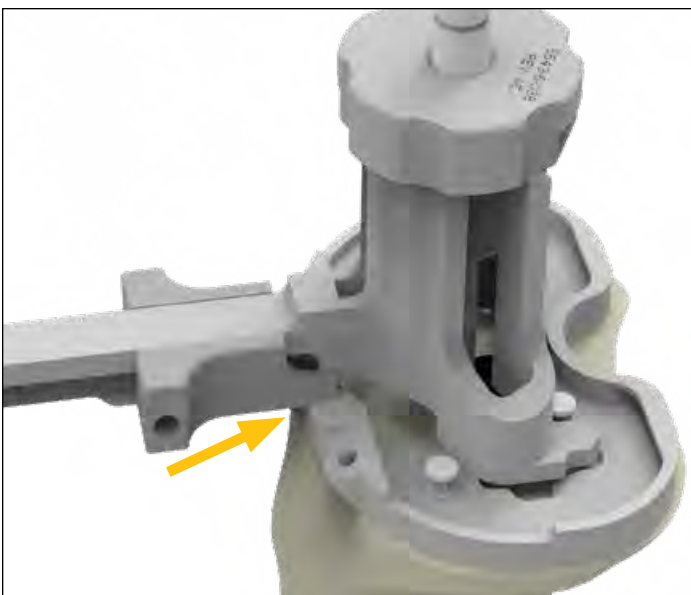


Figure 29

## Revision Baseplate: Tibial Template sizing and positioning

Reinsert the last IM reamer (**Figure 27**).

Size the proximal tibia with a Revision Tibial Template, Revision Keel Punch Guide, and Neutral Bushing Guide placed over the reamer and onto the resected surface of the tibia (**Figure 28**). Ensure that the slider is engaged with tibial template (**Figure 29**).

- Attach Tibial Augment Trials (if tibial augment cuts were made) to the underside of the Universal Tibial Template.
- **Attention:** Tibial offsetting with the Revision Baseplate is not possible.



**Figure 30**

Rotational and alignment of the Universal Tibial Template should be checked. An alignment rod can be used to aid in setting the final component position.

- To check alignment, attach the Revision Keel Punch Guide to the Universal Tibial Template ensuring the slider is engaged. Insert the Universal Alignment Rod through the hole in the Revision Keel Punch Guide (**Figure 30**).

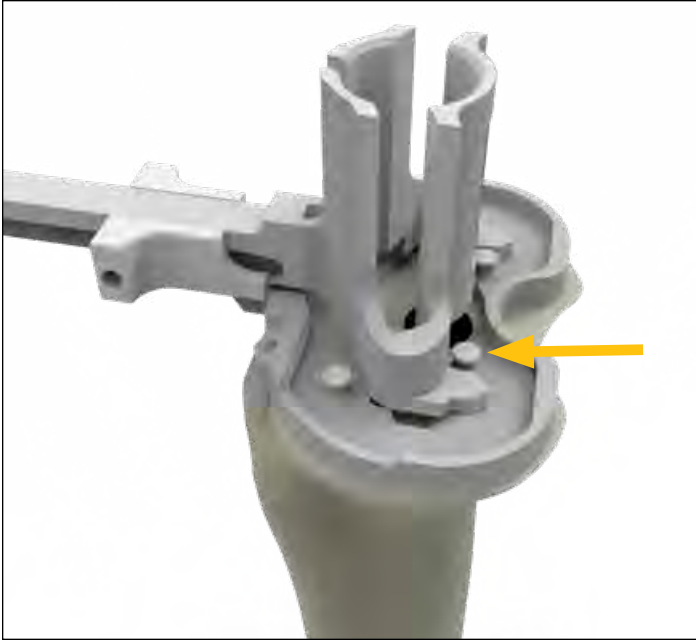
If adequate coverage and position is attained, pin the Universal Tibial Template to the proximal tibia using headless pins in the anterior angled pin holes or headed pins in the anterior template tray pin holes.

If adequate coverage and position is not attained, consider downsizing the tibial template.

**Technical points**

If additional fixation is needed for the Universal Tibial Template to the proximal tibia, remove the IM Reamer Neutral Bushing Guide and Revision Keel Punch Guide and place headed nails into the posterior template pin holes (**Figure 31**). Once completed, reassemble the Revision Keel Punch Guide.

It is optional to mark the anterior surface of the tibia, aligning marks to the two engravings on the template to ensure rotation in subsequent steps matched planned rotation (**Figure 32**).



**Figure 31**



**Figure 32**



Figure 33

Revision Baseplate: Boss preparation

If the IM reamer is greater than or equal to 19mm, the Revision Boss Reamer is not necessary. The IM reamer has prepared for the Revision Baseplate boss diameter.

Remove the Neutral Bushing Guide from the Revision Keel Punch Guide, leaving the IM reamer and Revision Keel Punch Guide in place.

Attach the Modular T-Handle to the Revision Boss Reamer. Place the Revision Boss Reamer over the shank of the IM reamer and into the Revision Keel Punch Guide. Ream until the physical stop is reached. See **Figures 33, 34, 36**.

If reaming is difficult, the Revision Boss Reamer may be attached to power only if the solid cylinder of the boss reamer has engaged the Revision Keel Punch Guide (**Figure 35**). Attach the Revision Boss Reamer to the power unit using the Universal Driver.

► **Attention:** Caution should be used to avoid perforating the anterior cortices.

Remove Revision Boss Reamer and IM Reamer.

**Technical points**

In sclerotic bone, the use of a saw prior to the Revision Keel Punch may be advisable.



Figure 34



Figure 35

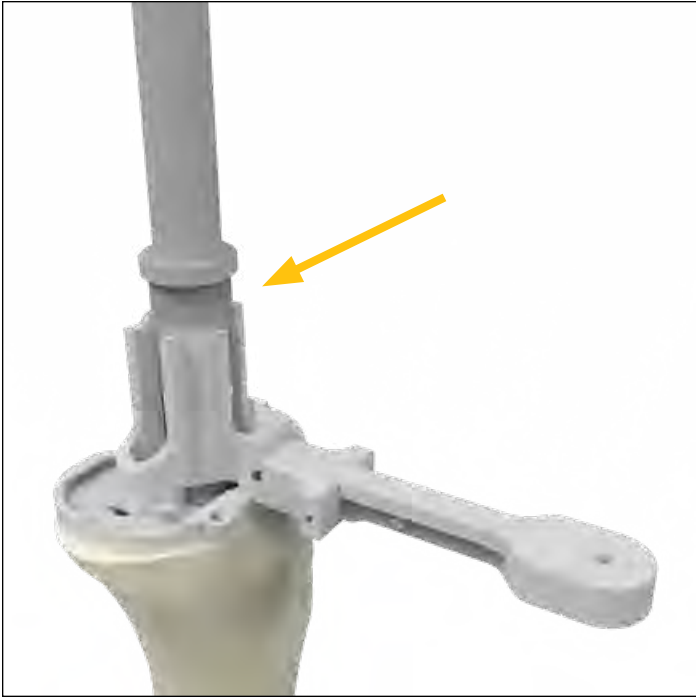


Figure 36



Figure 37

### Keel preparation

Place the appropriate Revision Keel Punch into the Revision Keel Punch Guide, ensure the tab is engaged with the guide. Use a mallet to impact the punch. Advance the Revision Keel Punch until it seats fully in the Revision Keel Punch Guide (**Figure 37**).

To extract the Revision Keel Punch, lift the Revision Keel Punch handle slightly proximal and rotate the handle anteriorly, engaging the anterior tab of the Revision Keel Punch Guide, to cantilever the Revision Keel Punch out of the tibia (**Figure 38**).

Once the tibia is fully prepared, remove the Universal Tibial Template and Revision Keel Punch Guide Assembly (**Figure 39**).

If using cones proceed to the Triathlon Tritanium Tibial Cone Augment Preparation section of this protocol. If cones are not being used proceed to the Femoral Preparation: TS Femur section of this protocol.

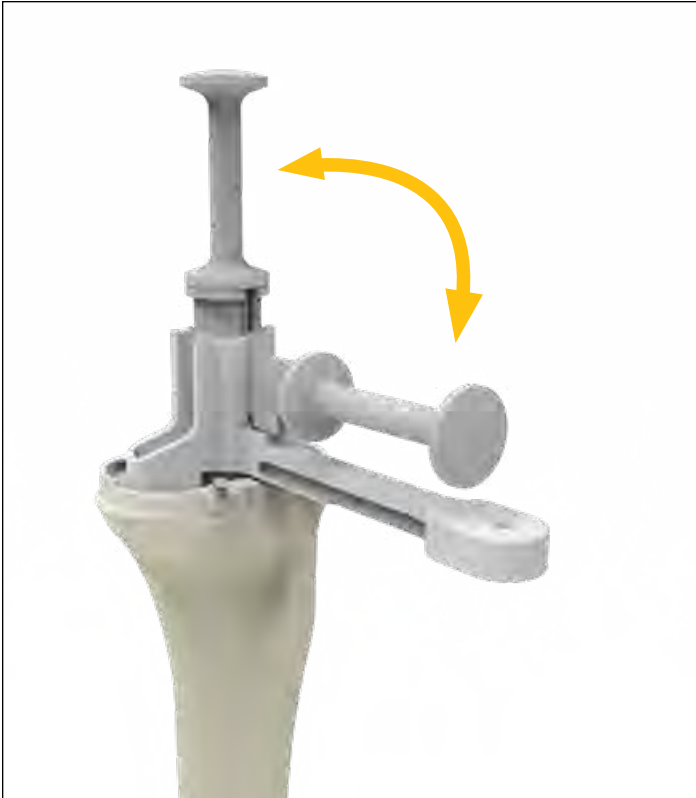


Figure 38

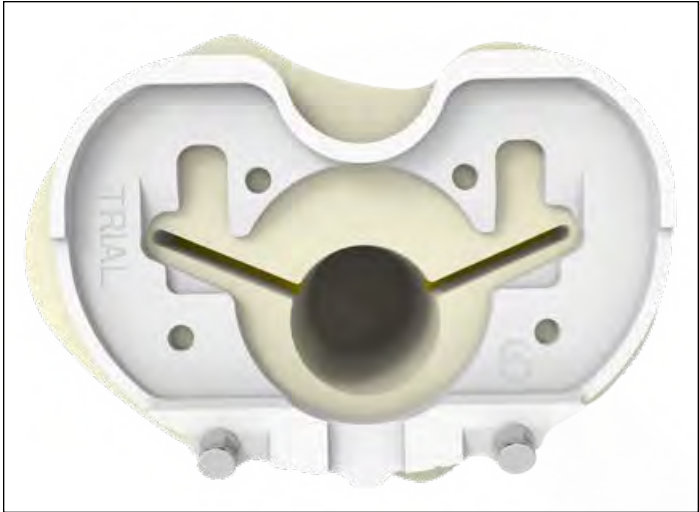


Figure 39



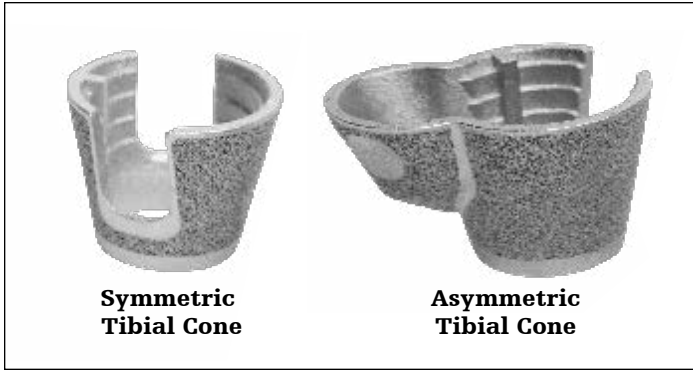


Figure 40

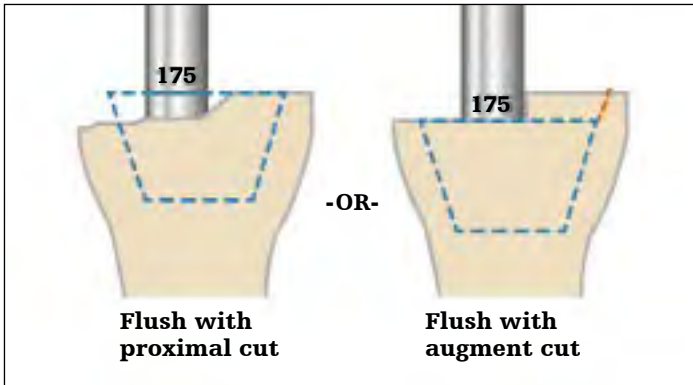


Figure 41

## Triathlon Tritanium Tibial Cone Augment preparation

Triathlon Tritanium Tibial Cone Augments come in two different shapes (**Figure 40**).

Tibial Canal preparation for Tibial Cone Augments

► **Attention:** Tibial Cone size A is not intended for use with the Revision Baseplate.

### Option 1: Reamer-based

When using a Symmetric/Asymmetric Cone, a minimum depth of 175mm is recommended for the IM reamer to facilitate accurate cone reaming and to ensure that the flutes on the Tibial Symmetric Cone Reamer do not interfere with the flutes on the IM Reamer.

Tap the final IM Reamer gently with a mallet to ensure that it is fully seated.

► **Note:** If Tibial Augments are to be used, ream until the 175mm marking is flush with the augment cut. Use the bottom of the 175mm line marking as the depth reference (**Figure 41**).

**Option 2: Stem Extender Shaft based**

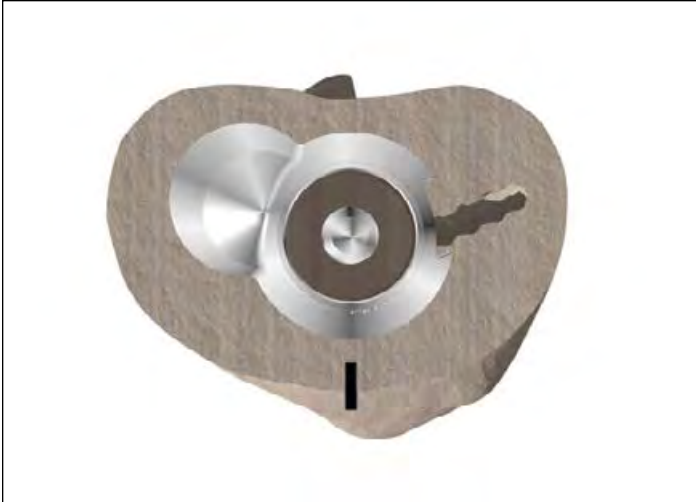
If desired, the IM reamer can be removed and subsequent preparation can be based off of a Stem Trial utilizing the required Stem Trial and the Stem Extender Shaft.

Assemble the Stem Extender shaft (6543-4-516) to the appropriate diameter Stem Trial and place the assembly into the canal.

Continue with Tibial Preparation as described in the protocol.

**Ream depth: Tibial components with cones**

<b>Stems (with Cones)</b>	<b>Depth</b>
100mm	175 (3rd groove)
150mm	175 (3rd groove)



**Figure 42**

**Preliminary Cone sizing**

Depending on the size and geometry of bone defect, either a symmetric or asymmetric tibial cone augment may be selected. Inverting a contralateral leg cone trial may help determine bone defect, assess cone coverage, and determine if symmetric or asymmetric cone is required.

- ▶ **Note:** Invert the Cone Trial over the resected tibial bone and ensure that the trial is centered on the IM Reamer (**Figure 42**). Centering the trial helps to ensure proper positioning.

**Revision Baseplate with Symmetric Tibial Cone**

**Symmetric Tibial Cone preparation**

Ensure that the Tibial Symmetric Cone Reamer is being used. This can be confirmed by checking that the reamer shaft reads "TIBIA."

Grooves on the reamer specify cone size (**Figures 43 and 45**). Reference the sizing chart to help determine appropriate cone sizing (See chart on the next page for Cone and Baseplate sizing options).

- ▶ **Note:** Use the top line of the groove (of the desired size) as the depth reference.

Insert the Tibial Symmetric Cone Reamer over the IM Reamer (**Figure 44**). If reaming under power, confirm that the drill is set to ream mode before reaming begins. Start the reamer before engaging the bone. Ream down to the desired depth/size.

- ▶ **Caution:** If the bone is soft, osteopenic, fractured, or sclerotic, consider initially reaming by hand using the T-Handle.

Remove both the Tibial Symmetric Cone Reamer and the IM Reamer.

If using an augment, see the next page to help determine proper preparation depth.

- ▶ **Note:** If the Cone needs to be placed in a slightly more posterior position, remove the IM Reamer and replace it with an IM Reamer of a smaller diameter. Place the Tibial Symmetric Cone Reamer over the IM reamer and gently flex it posteriorly. Ream down to the desired depth/size.

- ▶ **Note:** Confirm that the Tibial Symmetric Cone Reamer is not being hindered by the cutting surface of the flutes on the IM Reamer. If so, the IM Reamer may need to be placed in a more distal position.

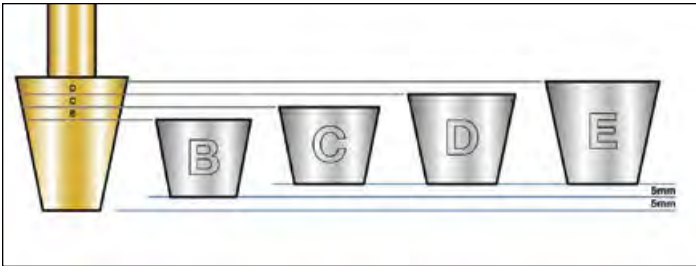
- ▶ **Note:** Reamer depth increases by 5mm per size.



**Figure 43**



**Figure 44**



**Figure 45**

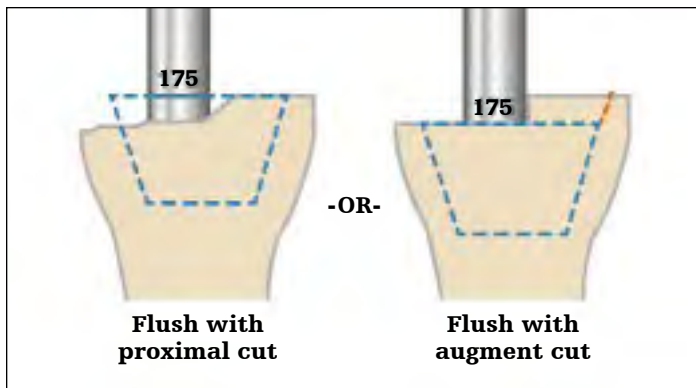


Figure 46

If augments are to be used, the size marking of the Tibial Symmetric Cone Reamer will indicate where the Cone will sit. Ream until the marking is flush with the augment cut (Figure 46).

**Technical points**

- ▶ **Attention:** Tibial Cone size A (Symmetric) is not intended for use with the Revision Baseplate.
- ▶ **Attention:** The Revision Baseplate is not intended for use with offset adapters.

Remove both the Tibial Symmetric Cone Reamer and the IM Reamer.

**Tibial Cone sizes**

		B	C	D	E
Implant sizes	Size 1	*			
	Size 2	*			
	Size 3	X			
	Size 4	X	X		
	Size 5	X	X	X	
	Size 6	X	X	X	X
	Size 7			X	X
<b>Distal Diameter (OD)</b>		23mm	25mm	25mm	25mm
<b>Max Stem Diameter (ID)</b>		19mm	21mm	21mm	21mm

**Revision Baseplate and Tibial Cone Augment compatibility**

Tibial Cone sizing per Tibial Baseplate. Blue represents optimal size conditions.

- ▶ **Note:** Cones B, C, D and E also have an asymmetric lobed option. Cones smaller than those marked with an X are still compatible but need to be positioned at least 5mm deeper. If these sizes are to be used, rotational freedom between the tibial implant and the cone may be limited with non size on size combinations. Trial to assess compatibility.
- ▶\* **Note:** Cone B, with baseplate sizes 1 and 2, has less freedom between the tibial implant and the cone than other sizes. The cone may protrude anteriorly with respect to the baseplate.

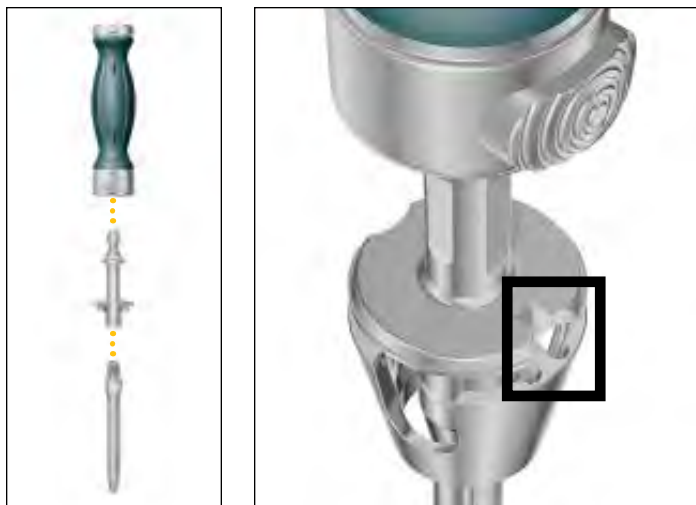


Figure 47



Figure 48

### Symmetric Cone trialing

If bone voids are such that Asymmetric Cone preparation is necessary, refer to the Asymmetric Cone Preparation section of the protocol.

- ▶ **Note:** Cone trial may be placed in the prepared bone prior to assembling the instruments as described below.

Assemble the desired Stem Trial with the Tibial Cone Introducer, TS Impaction Handle, and the selected Symmetric Cone Trial (100mm stem maximum).

Tibial Cone Introducers are size specific.

- ▶ **Note:** Downsize the Trial Stem by 1mm.

Align the orientation key on the trial with the key feature on the Cone Introducer. The orientation key is located posteriorly on the trial (**Figure 47**).

- ▶ **Note:** There is no positive lock on the Cone Trial and the Cone Introducer. The trial may disconnect from the introducer.

- ▶ **Note:** The Cone Trial can be placed into the prepared bone before the Stem Trial and the Cone Introducer.

When inserting the Cone Trial, ensure that the anterior rotational alignment marking on the trial is aligned with the anterior surface marking previously determined by the Universal Tibial Template (**Figure 48**).

Insert the trial until it is seated at the appropriate depth. Remove the Cone Introducer and the Stem Trial so that only the Cone Trial remains in the void.

- ▶ **Caution:** Do not impact or implant the Cone Trials.

- ▶ **Note:** Stem trials with product code 5560-T-XXX cannot be used with cone augment instrumentation. This includes trials 5560-T-109, 5560-T-112 and 5560-T-115.

### Options if added cone stability is required:

Ream to a larger Symmetric Cone (Repeat steps from the Symmetric Cone Preparation section of the protocol).

Or prepare for an Asymmetric Cone (Follow the steps from the Asymmetric Cone Preparation section of the protocol).

Or implant the Cone with cement.

Proceed to the Femoral Preparation section of this protocol.

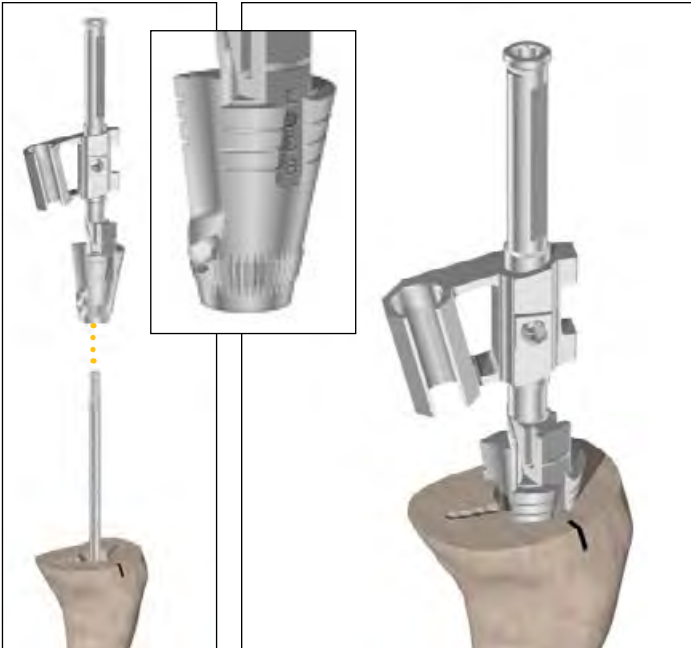


Figure 49

## Revision Baseplate with Asymmetric Tibial Cone

Asymmetric Cone preparation is an option for increased stability and void filling after Symmetric Cone reaming has been completed.

Symmetric Cone preparation must be performed before Asymmetric Cone preparation can begin. Refer to the Symmetric Cone Preparation section of the protocol.

During Asymmetric Cone preparation, be sure to properly set cone rotation to ensure proper alignment with the Baseplate.

Slide the appropriate Tibial Cone Reamer Guide over the IM Reamer and into the prepared tibia (**Figure 49**).

- ▶ **Note:** There are two Tibial Cone Reamer Guides. One is designed for left medial / right lateral use, and the other is designed for right medial / left lateral use.
- ▶ **Note:** Do not fully seat the Tibial Cone Reamer Guide until after rotation is set.



**Figure 50**

Attach the Tibial Cone Alignment Guide Handle to the Tibial Cone Reamer Guide (**Figure 50**).

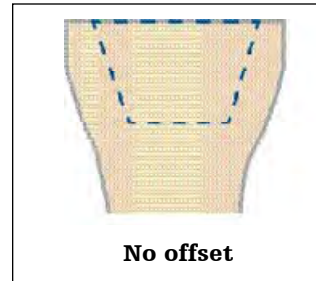
Insert the Tibial Asymmetric Cone Reamer into the Tibial Cone Reamer Guide to assist in visualization of guide positioning.

Select the correct reamer to match the cone size.

Slide back the bushing on the reamer and place the reamer into the slot of the guide (**Figure 52**).



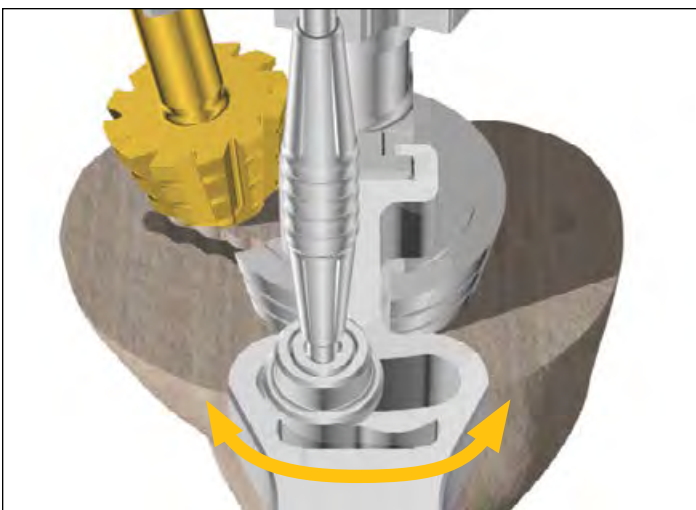
**Figure 52**



**Figure 51**

**Sizing example**

No stem offset
Symmetric reamer depth (C)
Alignment Guide level of embedment (C)
Asymmetric Lobe reamer size (C)
Asymmetric implant size



**Figure 53**

Insert the Alignment Rod into the bushing on the Tibial Cone Alignment Guide Handle.

► **Note:** The Universal Alignment Rod is only intended to help align anterior rotation markings to help ensure proper cone positioning/rotation.

Lower the Tibial Asymmetric Cone Reamer down to the desired location.

Use the Tibial Cone Alignment Guide Handle to position the reamer and rotate the guide. The assembly can be rotated by using the built-in rotational constraints ( $\pm 10$  degrees) (**Figure 53**).



Figure 54

Once the desired positioning is established, move the Alignment Rod so that it aligns with the anterior rotational marking previously set using the Universal Tibial Template. This will ensure that desired tibial rotation is maintained.

If the Alignment Rod does not line up with the anterior marking, reduce rotation until it does so.

The Tibial Cone Reamer Guide has micro-flutes at its base to maintain rotation once set.

After alignment has been set, seat the Tibial Cone Reamer Guide so that it sits at the same depth/size as the Tibial Symmetric Cone Reamer (**Figure 54**).



Figure 55

If reaming under power, confirm that the drill is set to ream mode before reaming begins.

Before reaming begins, ensure that the bushing is fully engaged.

- ▶ **Caution:** If the bone is soft, osteopenic, fractured, or sclerotic, consider initially reaming by hand using the T-Handle.

Hold the Tibial Cone Alignment Guide Handle in the previously determined location to maintain rotation.

Start the reamer before engaging the bone. Ream down to the stop (**Figure 55**).

Remove the reamer from the guide. If necessary, the slap hammer can be connected to the end of the Tibial Cone Alignment Guide to assist with guide removal.

Remove the IM Reamer.



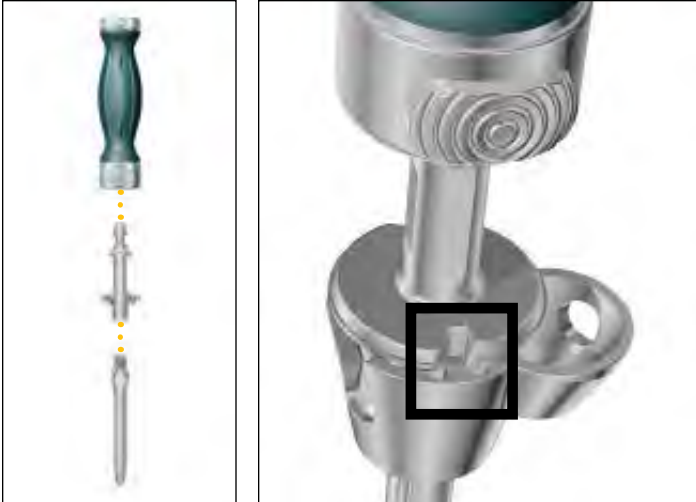


Figure 56



Figure 57

### Asymmetric Cone trialing

- ▶ **Note:** The Cone Trial can be placed into the prepared bone before the Stem Trial and the Cone Introducer.

Assemble the desired Stem Trial with the Tibial Cone Introducer, TS Impaction Handle, and the selected Asymmetric Cone Trial (100mm stem maximum).

Tibial Cone Introducers are intended for use with both Symmetric and Asymmetric Cones.

- ▶ **Note:** Downsize the Stem Trial by 1mm.

Align the orientation key on the trial with the key feature on the Cone Introducer. The orientation key is located posteriorly on the trial (**Figure 56**).

- ▶ **Note:** There is no positive lock on the Cone Trial and the Cone Introducer. The trial may disconnect from the introducer.

Insert the trial until it is seated at the appropriate depth (**Figure 57**). Remove the Cone Introducer and the Stem Trial so that only the Cone Trial remains in the void.

- ▶ **Caution:** Do not impact or implant Cone Trials.
- ▶ **Note:** Stem trials with product code 5560-T-XXX cannot be used with cone augment instrumentation. This includes trials 5560-T-109, 5560-T-112 and 5560-T-115.

### Options if added Cone stability is required:

Ream for a larger Asymmetric Cone (Repeat steps from the Asymmetric Cone Preparation section of the protocol).

Or implant the Cone with cement.

Proceed to the Femoral Preparation section of this protocol.

## Femoral preparation: TS Femur

Refer to compatibility chart for implant compatibilities.

- ▶ **Note:** The Trial Cutting Guide workflow is only applicable for revisions as previous bone cuts are required for component to fit.
- ▶ **Note:** If the TS femur is used with offsets and it is to be converted to a Hinge, the preparation must be completed with a 3-in-1 bone preparation method during the conversion as the Hinge femur is not available with offsets.

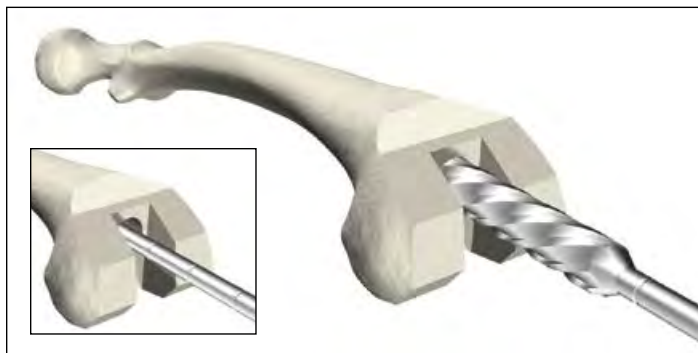


Figure 58



Figure 59

## Triathlon TS 4-in-1 Cutting Block preparation

### Intramedullary femoral preparation

Assemble the 8mm Starter Awl to either the T-handle or power unit using the Universal Driver.

Ream the femoral intramedullary canal.

Ream to the desired depth of stem or length of fixation preferred for femoral alignment. Grooves along the shank of the reamer indicate the depth of the reamer in the canal.

Progressively ream, increasing diameter in 1mm increments until cortical chatter is achieved, and leave the final reamer in the femoral intramedullary canal (**Figure 58**).

### Technical points

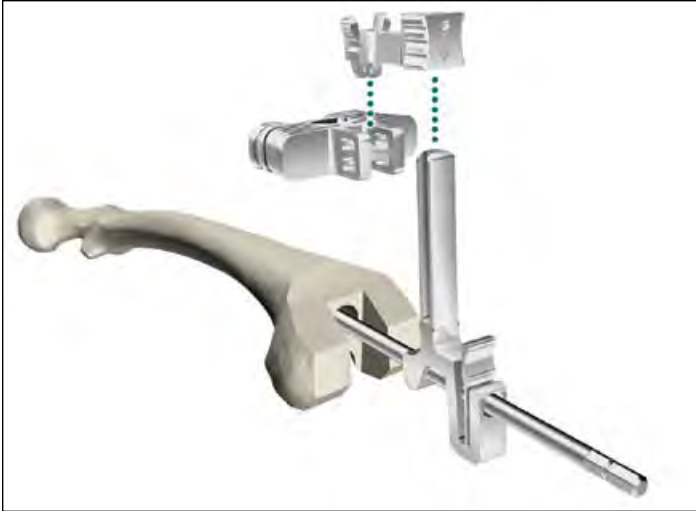
1. A minimum depth of 150mm, corresponding to the femoral boss and a 100mm stem, is recommended to achieve femoral intramedullary alignment.
2. Tap the final reamer gently with a mallet to assure that it is firmly seated.
3. A femoral offset can be planned for by reaming an additional 25mm, for a total of 75mm greater than the desired stem length (stem + 50mm from the joint line to the boss + 25mm offset).
4. If the reamer diameter is less than 16mm, prepare for the boss of the Femoral Component by reaming over the top of the IM Reamer shank with the Boss/Offset Reamer. Ream until the step on the Boss/Offset Reamer lines up with the planned resected bone depth (**Figure 59**).

### Ream depth (mm): Femoral components

Stem length	Depth marking
50-100mm	150
100mm w/offset	175
Femoral Cone	175*
150mm	200
150mm w/offset	225

\* When preparing for size 7-8 Cones, ream an additional 5mm deeper to prevent the Cone Reamer from bottoming out on the IM Reamer.

- ▶ **Note:** When reaming with Stem Extenders, ream an additional 25mm or 50mm accordingly.



**Figure 60**

### Distal femoral resection

Slide the Resection Guide Tower over the top of the IM Reamer by depressing the finger tab. Assemble the Revision Distal Resection Guide to the Support Arm. Slide the assembly on to the Resection Guide Tower (**Figure 60**). Verify that the Revision Distal Resection Guide reads “Left” for left leg or “Right” for right leg on the side facing away from the femur (**Figure 61**).

Set distal/proximal resection level and orientation by depressing the finger tab on the Resection Guide Tower and aligning the Revision Distal Resection Guide with the medial epicondyle in order to recreate the anatomical joint-line (**Figure 61**).

Pin the Revision Distal Resection Guide to the distal femur.



**Figure 61**

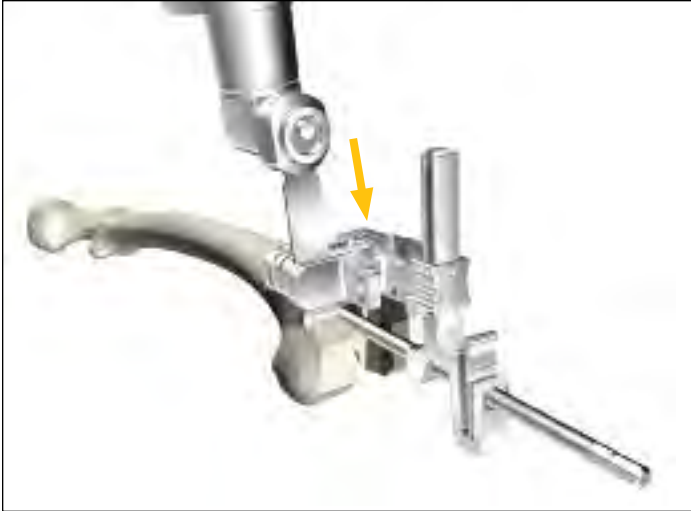


Figure 62

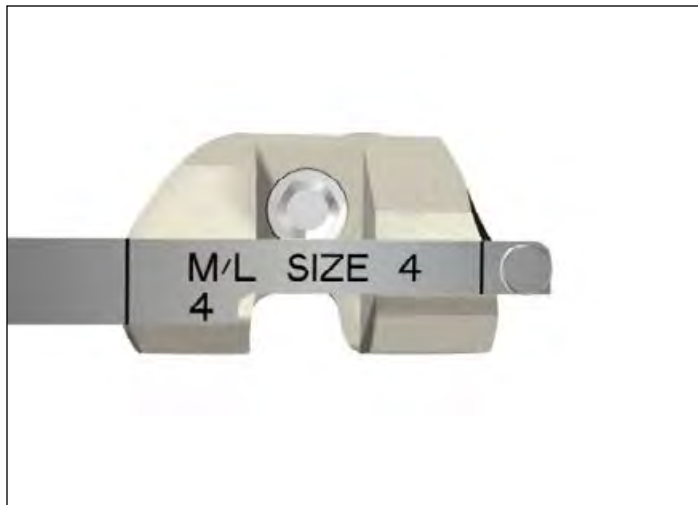


Figure 63

## Distal femoral deficiency evaluation and Augment preparation

Resect the distal femur. 5mm, 10mm and 15mm distal augment resections can be made at this point with the Revision Distal Resection Guide (**Figure 62**).

### Technical points

Surgeons who prefer a non-captured 0mm cut can use the top of the Revision Distal Resection Guide. The 0mm cut slot, 5mm and 10mm slot can then be used for a 5, 10 and 15mm augment resections respectively.

► **Note:** In this scenario do not use the 15mm cutting slot.

If desired, the Support Arm, Resection Guide Tower and IM Reamer can be removed before completing the femoral resections. To do so, depress the tabs on the Support Arm to disengage it from the Revision Distal Femoral Resection Guide. Slide the Support Arm anterior. Depress the tab on the Resection Guide Tower and slide it off the IM Reamer. Use a T-handle to remove the IM Reamer.

## TS Femur size selection

### Femoral sizing with templates

To determine femoral size, match the appropriate Femoral Sizing Templates up to the femur.

► **Note:** Pay careful attention to match the femoral size to the planned restored joint-line as opposed to flush with the surfaces of the femur. A long engraved line on the sagittal profile of the femoral sizing templates indicate the boss position of the femoral component, while the shorter engraved lines above and below represent the boss position of the femoral component with 2mm and 4mm anterior and posterior offsets, respectively. In addition, along the handle of each femoral sizing template are two additional tick marks, which represent the M/L width of the corresponding size femoral component (**Figure 63**).

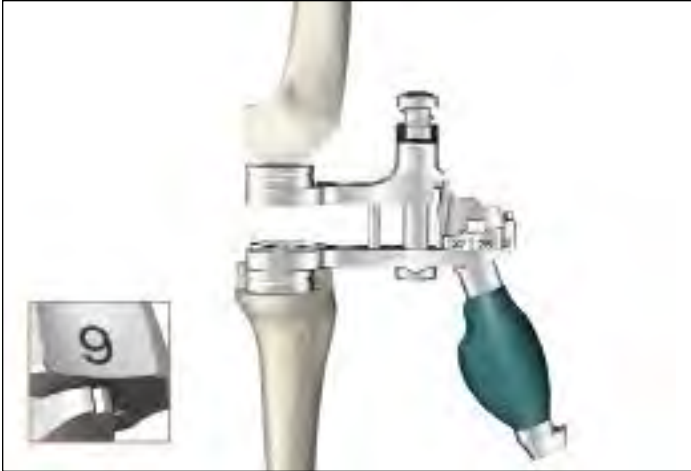


Figure 64



Figure 65

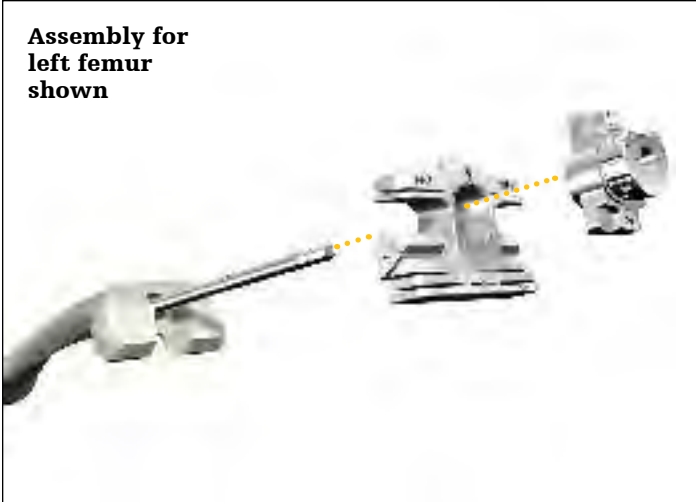
## Gap balancing

Remove the intramedullary reamer from the femoral canal.

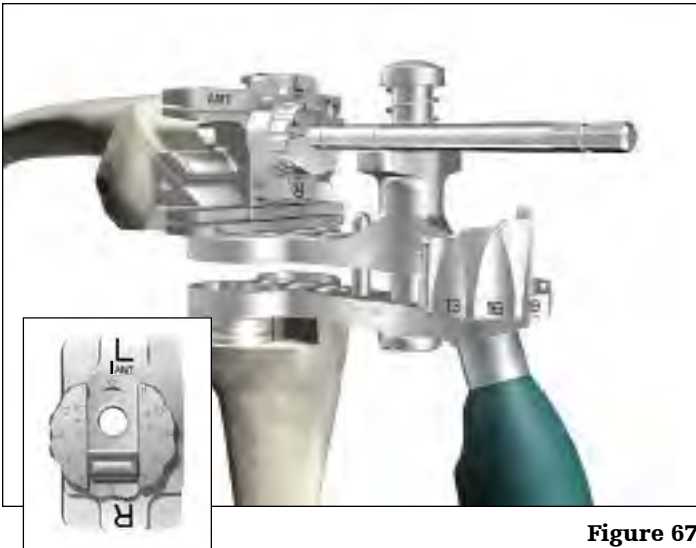
### Extension gap

Put the knee into Extension (0 degrees). If distal femoral and/or tibial augmentation has been prepared for, assemble the appropriate thickness of Spacer Block Augments to the appropriate sides of the upper and/or lower paddle of the Adjustable Spacer Block (**Figure 64**).

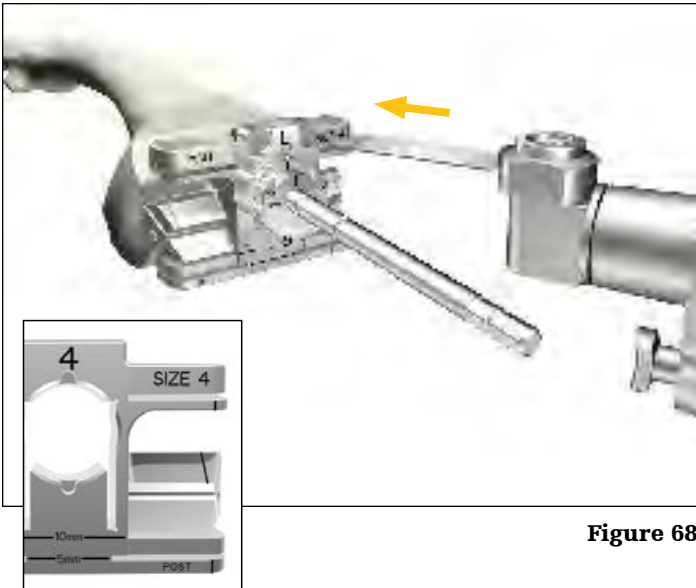
The numbers on the thumbwheel correspond to the implant insert thickness. Lift the Upper Paddle Grip to free the adjustment wheel. Align the notch with the appropriate thickness (**Figure 65**) and assess the gap space until the appropriate insert thickness is established. Read the measurement off of the knob to determine the tibial insert thickness. Remove the Adjustable Spacer Block from the joint space.



**Figure 66**



**Figure 67**



**Figure 68**

Femoral resections/offsetting/flexion gap balancing

Replace the IM Reamer in the femoral canal. If distal augments are required, assemble Distal Spacers to the distal surface of the appropriate size All-in-One Resection Guide corresponding to distal augmentation resections (5, 10, 15mm).

Assemble the Femoral Offset Bushing to the appropriate size All-in-One Resection Guide, paying careful attention to clock in such that it reads either “Left” or “Right” depending on which is appropriate (**Figure 67**).

Slide the All-in-One cutting Guide and Femoral Offset Bushing over the shank of the IM Reamer (**Figure 66**).

► **Note:** If Adjustable Spacer Block Augments were used to assess extension gap, remove prior to flexion gap assessment.

Put the knee into Flexion (90 degrees). If tibial augmentation has been prepared for, assemble the appropriate thickness Spacer Block Augment to lower paddle of the Adjustable Spacer Block. Set the Adjustable Spacer Block to match the measured extension gap. Place the Adjustable Spacer Block between the resected proximal tibia and the posterior surface of the All-in-One Resection Guide.

Use the upper paddle of the Adjustable Spacer Block as reference for the restored flexion joint-line. Rotate the offset dial and slide the slider on the Femoral Offset Bushing and adjust the internal/external rotation of the All-in-One cutting block until the posterior surface of the block is flush with the upper paddle of the Adjustable Spacer Block (**Figure 67**).

► **Note:** Vertical markings on either side of the All-in-One Resection Guides correspond to the M/L width of the femoral components (**Figure 68**).

Once the position of the All-in-One Resection Guide is optimized, pin it to the distal femur.

Record the magnitude and position of the femoral offset from the Femoral Offset Bushing (e.g., 2mm Offset at 12 o’clock).

Remove the Adjustable Spacer Block from the joint space.

Complete the four femoral resections as well as any posterior augment resections using a 15mm oscillation saw blade (**Figure 68**).

► **Note:** Posterior clean-up cut is made using the outer most posterior surface of the All-in-One Resection Guide.

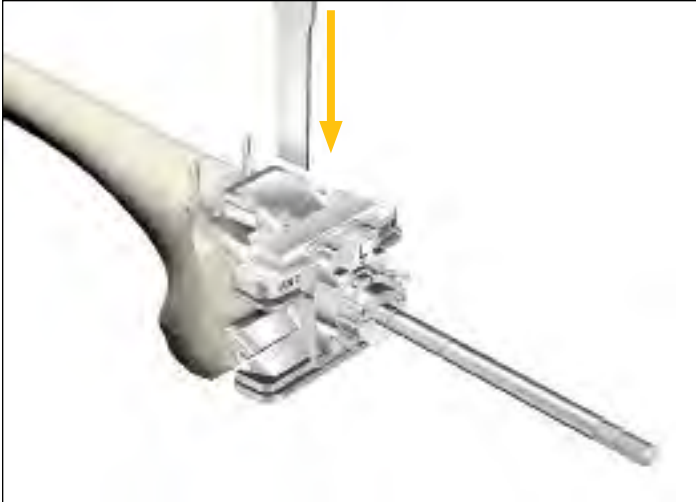


Figure 69

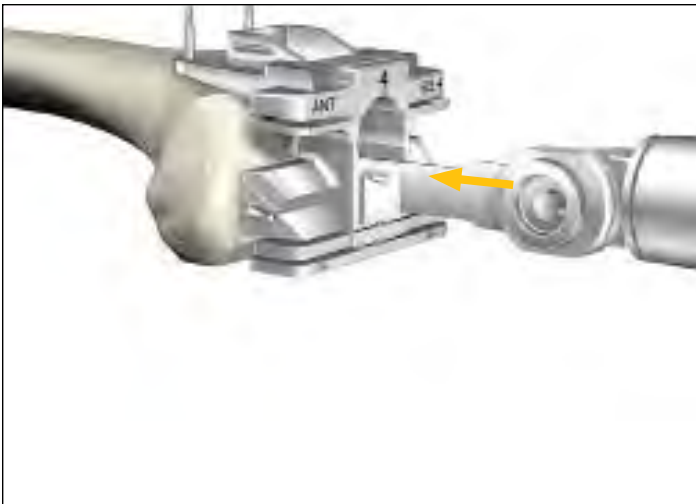


Figure 70

Pin the Revision Box Cutting Guide to the bone.

Using a narrow, 15mm - wide 0.050" thick oscillating saw blade, resect for the M/L walls and score the proximal wall of the femoral box through the Revision Box Cutting Guide (Anterior/Posterior) (**Figure 69**).

Remove the Femoral Offset Bushing from the All-in-One Resection Guide and slide it off the shaft of the IM Reamer.

Using a T-handle remove the IM Reamer by pulling it through the All-in-One Resection Guide.

Using a narrow, 15mm - wide 0.050" thick oscillating saw, score the M/L walls of the femoral box preparation through the distal face of the All-in-One Resection Guide (**Figure 70**).

► **Note:** If the IM Reamer cannot be pulled through the All-in-One Resection Guide, disassemble the All-in-One Resection Guide first. With the Revision Box Cutting Guide still pinned in place, remove the fixation pins from the All-in-One Resection Guide. Next remove the All-in-One Resection Guide by pulling/tilting the posterior end away from the distal femur.

Once the All-in-One Resection Guide is out of the way, remove the IM Reamer and finish the box preparation using an oscillating saw.



**Figure 71A**

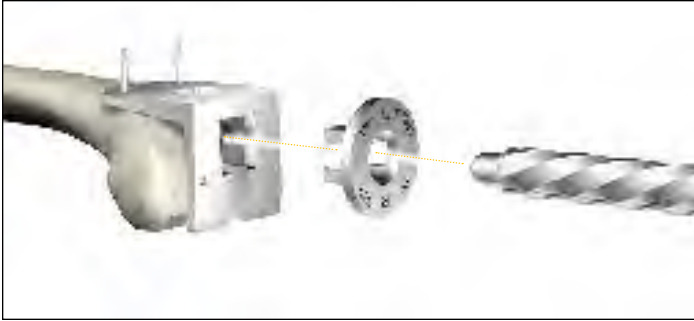
Assemble the Revision Box Cutting Guide to the anterior surface of the All-in-One Resection Guide (**Figures 71A and 71B**).

- ▶ **Tip:** For added stability make the anterior resection and anterior chamfer cut first. Then assemble the Revision Box Cutting Guide to the All-in-One Resection Guide. Pin the Revision Box Cutting Guide to the bone and complete the remaining femoral resections.



**Figure 71B**





**Figure 72A**



**Figure 72B**

Option: Offset femoral boss preparation

Remove the All-in-One Resection Guide assembly from the femur, and place the Femoral Boss Preparation Guide over the pins used for the Revision Box Cutting Guide.

Insert the Femoral Boss Reamer Bushing into Femoral Boss Preparation Guide, paying careful attention to clock it such that it reads either “Left” or “Right” depending on which is appropriate (**Figure 72A**).

Place the assembly on to the distal femur and pin the anterior flange to the femur.

Prepare for a deeper box cut through the Boss Reamer Guide. An IM Reamer may also be utilized in preparation for a short cemented stem.

Attach the 19mm IM Reamer to the Universal Driver.

Place the 19mm IM Reamer into the Femoral Boss Reamer Bushing. Ream until the groove in the cutting teeth of the 19mm IM Reamer lines up with the face of the Femoral Boss Reamer Bushing (**Figure 72B**). This clears for the femoral boss in the offset position.

Remove the fixation pins and disassemble the Femoral Boss Preparation Guide from the femur.

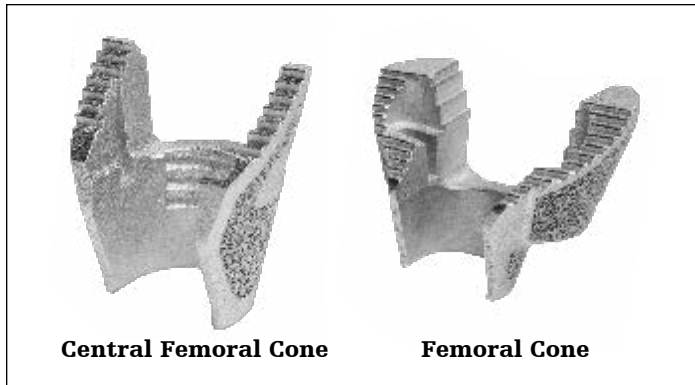
If Tritanium Cone Augments are required proceed to the Triathlon Tritanium Femoral Cone Augment Preparation for TS section of this protocol.

For trialing refer to the Component Trialing section of this protocol.

### Triathlon Tritanium Femoral Cone Augment preparation for TS

- ▶ **Attention:** Triathlon Tritanium Femoral Cone Augments are not intended to be implanted with offset adaptors.

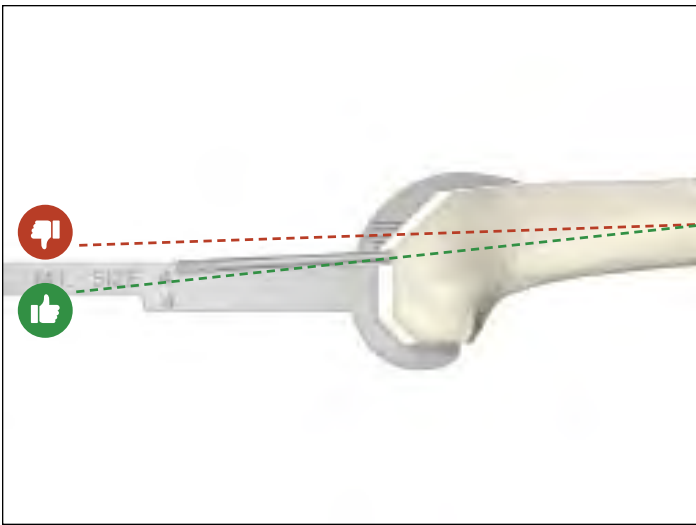
Triathlon Tritanium Femoral Cone Augments come in two different shapes (**Figure 73**).



**Figure 73**



**Figure 74**



**Figure 75**

**Ream depth (mm): Femoral components**

Stem	Femur
50-100mm	150
100mm w/offset	175
Femoral Cone	175*
150mm	200
150mm w/offset	225

► **Note:** When reaming with Stem Extenders, ream an additional 25mm or 50mm accordingly.

Femoral preparation

To prepare the femur, reference the Femoral Preparation and Gap Balancing sections of the protocol.

Intramedullary reaming for Cones

Prepare the femoral canal to accept a stem as described in the intramedullary femoral preparation section of the protocol.

If not previously completed, mark femoral rotation using epicondylar landmarks (**Figure 74**).

A minimum depth of 175mm is recommended for the IM reamer to facilitate accurate cone reaming and to ensure that the flutes on the Cone Reamer do not interfere with the flutes on the IM Reamer.

► **Note:** Use the Triathlon TS sizing templates and epicondylar markings (**Figure 75**) to determine if the IM Reamer is positioned too far anteriorly. If so, flex the reamer to attain a more posterior position (downsize the reamer if necessary).

► **Note:** If TS Femoral Distal Augments are to be used, ream until the 175mm marking is flush with the augment cut. Use the bottom of the 175mm line marking as the depth reference.

Tap the final IM Reamer gently with a mallet to ensure that it is fully seated.

► **Note:** If the final IM reamer diameter is less than 16mm, prepare for the boss of the femoral component by reaming over the top of the IM Reamer shaft with the Boss/Offset Reamer. Ream until the Boss/Offset Reamer bottoms out on the IM Reamer or until the stop collar lines up to the planned resected bone depth.

Option: Stem Extender Shaft-based workflow

If desired, the IM reamer can be removed and subsequent preparation can be based off of a Stem Trial utilizing the required Stem Trial and the Stem Extender Shaft.

Assemble the Stem Extender Shaft to the appropriate diameter Stem Trial and place the assembly into the canal.

Continue with Femoral Preparation as described in the protocol.



Figure 76

## Distal femoral resection

Refer to the distal femoral resection and distal femoral deficiency evaluation and Augment preparation sections of the protocol.

- ▶ **Reminder:** If TS Femoral Distal Augments are to be used, ream until the 175mm marking is flush with the augment cut. Use the bottom of the 175mm line marking as the depth reference.

## Femoral implant sizing

Determine femoral implant size by using the Femoral Sizing Templates (**Figure 76**) or by measuring the previous femoral implant.

Once the proper femoral implant size has been determined, use the sizing chart on the next page to help determine possible rotational constraints between the box of the TS Femoral Component and the Femoral Cone.

The chart also provides sizing information for use with posterior augments.

- ▶ **Note:** Femoral Cones are not intended to be implanted for use with Offset Adapters.
- ▶ **Note:** Reverify femoral rotation using either the epicondylar axis or by marking pin location from the cutting guide.
- ▶ **Note:** Assess the TS box cut. If necessary, remove the reamer and complete the cuts. Ensure that the IM reamer is re-positioned into the canal once the cuts are complete. Gently tap the reamer to re-attain proper seating. TS box cuts should be performed before cone reaming.

TS Femur Size	Femoral Cone Sizes				
	1-2	3-4	5	6	7-8
1					
2					
3					
4					
5					
6					
7					
8					
Proximal Diameter (OD)	21mm	23mm	25mm	27mm	29mm
Max Stem Diameter (ID)	16mm	17mm	19mm	21mm	22mm

- Allows for ±10° rotational freedom with 5 or 10mm posterior augments
- Allows for ±10° rotational freedom with 5mm posterior augments only
- Rotational freedom between the Cone Augment and the TS femur is limited. Trial to assess compatibility.
- Allows for ±5° of rotational freedom

## Preliminary Cone selection and sizing

Depending on the size and geometry of the bone defect, either cone shape may be selected.

Inverting a contralateral leg Cone Trial can help size the bone defect, assess cone coverage and determine if a Central or Femoral Cone is required.

- **Proceed either to Option 1:** Central Femoral Cone or **Option 2:** Femoral Cone procedural steps of this protocol.

► **Note:** Invert the Cone Trial over the resected femoral bone and ensure that the trial is centered on the IM Reamer. Centering the trial helps to ensure proper positioning.

Proceed either to the appropriate Tibial Cone Preparation step by selecting the associated tile.

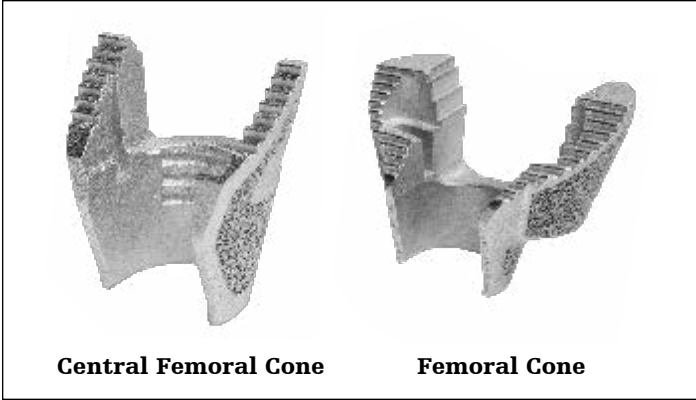


Figure 77

**Option 1: Central Femoral Cone preparation for Triathlon TS**

Ensure that the TS Central Femoral Cone Reamer (6543-6-130) is being used. This can be confirmed by checking that the reamer shaft is silver in color and that the shaft reads "TS Central Femur" (Figure 78).

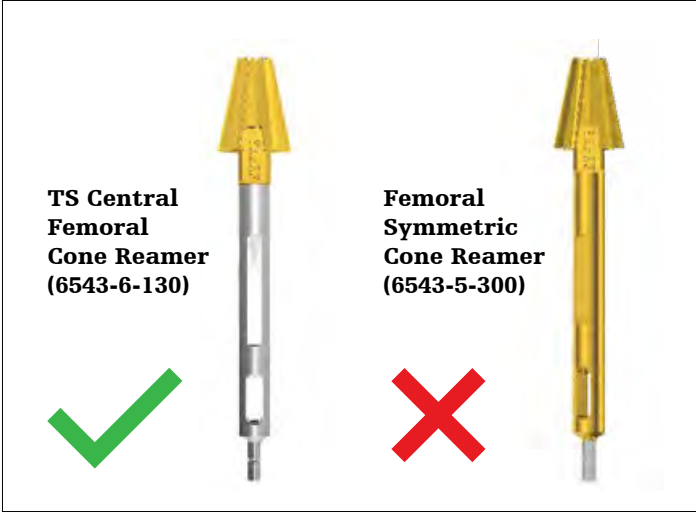


Figure 78

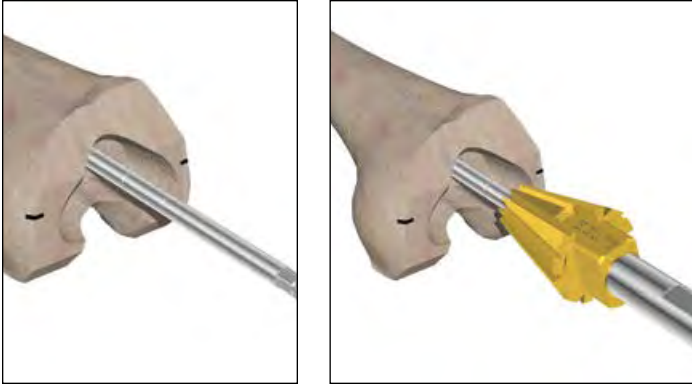


Figure 79

Insert the TS Central Femoral Cone Reamer (6543-6-130) over the IM reamer or Stem Extender. If reaming under power, confirm that the drill is to ream mode before reaming begins (**Figure 79**).

Start the reamer before engaging the bone. Ream down to the desired depth for bone void coverage.

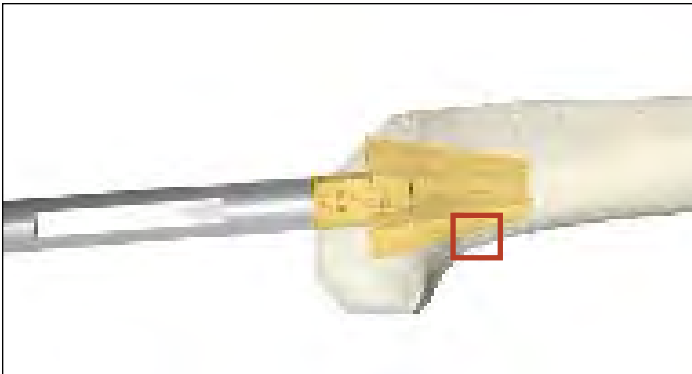
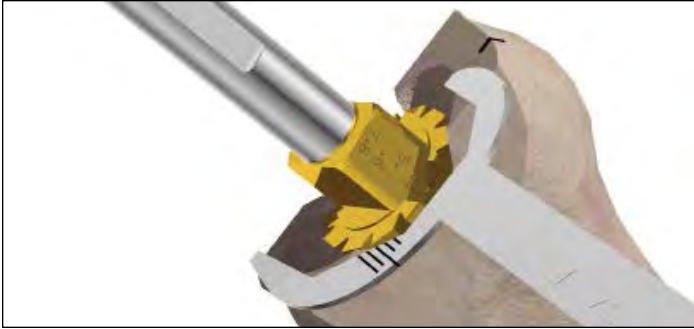


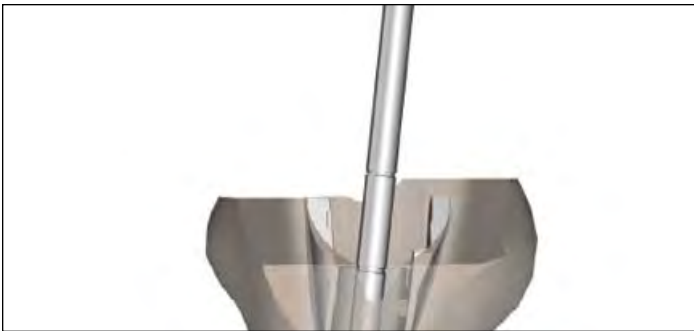
Figure 80

- ▶ **Caution:** If bone is soft, osteopenic, fractured or sclerotic, consider initially reaming by hand using the T-handle.
- ▶ **Caution:** Stop reaming if contact with the posterior cortex of the femur causes the Central Femoral Cone Reamer to deflect anteriorly (**Figure 80**). If bone void is not adequately filled by the corresponding size Central Femoral Cone, consider using a Femoral Cone (by proceeding to option two: Femoral Cone assembly and subsequent steps of the protocol) or use alternative methods to fill void.

If the bone void is not adequately filled by the corresponding size Central Femoral Cone, consider using a Femoral Cone by proceeding to Femoral Cone Preparation for Triathlon TS steps of the protocol or use alternative methods to fill the void.



**Figure 81**



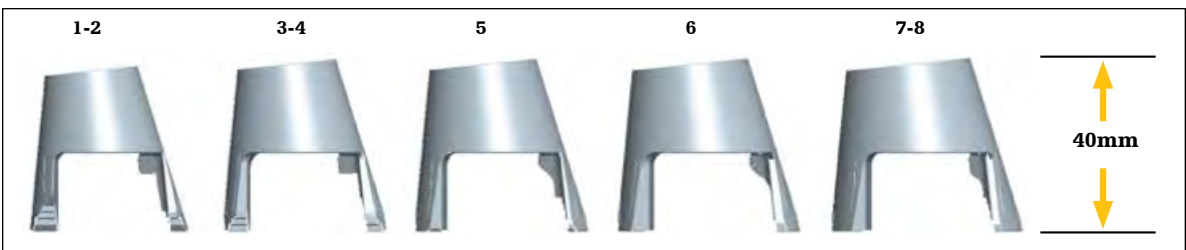
**Figure 82**



**Figure 83**



**Figure 84**



**Figure 85**

To determine size of the Central Femoral Cone, utilize the Femoral Sizing Templates. Ensure that the distal femoral cut intersects the dot marking. The dot signifies the surface of the resected plane (**Figure 81**).

- ▶ **Caution:** Stop the reamer before using the Femoral Sizing Templates.
- ▶ **Note:** Ream until the dot marking is flush with the most distal surface of the cut. Dot marking must be directly anterior.
- ▶ **Note:** Confirm that the TS Central Femoral Cone Reamer (6543-6-130) is not being hindered by the cutting surface of the flutes on the IM reamer. If so, the IM Reamer may need to be placed in a more proximal position.
- ▶ **Note:** Dot markings on the reamer increase in depth by 5mm.
- ▶ **Caution:** If augment cuts have been completed, there may be interference between the leg of the cone and the Femoral Distal augment. In the case of a 10mm difference between the cut surfaces (**see Figure 83**), it is recommended to downsize the Central Femoral Cone by one size. In the case of a 15mm difference between the cut surfaces (**see Figure 84**), it is recommended to downsize the Central Femoral Cone by two sizes. If this is not possible, downsize by one size and/or reduce the thickness of the Femoral Distal Augment.





Figure 86

### Central Femoral Cone trialing

The Central Femoral Cone Trial can be placed in the prepared bone. Assemble the desired Stem Trial with the corresponding Central Femoral Cone Introducer and TS Impaction Handle. There are two Central Femoral Cone introducers: One for sizes 1-4 Central Femoral Cones and another for sizes 5-8. Ensure correct side (L or R marking) is facing anterior.

- ▶ **Note:** Stem trials with product code 5560-T-XXX cannot be used with cone augment instrumentation. This includes trials 5560-T-109, 5560-T-112 and 5560-T-115.

Align the orientation keys on the Introducer with the feature on the Cone Trial. The orientation keys are located medially and laterally on the trial.

- ▶ **Caution:** There is no positive lock on the Central Femoral Cone Trial and the Cone Introducer. If inserting the Trial on the Introducer, be aware that the Cone Trial may disconnect from the Introducer.
- ▶ **Caution:** Do not impact or implant the Central Femoral Cone Trials.

The Central Femoral Cone Trial/Implant is designed to sit 5mm proximal to the most distal surface of the femur (**Figure 86**). If Central Femoral Cone Trial/Implant sits flush with the distal surface, there is chance of interference with the box of the TS Femoral Component.



**Figure 87**

Confirm the depth of the Central Femoral Cone Trial by placing the Blade Runner into the slot on the Central Femoral Cone Introducer. Proper depth can be confirmed if the Blade Runner contacts the distal surface of the femur (**Figure 87**). If a gap exists between the Blade Runner and the distal surface of the femur, consider downsizing the Central Cone or re-reaming deeper.

Confirm that the rotation of the Central Femoral Cone Trial aligns with previous epicondylar markings. The Blade Runner can be placed in the slot of the introducer to aid in visualizing alignment (**Figure 88**).

► **Note:** Refer to compatibility chart for rotational limitations between the Central Femoral Cone and TS Femoral Component.

### **Options if added Cone stability is required**

Ream to a larger Central Femoral Cone (repeat steps from the Femoral Cone preparation section of the protocol).

Convert to a Femoral Cone (starting at Femoral Cone Reamer Guide assembly step of the protocol).

Implant the Central Femoral Cone with cement.

For trialing proceed to the Component Trialing section of this protocol.



**Figure 88**

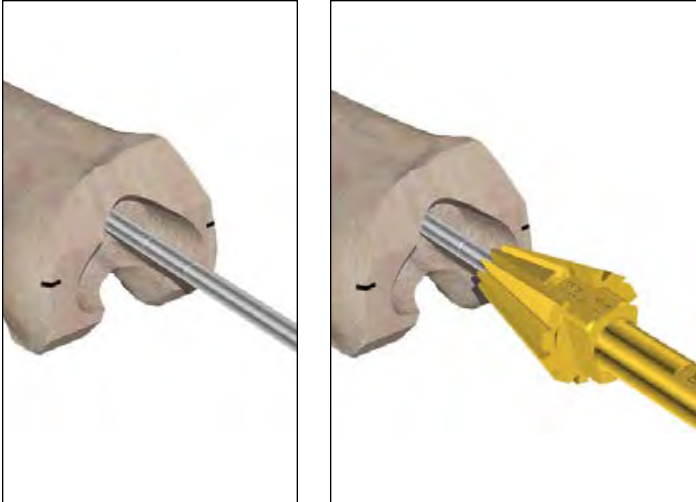


Figure 89



Figure 90

### Option 2: Femoral Cone preparation

Ensure that the Femoral Symmetric Cone Reamer is being used. This can be confirmed by checking that the reamer shaft is gold in color and that the shaft reads “Femur”.

Reference the Femoral Cone sizing chart to help determine appropriate cone sizing, as well as TS femoral compatibility (See chart on the following page).

Insert the Femoral Symmetric Cone Reamer over the IM Reamer. If reaming under power, confirm that the drill is set to ream mode before reaming begins.

Start the reamer before engaging the bone (**Figure 89**). Ream down to the desired depth/size. While reaming, periodically check the reamer depth (markings) to ensure proper measurement is achieved.

► **Caution:** If the bone is soft, osteopenic, fractured, or sclerotic, consider initially reaming by hand using the T-handle.

Utilize the femoral sizing templates to ensure that the distal femoral surface intersects the dot marking. The dot signifies the surface of the resected plane. Stop the reamer before using the templates (**Figure 90**).

		Femoral Cone Sizes						
		1-2	3	4	5	6	7-8	
TS Femur Size	1	Blue		Green				
	2	Blue			Green			Grey
	3	Blue		Green		Grey		Grey
	4	Green		Blue		Grey		Grey
	5	Green		Blue		Grey		Grey
	6	Green		Blue		Grey		Grey
	7	Green		Blue		Grey		Grey
	8	Green		Blue		Grey		Grey
Proximal Diameter (OD)		21mm	23mm	23mm	25mm	27mm	29mm	
Max Stem Diameter (ID)		16mm	18mm	18mm	20mm	22mm	22mm	

**Green allows for 10mm posterior augments. Blue allows for 5mm posterior augments. Rotational freedom between the femoral implant and the Cone may be limited with non size on size combinations. Trial to assess compatibility.**

► **Note:** Dot markings must be directly anterior.

Remove both the Symmetric Femoral Cone Reamer and the IM Reamer.

If augments are to be used, the dot marking of the Symmetric Femoral Cone Reamer will indicate where the cone will sit. Ream until the dot marking is flush with the augment cut.

► **Note:** If the Cone needs to be placed in a slightly more posterior position, remove the IM Reamer and replace it with an IM Reamer of a smaller diameter. Place the Symmetric Femoral Cone Reamer over the IM reamer and gently flex it posteriorly. Ream down to the desired depth/size.

► **Note:** Confirm that the Symmetric Femoral Cone Reamer is not being hindered by the cutting surface of the flutes on the IM Reamer. If so, the IM Reamer may need to be placed in a more distal position.

► **Note:** Reamer depth increases by 5mm between sizes.

### Femoral Cone Reamer Guide assembly

Assemble the Femoral Cone Reamer Guide with a Stem Trial of the same diameter (or a 1mm smaller diameter) as the IM reamer (**Figure 91**). The stem must be at least 50mm shorter than the final stem (Maximum 100mm Trial Stem).

► **Note:** The Femoral Cone Reamer Guide features dot markings to allow for easy depth referencing.

► **Note:** Stem trials with product code 5560-T-XXX cannot be used with cone augment instrumentation. This includes trials 5560-T-109, 5560-T-112 and 5560-T-115.

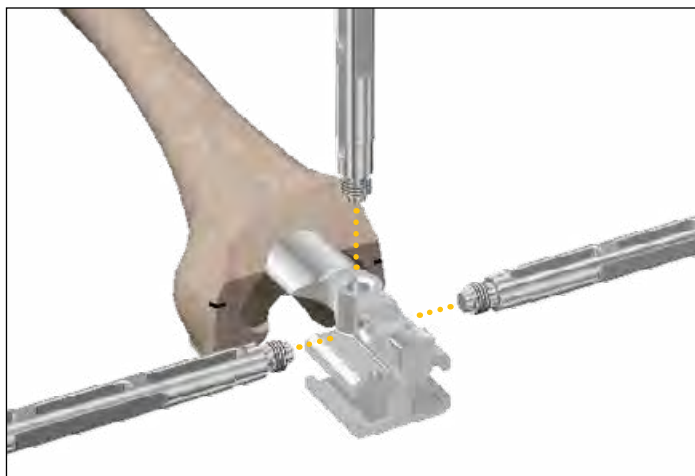
Thread the Femoral Cone Handle into the guide and confirm positioning.

Use the Femoral Cone Handle to adjust rotation of the guide. The handle can also be used to provide extra stability during lobed femoral cone reaming.

► **Note:** The guide provides three handle insertion options: lateral, medial, and anterior (**Figure 92**).



**Figure 91**



**Figure 92**

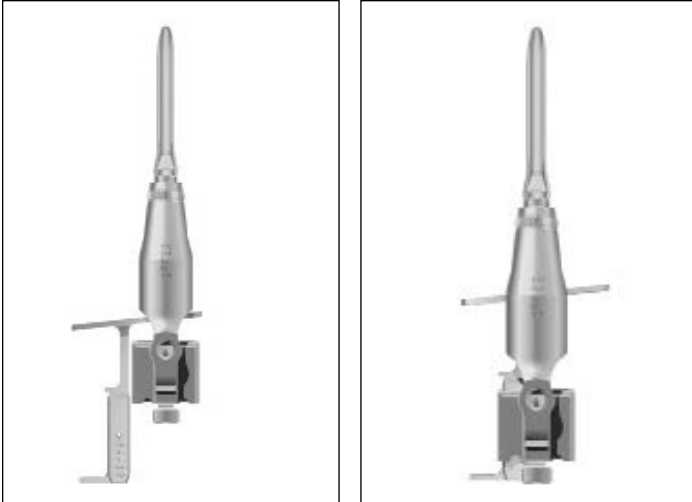


Figure 93

### Depth and sizing guide

Insert the Femoral Cone Reamer Guide into the IM canal. Position the guide so that the dot markings are anterior.

Insert the Femoral Cone Alignment Guide through the Femoral Cone Reamer Guide. Slide the guide until the alignment plate lies flush with the distal femoral surface (**Figure 93**).

- **Note:** The Femoral Cone Alignment Guide must be assembled in the medial slot with the pull tab facing medially.

The slots in the alignment plate of the Femoral Cone Alignment Guide must be placed parallel to the epicondylar axis (or to the previous marks from the 4-in-1 cutting guide fixation pins) or parallel to the proximal tibia cut (**Figure 94**). The posterior edge of the plate can be aligned parallel to the posterior femoral cut, if no augments are required, to reconfirm positioning. This will help to set femoral rotation (+/- 5°).

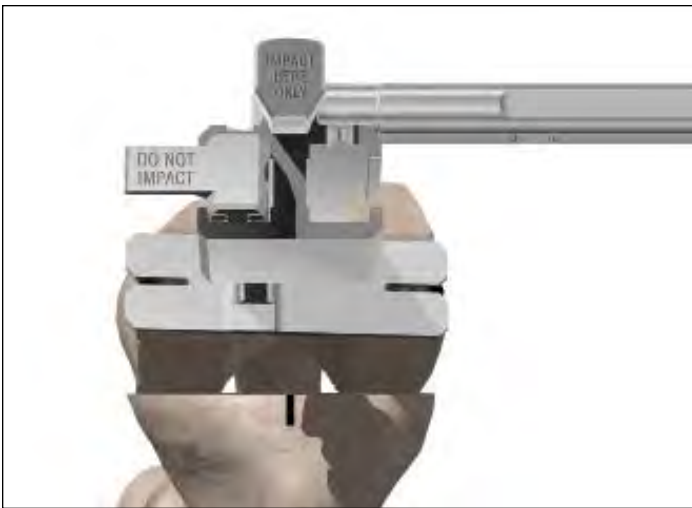


Figure 94



Figure 95

The Femoral Cone Reamer Guide has micro-flutes at its base to maintain rotation once set.

- ▶ **Note:** Do not fully seat the Femoral Cone Reamer Guide until after rotation is set. Seat the guide so that it sits at the appropriate depth marking.
- ▶ **Caution:** Gently tap the Femoral Cone Reamer Guide only in indicated area.
- ▶ **Caution:** Do not impact the Femoral Cone Alignment Guide.

Proper implant preparation can be determined by ensuring that the anterior surface markings of the Femoral Cone Reamer Guide and the numbers displayed on the end of the Femoral Cone Alignment Guide match (**Figure 95**).

- ▶ **Note:** If sizing indicators do not match, re-ream with the Symmetric Femoral Cone Reamer and seat the guide deeper.

Utilize the Femoral Sizing Templates to reconfirm proper sizing.

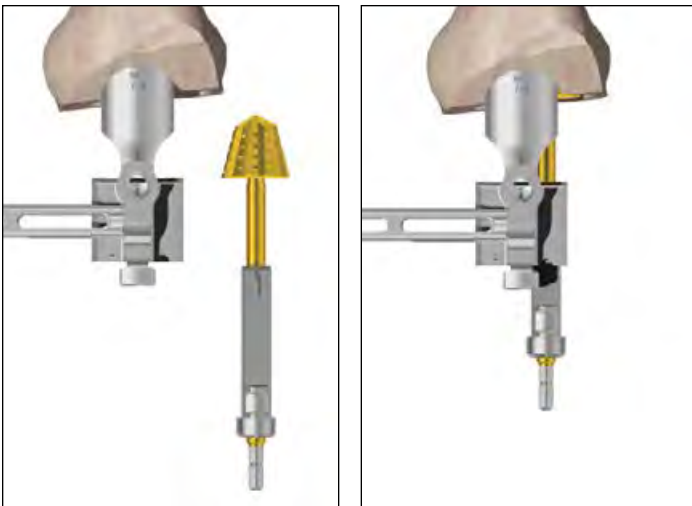


Figure 96

### Femoral Cone reaming (lobe preparation)

Evaluate medial and lateral bone quality. Perform initial reaming on the femoral section with poorer bone quality.

Use the Femoral Cone Handle to provide extra stability during reaming.

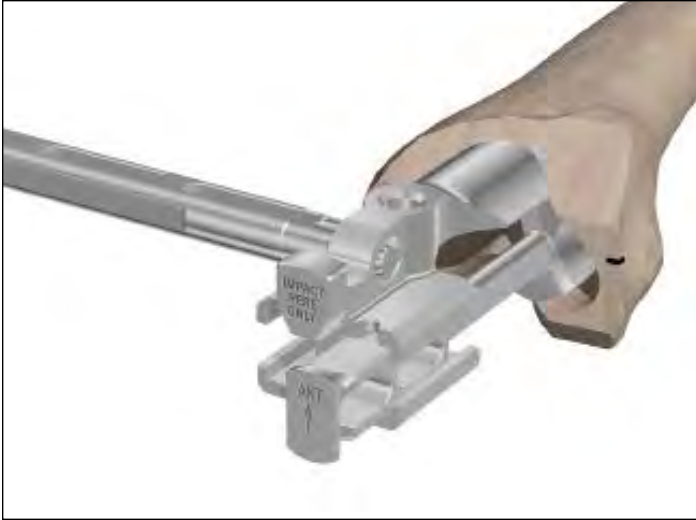
Insert the appropriate Femoral Cone Reamer into the Femoral Cone Reamer Guide, and ream for the first cone lobe. Keyway prevents incorrect assembly.

- ▶ **Note:** Fully engage the bushing before reaming. Confirm that the drill is set to ream mode.

Start the reamer before engaging the bone. Ream down to the stop (**Figure 96**).

- ▶ **Caution:** If the bone is soft, osteopenic, fractured, or sclerotic, consider initially reaming by hand using the T-handle.

Remove the reamer.



**Figure 97**

Insert the correct size Femoral Cone Stabilizer into the reamed section of the femur to further increase stability (**Figure 97**). Keyway prevents incorrect assembly.

- ▶ **Caution:** Do not impact the Femoral Cone Stabilizer.



**Figure 98**

Insert the Femoral Cone Reamer into the opposite side of the guide and ream for the second cone lobe (**Figure 98**).

► **Note:** Fully engage the bushing before reaming. Confirm that the drill is set to ream mode.

Start the reamer before engaging the bone. Ream down to the stop.

► **Caution:** If the bone is soft, osteopenic, fractured, or sclerotic, consider initially reaming by hand using the T-handle.

Remove the reamer.

Remove the Femoral Cone Reamer Guide. Use the Slap Hammer to assist in Guide removal, if necessary (**Figure 99**).



**Figure 99**



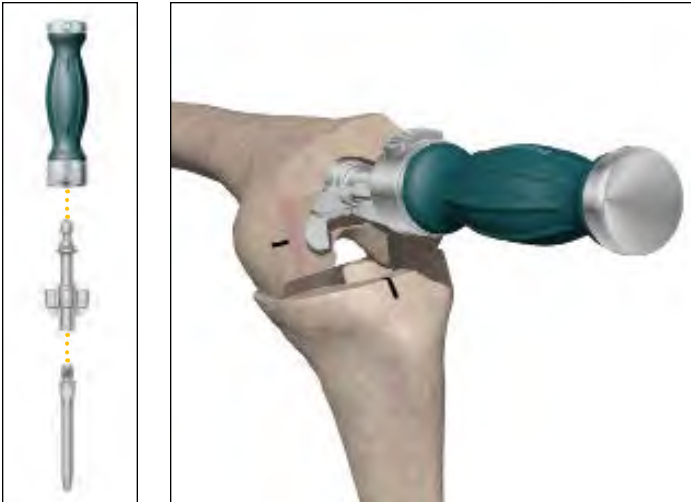


Figure 100

### Femoral Cone trialing

The Femoral Cone Trial can be placed in the prepared bone. Assemble the desired Stem Trial with the corresponding Femoral Cone Introducer and TS Impaction Handle (**Figure 100**). There is one Femoral Cone Introducers for all sizes.

► **Note:** Stem trials with product code 5560-T-XXX cannot be used with cone augment instrumentation. This includes trials 5560-T-109, 5560-T-112, and 5560-T-115.

Align the orientation keys on the Introducer with the feature on the Cone Trial. The orientation keys are located medially and laterally on the trial.

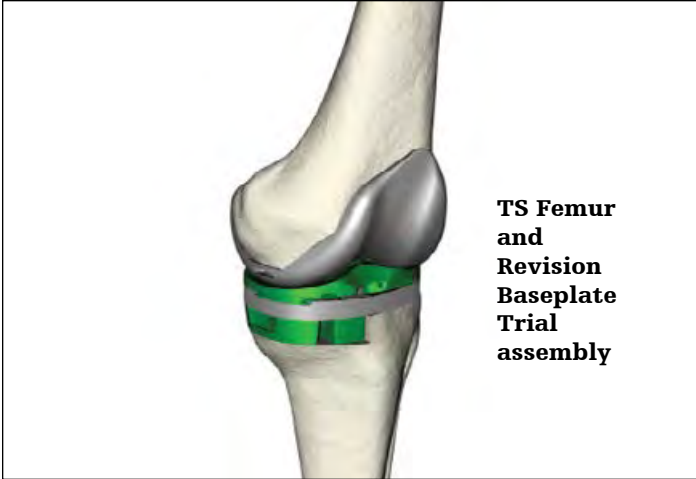
► **Caution:** There is no positive lock on the Central Femoral Cone Trial and the Cone Introducer. If inserting the Trial on the Introducer, be aware that the trial may disconnect from the introducer.

### Options if added cone stability is required

Ream to a larger Femoral Cone (repeat steps from the Femoral Cone preparation section of the protocol).

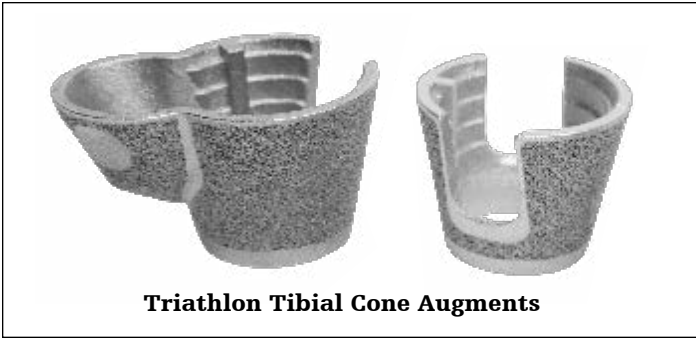
Or implant the Cone with cement.

For trialing proceed to the Component Trialing section of this protocol.



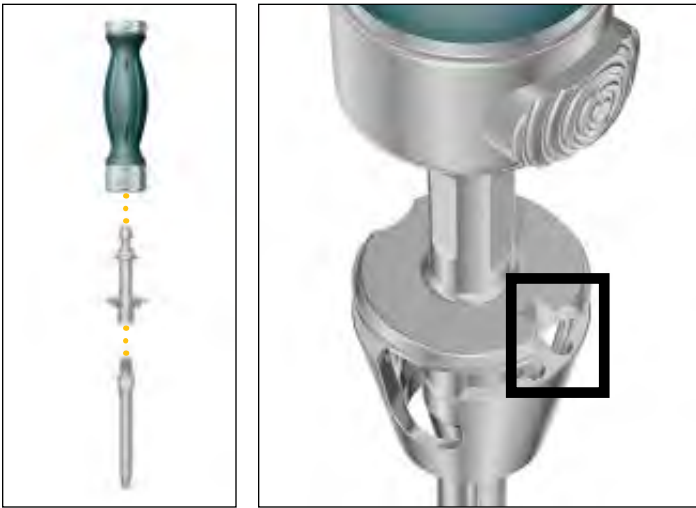
**TS Femur and Revision Baseplate Trial assembly**

**Figure 101**



**Triathlon Tibial Cone Augments**

**Figure 102**



**Figure 103**

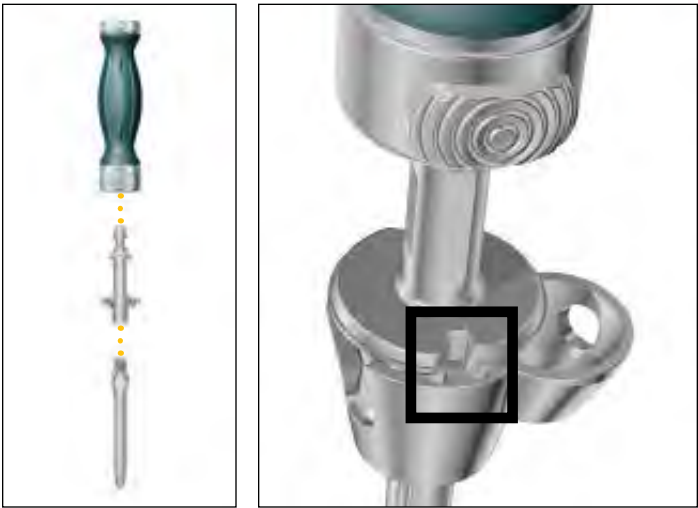
**Component trialing**

**Tibial Trial assembly**

If you are planning for Cone Augments begin with Cone Augment trialing if it has not already been completed.

**Titanium Tibial Cone Augment trialing**

- Assemble the desired Stem Trial (100mm stem maximum) with the Tibial Cone Introducer, Impaction Handle, TS Impaction Handle and the previously selected Symmetric or Asymmetric Cone Trial.
- Tibial Cone Introducers are size specific and intended for use with both Symmetric and Asymmetric Cones.
- Align the orientation key on the trial with the key feature on the Cone Introducer. The orientation key is located posteriorly on the trial. See **Figure 103** (Symmetric) and **Figure 104** (Asymmetric).



**Figure 104**

**Technical points**

- ▶ **Caution:** There is no positive lock on the Cone Trial and the Cone Introducer. The trial may disconnect from the introducer.

The Cone Trial can be placed into the prepared bone before the Stem Trial and the Cone Introducer.

Downsize the Stem Trial by 1mm.

When inserting the Cone Trial, ensure that the anterior rotational alignment marking on the trial is aligned with the anterior surface marking previously determined by the Universal Tibial Template. See **Figure 105** (Symmetric) and **Figure 106** (Asymmetric).

Insert the trial until it is seated at the appropriate depth. Remove the Cone Introducer and the Stem Trial so that only the Cone Trial remains in the void.

**Technical points**

- ▶ **Caution:** Do not impact or implant the Cone Trials.

Stem trials with product code 5560-T-XXX cannot be used with cone augment instrumentation. This includes trials 5560-T-109, 5560-T-112, and 5560-T-115.



**Figure 105**



**Figure 106**



Figure 107

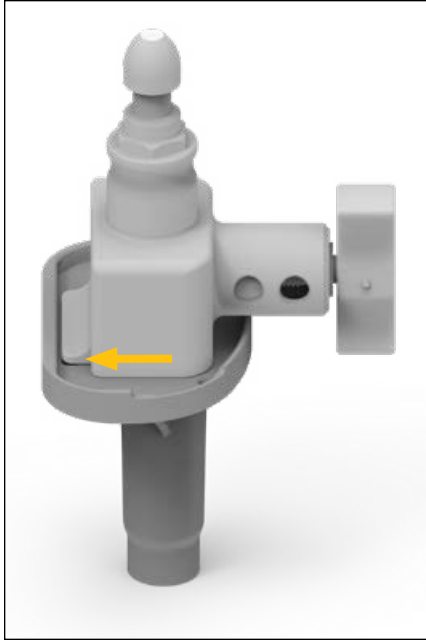


Figure 108

**Revision Baseplate Trial assembly**

► **Attention:** The Revision Baseplate is not available with offset adaptors

Assemble all Tibial Augment Trials to the appropriate size Tibial Baseplate Trial.

Thread the appropriate size Stem Trial into the Tibial Baseplate Trial.

Assemble the tibial trial construct to the Revision Baseplate Impactor/Extractor and impact onto the Tibia (**Figure 107**). Ensure the tab of the Impactor/Extractor is engaged under the posterior lip of the baseplate before impacting (**Figures 108-110**).

Assemble the appropriate size Hinge Insert Trial into the Revision Tibial Baseplate Trial. Do not impact the Insert Trial during assembly.

**Femoral Trial assembly**

If you are planning for Cone Augments begin with Cone Augment trialing if it has not already been completed.



Figure 109



Figure 110

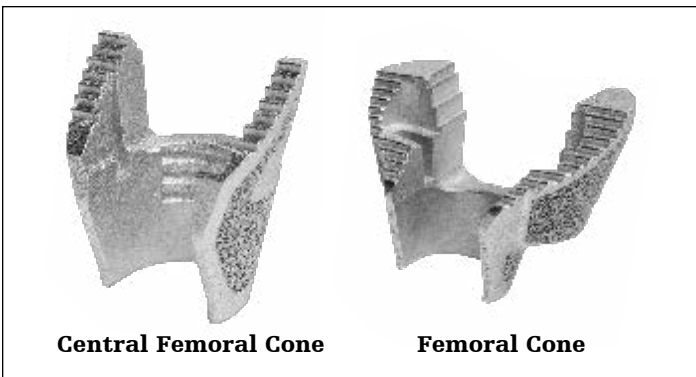


Figure 111



Figure 112



Figure 113

### Central Femoral Cone trialing

The Central Femoral Cone Trial can be placed in the prepared bone. Assemble the desired Stem Trial with the corresponding Central Femoral Cone Introducer and TS Impaction Handle. There are two Central Femoral Cone introducers: One for sizes 1-4 Central Femoral Cones and another for sizes 5-8. Ensure correct side (L or R marking) is facing anterior.

- ▶ **Note:** Stem trials with product code 5560-T-XXX cannot be used with cone augment instrumentation. This includes trials 5560-T-109, 5560-T-112 and 5560-T-115.

Align the orientation keys on the Introducer with the feature on the Cone Trial. The orientation keys are located medially and laterally on the trial.

- ▶ **Caution:** There is no positive lock on the Central Femoral Cone Trial and the Cone Introducer. If inserting the Trial on the Introducer, be aware that the Cone Trial may disconnect from the Introducer.
- ▶ **Caution:** Do not impact or implant the Central Femoral Cone Trials.

The Central Femoral Cone Trial/Implant is designed to sit 5mm proximal to the most distal surface of the femur (**Figure 113**). If Central Femoral Cone Trial/Implant sits flush with the distal surface, there is chance of interference with the box of the TS Femoral Component.

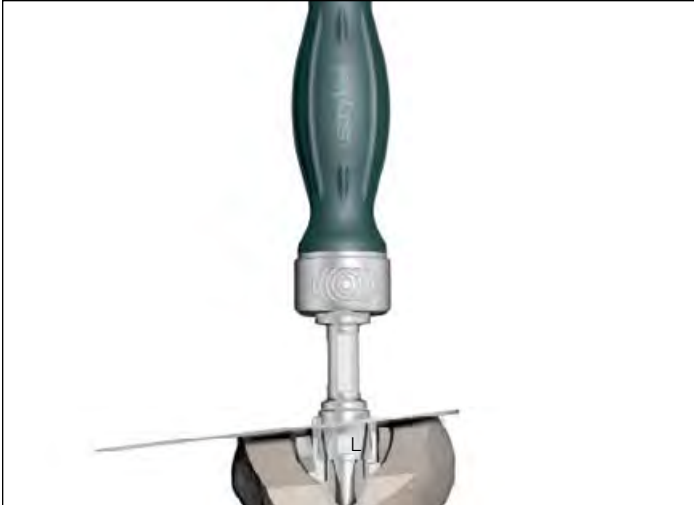


Figure 114

Confirm the depth of the Central Femoral Cone Trial by placing the Blade Runner into the slot on the Central Femoral Cone Introducer. Proper depth can be confirmed if the Blade Runner contacts the distal surface of the femur (**Figure 114**). If a gap exists between the Blade Runner and the distal surface of the femur, consider downsizing the Central Cone or re-reaming deeper.

Confirm that the rotation of the Central Femoral Cone Trial aligns with previous epicondylar markings. The Blade Runner can be placed in the slot of the introducer to aid in visualizing alignment (**Figure 115**).

► **Note:** Refer to compatibility chart for rotational limitations between the Central Femoral Cone and TS Femoral Component.

**Options if added Cone stability is required**

Ream to a larger Central Femoral Cone (repeat steps from the Femoral Cone preparation section of the protocol).

Convert to a Femoral Cone (starting at Femoral Cone Reamer Guide assembly step of the protocol).

Implant the Central Femoral Cone with cement.

Proceed to the appropriate femoral trialing section of this protocol.



Figure 115



Triathlon TS Femur

Figure 116

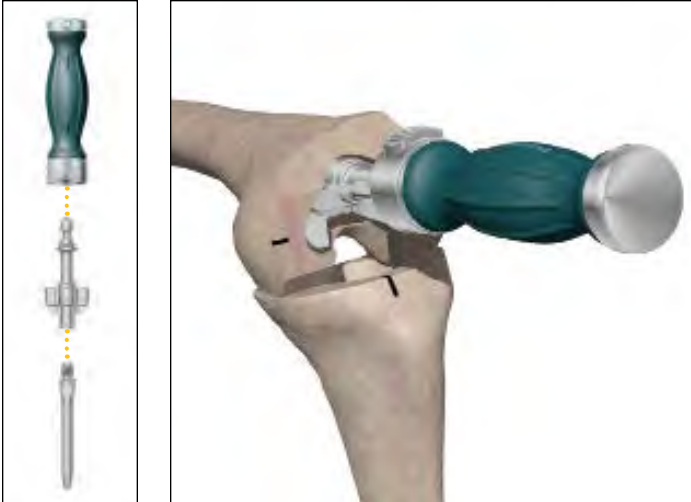


Figure 117

## Femoral Cone trialing

The Femoral Cone Trial can be placed in the prepared bone. Assemble the desired Stem Trial with the corresponding Femoral Cone Introducer and TS Impaction Handle (**Figure 117**). There is one Femoral Cone Introducers for all sizes.

- ▶ **Note:** Stem trials with product code 5560-T-XXX cannot be used with cone augment instrumentation. This includes trials 5560-T-109, 5560-T-112 and 5560-T-115.

Align the orientation keys on the Introducer with the feature on the Cone Trial. The orientation keys are located medially and laterally on the trial.

- ▶ **Caution:** There is no positive lock on the Central Femoral Cone Trial and the Cone Introducer. If inserting the Trial on the Introducer, be aware that the trial may disconnect from the introducer.

### Options if added Cone stability is required

Ream to a larger Femoral Cone (repeat steps from the Femoral Cone preparation section of the protocol).

Or, implant the Cone with cement.



Figure 118

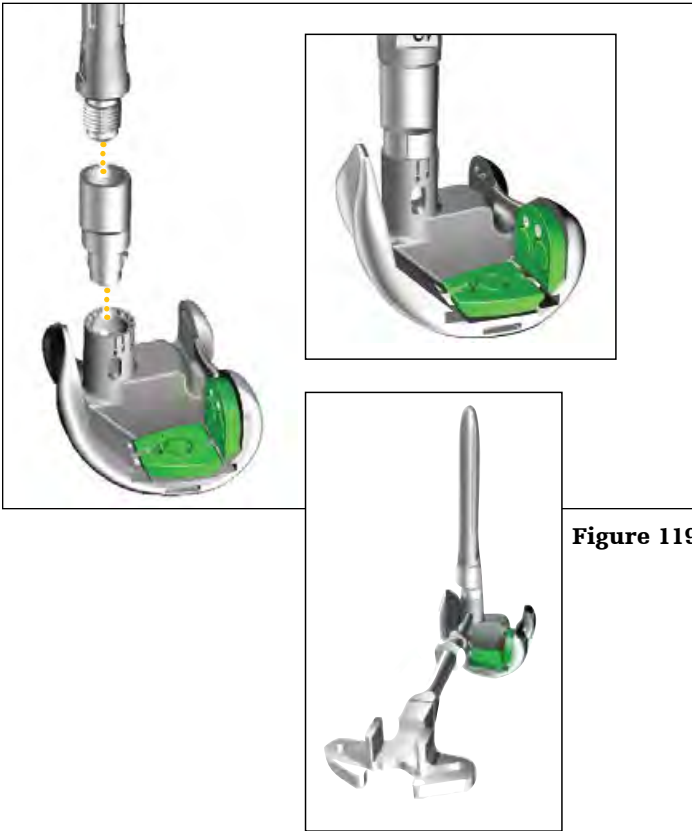


Figure 119

## Triathlon TS Trial Assembly

### Femoral trial assembly

- ▶ **Without offset:** Assemble all Posterior and Distal Femoral Augment Trials prepared for onto the appropriate size Femoral Trial. Ensure that both Distal Femoral Augment Trial tabs have engaged the undercuts of the Femoral Trial (**Figure 118**).

Thread the appropriate size Stem Trial into the Femoral Trial.

- ▶ **Note:** Femoral Distal Augment Trials are size specific and are offered in 5mm, 10mm, and 15mm thicknesses. See catalog.
- ▶ **With offset:** Thread the appropriate size Stem Trial into the appropriate size Offset Adapter Trial (**Figure 119**).

Dial the rotation of the Offset Trial to the position recorded from the Femoral Offset Bushing. Align the scribe line on the Offset Adapter Trial to the scribe line on the femoral boss and snap the Offset Adapter Trial into the Femoral Trial.

To disassemble the offset adapter trial, insert the key on the Universal Counter Wrench into one of the three slots in the Offset Adapter Trial as shown.





Assemble the femoral trial construct to the Femoral Impactor/Extractor and impact onto the femur (**Figure 120**).

**Figure 120**



Perform the trial reduction and evaluate joint stability (**Figure 121**).

**Figure 121**



Figure 122



Figure 123

## Trial and Cone Augment trialing and removal

### TS trialing with Cone Trials

Assemble and use the Tibial Baseplate Trial to ensure proper cone sizing/positioning. Refer to the Revision Baseplate Trial assembly section of the protocol.

Assemble and use the Femoral Trial to ensure proper cone sizing/ positioning and to verify accuracy of the femoral cuts. Refer to the Femoral Trial Assembly section of the protocol.

Perform trial reduction and assess joint biomechanics (**Figure 122**).

Extract the TS Trial components, as well as the Femoral and Tibial Cone Trials.

Use the Cone Extractor to remove the Cone Trials (**Figure 123**).

Insert the extractor into the Cone Trial (jaws closed). Squeeze the extractor handles to open the jaws. The jaws will engage the slots within the proximal end of the Cone Trial.

Once the jaws engage with the slots, remove the trial. Strike the handle of the extractor to assist in removal of the Cone Trial.

- **Note:** A Lamina Spreader (with narrow fixed pads) or a Curette (reverse angle) may also be used to remove the Cone Trials. Insert the Lamina Spreader or Curette into the Cone Trial and apply back pressure.

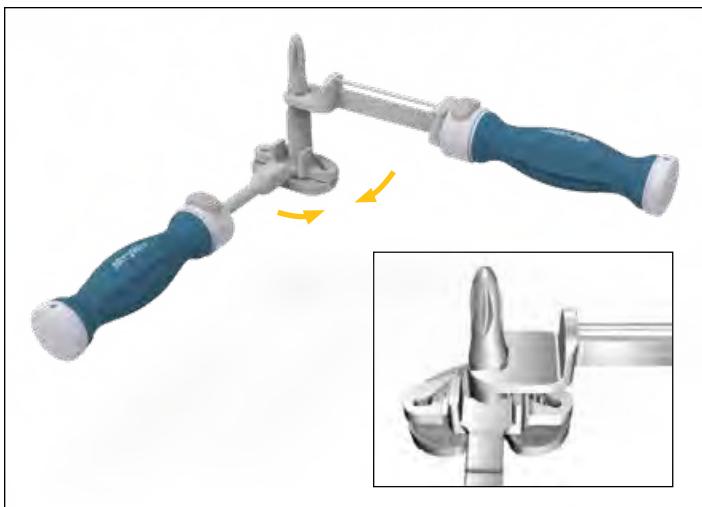


Figure 124A



Figure 124B

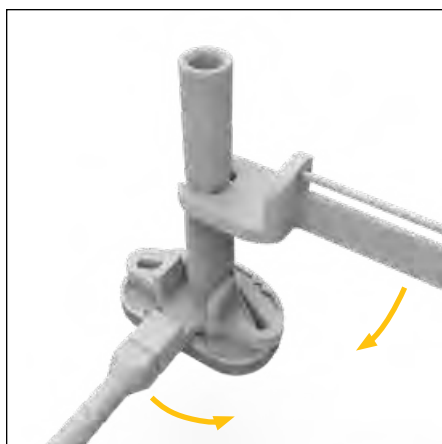


Figure 125

## Definitive component assembly

### Revision Baseplate Tibial Implant assembly

Assemble the stem to the baseplate prior to assembling augments.

#### Tibia with stem

Using the Universal Counter Wrench with the **tibia** side up, hold the Revision Baseplate in place by placing the slots of the counter wrench down over the keel fins of the baseplate.

Thread the appropriate size stem into the Tibial Baseplate Boss.

Place the open face end of the Torque Wrench on the flats of the stem.

Tighten by pulling the wrenches **together** (Figure 124A). Torque Stem to 120 in-lbs. as indicated on the Torque Wrench (Figure 124B).

#### Optional Tibia with Stem Extender

Using the Universal Counter Wrench with the **tibia** side up, hold the Revision Baseplate in place by placing the keel fins into the slots. Thread the Stem Extender into the Tibial Baseplate boss.

Place the open face end of the Universal Torque Wrench on the flats of the Stem Extender. Tighten by pulling the wrenches **together** (Figure 125).

Torque stem extender to 120 in-lbs. as indicated on the Universal Torque Wrench.

Thread the appropriate size stem into the Stem Extender.

Place the open face end of the Torque Wrench on the flats of the stem.

Tighten by pulling the wrenches **together**. Torque Stem to 120 in-lbs. as indicated on the Torque Wrench.

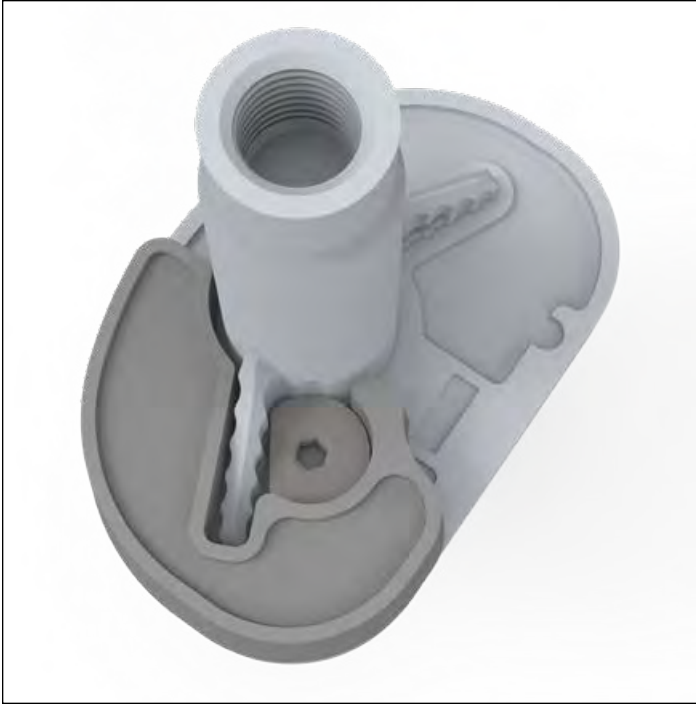


Figure 126

### Tibial Augmentation Revision Baseplate

Assemble the 1/8" Universal Joint (or Straight) Hex Drive into the Slip Torque Handle.

Place the Tibial Augment on the distal side of the Baseplate. Verify both pins of the Tibial Augment are engaged into the slots on the underside of the Revision Baseplate and that the Tibial Augment is seated flush (**Figure 126**).

Using the 1/8" Universal Joint (or Straight) Hex Drive, torque the helical bolt captured within the tibial augment until the torque driver slips, at that time the driver is designed to emit an audible click (**Figure 127**).

Verify that the helical bolt is engaged into the slot on the keel of the Revision Baseplate. Repeat on a second augment if required on the other side.

### Technical point

Triathlon Tibial Augments are not intended to be cemented together and stacked to fill voids.



Figure 127



**Figure 128**

## Definitive Triathlon TS Femur assembly

### **Femoral Augments: TS Femur**

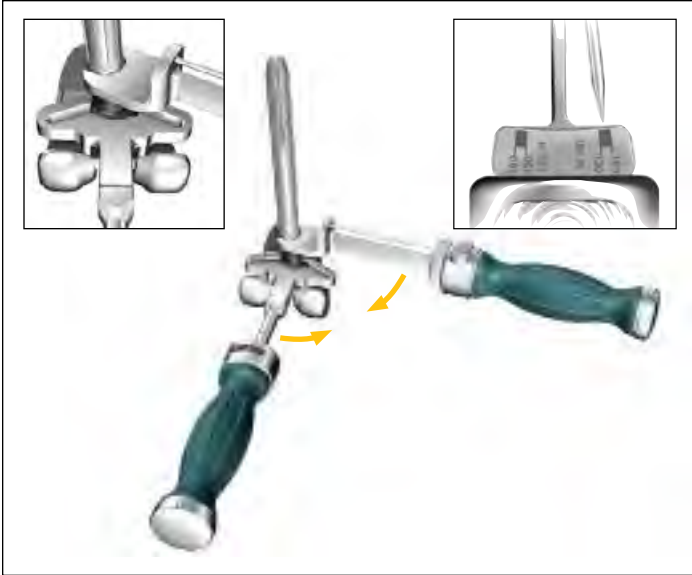
Assemble the 1/8" Universal Hex Driver into the Slip Torque Handle.

Place the Femoral Augment on the appropriate (distal or posterior) surface of the Femoral Component.

Assemble the Augment Screw through the Femoral Augment into the threaded hole in the Femoral Component (**Figure 128**).

Torque the Augment Screw until the torque driver slips; at that time the driver is designed to emit an audible click. Repeat this sequence on all required femoral augments.

► **Note:** If using the largest augments, assemble stem first.



**Figure 129**

Triathlon TS Femur with stem and no offset  
Using the Universal Counter Wrench with the FEMUR side up, hold the Femoral component in place by assembling the box into the gap.

Thread the appropriate size stem into the femoral component.

Place the open face end of the Torque Wrench onto the flats of the stem.

Tighten by pulling the wrenches **together**. Torque Stem to 120 in-lbs. as indicated on the Torque Wrench (**Figure 129**).



**Figure 130**

Triathlon TS Femur with Stem Extender

Using the Universal Counter Wrench with the Femur side up, hold the femur in place by placing the box into the gap. Thread the Stem Extender into the Femoral Component.

Place the open face end of the Universal Torque Wrench on the flats of the Stem Extender. Tighten by pulling the wrenches **together** (**Figure 130**).

Torque Stem to 120 in-lbs. as indicated on the Universal Torque Wrench.



**Figure 131**

### Triathlon TS Femur only with Offset Adapter

Ensure jam nut is up against the offset Adapter, exposing all threads.

Thread the Offset Adapter into the Femoral Component until the jam nut bottoms out on the femoral boss (**Figure 131**).

Dial the rotation of the Offset Adapter to the position recorded from the Femoral Offset Bushing by turning the Offset Adapter counter-clockwise and aligning the tick mark on Offset Adapter to the tick mark on the femoral boss.

Holding Offset Adapter in place, turn the jam nut **counterclockwise** and hand tighten it against the femoral boss. This will hold the construct in the appropriate position for final tightening.

Holding Torque Wrench in **left hand**, place open face end of wrench onto the flats of the jam nut.

Next, holding the Counter Wrench in your **right hand**, place the open face end of the wrench on the flats on the Offset Adapter (**Figure 132**).

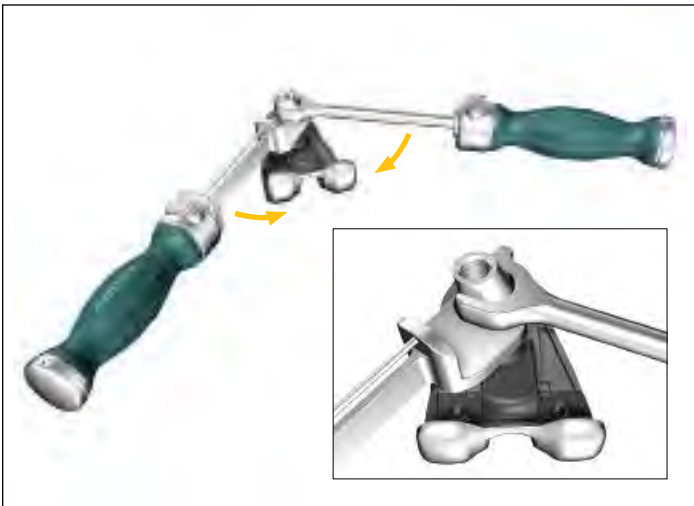
Tighten by pulling the wrenches **together**. Torque to 120 in-lbs. as indicated on the Torque Wrench.

Thread the appropriate size stem into Offset Adapter.

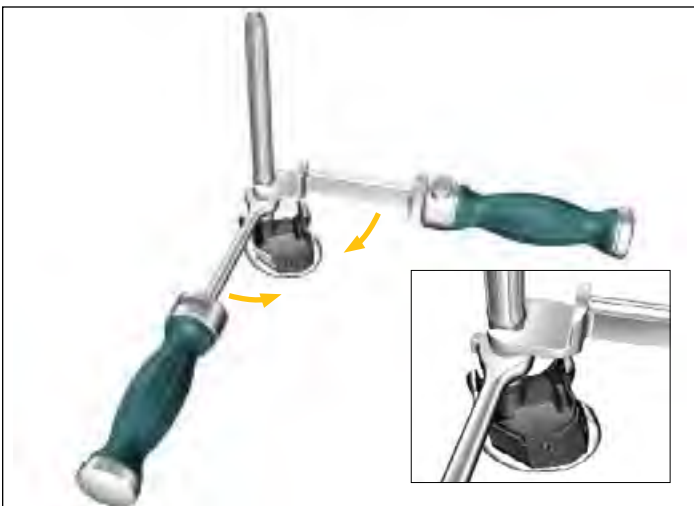
Now, holding the Torque Wrench in your **right hand**, place the open face end of the wrench onto the flats of the stem.

Hold the Counter Wrench in your **left hand** and place the open face end of the wrench on the flats of the Offset Adapter (**Figure 133**).

Tighten by pulling the wrenches **together**. Torque Stem to 120 in-lbs. as indicated on the Torque Wrench.



**Figure 132**



**Figure 133**

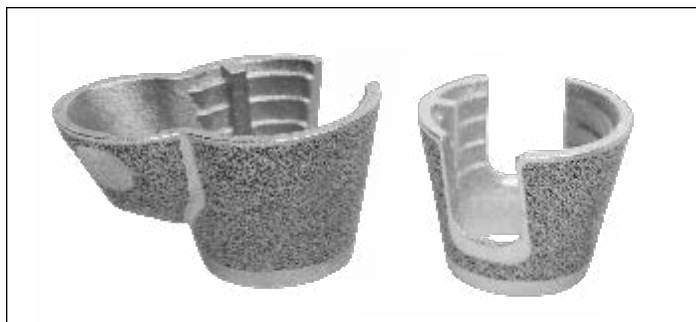


Figure 134



Figure 135

## Implantation

If needed, further prepare resected bone surfaces using an osteotome, oscillating saw blade, or bone file.

If using a cemented stem, it is advised to implant a cement restrictor prior to Cone implantation.

### Tritanium Cone implantation (tibial cone)

► **Reminder:** The Revision Baseplate is only compatible with Symmetric and Asymmetric Tibial Cones sizes B-E.

Assemble the desired Stem Trial (1mm smaller than reamed for) with the Tibial Cone Introducer, TS Impaction Handle, and the selected Symmetric/Asymmetric Cone Implant (**Figure 134**).

Tibial Cone Introducers are size specific.

Align the orientation key on the implant with the key feature on the Cone Introducer. The orientation key is located posteriorly on the implant.

► **Note:** There is no positive lock on the Cone Implant and the Cone Introducer. The implant may disconnect from the introducer.

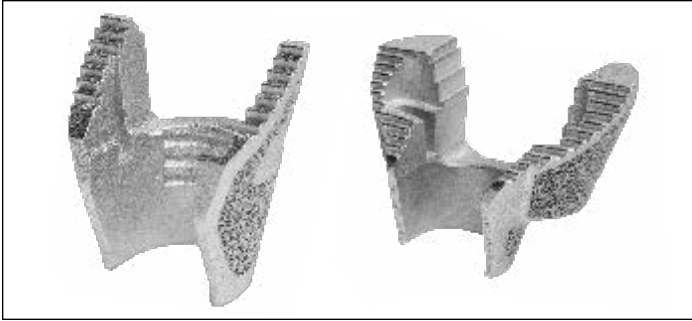
► **Note:** The Cone can be placed into the prepared bone before the Stem Trial and the Cone Introducer.

► **Note:** When inserting a Symmetric Cone Implant, ensure that the anterior rotational alignment marking on the implant is aligned with the anterior surface marking previously determined by the Universal Tibial Template (**Figure 135**).

Gently impact the Symmetric/Asymmetric Cone Implant and confirm that it is fully seated at the appropriate depth.

► **Note:** Stem trials with product code 5560-T-XXX cannot be used with cone augment instrumentation. This includes trials 5560-T-109, 5560-T-112 and 5560-T-115.





**Figure 136**

### Triathlon Tritanium Femoral Cone implantation (femoral cone)

Assemble the desired Stem Trial (1mm smaller than reamed for) with the corresponding Central or Femoral Cone Introducer, TS Impaction Handle, and the selected Femoral Cone Implant (**Figure 136**).

There are two introducers for the Central Cones and one for the Femoral Cones.

Align the orientation key on the implant with the key feature on the Cone Introducer. The orientation keys are located medially and laterally on the implant.

- ▶ **Note:** There is no positive lock on the Cone Implant and the Cone Introducer. The implant may disconnect from the introducer.
- ▶ **Note:** The Cone can be placed into the prepared bone before the Stem Trial and the Cone Introducer.

Gently tap the Femoral Cone Implant and confirm that it is fully seated at the appropriate depth (**Figure 137**).

- ▶ **Note:** Stem trials with product code 5560-T-XXX cannot be used with cone augment instrumentation. This includes trials 5560-T-109, 5560-T-112 and 5560-T-115.



**Figure 137**



Figure 138

## Adjustment of Cone Implant before cementation

### Cone implants

For Femoral and Tibial Trial assembly, refer to the Triathlon TS Trial Assembly and the Tibial Trial assembly sections of the protocol.

Introduce the TS Femoral and Tibial Trials.

Perform final trial reduction with the Cone implants and evaluate joint stability.

Remove the TS trial components.

### TS component implantation with Cone Implants

For assembly of Tibial and Femoral Components, refer to the Revision Baseplate Tibial Implant assembly and Definitive Triathlon TS Femur assembly sections of the protocol.

Cone implants must be fully seated before cementing the entire construct.

- ▶ **Caution:** Only use the Cone Extractor if the implant is seated in the wrong orientation and must be re-positioned (before cementing).

Insert the extractor into the Cone Implant (jaws closed). Ensure that the flared edges of the jaws are positioned outside of the distal end of the cone. Squeeze the extractor handles to open the jaws (**Figure 138**).

- ▶ **Note:** A Lamina Spreader (with fixed narrow pads) or a Curette (reverse angle) may also be used to remove the Cone Implants. Insert the Lamina Spreader or Curette into the Cone ensuring that the ends of either instrument are positioned outside of the distal end of the implant. Apply back pressure.

- ▶ **Caution:** If the Cone Implant is extracted (before cementing), inspect the Cone for damage before re-insertion.

See next section for component and cone cementing techniques.

- ▶ **Note:** All stem implants are compatible with the cone augments. Refer to sizing charts to see maximum stem diameter per cone size.

## Revision Baseplate implantation

### Revision Baseplate with Cemented Stem and Cone Augment

Assess length of the construct and determine the appropriate depth of cement restrictor.

Insert corresponding restrictor.

Attach Revision Baseplate Impactor/Extractor to the Impaction Handle.

Assemble the Tibial Implant Assembly to the Revision Baseplate Tibial Impactor/ Extractor by turning the knob.

Ensure the tab of the Impactor/Extractor is engaged under the posterior lip of the baseplate (**Figures 139-141**).

Irrigate the joint and then dry.

Mix cement.

#### Technical points

Tibial Cone Implant used with a cemented stem will require at least two doses without major bone voids. The same is true for bones with IM canals greater than 20mm to fill the cone volume and help facilitate solid fixation to the cone.

Apply a thin layer of wet cement on the underside of the baseplate. Allow the cement to dough.

Use the standard cementing technique with a cement gun to retrograde fill the canal and cone.

Pressurize the cement into the cone, the metaphysis and onto the flat tibial surface.

Impact the tibial implant assembly onto the tibia until fully seated (do so when the cement is in its doughy state) and remove excess cement. Ensure proper rotation and alignment of the baseplate prior and during impaction.



Figure 139



Figure 140



Figure 141

## Revision Baseplate with Cemented Stem without Cone Augment

Assess length of the construct and determine the appropriate depth of cement restrictor.

Insert corresponding restrictor.

Attach Revision Baseplate Impactor/Extractor to the Impaction Handle.

Assemble the Tibial Implant Assembly to the Revision Baseplate Tibial Impactor/Extractor by turning the knob.

Ensure the tab of the Impactor/Extractor is engaged under the posterior lip of the baseplate (**Figures 142-144**).

Irrigate the joint and then dry.

Mix cement.

Apply cement to the appropriate sections of the tibial implant assembly and the proximal tibia.

- Use the standard cementing technique with a cement gun to retrograde fill the canal.
- Apply doughy cement to the back surface of the baseplate and build the cement up along the stem implant junction proximally.

Pressurize the cement into the metaphysis and onto the flat tibial surface.

Impact the tibial implant assembly onto the tibia until fully seated (do so when the cement is in its doughy state) and remove excess cement. Ensure proper rotation and alignment of the baseplate prior and during impaction.



Figure 142



Figure 143



Figure 144

## Revision Baseplate with Fluted Stem and Cone Augment

Attach Revision Baseplate Impactor/Extractor to the Impaction Handle.

Assemble the Tibial Implant Assembly to the Revision Baseplate Tibial Impactor/Extractor by turning the knob.

Ensure the tab of the Impactor/Extractor is engaged under the posterior lip of the baseplate (**Figures 145-147**).

Irrigate the joint and then dry.

Mix cement.

### Technical points

Tibial Cone Implant used with Fluted stems will require at least one dose of cement for Cone sizes B and C and 2 doses for Cone sizes D and E will be required in the absence of major bone voids.

When using Fluted Stems with Cone implants, wipe the inside surface of the cone with a thin layer of wet cement (avoid cement moving distally beyond the inferior edge of the cone). Apply doughy cement to the back surface of the baseplate and build the cement up along the stem implant junction proximally so that the cement can fill the full depth of the cone.

Make sure the stem tray construct has enough cement coating the implant, with enough volume to fill the Cone and cover the stem tray junction.

Pressurize the cement into the flat tibial surface.

Impact the tibial implant assembly onto the tibia until fully seated (do so when the cement is in its dough-like state) and remove excess cement. Ensure proper rotation and alignment of the baseplate prior and during impaction.



Figure 145



Figure 146



Figure 147

### Revision Baseplate with Fluted Stem without Cone Augment

Assess length of the construct and determine the appropriate depth of cement restrictor.

Insert corresponding restrictor.

Attach Revision Baseplate Impactor/Extractor to the Impaction handle.

Assemble the Tibial Implant Assembly to the Revision Baseplate Tibial Impactor/ Extractor by turning the knob.

Ensure the tab of the Impactor/Extractor is engaged under the posterior lip of the baseplate (**Figures 148-150**).

Irrigate the joint and then dry.

Mix cement.

Apply cement to the appropriate sections of the tibial implant assembly and the proximal tibia.

Pressurize the cement into the flat tibial surface.

Impact the tibial implant assembly onto the tibia until fully seated and remove all excess cement. Ensure proper rotation and alignment of the baseplate prior and during impaction.



Figure 148



Figure 149



Figure 150

## Triathlon TS Femoral Implant implantation

### Triathlon TS Femur with Cemented Stem

Assess length of the construct and determine the appropriate depth of cement restrictor.

Insert corresponding restrictor.

Ensure that the Cone Implant is properly seated.

Attach the Femoral Impactor Handle/ Extractor to the impaction handle. Assemble the femoral implant assembly to the Femoral Impactor/Extractor.

Assess length of the construct and determine the appropriate cement restrictors. Insert corresponding restrictor.

Irrigate the joint and then dry.

Mix cement.

► **Note:** Cone Implants used with cemented stems will require at least two doses without major bone voids or bones with IM canals greater than 20mm to fill the cone volume and help facilitate solid fixation to the cone.

Apply a thin layer of wet cement on the back of the femoral implant. Allow the cement to dough.

Use the standard cementing technique with a cement gun to retrograde fill the canal and cone.

Pressurize the cement into the cone, the metaphysis, and onto the cut distal femoral surfaces.

Impact the femoral implant assembly onto the femur until fully seated (do so when the cement is in dough-like state) and remove excess cement.

### Triathlon TS Femur with Fluted Stem

Ensure that the cone is properly seated.

Attach the Femoral Impactor Handle/ Extractor to the impaction handle. Assemble the femoral implant assembly to the Femoral Impactor/Extractor.

Irrigate the joint and then dry.

Mix cement.

► **Note:** When using Cone Implants with Fluted Stems, at least one dose of cement for Cone sizes 1-2 and 3, and 2 doses for Cone sizes 4, 5, 6, and 7-8 will be required in the absence of major bone voids.

When using Fluted Stems with Cone implants, wipe the inside surface of the cone with a thin layer of wet cement (avoid cement moving distally beyond the superior edge of the cone). Apply doughy cement to the back surfaces of the assembled femoral implant, and build the cement up along the stem implant junction proximally so the cement can fill the full depth of the cone.

Make sure the stem tray construct has enough cement coating the implant, with enough volume to fill the Cone and cover the stem tray junction.

Pressurize the cement onto the cut distal femoral surfaces.

Impact the femoral implant assembly onto the femur until fully seated (do so when the cement is in its dough-like state) and remove excess cement.



Figure 151A



Figure 151B



Figure 152



Figure 153

### Revision Insert implantation

- ▶ **Attention:** The Triathlon Revision Insert is only intended for use with the Revision Baseplate.

Prior to applying the definitive Tibial Insert, the appropriately sized TS Tibial Insert Trial may be placed in the Revision Baseplate to help assess joint stability and range of motion and confirm insert thickness once more. Do not impact the Insert Trial during assembly.

Once definitive Triathlon Revision Insert is selected, inspect the inner surface of the bearing post hole to ensure it is free of debris.

The Filler Bushing is packaged with the Revision insert.

Place the Filler Bushing into the bearing post hole. Ensure that the key on the Filler Bushing aligns to the corresponding key relief on the anterior aspect of the Revision Baseplate (**Figure 151**).

Attach the Tibial Insert Impactor to the Impaction Handle.

Ensure that the Revision Baseplate is completely free of debris.

Angle the Revision TS Tibial Insert posteriorly into the Revision Baseplate (**Figure 152**).

Impact the insert to snap it into place anteriorly.

### Technical point

If the insert does not fully seat, confirm that the filler bushing is flush with the surface of the Revision Baseplate.

### TS Stabilizer Pin

Place the Insert Stabilizer Pin into Tibial Insert post “barbed” end up. Using the Stabilizer Post Impactor tap the Insert Stabilizer Pin down until it is below the proximal surface of the Tibial Insert post (**Figure 153**).

- ▶ **Note:** The Insert Stabilizer Pin is packaged with the Tibial Insert.

### Closure

After cement polymerization and removal of all residual cement, thoroughly irrigate the joint. Hemostasis is achieved after deflation of the tourniquet. Close soft tissues in the normal, layered fashion.





Figure 154



Figure 155

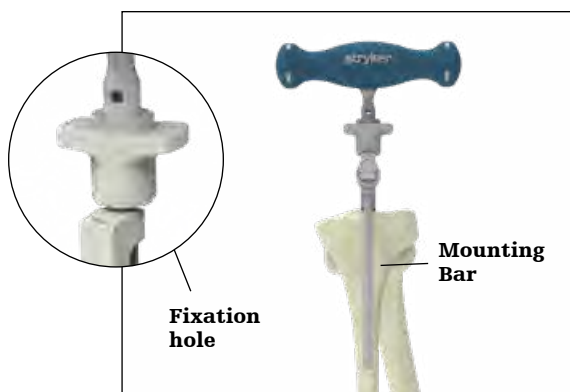


Figure 156



Figure 157

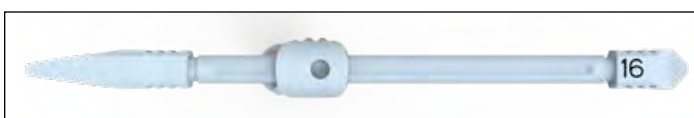


Figure 158

## Addendums

### Addendum 1

#### Revision Baseplate Tibial Preparation with Primary Tibial Instrumentation

To alleviate the potential for tibial eminence interference with the Hinge tibial resection guide tower, follow the Triathlon primary tibial IM workflow per TRIATH-SP-30 using the Hinge Tibial Stylus as substitute to help ensure proper resection depth is created. The workflow is also detailed below.

#### Revision Baseplate: Proximal tibial resection IM workflow

**When determining the tibial resection depth, consider any impact to joint line and patella tracking in the case a future revision of the femur to a Triathlon Hinge Femur is required.** In a native joint for a Revision Insert, to maintain the joint line, the minimum tibial resection from the native joint line is 9mm. 9mm of bone will be resected with the initial proximal resection when using the "9" end of the Triathlon Stylus on the lowest level of the unaffected compartment.

Attach the 3/8" IM Drill to the Universal Driver and create a hole in the location determined by the preoperative X-rays (**Figure 154**).

Attach the T-Handle Driver to the 5/16" IM Rod and slowly pass into the canal, ensuring clearance. Remove the 5/16" IM Rod and insert it into the body of the Tibial Alignment Jig IM. The assembly is then inserted into the canal until the isthmus is engaged (**Figure 155**).

With the body of the Tibial Alignment Jig IM resting on the proximal tibia, proper rotational alignment can be achieved by rotating the instrument about the 5/16" IM rod so that the vertical mounting bar is over the medial 1/3 of the tibial tubercle (**Figure 156**). A headless pin or the 1/8" drill is then inserted into the fixation hole to fix rotation (see inset).

Assemble the appropriate Tibial Resection Guide (left or right) on the Tibial Adjustment Housing.

Ensure posterior slope is set to 0 degrees.

Attach the assembly onto the mounting bar by pressing the bronze wheel on the Tibial Adjustment Housing. Attach the Universal Alignment Handle to the Tibial Resection Guide and slide a Universal Alignment Rod through the handle for sagittal assessment. When alignment is confirmed, the Universal Alignment Handle should be centered over the ankle (**Figure 157**).

The Hinge Tibial Stylus with corresponding 16mm depth attaches to the Tibial Resection Guide referencing the lowest level of the unaffected compartment (**Figure 158**).

The height of the Tibial Resection Guide, Tibial Stylus and Tibial Adjustment Housing can be adjusted using the bronze wheel on the Tibial Adjustment Housing. For coarse adjustment, press the bronze wheel and slide the assembly up or down. For fine adjustment, turn the bronze wheel to the right to move the assembly up the Proximal Rod or turn left to move the assembly down the Proximal Rod (**Figure 159**).



**Figure 159**

Place two Headless Pins into the “0” [neutral] holes, fixing the level of the Tibial Resection Guide.

If additional stability of the guide is required, utilize the oblique “X” pin-hole.

Remove all alignment instruments leaving only the Tibial Resection Guide in place. Squeeze the bronze tabs on the Tibial Adjustment Housing to disengage the assembly from the Tibial Resection Guide. Slide the Tibial Adjustment Housing anteriorly. Remove the 5/16” IM Rod, the Tibial Alignment Jig IM, the Tibial Adjustment Housing and the Universal Alignment Handle.

Resection of the proximal tibia is now completed. An optional Tibial Resection Guide Modular Capture (Left or Right) may be added.

Remove the Tibial Resection Guide.

For the remaining tibial preparation technique proceed to the Tibial Template sizing section of the desired technique guide.

## Triathlon Revision instruments

For use of the Triathlon TS TCG for femoral prep and the TCG insert trials for femoral prep see TRITS-SP-1.

Item number	Description	Quantity in set
6543-6-501	Revision IM Reamers (8-19mm)-- Tray	1
6543-7-527	Boss/Offset Reamer	1
6543-6-019	Revision Boss Reamer	1
6543-7-508	8mm Starter Awl	1
6543-7-509	IM Reamer - 9mm	1
6543-7-510	IM Reamer - 10mm	1
6543-7-511	IM Reamer - 11mm	1
6543-7-512	IM Reamer - 12mm	1
6541-4-800	T-Handle Driver	1
6541-4-538	3/8" IM Drill	1
6543-7-513	IM Reamer - 13mm	1
6543-7-514	IM Reamer - 14mm	1
6543-7-515	IM Reamer - 15mm	1
6543-7-516	IM Reamer - 16mm	1
6543-7-517	IM Reamer - 17mm	1
6543-7-518	IM Reamer - 18mm	1
6543-7-519	IM Reamer - 19mm	1
5560-T-109	Cemented Stem Trial 9 x 50mm	2
5560-T-112	12 x 50mm Stem Trial	2
5560-T-115	15 x 50mm Stem Trial	2
6543-6-502	Revision General-- Tray	1
6541-4-602	Universal Alignment Rod	1
6541-4-806	Universal Alignment Handle	1
6541-4-803	Slap Hammer	1
6541-4-801	Universal Driver	1
6541-4-400	Blade Runner	1
6543-1-603	Size 1-8 Femoral Sizing Templates	1
6541-4-804	Headless Pin Extractor	1
6541-4-518	1/8" Drill	1
6541-4-300	Headed Nail Impactor/Extractor	1
6541-4-003A	Headless Pins - 3"	4
6541-4-515	Headed Nails - 1 1/2"	2
6541-4-575	Headed Nails - 3/4"	2
6541-4-809	Headless Pin Driver	1

**Triathlon Revision instruments** continued

Item number	Description	Quantity in set
6543-6-503	Revision Tibial Prep-- Tray	1
5545-T-102	Tibial Augment Trial, Size 1 RM/LL - 5mm	1
5545-T-101	Tibial Augment Trial, Size 1 LM/RL - 5mm	1
5545-T-202	Tibial Augment Trial, Size 2 RM/LL - 5mm	1
5545-T-201	Tibial Augment Trial, Size 2 LM/RL - 5mm	1
5545-T-302	Tibial Augment Trial, Size 3 RM/LL - 5mm	1
5545-T-301	Tibial Augment Trial, Size 3 LM/RL - 5mm	1
5545-T-402	Tibial Augment Trial, Size 4 RM/LL - 5mm	1
5545-T-401	Tibial Augment Trial, Size 4 LM/RL - 5mm	1
5545-T-502	Tibial Augment Trial, Size 5 RM/LL - 5mm	1
5545-T-501	Tibial Augment Trial, Size 5 LM/RL - 5mm	1
5545-T-602	Tibial Augment Trial, Size 6 RM/LL - 5mm	1
5545-T-601	Tibial Augment Trial, Size 6 LM/RL - 5mm	1
5545-T-702	Tibial Augment Trial, Size 7 RM/LL - 5mm	1
5545-T-701	Tibial Augment Trial, Size 7 LM/RL - 5mm	1
5545-T-802	Tibial Augment Trial, Size 8 RM/LL - 5mm	1
5545-T-801	Tibial Augment Trial, Size 8 LM/RL - 5mm	1
5546-T-102	Tibial Augment Trial, Size 1 RM/LL - 10mm	1
5546-T-101	Tibial Augment Trial, Size 1 LM/RL - 10mm	1
5546-T-202	Tibial Augment Trial, Size 2 RM/LL - 10mm	1
5546-T-201	Tibial Augment Trial, Size 2 LM/RL - 10mm	1
5546-T-302	Tibial Augment Trial, Size 3 RM/LL - 10mm	1
5546-T-301	Tibial Augment Trial, Size 3 LM/RL - 10mm	1
5546-T-402	Tibial Augment Trial, Size 4 RM/LL - 10mm	1
5546-T-401	Tibial Augment Trial, Size 4 LM/RL - 10mm	1
5546-T-502	Tibial Augment Trial, Size 5 RM/LL - 10mm	1
5546-T-501	Tibial Augment Trial, Size 5 LM/RL - 10mm	1
5546-T-602	Tibial Augment Trial, Size 6 RM/LL - 10mm	1
5546-T-601	Tibial Augment Trial, Size 6 LM/RL - 10mm	1
5546-T-702	Tibial Augment Trial, Size 7 RM/LL - 10mm	1
5546-T-701	Tibial Augment Trial, Size 7 LM/RL - 10mm	1
5546-T-802	Tibial Augment Trial, Size 8 RM/LL - 10mm	1
5546-T-801	Tibial Augment Trial, Size 8 LM/RL - 10mm	1
6543-7-601	Resection Guide Tower	1
6543-7-600	Support Arm Assembly	1
6543-6-700	Revision Tibial Resection Guides - Slotted -Left	1
6543-6-701	Revision Tibial Resection Guides - Slotted -Right	1
6541-2-807	Alignment Handle	1
6541-2-429Y	Tibial Stylus	1
6541-2-601	Universal Tibial Template Size 1	1
6541-2-602	Universal Tibial Template Size 2	1
6541-2-603	Universal Tibial Template Size 3	1
6541-2-604	Universal Tibial Template Size 4	1
6541-2-605	Universal Tibial Template Size 5	1
6541-2-606	Universal Tibial Template Size 6	1
6541-2-607	Universal Tibial Template Size 7	1
6541-2-608	Universal Tibial Template Size 8	1

**Triathlon Revision instruments** continued

Item number	Description	Quantity in set
6543-6-504	Revision 100mm Stem Trial (9-25mm)-- Tray	1
5565-T-009A	9 x 100mm Stem Trial	1
5565-T-010A	10 x 100mm Stem Trial	2
5565-T-011A	11 x 100mm Stem Trial	2
5565-T-012A	12 x 100mm Stem Trial	2
5565-T-013A	13 x 100mm Stem Trial	2
5565-T-014A	14 x 100mm Stem Trial	2
5565-T-015A	15 x 100mm Stem Trial	2
5565-T-016A	16 x 100mm Stem Trial	2
5565-T-017A	17 x 100mm Stem Trial	2
5565-T-018A	18 x 100mm Stem Trial	2
5565-T-019A	19 x 100mm Stem Trial	2
5565-T-020A	20 x 100mm Stem Trial	2
5565-T-021A	21 x 100mm Stem Trial	1
5565-T-022A	22 x 100mm Stem Trial	1
5565-T-023A	23 x 100mm Stem Trial	1
5565-T-024A	24 x 100mm Stem Trial	1
5565-T-025A	25 x 100mm Stem Trial	1
6543-6-505	Revision Finishing-- Tray	1
6541-4-810	Impaction Handle	2
6541-4-813	Tibial Insert Impactor	1
6543-4-818	Universal Torque Wrench	1
6543-6-801	Universal Counter Wrench	1
6541-4-807	Femoral Impactor/Extractor	1
6541-4-811	Femoral Impactor	1
6541-4-812	Baseplate Impactor	1
6543-6-850	Revision Baseplate Impactor/Extractor	1
6543-6-030	Hinge Femoral Counter Wrench	1
6541-4-825	Slip Torque Handle	1
6541-4-805	Tibial Baseplate Impactor/Extractor	1
6541-4-802	1/8" Hex Drive	1
6543-4-802	Universal 1/8" Hex Driver	1
6543-4-600	Stabilizer Post Impactor	1

**Triathlon Revision instruments** continued

Item number	Description	Quantity in set
6543-6-506	TS Universal Baseplate Finishing-- TRAY	1
6541-2-013	Size 1-3 Keel Punch (Universal Baseplate)	1
6541-2-046	Size 4-6 Keel Punch (Universal Baseplate)	1
6541-2-078	Size 7-8 Keel Punch (Universal Baseplate)	1
6541-2-748	Size 4-8 Keel Punch Guide (Universal)	1
6541-2-713	Size 1-3 Keel Punch Guide (Universal)	1
6543-2-600	Tibial Offset Bushing	1
6543-2-601	Tibial Offset Bushing Guide	1
5521-T-100	Size 1 Universal Baseplate Trial	1
5521-T-200	Size 2 Universal Baseplate Trial	1
5521-T-300	Size 3 Universal Baseplate Trial	1
5521-T-400	Size 4 Universal Baseplate Trial	1
5521-T-500	Size 5 Universal Baseplate Trial	1
5521-T-600	Size 6 Universal Baseplate Trial	1
5521-T-700	Size 7 Universal Baseplate Trial	1
5521-T-800	Size 8 Universal Baseplate Trial	1
6543-6-507	TS Femoral Prep-- TRAY	1
6543-1-701	Size 1 All-in-One Cutting Block	1
6543-1-702	Size 2 All-in-One Cutting Block	1
6543-1-703	Size 3 All-in-One Cutting Block	1
6543-1-704	Size 4 All-in-One Cutting Block	1
6543-1-705	Size 5 All-in-One Cutting Block	1
6543-1-706	Size 6 All-in-One Cutting Block	1
6543-1-707	Size 7 All-in-One Cutting Block	1
6543-1-708	Size 8 All-in-One Cutting Block	1
6543-1-005	5mm Distal Spacer	2
6543-1-010	10mm Distal Spacer	2
6543-1-015	15mm Distal Spacer	2
6543-4-400	Joint Line Ruler	1
6543-1-710	Revision Box Cutting Guide	1
6543-1-600	Femoral Offset Bushing	1
6543-1-721	Revision Distal Resection Guide	1
6543-6-551	Femoral Distal Spacers- CADDY	1
6543-6-508	TS Femoral Augment Trials-- TRAY	1
5540-T-100A	Femoral Distal Augment Trial, size 1, 5mm	2
5540-T-200A	Femoral Distal Augment Trial, size 2, 5mm	2
5540-T-300A	Femoral Distal Augment Trial, size 3, 5mm	2
5540-T-400A	Femoral Distal Augment Trial, size 4, 5mm	2
5540-T-500A	Femoral Distal Augment Trial, size 5, 5mm	2
5540-T-600A	Femoral Distal Augment Trial, size 6, 5mm	2
5540-T-700A	Femoral Distal Augment Trial, size 7, 5mm	2
5540-T-800A	Femoral Distal Augment Trial, size 8, 5mm	2

**Triathlon Revision instruments** continued

Item number	Description	Quantity in set
5541-T-100A	Femoral Distal Augment Trial, size 1, 10mm	2
5541-T-200A	Femoral Distal Augment Trial, size 2, 10mm	2
5541-T-300A	Femoral Distal Augment Trial, size 3, 10mm	2
5541-T-400A	Femoral Distal Augment Trial, size 4, 10mm	2
5541-T-500A	Femoral Distal Augment Trial, size 5, 10mm	2
5541-T-600A	Femoral Distal Augment Trial, size 6, 10mm	2
5541-T-700A	Femoral Distal Augment Trial, size 7, 10mm	2
5541-T-800A	Femoral Distal Augment Trial, size 8, 10mm	2
5542-T-100A	Femoral Distal Augment Trial, size 1, 15mm	2
5542-T-200A	Femoral Distal Augment Trial, size 2, 15mm	2
5542-T-300A	Femoral Distal Augment Trial, size 3, 15mm	2
5542-T-400A	Femoral Distal Augment Trial, size 4, 15mm	2
5542-T-500A	Femoral Distal Augment Trial, size 5, 15mm	2
5542-T-600A	Femoral Distal Augment Trial, size 6, 15mm	2
5542-T-700A	Femoral Distal Augment Trial, size 7, 15mm	2
5542-T-800A	Femoral Distal Augment Trial, size 8, 15mm	2
5543-T-100	Femoral Posterior Augment Trial, size 1, 5mm	2
5543-T-200	Femoral Posterior Augment Trial, size 2, 5mm	2
5543-T-300	Femoral Posterior Augment Trial, size 3, 5mm	2
5543-T-400	Femoral Posterior Augment Trial, size 4, 5mm	2
5543-T-500	Femoral Posterior Augment Trial, size 5, 5mm	2
5543-T-600	Femoral Posterior Augment Trial, size 6, 5mm	2
5543-T-700	Femoral Posterior Augment Trial, size 7, 5mm	2
5543-T-800	Femoral Posterior Augment Trial, size 8, 5mm	2
5544-T-100	Femoral Posterior Augment Trial, size 1, 10mm	2
5544-T-200	Femoral Posterior Augment Trial, size 2, 10mm	2
5544-T-300	Femoral Posterior Augment Trial, size 3, 10mm	2
5544-T-400	Femoral Posterior Augment Trial, size 4, 10mm	2
5544-T-500	Femoral Posterior Augment Trial, size 5, 10mm	2
5544-T-600	Femoral Posterior Augment Trial, size 6, 10mm	2
5544-T-700	Femoral Posterior Augment Trial, size 7, 10mm	2
5544-T-800	Femoral Posterior Augment Trial, size 8, 10mm	2
6543-6-552	Femoral Distal Augment Trials (Size 1-4)--CADDY	1
6543-6-553	Femoral Distal Augment Trials (Size 5-8)--CADDY	1
6543-6-554	Femoral Posterior Augment Trials (Size 1-8)--CADDY	1
6543-6-509	TS Femoral Trials - Left-- TRAY	1
5512-T-101	TS Femoral Trials, Size 1, Left	1
5512-T-201	TS Femoral Trials, Size 2, Left	1
5512-T-301	TS Femoral Trials, Size 3, Left	1
5512-T-401	TS Femoral Trials, Size 4, Left	1
5512-T-501	TS Femoral Trials, Size 5, Left	1
5512-T-601	TS Femoral Trials, Size 6, Left	1
5512-T-701	TS Femoral Trials, Size 7, Left	1
5512-T-801	TS Femoral Trials, Size 8, Left	1

**Triathlon Revision instruments** continued

Item number	Description	Quantity in set
6543-6-510	TS Femoral Trials - Right-- TRAY	1
5512-T-102	TS Femoral Trials, Size 1, Right	1
5512-T-202	TS Femoral Trials, Size 2, Right	1
5512-T-302	TS Femoral Trials, Size 3, Right	1
5512-T-402	TS Femoral Trials, Size 4, Right	1
5512-T-502	TS Femoral Trials, Size 5, Right	1
5512-T-602	TS Femoral Trials, Size 6, Right	1
5512-T-702	TS Femoral Trials, Size 7, Right	1
5512-T-802	TS Femoral Trials, Size 8, Right	1
6543-6-511	TS Insert Trials (9-19mm)-- TRAY	1
5537-T-109X	Triathlon TS Tibial Insert Trial, Size 1, 9mm	1
5537-T-111X	Triathlon TS Tibial Insert Trial, Size 1, 11mm	1
5537-T-113X	Triathlon TS Tibial Insert Trial, Size 1, 13mm	1
5537-T-116X	Triathlon TS Tibial Insert Trial, Size 1, 16mm	1
5537-T-119X	Triathlon TS Tibial Insert Trial, Size 1, 19mm	1
5537-T-209X	Triathlon TS Tibial Insert Trial, Size 2, 9mm	1
5537-T-211X	Triathlon TS Tibial Insert Trial, Size 2, 11mm	1
5537-T-213X	Triathlon TS Tibial Insert Trial, Size 2, 13mm	1
5537-T-216X	Triathlon TS Tibial Insert Trial, Size 2, 16mm	1
5537-T-219X	Triathlon TS Tibial Insert Trial, Size 2, 19mm	1
5537-T-309X	Triathlon TS Tibial Insert Trial, Size 3, 9mm	1
5537-T-311X	Triathlon TS Tibial Insert Trial, Size 3, 11mm	1
5537-T-313X	Triathlon TS Tibial Insert Trial, Size 3, 13mm	1
5537-T-316X	Triathlon TS Tibial Insert Trial, Size 3, 16mm	1
5537-T-319X	Triathlon TS Tibial Insert Trial, Size 3, 19mm	1
5537-T-409X	Triathlon TS Tibial Insert Trial, Size 4, 9mm	1
5537-T-411X	Triathlon TS Tibial Insert Trial, Size 4, 11mm	1
5537-T-413X	Triathlon TS Tibial Insert Trial, Size 4, 13mm	1
5537-T-416X	Triathlon TS Tibial Insert Trial, Size 4, 16mm	1
5537-T-419X	Triathlon TS Tibial Insert Trial, Size 4, 19mm	1
5537-T-509X	Triathlon TS Tibial Insert Trial, Size 5, 9mm	1
5537-T-511X	Triathlon TS Tibial Insert Trial, Size 5, 11mm	1
5537-T-513X	Triathlon TS Tibial Insert Trial, Size 5, 13mm	1
5537-T-516X	Triathlon TS Tibial Insert Trial, Size 5, 16mm	1
5537-T-519X	Triathlon TS Tibial Insert Trial, Size 5, 19mm	1
5537-T-609X	Triathlon TS Tibial Insert Trial, Size 6, 9mm	1
5537-T-611X	Triathlon TS Tibial Insert Trial, Size 6, 11mm	1
5537-T-613X	Triathlon TS Tibial Insert Trial, Size 6, 13mm	1
5537-T-616X	Triathlon TS Tibial Insert Trial, Size 6, 16mm	1
5537-T-619X	Triathlon TS Tibial Insert Trial, Size 6, 19mm	1
5537-T-709X	Triathlon TS Tibial Insert Trial, Size 7, 9mm	1
5537-T-711X	Triathlon TS Tibial Insert Trial, Size 7, 11mm	1
5537-T-713X	Triathlon TS Tibial Insert Trial, Size 7, 13mm	1



**Triathlon Revision instruments** continued

Item number	Description	Quantity in set
5537-T-716X	Triathlon TS Tibial Insert Trial, Size 7, 16mm	1
5537-T-719X	Triathlon TS Tibial Insert Trial, Size 7, 19mm	1
5537-T-809X	Triathlon TS Tibial Insert Trial, Size 8, 9mm	1
5537-T-811X	Triathlon TS Tibial Insert Trial, Size 8, 11mm	1
5537-T-813X	Triathlon TS Tibial Insert Trial, Size 8, 13mm	1
5537-T-816X	Triathlon TS Tibial Insert Trial, Size 8, 16mm	1
5537-T-819X	Triathlon TS Tibial Insert Trial, Size 8, 19mm	1
6543-6-512	Revision Baseplate Finishing-- TRAY	1
6543-6-038	IM Reamer Neutral Bushing Guide	1
5612-T-100	Revision Baseplate Trial, Size 1	1
5612-T-200	Revision Baseplate Trial, Size 2	1
5612-T-300	Revision Baseplate Trial, Size 3	1
5612-T-400	Revision Baseplate Trial, Size 4	1
5612-T-500	Revision Baseplate Trial, Size 5	1
5612-T-600	Revision Baseplate Trial, Size 6	1
5612-T-700	Revision Baseplate Trial, Size 7	1
6543-6-313	Revision Baseplate Keel Punch, Size 1-3	1
6543-6-346	Revision Baseplate Keel Punch, Size 4-6	1
6543-6-347	Revision Baseplate Keel Punch, Size 7	1
6543-6-413	Revision Baseplate Keel Punch Guide, Size 1-3	1
6543-6-447	Revision Baseplate Keel Punch Guide, Size 4-7	1
6543-6-039	Hinge Tibial Stylus	1
6543-6-517	Revision IM Reamers (20-25mm)-- TRAY	1
6543-7-520	IM Reamer - 20mm	1
6543-7-521	IM Reamer - 21mm	1
6543-7-522	IM Reamer - 22mm	1
6543-7-523	IM Reamer - 23mm	1
6543-7-524	IM Reamer - 24mm	1
6543-7-525	IM Reamer - 25mm	1
5571-T-025	Triathlon Stem Extender Trial - 25mm	2
5571-T-050	Triathlon Stem Extender Trial - 50mm	2

**Triathlon Revision instruments** continued

Item number	Description	Quantity in set
6543-6-518	Revision 150mm Stem Trial (9-25mm)	1
5566-T-009A	9 x 150mm Stem Trial	1
5566-T-010A	10 x 150mm Stem Trial	1
5566-T-011A	11 x 150mm Stem Trial	2
5566-T-012A	12 x 150mm Stem Trial	2
5566-T-013A	13 x 150mm Stem Trial	2
5566-T-014A	14 x 150mm Stem Trial	2
5566-T-015A	15 x 150mm Stem Trial	2
5566-T-016A	16 x 150mm Stem Trial	1
5566-T-017A	17 x 150mm Stem Trial	1
5566-T-018A	18 x 150mm Stem Trial	1
5566-T-019A	19 x 150mm Stem Trial	1
5566-T-020A	20 x 150mm Stem Trial	1
5566-T-021A	21 x 150mm Stem Trial	1
5566-T-022A	22 x 150mm Stem Trial	1
5566-T-023A	23 x 150mm Stem Trial	1
5566-T-024A	24 x 150mm Stem Trial	1
5566-T-025A	25 x 150mm Stem Trial	1
6543-6-519	TS Misc. Instruments-- TRAY	1
6543-4-516	Stem Extender Shaft	1
6543-2-703	Tibial Resection Guide Link	1
6543-4-803	Offset Counter Wrench	1
6543-1-751	Femoral Boss Bushing	1
6543-1-750	Femoral Boss Prep Guide	1
6541-4-610	Adjustable Spacer Block	1
6543-4-605	Adjustable Spacer Block Augment (5mm)	4
6543-4-610	Adjustable Spacer Block Augment (10mm)	4
6543-4-615	Adjustable Spacer Block Augment (15mm)	2
6543-6-556	Offset Adaptor Trials-- CADDY	1
5570-T-020A	Triathlon TS Offset Adaptor Trial (2mm)	2
5570-T-040A	Triathlon TS Offset Adaptor Trial (4mm)	2
5570-T-060A	Triathlon TS Offset Adaptor Trial (6mm)	2
5570-T-080A	Triathlon TS Offset Adaptor Trial (8mm)	2

**Triathlon Revision instruments** continued

Item number	Description	Quantity in set
6543-6-520	TS Insert Trials (Size 1-5, 22-31mm)--TRAY	1
5537-T-122X	Triathlon TS Tibial Insert Trial, Size 1, 22mm	1
5537-T-125X	Triathlon TS Tibial Insert Trial, Size 1, 25mm	1
5537-T-128X	Triathlon TS Tibial Insert Trial, Size 1, 28mm	1
5537-T-131X	Triathlon TS Tibial Insert Trial, Size 1, 31mm	1
5537-T-222X	Triathlon TS Tibial Insert Trial, Size 2, 22mm	1
5537-T-225X	Triathlon TS Tibial Insert Trial, Size 2, 25mm	1
5537-T-228X	Triathlon TS Tibial Insert Trial, Size 2, 28mm	1
5537-T-231X	Triathlon TS Tibial Insert Trial, Size 2, 31mm	1
5537-T-322X	Triathlon TS Tibial Insert Trial, Size 3, 22mm	1
5537-T-325X	Triathlon TS Tibial Insert Trial, Size 3, 25mm	1
5537-T-328X	Triathlon TS Tibial Insert Trial, Size 3, 28mm	1
5537-T-331X	Triathlon TS Tibial Insert Trial, Size 3, 31mm	1
5537-T-422X	Triathlon TS Tibial Insert Trial, Size 4, 22mm	1
5537-T-425X	Triathlon TS Tibial Insert Trial, Size 4, 25mm	1
5537-T-428X	Triathlon TS Tibial Insert Trial, Size 4, 28mm	1
5537-T-431X	Triathlon TS Tibial Insert Trial, Size 4, 31mm	1
5537-T-522X	Triathlon TS Tibial Insert Trial, Size 5, 22mm	1
5537-T-525X	Triathlon TS Tibial Insert Trial, Size 5, 25mm	1
5537-T-528X	Triathlon TS Tibial Insert Trial, Size 5, 28mm	1
5537-T-531X	Triathlon TS Tibial Insert Trial, Size 5, 31mm	1
6543-6-521	TS Insert Trials (Size 6-8, 22-31mm)-- TRAY	1
5537-T-622X	Triathlon TS Tibial Insert Trial, Size 6, 22mm	1
5537-T-625X	Triathlon TS Tibial Insert Trial, Size 6, 25mm	1
5537-T-628X	Triathlon TS Tibial Insert Trial, Size 6, 28mm	1
5537-T-631X	Triathlon TS Tibial Insert Trial, Size 6, 31mm	1
5537-T-722X	Triathlon TS Tibial Insert Trial, Size 7, 22mm	1
5537-T-725X	Triathlon TS Tibial Insert Trial, Size 7, 25mm	1
5537-T-728X	Triathlon TS Tibial Insert Trial, Size 7, 28mm	1
5537-T-731X	Triathlon TS Tibial Insert Trial, Size 7, 31mm	1
5537-T-822X	Triathlon TS Tibial Insert Trial, Size 8, 22mm	1
5537-T-825X	Triathlon TS Tibial Insert Trial, Size 8, 25mm	1
5537-T-828X	Triathlon TS Tibial Insert Trial, Size 8, 28mm	1
5537-T-831X	Triathlon TS Tibial Insert Trial, Size 8, 31mm	1

**Triathlon Revision instruments** continued

Item number	Description	Quantity in set
6543-6-522	TS TCG-- TRAY	1
6543-4-820	TCG T-20 Torx Driver	1
5100-3600	Torque Limiting Screw Driver	1
6543-1-742	TS TCG Valgus Adaptor (2mm)	1
6543-1-744	TS TCG Valgus Adaptor (4mm)	1
6543-1-746	TS TCG Valgus Adaptor (6mm)	1
6543-1-748	TS TCG Valgus Adaptor (8mm)	1
6543-1-740	TS TCG Valgus Adaptor (0mm)	1
6543-4-524	TS TCG Reamer	1
6543-1-731	TS TCG, Size 1	1
6543-1-732	TS TCG, Size 2	1
6543-1-733	TS TCG, Size 3	1
6543-1-734	TS TCG, Size 4	1
6543-1-735	TS TCG, Size 5	1
6543-1-736	TS TCG, Size 6	1
6543-1-737	TS TCG, Size 7	1
6543-1-738	TS TCG, Size 8	1
6543-6-523	TS TCG Insert Trials (9-19mm)-- TRAY	1
5538-T-109X	Triathlon TS TCG Tibial Insert Trial, Size 1, 9mm	1
5538-T-111X	Triathlon TS TCG Tibial Insert Trial, Size 1, 11mm	1
5538-T-113X	Triathlon TS TCG Tibial Insert Trial, Size 1, 13mm	1
5538-T-116X	Triathlon TS TCG Tibial Insert Trial, Size 1, 16mm	1
5538-T-209X	Triathlon TS TCG Tibial Insert Trial, Size 2, 9mm	1
5538-T-211X	Triathlon TS TCG Tibial Insert Trial, Size 2, 11mm	1
5538-T-213X	Triathlon TS TCG Tibial Insert Trial, Size 2, 13mm	1
5538-T-216X	Triathlon TS TCG Tibial Insert Trial, Size 2, 16mm	1
5538-T-309X	Triathlon TS TCG Tibial Insert Trial, Size 3, 9mm	1
5538-T-311X	Triathlon TS TCG Tibial Insert Trial, Size 3, 11mm	1
5538-T-313X	Triathlon TS TCG Tibial Insert Trial, Size 3, 13mm	1
5538-T-316X	Triathlon TS TCG Tibial Insert Trial, Size 3, 16mm	1
5538-T-409X	Triathlon TS TCG Tibial Insert Trial, Size 4, 9mm	1
5538-T-411X	Triathlon TS TCG Tibial Insert Trial, Size 4, 11mm	1
5538-T-413X	Triathlon TS TCG Tibial Insert Trial, Size 4, 13mm	1
5538-T-416X	Triathlon TS TCG Tibial Insert Trial, Size 4, 16mm	1
5538-T-509X	Triathlon TS TCG Tibial Insert Trial, Size 5, 9mm	1
5538-T-511X	Triathlon TS TCG Tibial Insert Trial, Size 5, 11mm	1
5538-T-513X	Triathlon TS TCG Tibial Insert Trial, Size 5, 13mm	1
5538-T-516X	Triathlon TS TCG Tibial Insert Trial, Size 5, 16mm	1
5538-T-609X	Triathlon TS TCG Tibial Insert Trial, Size 6, 9mm	1
5538-T-611X	Triathlon TS TCG Tibial Insert Trial, Size 6, 11mm	1
5538-T-613X	Triathlon TS TCG Tibial Insert Trial, Size 6, 13mm	1
5538-T-616X	Triathlon TS TCG Tibial Insert Trial, Size 6, 16mm	1

**Triathlon Revision instruments** continued

Item number	Description	Quantity in set
5538-T-119X	Triathlon TS TCG Tibial Insert Trial, Size 1, 19mm	1
5538-T-219X	Triathlon TS TCG Tibial Insert Trial, Size 2, 19mm	1
5538-T-319X	Triathlon TS TCG Tibial Insert Trial, Size 3, 19mm	1
5538-T-419X	Triathlon TS TCG Tibial Insert Trial, Size 4, 19mm	1
5538-T-519X	Triathlon TS TCG Tibial Insert Trial, Size 5, 19mm	1
5538-T-619X	Triathlon TS TCG Tibial Insert Trial, Size 6, 19mm	1
5538-T-709X	Triathlon TS TCG Tibial Insert Trial, Size 7, 9mm	1
5538-T-711X	Triathlon TS TCG Tibial Insert Trial, Size 7, 11mm	1
5538-T-713X	Triathlon TS TCG Tibial Insert Trial, Size 7, 13mm	1
5538-T-716X	Triathlon TS TCG Tibial Insert Trial, Size 7, 16mm	1
5538-T-719X	Triathlon TS TCG Tibial Insert Trial, Size 7, 19mm	1
5538-T-809X	Triathlon TS TCG Tibial Insert Trial, Size 8, 9mm	1
5538-T-811X	Triathlon TS TCG Tibial Insert Trial, Size 8, 11mm	1
5538-T-813X	Triathlon TS TCG Tibial Insert Trial, Size 8, 13mm	1
5538-T-816X	Triathlon TS TCG Tibial Insert Trial, Size 8, 16mm	1
5538-T-819X	Triathlon TS TCG Tibial Insert Trial, Size 8, 19mm	1
6543-6-524	TS TCG Insert Trials (Size 1-5, 22-31mm)-- TRAY	1
5538-T-122X	Triathlon TS TCG Tibial Insert Trial, Size 1, 22mm	1
5538-T-125X	Triathlon TS TCG Tibial Insert Trial, Size 1, 25mm	1
5538-T-128X	Triathlon TS TCG Tibial Insert Trial, Size 1, 28mm	1
5538-T-131X	Triathlon TS TCG Tibial Insert Trial, Size 1, 31mm	1
5538-T-222X	Triathlon TS TCG Tibial Insert Trial, Size 2, 22mm	1
5538-T-225X	Triathlon TS TCG Tibial Insert Trial, Size 2, 25mm	1
5538-T-228X	Triathlon TS TCG Tibial Insert Trial, Size 2, 28mm	1
5538-T-231X	Triathlon TS TCG Tibial Insert Trial, Size 2, 31mm	1
5538-T-322X	Triathlon TS TCG Tibial Insert Trial, Size 3, 22mm	1
5538-T-325X	Triathlon TS TCG Tibial Insert Trial, Size 3, 25mm	1
5538-T-328X	Triathlon TS TCG Tibial Insert Trial, Size 3, 28mm	1
5538-T-331X	Triathlon TS TCG Tibial Insert Trial, Size 3, 31mm	1
5538-T-422X	Triathlon TS TCG Tibial Insert Trial, Size 4, 22mm	1
5538-T-425X	Triathlon TS TCG Tibial Insert Trial, Size 4, 25mm	1
5538-T-428X	Triathlon TS TCG Tibial Insert Trial, Size 4, 28mm	1
5538-T-431X	Triathlon TS TCG Tibial Insert Trial, Size 4, 31mm	1
5538-T-522X	Triathlon TS TCG Tibial Insert Trial, Size 5, 22mm	1
5538-T-525X	Triathlon TS TCG Tibial Insert Trial, Size 5, 25mm	1
5538-T-528X	Triathlon TS TCG Tibial Insert Trial, Size 5, 28mm	1
5538-T-531X	Triathlon TS TCG Tibial Insert Trial, Size 5, 31mm	1

**Triathlon Revision instruments** continued

Item number	Description	Quantity in set
6543-6-526	TS TCG Insert Trials (Size 6-8, 22-31mm)	1
5538-T-622X	Triathlon TS TCG Tibial Insert Trial, Size 6, 22mm	1
5538-T-625X	Triathlon TS TCG Tibial Insert Trial, Size 6, 25mm	1
5538-T-628X	Triathlon TS TCG Tibial Insert Trial, Size 6, 28mm	1
5538-T-631X	Triathlon TS TCG Tibial Insert Trial, Size 6, 31mm	1
5538-T-722X	Triathlon TS TCG Tibial Insert Trial, Size 7, 22mm	1
5538-T-725X	Triathlon TS TCG Tibial Insert Trial, Size 7, 25mm	1
5538-T-728X	Triathlon TS TCG Tibial Insert Trial, Size 7, 28mm	1
5538-T-731X	Triathlon TS TCG Tibial Insert Trial, Size 7, 31mm	1
5538-T-822X	Triathlon TS TCG Tibial Insert Trial, Size 8, 22mm	1
5538-T-825X	Triathlon TS TCG Tibial Insert Trial, Size 8, 25mm	1
5538-T-828X	Triathlon TS TCG Tibial Insert Trial, Size 8, 28mm	1
5538-T-831X	Triathlon TS TCG Tibial Insert Trial, Size 8, 31mm	1
6543-5-200	Tibial Symmetric Cone Reamer	1
6543-5-220	Tibial Asymmetric Cone Reamer Size B	1
6543-5-230	Tibial Asymmetric Cone Reamer Size C	1
6543-5-240	Tibial Asymmetric Cone Reamer Size D	1
6543-5-250	Tibial Asymmetric Cone Reamer Size E	1
6543-5-201	Tibial Cone Reamer Guide LM/RL	1
6543-5-202	Tibial Cone Reamer Guide RM/LL	1
6543-5-203	Tibial Cone Alignment Guide	1
6543-8-017	Tibial Cone Upper Tray	1
6543-5-211	Tibial Cone Introducer Size A	1
6543-5-221	Tibial Cone Introducer Size B	1
6543-5-231	Tibial Cone Introducer Size C	1
6543-5-241	Tibial Cone Introducer Size D	1
6543-5-251	Tibial Cone Introducer Size E	1
6541-5-100	Cone Extractor	1
5549-T-110	Tibial Symmetric Cone Augment Trial Size A	1
5549-T-120	Tibial Symmetric Cone Augment Trial Size B	1
5549-T-130	Tibial Symmetric Cone Augment Trial Size C	1
5549-T-140	Tibial Symmetric Cone Augment Trial Size D	1
5549-T-150	Tibial Symmetric Cone Augment Trial Size E	1
5549-T-221	Tibial Asymmetric Cone Augment Trial Size B LM/RL	1
5549-T-222	Tibial Asymmetric Cone Augment Trial Size B RM/LL	1
5549-T-231	Tibial Asymmetric Cone Augment Trial Size C LM/RL	1
5549-T-232	Tibial Asymmetric Cone Augment Trial Size C RM/LL	1
5549-T-241	Tibial Asymmetric Cone Augment Trial Size D LM/RL	1
5549-T-242	Tibial Asymmetric Cone Augment Trial Size D RM/LL	1
5549-T-251	Tibial Asymmetric Cone Augment Trial Size E LM/RL	1
5549-T-252	Tibial Asymmetric Cone Augment Trial Size E RM/LL	1
6543-8-117	Tibial Cone Lower Tray	1
5900-8114	Stryker Case	1

**Triathlon Revision instruments** continued

Item number	Description	Quantity in set
6543-5-300	Femoral Symmetric Cone Reamer	1
6543-5-301	Femoral Cone Reamer Guide	1
6543-5-303	Femoral Cone Alignment Guide	1
6543-5-304	Femoral Cone Introducer	1
6541-5-100	Cone Extractor	1
5549-T-321	Femoral Cone Augment Trial Size 1 & 2 Left	1
5549-T-322	Femoral Cone Augment Trial Size 1 & 2 Right	1
5549-T-331	Femoral Cone Augment Trial Size 3 Left	1
5549-T-332	Femoral Cone Augment Trial Size 3 Right	1
5549-T-341	Femoral Cone Augment Trial Size 4 Left	1
5549-T-342	Femoral Cone Augment Trial Size 4 Right	1
5549-T-351	Femoral Cone Augment Trial Size 5 Left	1
5549-T-352	Femoral Cone Augment Trial Size 5 Right	1
5549-T-361	Femoral Cone Augment Trial Size 6 Left	1
5549-T-362	Femoral Cone Augment Trial Size 6 Right	1
5549-T-371	Femoral Cone Augment Trial Size 7 & 8 Left	1
5549-T-372	Femoral Cone Augment Trial Size 7 & 8 Right	1
6543-8-118	Femoral Cone Prep. 1 Tray	1
1020-9000	Single Tray Case	1
6543-5-302	Femoral Cone Handle	1
6543-5-321	Femoral Cone Stabilizer Size 1 & 2	1
6543-5-331	Femoral Cone Stabilizer Size 3	1
6543-5-341	Femoral Cone Stabilizer Size 4	1
6543-5-351	Femoral Cone Stabilizer Size 5	1
6543-5-361	Femoral Cone Stabilizer Size 6	1
6543-5-371	Femoral Cone Stabilizer Size 7 & 8	1
6543-5-320	Femoral Cone Reamer Size 1 & 2	1
6543-5-330	Femoral Cone Reamer Size 3	1
6543-5-340	Femoral Cone Reamer Size 4	1
6543-5-350	Femoral Cone Reamer Size 5	1
6543-5-360	Femoral Cone Reamer Size 6	1
6543-5-370	Femoral Cone Reamer Size 7 & 8	1
6543-8-018	Femoral Cone Prep. 2 Tray	1
1020-9000	Single Tray Case	1

**Triathlon Revision instruments** continued

<b>Item number</b>	<b>Description</b>	<b>Quantity in set</b>
6543-6-128	Central Femoral Cone Introducer Size 1 - 4	1
6543-6-129	Central Femoral Cone Introducer Size 5 - 8	1
6543-6-130	TS Central Femoral Cone Reamer	1
6543-5-300	Femoral Symmetric Cone Reamer	1
6543-6-131	Central Femoral Cone Augment Trial Size 1-2, Left	1
6543-6-132	Central Femoral Cone Augment Trial Size 1-2, Right	1
6543-6-135	Central Femoral Cone Augment Trial Size 3-4, Left	1
6543-6-136	Central Femoral Cone Augment Trial Size 3-4, Right	1
6543-6-137	Central Femoral Cone Augment Trial Size 5, Left	1
6543-6-138	Central Femoral Cone Augment Trial Size 5, Right	1
6543-6-139	Central Femoral Cone Augment Trial Size 6, Left	1
6543-6-140	Central Femoral Cone Augment Trial Size 6, Right	1
6543-6-141	Central Femoral Cone Augment Trial Size 7-8, Left	1
6543-6-142	Central Femoral Cone Augment Trial Size 7-8, Right	1
6541-5-100	Cone Extractor	1
6543-6-960	Triathlon Tritanium Central Femoral Cone Preparation Tray	1



## Triathlon Revision implants

### Triathlon TS Femoral Component part numbers

Item number	Description
5512-F-101	TS Femoral Component #1 Left
5512-F-201	TS Femoral Component #2 Left
5512-F-301	TS Femoral Component #3 Left
5512-F-401	TS Femoral Component #4 Left
5512-F-501	TS Femoral Component #5 Left
5512-F-601	TS Femoral Component #6 Left
5512-F-701	TS Femoral Component #7 Left
5512-F-801	TS Femoral Component #8 Left
5512-F-102	TS Femoral Component #1 Right
5512-F-202	TS Femoral Component #2 Right
5512-F-302	TS Femoral Component #3 Right
5512-F-402	TS Femoral Component #4 Right
5512-F-502	TS Femoral Component #5 Right
5512-F-602	TS Femoral Component #6 Right
5512-F-702	TS Femoral Component #7 Right
5512-F-802	TS Femoral Component #8 Right

### Triathlon Revision Tibial Baseplate part numbers

Item number	Description
5612-B-100	Triathlon Revision Tibial Baseplate Size 1
5612-B-200	Triathlon Revision Tibial Baseplate Size 2
5612-B-700	Triathlon Revision Tibial Baseplate Size 7
5612-B-100	Triathlon Revision Tibial Baseplate Size 1
5612-B-200	Triathlon Revision Tibial Baseplate Size 2
5612-B-300	Triathlon Revision Tibial Baseplate Size 3
5612-B-400	Triathlon Revision Tibial Baseplate Size 4
5612-B-500	Triathlon Revision Tibial Baseplate Size 5
5612-B-600	Triathlon Revision Tibial Baseplate Size 6
5612-B-700	Triathlon Revision Tibial Baseplate Size 7

**Triathlon Revision implants** continued

**Triathlon Tritanium Cone Augments part numbers**

Item number	Description
5549-A-120	Triathlon Tritanium Symmetric Cone Augment Size B
5549-A-130	Triathlon Tritanium Symmetric Cone Augment Size C
5549-A-140	Triathlon Tritanium Symmetric Cone Augment Size D
5549-A-150	Triathlon Tritanium Symmetric Cone Augment Size E
5549-A-221	Triathlon Tritanium Asymmetric Cone Augment Size B LM/RL
5549-A-222	Triathlon Tritanium Asymmetric Cone Augment Size B RM/LL
5549-A-231	Triathlon Tritanium Asymmetric Cone Augment Size C LM/RL
5549-A-232	Triathlon Tritanium Asymmetric Cone Augment Size C RM/LL
5549-A-241	Triathlon Tritanium Asymmetric Cone Augment Size D LM/RL
5549-A-242	Triathlon Tritanium Asymmetric Cone Augment Size D RM/LL
5549-A-251	Triathlon Tritanium Asymmetric Cone Augment Size E LM/RL
5549-A-252	Triathlon Tritanium Asymmetric Cone Augment Size E RM/LL
5549-A-321	Triathlon Tritanium Femoral Cone Augment Size 1 & 2 Left
5549-A-322	Triathlon Tritanium Femoral Cone Augment Size 1 & 2 Right
5549-A-331	Triathlon Tritanium Femoral Cone Augment Size 3 Left
5549-A-332	Triathlon Tritanium Femoral Cone Augment Size 3 Right
5549-A-341	Triathlon Tritanium Femoral Cone Augment Size 4 Left
5549-A-342	Triathlon Tritanium Femoral Cone Augment Size 4 Right
5549-A-351	Triathlon Tritanium Femoral Cone Augment Size 5 Left
5549-A-352	Triathlon Tritanium Femoral Cone Augment Size 5 Right
5549-A-361	Triathlon Tritanium Femoral Cone Augment Size 6 Left
5549-A-362	Triathlon Tritanium Femoral Cone Augment Size 6 Right
5549-A-371	Triathlon Tritanium Femoral Cone Augment Size 7 & 8 Left
5549-A-372	Triathlon Tritanium Femoral Cone Augment Size 7 & 8 Right
5549-A-621	Triathlon Tritanium Central Femoral Cone Augment Size 1&2 Left
5549-A-622	Triathlon Tritanium Central Femoral Cone Augment Size 1&2 Right
5549-A-641	Triathlon Tritanium Central Femoral Cone Augment Size 3&4 Left
5549-A-642	Triathlon Tritanium Central Femoral Cone Augment Size 3&4 Right
5549-A-651	Triathlon Tritanium Central Femoral Cone Augment Size 5 Left
5549-A-652	Triathlon Tritanium Central Femoral Cone Augment Size 5 Right
5549-A-661	Triathlon Tritanium Central Femoral Cone Augment Size 6 Left
5549-A-662	Triathlon Tritanium Central Femoral Cone Augment Size 6 Right
5549-A-671	Triathlon Tritanium Central Femoral Cone Augment Size 7&8 Left
5549-A-672	Triathlon Tritanium Central Femoral Cone Augment Size 7&8 Right

**Triathlon Revision implants** continued

**Triathlon TS Femoral Augment part numbers**

Item number	Description
5540-A-101	Triathlon Femoral Distal Augment - 5mm #1 Left
5540-A-201	Triathlon Femoral Distal Augment - 5mm #2 Left
5540-A-301	Triathlon Femoral Distal Augment - 5mm #3 Left
5540-A-401	Triathlon Femoral Distal Augment - 5mm #4 Left
5540-A-501	Triathlon Femoral Distal Augment - 5mm #5 Left
5540-A-601	Triathlon Femoral Distal Augment - 5mm #6 Left
5540-A-701	Triathlon Femoral Distal Augment - 5mm #7 Left
5540-A-801	Triathlon Femoral Distal Augment - 5mm #8 Left
5540-A-102	Triathlon Femoral Distal Augment - 5mm #1 Right
5540-A-202	Triathlon Femoral Distal Augment - 5mm #2 Right
5540-A-302	Triathlon Femoral Distal Augment - 5mm #3 Right
5540-A-402	Triathlon Femoral Distal Augment - 5mm #4 Right
5540-A-502	Triathlon Femoral Distal Augment - 5mm #5 Right
5540-A-602	Triathlon Femoral Distal Augment - 5mm #6 Right
5540-A-702	Triathlon Femoral Distal Augment - 5mm #7 Right
5540-A-802	Triathlon Femoral Distal Augment - 5mm #8 Right
5541-A-101	Triathlon Femoral Distal Augment - 10mm #1 Left
5541-A-201	Triathlon Femoral Distal Augment - 10mm #2 Left
5541-A-301	Triathlon Femoral Distal Augment - 10mm #3 Left
5541-A-401	Triathlon Femoral Distal Augment - 10mm #4 Left
5541-A-501	Triathlon Femoral Distal Augment - 10mm #5 Left
5541-A-601	Triathlon Femoral Distal Augment - 10mm #6 Left
5541-A-701	Triathlon Femoral Distal Augment - 10mm #7 Left
5541-A-801	Triathlon Femoral Distal Augment - 10mm #8 Left
5541-A-102	Triathlon Femoral Distal Augment - 10mm #1 Right
5541-A-202	Triathlon Femoral Distal Augment - 10mm #2 Right
5541-A-302	Triathlon Femoral Distal Augment - 10mm #3 Right
5541-A-402	Triathlon Femoral Distal Augment - 10mm #4 Right
5541-A-502	Triathlon Femoral Distal Augment - 10mm #5 Right
5541-A-602	Triathlon Femoral Distal Augment - 10mm #6 Right
5541-A-702	Triathlon Femoral Distal Augment - 10mm #7 Right
5541-A-802	Triathlon Femoral Distal Augment - 10mm #8 Right
5542-A-101	Triathlon Femoral Distal Augment - 15mm #1 Left
5542-A-201	Triathlon Femoral Distal Augment - 15mm #2 Left
5542-A-301	Triathlon Femoral Distal Augment - 15mm #3 Left
5542-A-401	Triathlon Femoral Distal Augment - 15mm #4 Left
5542-A-501	Triathlon Femoral Distal Augment - 15mm #5 Left
5542-A-601	Triathlon Femoral Distal Augment - 15mm #6 Left
5542-A-701	Triathlon Femoral Distal Augment - 15mm #7 Left
5542-A-801	Triathlon Femoral Distal Augment - 15mm #8 Left
5542-A-102	Triathlon Femoral Distal Augment - 15mm #1 Right
5542-A-202	Triathlon Femoral Distal Augment - 15mm #2 Right

**Triathlon Revision implants** continued

**Triathlon TS Femoral Augment part numbers (continued)**

<b>Item number</b>	<b>Description</b>
5542-A-302	Triathlon Femoral Distal Augment - 15mm #3 Right
5542-A-402	Triathlon Femoral Distal Augment - 15mm #4 Right
5542-A-502	Triathlon Femoral Distal Augment - 15mm #5 Right
5542-A-602	Triathlon Femoral Distal Augment - 15mm #6 Right
5542-A-702	Triathlon Femoral Distal Augment - 15mm #7 Right
5542-A-802	Triathlon Femoral Distal Augment - 15mm #8 Right
5543-A-100	Triathlon Femoral Posterior Augment, 5mm - Size 1
5543-A-200	Triathlon Femoral Posterior Augment, 5mm - Size 2
5543-A-300	Triathlon Femoral Posterior Augment, 5mm - Size 3
5543-A-400	Triathlon Femoral Posterior Augment, 5mm - Size 4
5543-A-500	Triathlon Femoral Posterior Augment, 5mm - Size 5
5543-A-600	Triathlon Femoral Posterior Augment, 5mm - Size 6
5543-A-700	Triathlon Femoral Posterior Augment, 5mm - Size 7
5543-A-800	Triathlon Femoral Posterior Augment, 5mm - Size 8
5544-A-100	Triathlon Femoral Posterior Augment, 10mm - Size 1
5544-A-200	Triathlon Femoral Posterior Augment, 10mm - Size 2
5544-A-300	Triathlon Femoral Posterior Augment, 10mm - Size 3
5544-A-400	Triathlon Femoral Posterior Augment, 10mm - Size 4
5544-A-500	Triathlon Femoral Posterior Augment, 10mm - Size 5
5544-A-600	Triathlon Femoral Posterior Augment, 10mm - Size 6
5544-A-700	Triathlon Femoral Posterior Augment, 10mm - Size 7
5544-A-800	Triathlon Femoral Posterior Augment, 10mm - Size 8

**Triathlon Revision implants** continued

**Triathlon Revision Tibial Augment part numbers**

Item number	Description
5612-A-110	Triathlon Revision Tibial Augment Size 1, RM/LL, 10mm
5612-A-111	Triathlon Revision Tibial Augment Size 1, LM/RL, 10mm
5612-A-150	Triathlon Revision Tibial Augment Size 1, RM/LL, 5mm
5612-A-151	Triathlon Revision Tibial Augment Size 1, LM/RL, 5mm
5612-A-210	Triathlon Revision Tibial Augment Size 2, RM/LL, 10mm
5612-A-211	Triathlon Revision Tibial Augment Size 2, LM/RL, 10mm
5612-A-250	Triathlon Revision Tibial Augment Size 2, RM/LL, 5mm
5612-A-251	Triathlon Revision Tibial Augment Size 2, LM/RL, 5mm
5612-A-310	Triathlon Revision Tibial Augment Size 3, RM/LL, 10mm
5612-A-311	Triathlon Revision Tibial Augment Size 3, LM/RL, 10mm
5612-A-350	Triathlon Revision Tibial Augment Size 3, RM/LL, 5mm
5612-A-351	Triathlon Revision Tibial Augment Size 3, LM/RL, 5mm
5612-A-410	Triathlon Revision Tibial Augment Size 4, RM/LL, 10mm
5612-A-411	Triathlon Revision Tibial Augment Size 4, LM/RL, 10mm
5612-A-450	Triathlon Revision Tibial Augment Size 4, RM/LL, 5mm
5612-A-451	Triathlon Revision Tibial Augment Size 4, LM/RL, 5mm
5612-A-510	Triathlon Revision Tibial Augment Size 5, RM/LL, 10mm
5612-A-511	Triathlon Revision Tibial Augment Size 5, LM/RL, 10mm
5612-A-550	Triathlon Revision Tibial Augment Size 5, RM/LL, 5mm
5612-A-551	Triathlon Revision Tibial Augment Size 5, LM/RL, 5mm
5612-A-610	Triathlon Revision Tibial Augment Size 6, RM/LL, 10mm
5612-A-611	Triathlon Revision Tibial Augment Size 6, LM/RL, 10mm
5612-A-650	Triathlon Revision Tibial Augment Size 6, RM/LL, 5mm
5612-A-651	Triathlon Revision Tibial Augment Size 6, LM/RL, 5mm
5612-A-710	Triathlon Revision Tibial Augment Size 7, RM/LL, 10mm
5612-A-711	Triathlon Revision Tibial Augment Size 7, LM/RL, 10mm
5612-A-750	Triathlon Revision Tibial Augment Size 7, RM/LL, 5mm
5612-A-751	Triathlon Revision Tibial Augment Size 7, LM/RL, 5mm
5612-A-810	Triathlon Revision Tibial Augment Size 8, RM/LL, 10mm
5612-A-811	Triathlon Revision Tibial Augment Size 8, LM/RL, 10mm
5612-A-850	Triathlon Revision Tibial Augment Size 8, RM/LL, 5mm
5612-A-851	Triathlon Revision Tibial Augment Size 8, LM/RL, 5mm

**Triathlon TS Stems - Cemented - part numbers**

Item number	Description
5560-S-109	Triathlon Cemented Stem 9mm x 50mm
5560-S-112	Triathlon Cemented Stem 12mm x 50mm
5560-S-115	Triathlon Cemented Stem 15mm x 50mm
5560-S-209	Triathlon Cemented Stem 9mm x 100mm
5560-S-212	Triathlon Cemented Stem 12mm x 100mm
5560-S-215	Triathlon Cemented Stem 15mm x 100mm
5560-S-309	Triathlon Cemented Stem 9mm x 150mm
5560-S-312	Triathlon Cemented Stem 12mm x 150mm
5560-S-315	Triathlon Cemented Stem 15mm x 150mm

## Triathlon Revision implants continued

### Triathlon TS Stems - Fluted - part numbers

Item number	Description
5565-S-010	Triathlon Fluted Stem, Titanium 10mm x 100mm
5565-S-011	Triathlon Fluted Stem, Titanium 11mm x 100mm
5565-S-012	Triathlon Fluted Stem, Titanium 12mm x 100mm
5565-S-013	Triathlon Fluted Stem, Titanium 13mm x 100mm
5565-S-014	Triathlon Fluted Stem, Titanium 14mm x 100mm
5565-S-015	Triathlon Fluted Stem, Titanium 15mm x 100mm
5565-S-016	Triathlon Fluted Stem, Titanium 16mm x 100mm
5565-S-017	Triathlon Fluted Stem, Titanium 17mm x 100mm
5565-S-018	Triathlon Fluted Stem, Titanium 18mm x 100mm
5565-S-019	Triathlon Fluted Stem, Titanium 19mm x 100mm
5565-S-020	Triathlon Fluted Stem, Titanium 20mm x 100mm
5565-S-021	Triathlon Fluted Stem, Titanium 21mm x 100mm
5565-S-022	Triathlon Fluted Stem, Titanium 22mm x 100mm
5565-S-023	Triathlon Fluted Stem, Titanium 23mm x 100mm
5565-S-024	Triathlon Fluted Stem, Titanium 24mm x 100mm
5565-S-025	Triathlon Fluted Stem, Titanium 25mm x 100mm
5566-S-010	Triathlon Fluted Stem, Titanium 10mm x 150mm
5566-S-011	Triathlon Fluted Stem, Titanium 11mm x 150mm
5566-S-012	Triathlon Fluted Stem, Titanium 12mm x 150mm
5566-S-013	Triathlon Fluted Stem, Titanium 13mm x 150mm
5566-S-014	Triathlon Fluted Stem, Titanium 14mm x 150mm
5566-S-015	Triathlon Fluted Stem, Titanium 15mm x 150mm
5566-S-016	Triathlon Fluted Stem, Titanium 16mm x 150mm
5566-S-017	Triathlon Fluted Stem, Titanium 17mm x 150mm
5566-S-018	Triathlon Fluted Stem, Titanium 18mm x 150mm
5566-S-019	Triathlon Fluted Stem, Titanium 19mm x 150mm
5566-S-020	Triathlon Fluted Stem, Titanium 20mm x 150mm
5566-S-021	Triathlon Fluted Stem, Titanium 21mm x 150mm
5566-S-022	Triathlon Fluted Stem, Titanium 22mm x 150mm
5566-S-023	Triathlon Fluted Stem, Titanium 23mm x 150mm
5566-S-024	Triathlon Fluted Stem, Titanium 24mm x 150mm
5566-S-025	Triathlon Fluted Stem, Titanium 25mm x 150mm

### Triathlon TS Offset Adapter part numbers

Item number	Description
5570-S-020	Triathlon TS Offset Adaptor 2mm
5570-S-040	Triathlon TS Offset Adaptor 4mm
5570-S-060	Triathlon TS Offset Adaptor 6mm
5570-S-080	Triathlon TS Offset Adaptor 8mm

### Triathlon TS Stem Extender part numbers

Item number	Description
5571-S-025	Triathlon Stem Extender 25mm
5571-S-050	Triathlon Stem Extender 50mm

## Triathlon Revision implants continued

### Triathlon Revision Insert X3

Item number	Description
5612-X-109	Triathlon Revision Insert X3 Size 1, 9mm
5612-X-111	Triathlon Revision Insert X3 Size 1, 11mm
5612-X-113	Triathlon Revision Insert X3 Size 1, 13mm
5612-X-116	Triathlon Revision Insert X3 Size 1, 16mm
5612-X-119	Triathlon Revision Insert X3 Size 1, 19mm
5612-X-122	Triathlon Revision Insert X3 Size 1, 22mm
5612-X-125	Triathlon Revision Insert X3 Size 1, 25mm
5612-X-209	Triathlon Revision Insert X3 Size 2, 9mm
5612-X-211	Triathlon Revision Insert X3 Size 2, 11mm
5612-X-213	Triathlon Revision Insert X3 Size 2, 13mm
5612-X-216	Triathlon Revision Insert X3 Size 2, 16mm
5612-X-219	Triathlon Revision Insert X3 Size 2, 19mm
5612-X-222	Triathlon Revision Insert X3 Size 2, 22mm
5612-X-225	Triathlon Revision Insert X3 Size 2, 25mm
5612-X-309	Triathlon Revision Insert X3 Size 3, 9mm
5612-X-311	Triathlon Revision Insert X3 Size 3, 11mm
5612-X-313	Triathlon Revision Insert X3 Size 3, 13mm
5612-X-316	Triathlon Revision Insert X3 Size 3, 16mm
5612-X-319	Triathlon Revision Insert X3 Size 3, 19mm
5612-X-322	Triathlon Revision Insert X3 Size 3, 22mm
5612-X-325	Triathlon Revision Insert X3 Size 3, 25mm
5612-X-409	Triathlon Revision Insert X3 Size 4, 9mm
5612-X-411	Triathlon Revision Insert X3 Size 4, 11mm
5612-X-413	Triathlon Revision Insert X3 Size 4, 13mm
5612-X-416	Triathlon Revision Insert X3 Size 4, 16mm
5612-X-419	Triathlon Revision Insert X3 Size 4, 19mm
5612-X-422	Triathlon Revision Insert X3 Size 4, 22mm
5612-X-425	Triathlon Revision Insert X3 Size 4, 25mm
5612-X-509	Triathlon Revision Insert X3 Size 5, 9mm
5612-X-511	Triathlon Revision Insert X3 Size 5, 11mm
5612-X-513	Triathlon Revision Insert X3 Size 5, 13mm
5612-X-516	Triathlon Revision Insert X3 Size 5, 16mm
5612-X-519	Triathlon Revision Insert X3 Size 5, 19mm
5612-X-522	Triathlon Revision Insert X3 Size 5, 22mm
5612-X-525	Triathlon Revision Insert X3 Size 5, 25mm
5612-X-609	Triathlon Revision Insert X3 Size 6, 9mm
5612-X-611	Triathlon Revision Insert X3 Size 6, 11mm
5612-X-613	Triathlon Revision Insert X3 Size 6, 13mm
5612-X-616	Triathlon Revision Insert X3 Size 6, 16mm
5612-X-619	Triathlon Revision Insert X3 Size 6, 19mm
5612-X-622	Triathlon Revision Insert X3 Size 6, 22mm
5612-X-625	Triathlon Revision Insert X3 Size 6, 25mm
5612-X-709	Triathlon Revision Insert X3 Size 7, 9mm
5612-X-711	Triathlon Revision Insert X3 Size 7, 11mm
5612-X-713	Triathlon Revision Insert X3 Size 7, 13mm
5612-X-716	Triathlon Revision Insert X3 Size 7, 16mm
5612-X-719	Triathlon Revision Insert X3 Size 7, 19mm
5612-X-722	Triathlon Revision Insert X3 Size 7, 22mm
5612-X-725	Triathlon Revision Insert X3 Size 7, 25mm

### X-ray Templates

Item number	Description
LTEMK39	Triathlon TS X-Ray Templates
LTEMK45	Triathlon Tritanium Cones X-Ray Templates

# Triathlon® Hinge

## Knee System



**Surgical protocol**

**Instruments**

**Implants**



## Surgical protocol

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## Indications and contraindications

### Indications

Triathlon Hinge Knee System is intended to be implanted with bone cement for the following condition(s):

- There is destruction of the joint surfaces, with or without significant bone deformity.
- The cruciate and/or collateral ligaments do not stabilize the knee joint.
- The ligaments are inadequate and/or the musculature is weak. And/or
- Revision is required of a failed prosthesis where there has been gross instability, with or without bone loss or inadequate soft tissue.
- And/or where segmental resection and replacement of the distal femur is required.

Refer to the package insert of the devices with which the device listed will be used for a complete list of related indications and contraindications.

### Contraindications

Absolute contraindications include:

1. overt infection;
2. distant foci of infections (which may cause hematogenous spread to the implant site);
3. rapid disease progression as manifested by joint destruction or bone resorption apparent on roentgenogram;
4. skeletally immature patients;
5. cases where there is poor bone stock which would make the procedure unjustifiable.
6. known or suspected sensitivity and/or allergy to any material in the device.

Conditions presenting an increased risk of failure include:

1. uncooperative patient or patient with neurologic disorder, incapable of following instructions;
2. osteoporosis;
3. metabolic disorders which may impair bone formation or cause bone loss;
4. osteomalacia; and,
5. previous arthrodesis.

A higher incidence of implant failure has also occurred in paraplegics, cerebral palsy and patients with Parkinson's disease.

See package insert for warnings, precautions, adverse effects, information for patients and other essential product information. Before using Triathlon instrumentation, verify:

- Instruments have been properly disassembled prior to cleaning and sterilization.
- Instruments have been properly assembled post-sterilization.
- Instruments have maintained design integrity.
- Proper size configurations are available.

For Instructions for Cleaning, Sterilization, Inspection and Maintenance of Orthopaedic Medical Devices, refer to LSTPI-B and SLI0001.

System compatibility

		Revision Baseplate	Triathlon Hinge Femur
Femur types	Triathlon TS Femur	✓	N/A
	Triathlon Hinge Femur	✓	N/A
Insert types	Triathlon TS Insert	✗	✗
	Triathlon Revision Insert	✓	✗
	Triathlon Hinge Insert	✓	✓
Stem types	Fluted Stems	✓	✓†
	Cemented Stems	✓	✓†
	Offset Adaptors	✗	✗
	Stem Extenders	✓*	✓
Cone types	Symmetric Tibial Cone	✓**	N/A
	Asymmetric Tibial Cone	✓**	N/A
	Central Femoral Cone	N/A	✓**
	Femoral Cone	N/A	✗
Patella types	Asymmetric	N/A	✓
	Asymmetric metal-backed	N/A	✓
	Symmetric metal-backed	N/A	✓
	Symmetric	N/A	✓

\* The 50mm Stem Extender cannot be used with the Triathlon Revision Tibial Baseplate Components (5612-B-X00) when used with a 150mm Triathlon TS Stem.

\*\* See detailed table within the protocol for Tibial Cone and Central Femoral Cone size compatibility.

† The Triathlon Hinge Knee Femoral Component requires a 100mm or longer Stem Extension.

Compatibility

This compatibility chart applies to the Triathlon Revision Baseplate and Triathlon Hinge Femur implant construct.

Tibial insert/baseplate compatibility

**Size matching:** Size specific, e.g., size 4 insert to be used only with size 4 baseplate.

► **Note:** The Hinge insert can only be used with the cemented Revision Baseplate.

Femoral component/baseplate compatibility

**Size matching:** See the table on the next page for appropriate femoral, tibial and bearing component implant compatibility.

Femoral component/patella compatibility

**Size matching:** Every patella is designed to articulate with every femur due to a common radius across all sizes.

Triathlon Hinge Augments (for Triathlon Hinge cemented femurs only)

Distal Augments are for use with both the medial and lateral portions of the side indicated, e.g., #4 is used for medial and lateral compartments on a size 4 femur.

Triathlon Revision Baseplate Augments

Tibial Augments come in left medial/right lateral or right medial/left lateral configurations.

Tibial Augments are size specific, e.g., size 4 tibial augments are for the size 4 Revision Baseplate and Universal Baseplate. For Universal Baseplate part numbers see TRITS-SP-2.

Tritanium Tibial Cone Augments

Size A tibial cone is not compatible with the Revision Baseplate due to the boss diameter.

Size B is the minimum size for tibial cone augment compatibility.

Triathlon TS Stems

The Triathlon Hinge Femoral component (5612-F-X0Y) requires a 100mm or longer Stem Extension.

The Triathlon Revision Tibial Baseplate (5612-B-X00) requires a 50mm or longer Stem Extension. A 50mm Stem Extender cannot be used when 150mm stem is used.

Revision Baseplate size	Hinge Femur size	Compatible Bearing Component part number
1	1-2	5612-0-001
2	1-2	5612-0-001
	3-4	5612-0-003
3	1-2	5612-0-001
	3-4	5612-0-003
4	1-2	5612-0-001
	3-4	5612-0-003
	5-6	5612-0-005
5	1-2	5612-0-001
	3-4	5612-0-003
	5-6	5612-0-005
6	1-2	5612-0-001
	3-4	5612-0-003
	5-6	5612-0-005
7	1-2	5612-0-001
	3-4	5612-0-003
	5-6	5612-0-005

**Compatibility table indicating appropriate bearing component implant for each tibial and femoral implant size.**

For all Triathlon Hinge constructs use the following hinge implant accessories:

- Tibial Sleeve 5612-5-002, packaged with the Hinge Insert (alternatively 6481-2-140)
- Bushings (x2) 5612-2-002 packaged in 5612-3-000 packaging assembly. (alternatively 6481-2-110)
- Axle 5612-3-001, packaged in 5612-3-000 packaging assembly (alternatively 6481-2-120)
- Bumper 5612-4-000 or 5612-4-003

The Tibial Sleeve is packaged with the Hinge Insert. The Axle and Bushings are packaged together as part number 5612-3-000.

Optional alternative assembly package 6481-2-150: Contains 6481-2-140 Tibial Sleeve and two 6481-2-110 Femoral bushings. The Bumper 6481-2-130 cannot be used for this construct.



Figure 1

## Exposure

A standard anterior mid-line incision can be utilized. A previous incision may be used that minimizes the risk of skin slough and breakdown (**Figure 1**).

The capsule is entered through a medial parapatellar approach or using an approach that allows the surgeon to deal best with the underlying pathology.

For revision procedures: Component removal

When removing the components to be revised, great care must be taken to preserve as much of the remaining bone stock as possible and to avoid the risk of fracture of the residual bone. Bone preservation can usually be facilitated using small flexible osteotomes, saws, and high-speed burring instruments.

## Tibial preparation: Revision Baseplate

### Revision Baseplate with Cemented Stems

Cemented stems come in 9, 12, and 15mm diameters in 50, 100 and 150mm lengths.

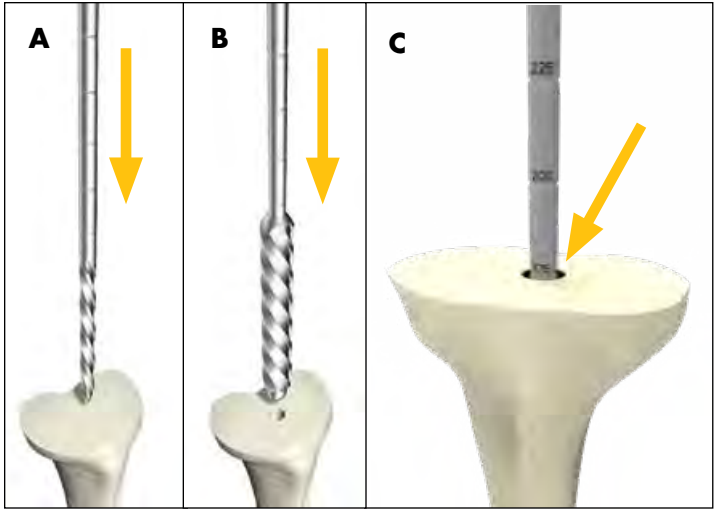
If Fluted stems are preferred, use the technique described in the Fluted stem section. Revision Baseplate with Fluted stems.

If the tibial preparation is on a native tibia removal of the anterior portion of the central eminence will be required after IM reaming to allow the Resection Guide Tower to fully seat. General surgical instruments can be used to remove the necessary bone (**Figure 2**). Alternatively, the Triathlon Primary IM referencing tibial resection instruments can be used, see the Addendum 1: Revision Baseplate Tibial Preparation with Primary Tibial Instrumentation portion of this protocol.

- ▶ **Attention:** The Revision Baseplate is not indicated for use with Size A Tibial Cones. The smallest compatible size is Size B.



Figure 2



**Figure 3**

**Revision Baseplate: Intramedullary Tibial preparation**

Assemble the 8mm Starter Awl to either the T-Handle or power unit using the Universal Driver.

Ream the tibial intramedullary canal (**Figure 3A**).

**Technical points**

If determining the appropriate pilot hole is challenging, considering using AP and lateral x-rays to determine the appropriate starting point.

Referencing the desired tibial resection, ream to desired stem depth (refer to depth chart) or to a length of fixation preferred for tibial alignment. Grooves along the shank of the reamer indicate the depth of the reamer in the canal (**Figure 3C**).

► **Note:** If Cone Augment usage is anticipated a 175mm reamer depth will be required.

Progressively ream, increasing diameter in 1mm increments until adequate purchase is achieved, and leave the final reamer in the canal (**Figure 3B**). Tap the final reamer gently with a mallet to assure that it is firmly seated.

**Depth markings: Cemented Stem components**

Stem length	Depth marking
50mm	125
100mm	175
150mm	225

► **Note:** The Revision Baseplate is not compatible with offset adapters.

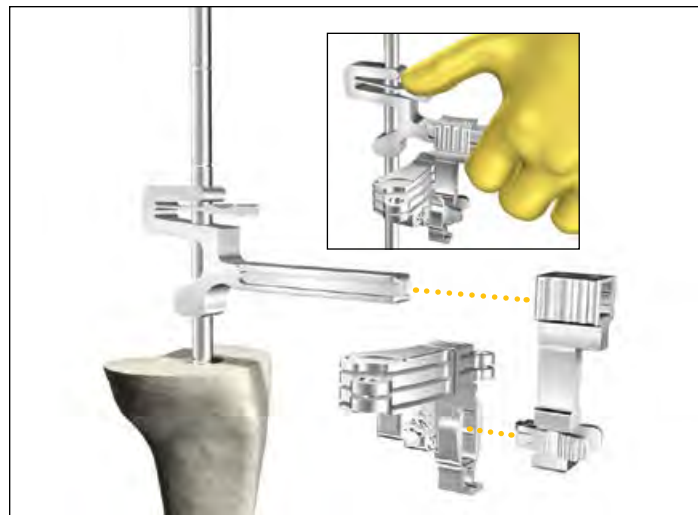
**Technical points**

► **Attention:** Tibial offsetting with the Revision baseplate is not possible.

If Tibial Augments are to be used, ream until the depth marking is flush with the expected augment cut. Use the bottom of the line marking as the depth reference.

When using a cemented stem, it is not necessary to gain cortical chatter as cancellous bone may be unnecessarily removed.

Be sure to completely remove cement and sclerotic bone from the center of the canal.



**Figure 4**



**Figure 5**



**Figure 6**

**Revision Baseplate: Proximal tibial resection**

Slide the Resection Guide Tower over top of the IM Reamer by depressing the finger tab as shown (**Figure 4**). Assemble the Revision Tibial Resection Guide to the Support Arm. Slide the assembly on to the Resection Guide Tower.

Depress the finger tab on the Resection Guide Tower and slide the assembly to the desired distal/proximal position on the IM Reamer.

Use the Blade Runner through the cutting slot to approximate the resection level.

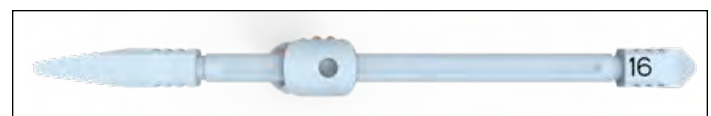
- When determining the tibial resection consider the native joint line and patella tracking.
- In a revision procedure a **2mm cleanup** resection cut can be performed. 2mm of bone will be resected with the initial proximal resection when using the “2” end of the Triathlon Stylus.
- In a native joint for a **Triathlon Hinge procedure**, to maintain the joint line, the minimum tibial resection from the native **joint line is 16mm**. 16mm of bone will be resected with the initial proximal resection when using the “16” end of the Hinge Tibial Stylus (**Figure 7**).
  - In a native joint the Hinge Tibial Stylus “11” end of the Hinge Tibial Stylus may be used for a reduced resection. 11mm of bone will be resected with the initial proximal resection when using the “11” end of the Hinge Stylus.

Use the Blade Runner through the cutting slots to approximate any augment resection level and rotational alignment of the guide when planning for an augment on one side of the tibia (**Figure 6**).

The Universal Alignment Rod can be used to aid in setting the final component position by inserting it through the Universal Alignment Handle and assembling the Universal Alignment Handle to the Revision Tibial Resection Guide (**Figure 5**).

► **Note:** In a bowed tibia, a surgeon may need to retract the reamer from 175mm depth to set the proper tibial cut slope.

Pin the Revision Tibial Resection Guide to the proximal tibia when the resection level has been determined.



**Figure 7**

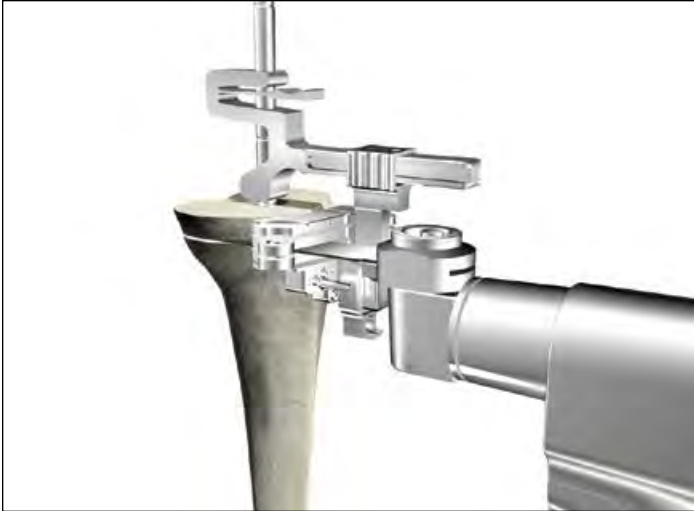


Figure 8



Figure 9



Figure 10

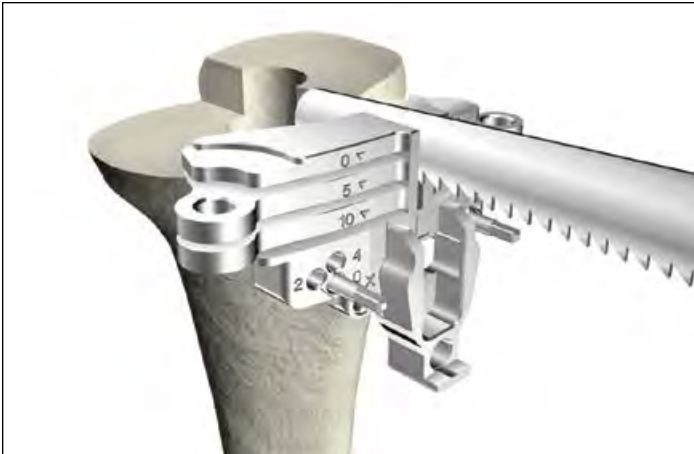


Figure 11

**Technical points**

- ▶ **Tip:** To facilitate easy removal of the Resection Guide Tower and Support Arm, place pins perpendicular to the bone.

Make a cut to produce a resected surface with a neutral slope (**Figure 8**).

Tibial augment resections can be made at this point with the Revision Tibial Resection Guide using a narrow, 15mm-wide, 0.050" thick oscillating saw blade. Make a 5mm or 10mm augment resection as appropriate.

After completing the cut around the reamer shaft, remove the Support Arm (**Figure 9**), Resection Guide Tower (**Figure 10**), and IM Reamer before completing the tibial resection. To do so, depress the tabs on the Support Arm to disengage it from the Revision Tibial Resection Guide. Slide the Support Arm anterior. Depress the tab on the Resection Guide Tower and slide it off the IM Reamer. Use a T-Handle to remove the IM Reamer.

Once the IM reamer is removed, an additional cross pin can be added to the Revision Tibial Resection Guide.

Using a reciprocating saw blade through the Revision Tibial Resection Guide, complete the sagittal augment resection (**Figure 11**).

Remove the pins and Tibial Resection Guide.

**Technical points**

Surgeons who prefer a non-captured cut can use the top of the resection guide. The 0mm and 5mm slots can then be used for 5mm and 10mm augment resections, respectively.

- ▶ **Note:** The 10mm slot should not be used if executing a non-captured cut.
- ▶ **Note:** If a tibial stylus is used to ascertain resection depth the depth will not correspond with the non-captured top surface.



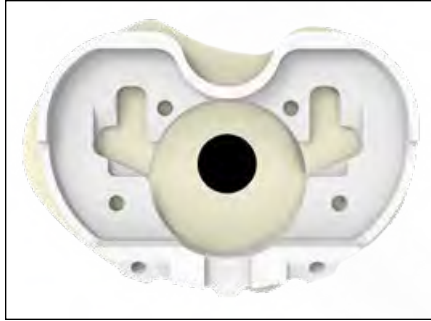


Figure 12



Figure 13

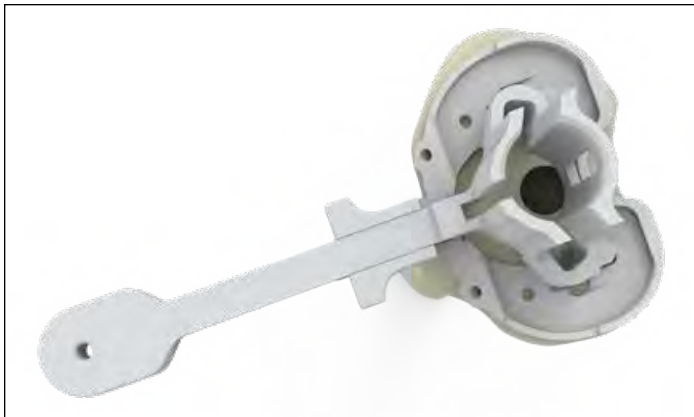


Figure 14

### Revision Baseplate: Tibial Template sizing and positioning

- ▶ **Attention:** Tibial offsetting with the Revision baseplate is not possible.

Size the proximal tibia with a Universal Tibial Template (**Figure 12**).

- Attach Tibial Augment Trials (if tibial augment cuts were made) to the underside of the Universal Tibial Template.

The Tibial Alignment Handle can be attached to the Universal Tibial Template if desired for tibial sizing.

Rotational alignment of the Universal Tibial Template should be checked. An alignment rod can be used to aid in setting the final component position. To check alignment, attach the Revision Keel Punch Guide to the Universal Tibial Template ensuring the slider is engaged (**Figure 15**). Insert the Universal Alignment Rod through the hole in the Revision Keel Punch Guide (**Figure 13**).

### Technical points

Offsetting is not possible with the Revision Baseplate. In some tibias, especially small tibias, prior to pinning the template it is recommended to visually assess if downsizing and/or repositioning the tibial template or downsizing the stem may be required to avoid impingement with the anterior cortices in subsequent reaming or keel punching steps. In order to assess this, complete the steps as follows:

- Insert last size reamer into the canal and lightly tap to seat it.
- Assemble the appropriately sized tibial template and keel punch guide. Assemble the template and guide over the shaft of the reamer onto the resected tibia.
- The magnitude of the offset observed between the IM reamer and the diameter of the keel punch guide should be used as a reference to determine if downsizing and/or repositioning the template may be required.

When adequate coverage and position is attained, pin the Universal Tibial Template to the proximal tibia using headed pins in the anterior template tray pin holes or headless pins in the anterior angled pin holes (**Figure 14**).

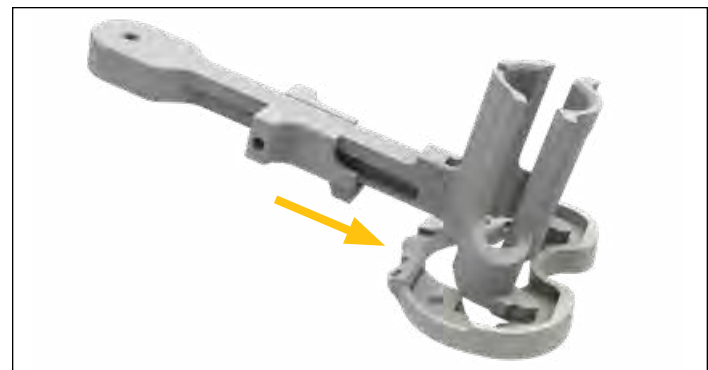


Figure 15



Figure 16

**Technical points**

If additional fixation is needed for the Universal Tibial Template to the proximal tibia, remove the Revision Keel Punch Guide from the template (if assembled) and place headed nails into the posterior template pin holes (**Figure 17**). Once completed, reassemble the Revision Keel Punch Guide.

It is optional to mark the anterior surface of the tibia. Align the marks to the two engravings on the template to help ensure that rotation in subsequent steps matches the planned rotation (**Figure 16**).

Revision Baseplate: Boss preparation

If not already assembled, assemble the Revision Keel Punch Guide to the Universal Tibial Template. Ensure the slider is engaged with the tibial template.

Attach the Modular T-Handle to the Revision Boss Reamer and ream by hand until the physical stop is reached (**Figure 18**). If fully seating the reamer is difficult, the Revision Boss Reamer may be attached to power only if the solid cylinder of the boss reamer has engaged the Revision Keel Punch Guide (**Figure 19**). Attach the Revision Boss Reamer to the power unit using the Universal Driver.

- ▶ **Attention:** Caution should be used to avoid perforating the anterior cortices during reaming.

Remove Revision Boss Reamer.

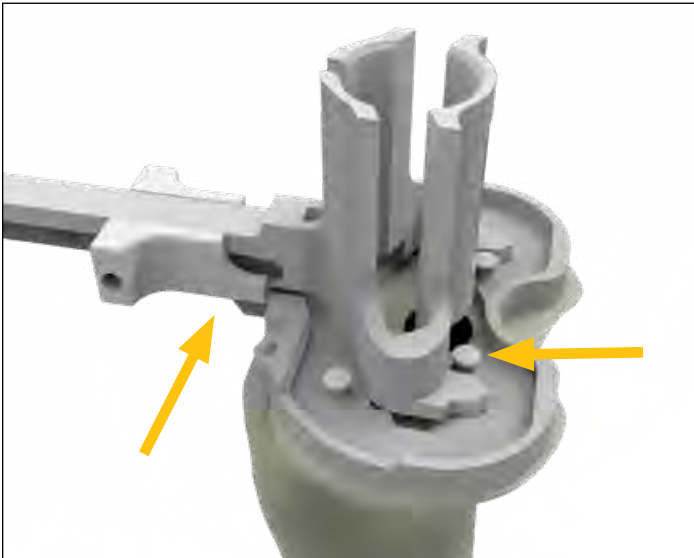


Figure 17



Figure 18



Figure 19A

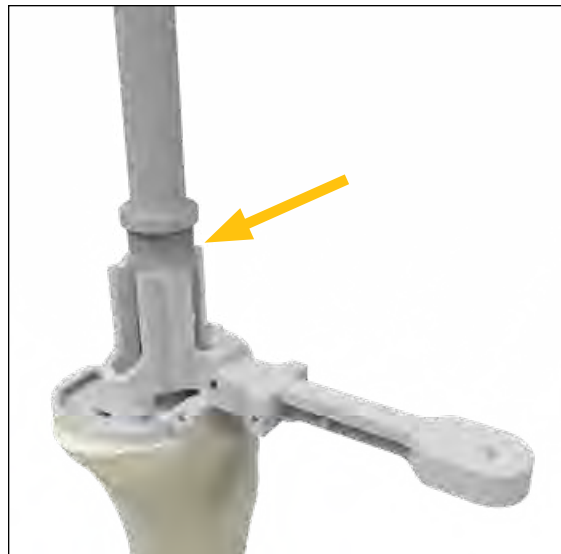


Figure 19B

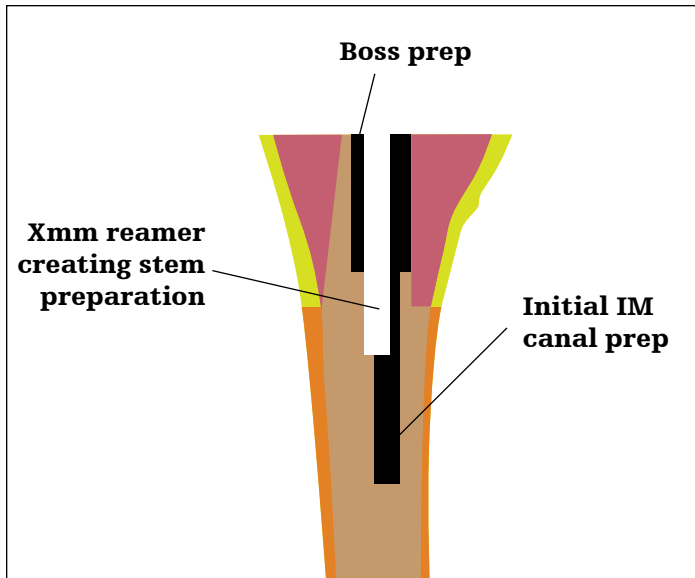


Figure 20

**Technical points**

- ▶ **Attention:** If the Revision Boss Reamer engages cortical bone or the pinned template begins to lift off the tibia, consider downsizing and/or repositioning the tibial template. In this position, the boss of the Revision Baseplate may prevent the baseplate from fully seating. This may happen in small tibias or tibias with a significant bow. Caution should be used to avoid perforating the anterior cortices.

In sclerotic bone, the use of a saw prior to the Revision Keel Punch may be advisable.

Revision Baseplate: Cemented Stem preparation

To help facilitate proper stem preparation coaxial to the boss preparation (**Figure 20**), the Neutral Bushing Guide should be used to ream for the stem.

Assemble the Neutral Bushing Guide to the 8mm Starter Awl (or downsized reamer size of choice) and the insert reamer through the keel punch guide. Once the reamer is seated in the boss preparation allow the Neutral Bushing Guide to bottom out in the Revision Keel Punch Guide (**Figure 21**). This will help ensure that the stem preparation will be coaxial to the Revision Boss Reamer preparation.

- ▶ **Note:** Do not impact the Neutral Bushing Guide into the Keel Punch Guide.

Ream using the T-Handle or power unit attached to the Universal Driver.

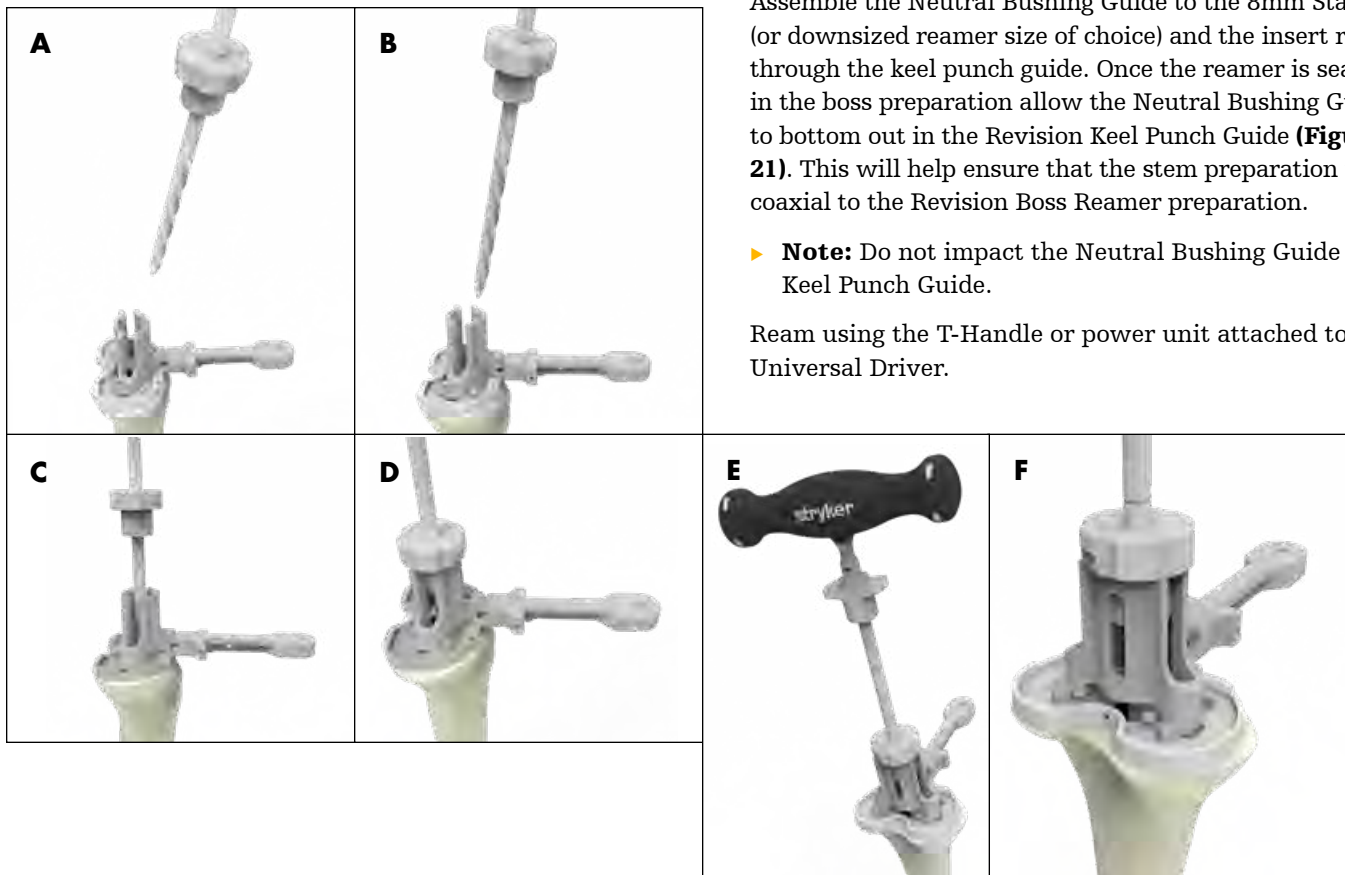


Figure 21

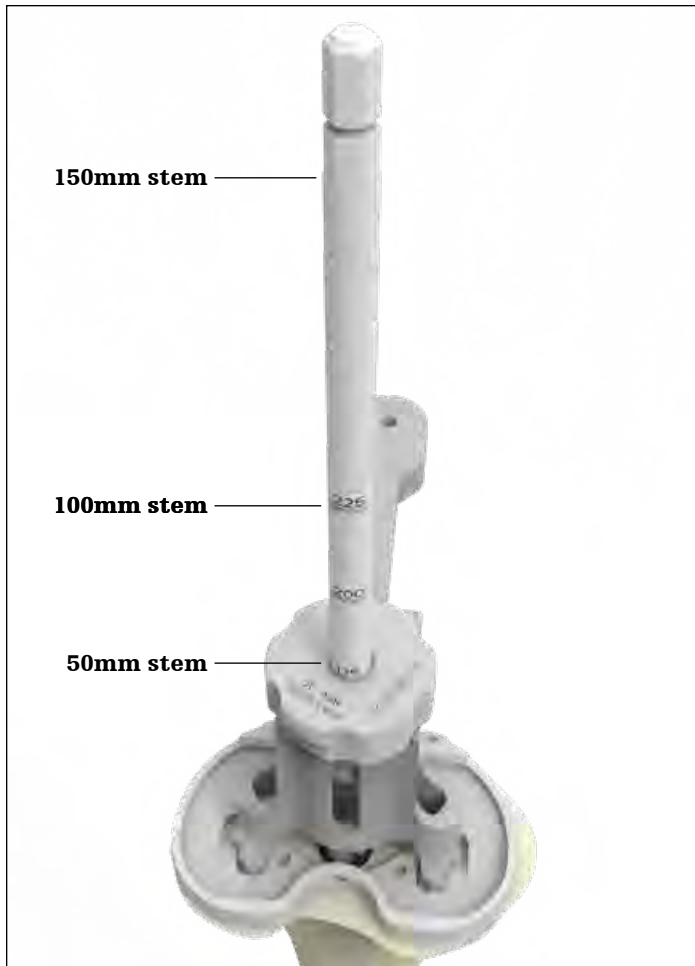


Figure 22

For a 50mm stem, ream until the 175mm marker on the IM reamer is flush with the proximal surface of the Neutral Bushing Guide (**Figure 22**). For other stem lengths refer to the table below. Incrementally ream until the desired stem diameter and cement mantle is reached.

**Technical point**

If the reamer cannot reach 175mm, consider downsizing and/or repositioning the tibial baseplate. In this position, the stem may prevent the baseplate from fully seating. If repositioning is desired, preparation of the bone will be required again.

**Depth markings: Cemented Stem components**

Stem length	Depth marking
50mm	175
100mm	225
150mm	Bottom of the power tool where it attaches to the reamer

- ▶ **Note:** The Revision Baseplate is not compatible with offset adapters.
- ▶ **Note:** If using stem extender implants (5571-S-025 and 5571-S-050), ream an additional 25mm or 50mm. The stem extender implants have a 16mm diameter; ream accordingly based on desired stem type. **The 50mm Stem Extender cannot be used with the Triathlon Revision Tibial Baseplate Components (5612-B-X00) when used with a 150mm Triathlon TS Stem.**

Remove the reamer.



Figure 23

### Keel preparation

Place the appropriate Revision Keel Punch into the Revision Keel Punch Guide, ensure the tab is engaged with the guide. Use a mallet to impact the punch. Advance the Revision Keel Punch until it seats fully in the Revision Keel Punch Guide (**Figure 23**).

To extract the Revision Keel Punch, lift the Revision Keel Punch handle slightly proximal and rotate the handle anteriorly, engaging the anterior tab of the Revision Keel Punch Guide, to cantilever the Revision Keel Punch out of the tibia (**Figure 24**).

Remove the Revision Keel Punch Guide, Keel Punch and Universal Tibial Template.

If desired, a Trial Baseplate and Stem trial can be used to confirm the tibial preparation is appropriate for the desired construct.

If using cones proceed to the Triathlon Tritanium Tibial Cone Augment Preparation section of this protocol. If cones are not being used proceed to the Femoral Preparation: Hinge Femur section of this protocol.



Figure 24

### Revision Baseplate with Fluted Stems

► **Attention:** Tibial offsetting with the Revision baseplate is not possible. In clinical scenarios where baseplate overhang may occur, consider using cemented stems.

If the tibial preparation is on a native tibia removal of the anterior portion of the central eminence will be required after IM reaming to allow the Resection Guide Tower to fully seat. General surgical instruments can be used to remove the necessary bone (**Figure 25**). Alternatively, the Triathlon Primary IM referencing tibial resection instruments can be used, see the Addendum 1: Revision Baseplate Tibial Preparation with Primary Tibial Instrumentation portion of this protocol.

► **Attention:** The Revision Baseplate is not indicated for use with Size A Tibial Cones. The smallest compatible size is Size B.



Figure 25

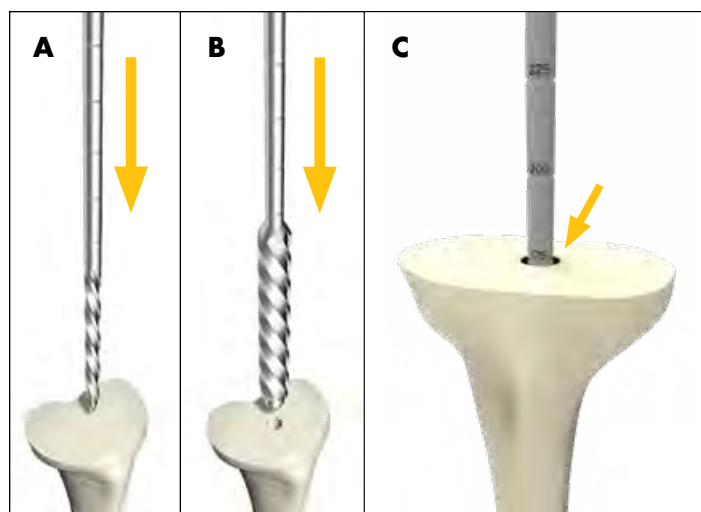


Figure 26

### Revision Baseplate: Intramedullary tibial preparation

Assemble the 8mm Starter Awl to either the T-Handle or power unit using the Universal Driver.

Ream the tibial intramedullary canal (**Figure 26A**).

#### Technical points

If determining the appropriate pilot hole is challenging, considering using AP and lateral x-rays to determine the appropriate starting point.

Referencing the desired tibial resection, ream to the desired stem depth (refer to depth chart) or to a length of fixation preferred for tibial alignment. Grooves along the shank of the reamer indicate the depth of the reamer in the canal (**Figure 26C**).

Progressively ream, increasing diameter in 1mm increments until adequate purchase is achieved, and leave the final reamer in the canal (**Figure 26B**). Tap the final reamer gently with a mallet to assure that it is firmly seated.

#### Ream depth (mm): Fluted Stem components

Stem length	Depth marking
100mm	175*
Tibial Cone	175*
150mm	225

\* If the final IM reamer is 16-18mm in diameter, an additional 25mm of reaming is required, resulting in a 200mm ream depth. This is required to avoid interference between the Revision Boss Reamer and the IM reamer cutting flutes (**Figure 27**).

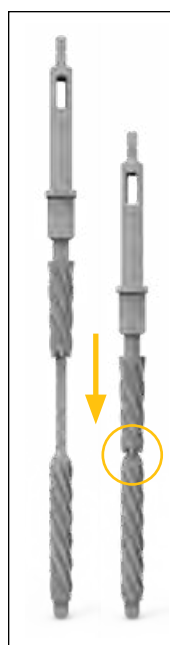


Figure 27

- **Note:** The Revision Baseplate is not compatible with offset adapters.
- **Note:** If using stem extender implants (5571-S-025 and 5571-S-050), ream an additional 25mm or 50mm accordingly. The stem extender implants have a 16mm diameter; ream accordingly based on desired stem type. **The 50mm Stem Extender cannot be used with the Triathlon Revision Tibial Baseplate Components (5612-B-X00) when used with a 150mm Triathlon TS Stem.**

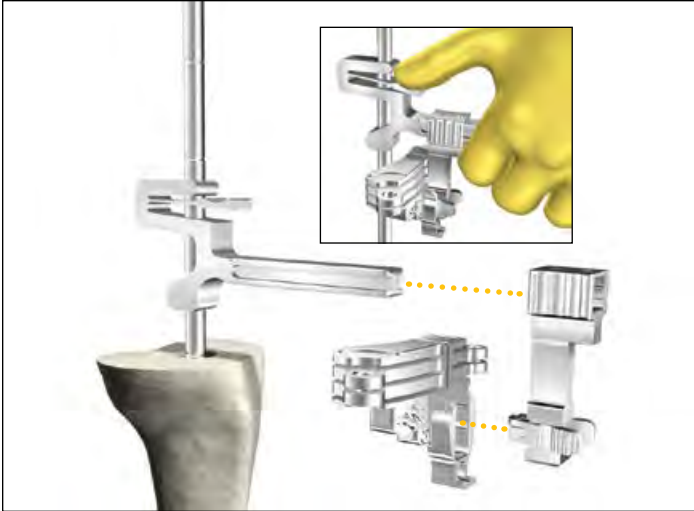


Figure 28

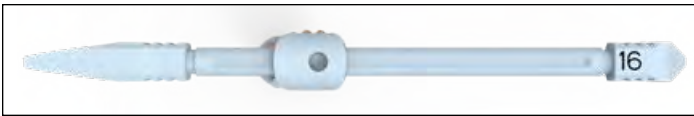


Figure 29



Figure 30A



Figure 30B

**Technical points**

If Tibial Augments are to be used, ream until the depth marking is flush with the expected augment cut. Use the bottom of the line marking as the depth reference.

Be sure to completely remove cement and sclerotic bone from the center of the canal.

**Revision Baseplate: Proximal tibial resection**

Slide the Resection Guide Tower over top of the IM Reamer by depressing the finger tab as shown (Figure 28). Assemble the Revision Tibial Resection Guide to the Support Arm. Slide the assembly on to the Resection Guide Tower.

Depress the finger tab on the Resection Guide Tower and slide the assembly to the desired distal/proximal position on the IM Reamer.

Use the Blade Runner through the cutting slot to approximate the resection level.

- When determining the tibial resection consider the native joint line and patella tracking.
- In a revision procedure a **2mm cleanup** resection cut can be performed. 2mm of bone will be resected with the initial proximal resection when using the “2” end of the Triathlon Stylus.
- In a native joint for a **Triathlon Hinge procedure**, to maintain the joint line, the minimum tibial resection from the **native joint line is 16mm**. 16mm of bone will be resected with the initial proximal resection when using the “16” end of the Hinge Tibial Stylus (Figure 29).
  - In a native joint the Hinge Tibial Stylus “11” end of the Hinge Tibial Stylus may be used for a reduced resection. 11mm of bone will be resected with the initial proximal resection when using the “11” end of the Hinge Stylus.

Use the Blade Runner through the cutting slot to approximate any augment resection level and rotational alignment of the guide when planning for an augment on one side of the tibia (Figure 30A).

The Universal Alignment Rod can be used to aid in setting the final component position by inserting it through the Universal Alignment Handle and assembling the Universal Alignment Handle to the Revision Tibial Resection Guide (Figure 30B).

- ▶ **Note:** In a bowed tibia, a surgeon may need to retract the reamer from 175mm depth to set the proper tibial cut slope.

Pin the Revision Tibial Resection Guide to the proximal tibia when the resection level and rotational alignment has been determined.



Figure 31

**Technical points**

► **Tip:** To help facilitate easy removal of the Resection Guide Tower and Support Arm, place pins perpendicular to the bone.

Make a cut to produce a resected surface with a neutral slope.

After completing the cut around the reamer shaft, remove the Support Arm (**Figure 31**), Resection Guide Tower (**Figure 32**), and IM Reamer before completing the tibial resection. To do so, depress the tabs on the Support Arm to disengage it from the Revision Tibial Resection Guide. Slide the Support Arm anterior. Depress the tab on the Resection Guide Tower and slide it off the IM Reamer. Use a T-Handle to remove the IM Reamer.

Once the IM reamer is removed, an additional cross pin can be added to the Revision Tibial Resection Guide.

Tibial augment resections can be made at this point with the Revision Tibial Resection Guide using a narrow, 15mm-wide, 0.050" thick oscillating saw blade. Make a 5mm or 10mm augment resection as appropriate.

Using a reciprocating saw blade through the Revision Tibial Resection Guide, complete the sagittal augment resection (**Figure 33**).

Remove the pins and Tibial Resection Guide.



Figure 32

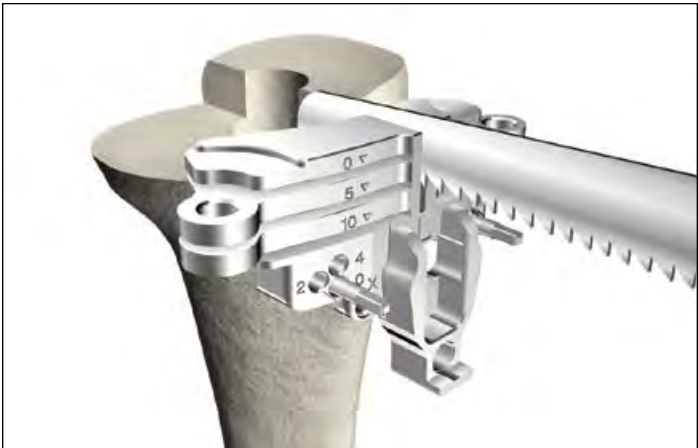


Figure 33



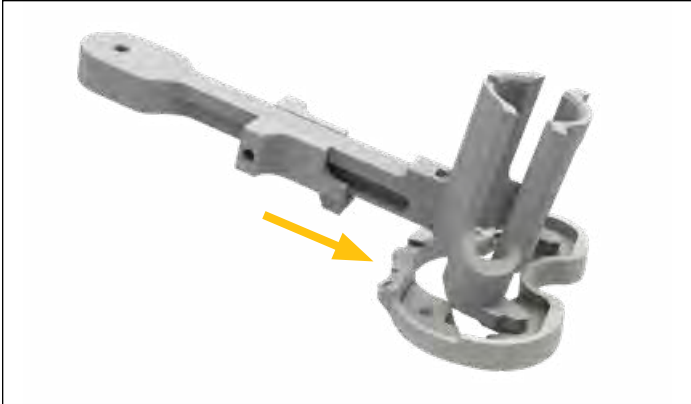


Figure 34

### Technical points

Surgeons who prefer a non-captured cut can use the top of the resection guide. The 0mm and 5mm slots can then be used for 5mm and 10mm augment resections, respectively.

- ▶ **Note:** The 10mm slot should not be used if executing a non-captured cut.
- ▶ **Note:** If a tibial stylus is used to ascertain resection depth the depth will not correspond with the non-captured top surface.

### Revision Baseplate: Tibial Template sizing and positioning

Reinsert the last IM reamer (**Figure 36**).

Size the proximal tibia with a Revision Tibial Template, Revision Keel Punch Guide, and Neutral Bushing Guide placed over the reamer and onto the resected surface of the tibia (**Figures 34 and 35**). Ensure that the slider is engaged with tibial template.

- Attach Tibial Augment Trials (if tibial augment cuts were made) to the underside of the Universal Tibial Template.
- ▶ **Attention:** Tibial offsetting with the Revision Baseplate is not possible.



Figure 35



Figure 36



Figure 37

Rotational and alignment of the Universal Tibial Template should be checked. An alignment rod can be used to aid in setting the final component position.

- To check alignment, attach the Revision Keel Punch Guide to the Universal Tibial Template ensuring the slider is engaged. Insert the Universal Alignment Rod through the hole in the Revision Keel Punch Guide (Figure 37).

If adequate coverage and position is attained, pin the Universal Tibial Template to the proximal tibia using headless pins in the anterior angled pin holes or headed pins in the anterior template tray pin holes.

If adequate coverage and position is not attained, consider downsizing the tibial template.

**Technical points**

If additional fixation is needed for the Universal Tibial Template to the proximal tibia, remove the IM Reamer Neutral Bushing Guide and Revision Keel Punch Guide and place headed nails into the posterior template pin holes (Figure 38). Once completed, reassemble the Revision Keel Punch Guide.

Mark the anterior surface of the tibia, aligning marks to the two engravings on the template to ensure rotation in subsequent steps matched planned rotation (Figure 39).

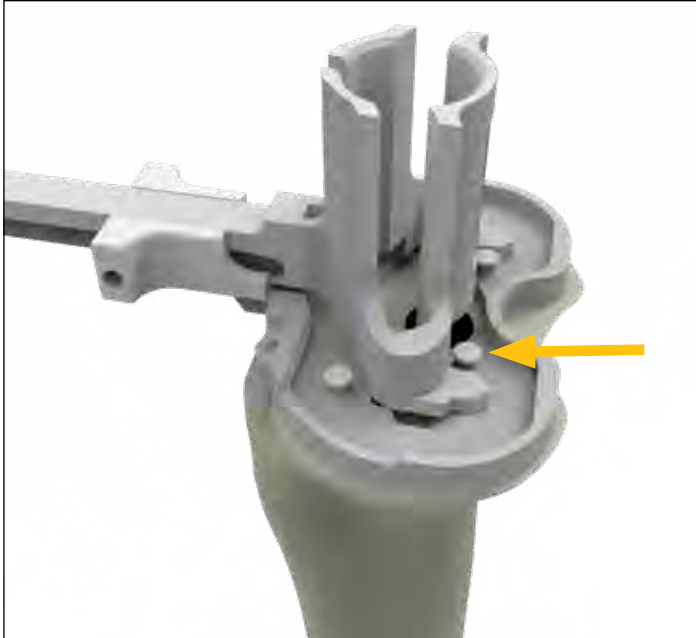


Figure 38



Figure 39



Figure 40

### Revision Baseplate: Boss preparation

If the IM reamer is greater than or equal to 19mm, the Revision Boss Reamer is not necessary, the IM reamer has prepared for the Revision Baseplate boss diameter.

Remove the Neutral Bushing Guide from the Revision Keel Punch Guide, leaving the IM reamer and Revision Keel Punch Guide in place.

Attach the Modular T-Handle to the Revision Boss Reamer. Place the Revision Boss Reamer over the shank of the IM reamer and into the Revision Keel Punch Guide (**Figures 40 and 41**). Ream until the physical stop is reached.

If reaming is difficult, the Revision Boss Reamer may be attached to power only if the solid cylinder of the boss reamer has engaged the Revision Keel Punch Guide (**Figures 42 and 43**). Attach the Revision Boss Reamer to the power unit using the Universal Driver.

► **Attention:** Caution should be used to avoid perforating the anterior cortices.

Remove Revision Boss Reamer and IM Reamer.

### Technical point

In sclerotic bone, the use of a saw prior to the Revision Keel Punch may be advisable.



Figure 41



Figure 42



Figure 43



Figure 44

### Keel preparation

Place the appropriate Revision Keel Punch into the Revision Keel Punch Guide, and ensure the tab is engaged with the guide. Use a mallet to impact the punch. Advance the Revision Keel Punch until it seats fully in the Revision Keel Punch Guide (**Figure 44**).

To extract the Revision Keel Punch, lift the Revision Keel Punch handle slightly proximal and rotate the handle anteriorly, engaging the anterior tab of the Revision Keel Punch Guide, to cantilever the Revision Keel Punch out of the tibia (**Figure 45**).

Once the tibia is fully prepared, remove the Universal Tibial Template and Revision Keel Punch Guide Assembly.

If using cones proceed to the Triathlon Tritanium Tibial Cone Augment Preparation section of this protocol. If cones are not being used proceed to the Femoral Preparation: Hinge Femur section of this protocol.



Figure 45

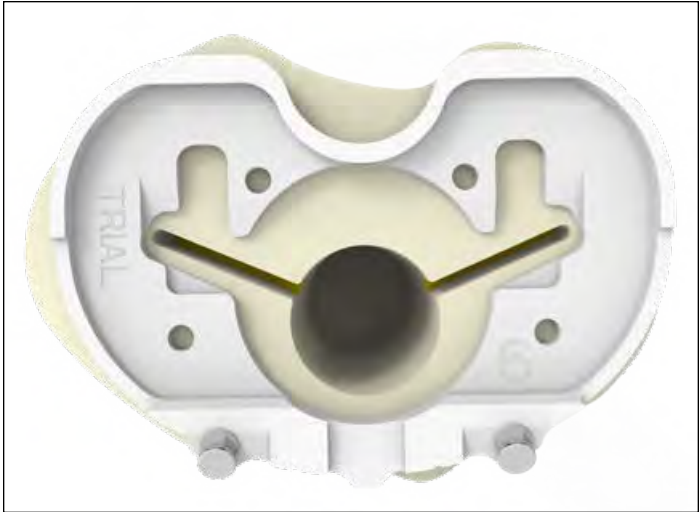


Figure 46

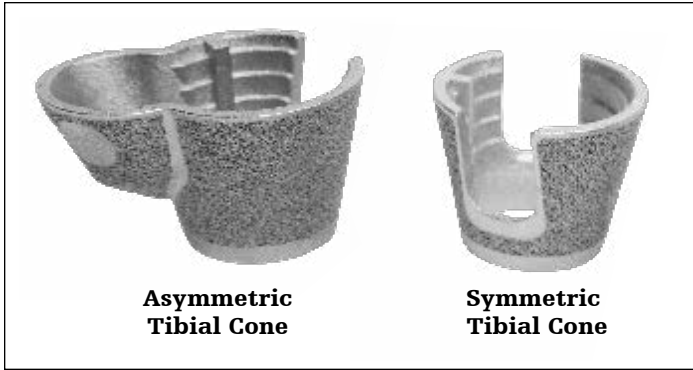


Figure 47

### Triathlon Tritanium Tibial Cone Augment preparation

Triathlon Tritanium Tibial Cone Augments come in two different shapes (Figure 47).

#### Tibial Canal preparation for Tibial Cone Augments

► **Attention:** Tibial Cone size A is not intended for use with the Revision Baseplate.

#### Option 1: Reamer-based

When using a Symmetric/Asymmetric Cone, a minimum depth of 175mm is recommended for the IM reamer to facilitate accurate cone reaming and to ensure that the flutes on the Tibial Symmetric Cone Reamer do not interfere with the flutes on the IM Reamer.

Tap the final IM Reamer gently with a mallet to ensure that it is fully seated.

► **Note:** If Tibial Augments are to be used, ream until the 175mm marking is flush with the augment cut. Use the bottom of the 175mm line marking as the depth reference (Figure 48).

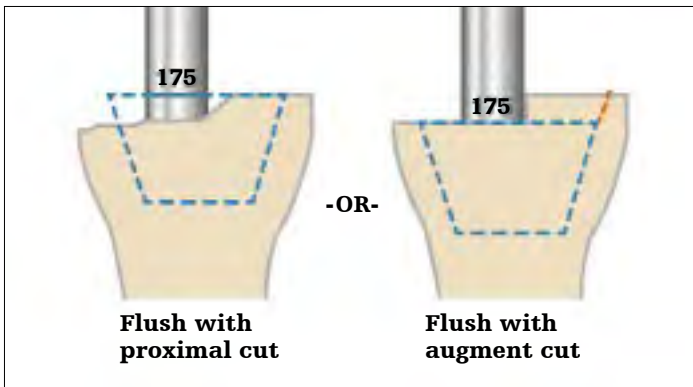


Figure 48

**Option 2: Stem Extender Shaft-based**

If desired, the IM reamer can be removed and subsequent preparation can be based off of a Stem Trial utilizing the required Stem Trial and the Stem Extender Shaft.

Assemble the Stem Extender shaft (6543-4-516) to the appropriate diameter Stem Trial and place the assembly into the canal.

Continue with Tibial Preparation as described in the protocol.

**Ream depth: Tibial components with cones**

<b>Stems (with cones)</b>	<b>Depth</b>
100mm	175 (3rd groove)
150mm	175 (3rd groove)



Figure 49

Preliminary Cone sizing

Depending on the size and geometry of bone defect, either a symmetric or asymmetric tibial cone augment may be selected. Inverting a contralateral leg cone trial may help determine bone defect, assess cone coverage, and determine if symmetric or asymmetric cone is required.

- ▶ **Note:** Invert the Cone Trial over the resected tibial bone and ensure that the trial is centered on the IM Reamer (Figure 49). Centering the trial helps to ensure proper positioning.

Revision Baseplate with Symmetric Tibial Cone

Ensure that the Tibial Symmetric Cone Reamer is being used. This can be confirmed by checking that the reamer shaft reads "TIBIA."

Grooves on the reamer specify cone size (Figures 51 and 52). Reference the sizing chart to help determine appropriate cone sizing (See chart on the next page for Cone and Baseplate sizing options).

- ▶ **Note:** Use the top line of the groove (of the desired size) as the depth reference.

Insert the Tibial Symmetric Cone Reamer over the IM Reamer (Figure 50). If reaming under power, confirm that the drill is set to ream mode before reaming begins.

Start the reamer before engaging the bone. Ream down to the desired depth/size.

- ▶ **Caution:** If the bone is soft, osteopenic, fractured, or sclerotic, consider initially reaming by hand using the T-Handle.

Remove both the Tibial Symmetric Cone Reamer and the IM Reamer.

If using an augment, see the next page to help determine proper preparation depth.

- ▶ **Note:** If the Cone needs to be placed in a slightly more posterior position, remove the IM Reamer and replace it with an IM Reamer of a smaller diameter. Place the Tibial Symmetric Cone Reamer over the IM reamer and gently flex it posteriorly. Ream down to the desired depth/size.

- ▶ **Note:** Confirm that the Tibial Symmetric Cone Reamer is not being hindered by the cutting surface of the flutes on the IM Reamer. If so, the IM Reamer may need to be placed in a more distal position.

- ▶ **Note:** Reamer depth increases by 5mm per size.



Figure 50



Figure 51



Figure 52

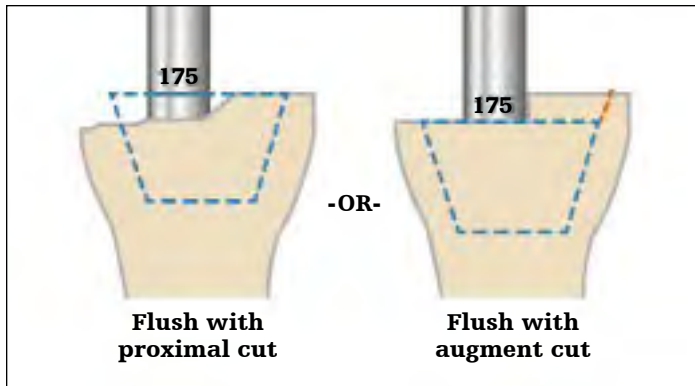


Figure 53

If augments are to be used, the size marking of the Tibial Symmetric Cone Reamer will indicate where the Cone will sit. Ream until the marking is flush with the augment cut (Figure 53).

**Technical points**

- ▶ **Attention:** Tibial Cone size A (Symmetric) are not intended for use with the Revision Baseplate.
- ▶ **Attention:** The Revision Baseplate is not intended for use with offset adapters.

Remove both the Tibial Symmetric Cone Reamer and the IM Reamer.

**Tibial Cone sizes**

		B	C	D	E
Implant sizes	Size 1	*			
	Size 2	*			
	Size 3	X			
	Size 4	X	X		
	Size 5	X	X	X	
	Size 6	X	X	X	X
	Size 7			X	X
<b>Distal Diameter (OD)</b>		23mm	25mm	25mm	25mm
<b>Max Stem Diameter (ID)</b>		19mm	21mm	21mm	21mm

**Revision Baseplate and Tibial Cone Augment compatibility**

Tibial Cone sizing per tibial baseplate. Blue represents optimal size conditions.

- ▶ **Note:** Cones B, C, D and E also have an asymmetric lobed option. Cones smaller than those marked with an X are still compatible but need to be positioned at least 5mm deeper. If these sizes are to be used, rotational freedom between the tibial implant and the cone may be limited with non size on size combinations. Trial to assess compatibility.
- ▶\* **Note:** Cone B, with baseplate sizes 1 and 2, has less freedom between the tibial implant and the cone than other sizes. The cone may protrude anteriorly with respect to the baseplate.





Figure 54A



Figure 54B



Figure 55

### Symmetric Cone trialing

If bone voids are such that Asymmetric Cone preparation is necessary, refer to the Asymmetric Cone Preparation section of the protocol.

- ▶ **Note:** Cone trial may be placed in the prepared bone prior to assembling the instruments as described below.

Assemble the desired Stem Trial with the Tibial Cone Introducer, TS Impaction Handle, and the selected Symmetric Cone Trial (100mm stem maximum).

Tibial Cone Introducers are size specific.

- ▶ **Note:** Downsize the Trial Stem by 1mm.

Align the orientation key on the trial with the key feature on the Cone Introducer. The orientation key is located posteriorly on the trial (**Figure 54**).

- ▶ **Note:** There is no positive lock on the Cone Trial and the Cone Introducer. The trial may disconnect from the introducer.

- ▶ **Note:** The Cone Trial can be placed into the prepared bone before the Stem Trial and the Cone Introducer.

When inserting the Cone Trial, ensure that the anterior rotational alignment marking on the trial is aligned with the anterior surface marking previously determined by the Universal Tibial Template (**Figure 55**).

Insert the trial until it is seated at the appropriate depth. Remove the Cone Introducer and the Stem Trial so that only the Cone Trial remains in the void.

- ▶ **Caution:** Do not impact or implant the Cone Trials.
- ▶ **Note:** Stem trials with product code 5560-T-XXX cannot be used with cone augment instrumentation. This includes trials 5560-T-109, 5560-T-112 and 5560-T-115.

### Options if added Cone stability is required:

Ream to a larger Symmetric Cone (Repeat steps from the Symmetric Cone Preparation section of the protocol).

Or prepare for an Asymmetric Cone (Follow the steps from the Asymmetric Cone Preparation section of the protocol).

Or implant the Cone with cement.

Proceed to the Femoral Preparation: Hinge Femur section of this protocol.



Figure 56

## Revision Baseplate and Asymmetric Tibial Cone preparation

### Asymmetric Tibial Cone preparation

Asymmetric Cone preparation is an option for increased stability and void filling after Symmetric Cone reaming has been completed.

Symmetric Cone preparation must be performed before Asymmetric Cone preparation can begin. Refer to the Symmetric Cone Preparation section of the protocol.

During Asymmetric Cone preparation, be sure to properly set cone rotation to ensure proper alignment with the Baseplate.

Slide the appropriate Tibial Cone Reamer Guide over the IM Reamer and into the prepared tibia (**Figure 56**).

- ▶ **Note:** There are two Tibial Cone Reamer Guides. One is designed for left medial / right lateral use, and the other is designed for right medial / left lateral use.
- ▶ **Note:** Do not fully seat the Tibial Cone Reamer Guide until after rotation is set.



Figure 57

Attach the Tibial Cone Alignment Guide Handle to the Tibial Cone Reamer Guide (**Figure 57**).

Insert the Tibial Asymmetric Cone Reamer into the Tibial Cone Reamer Guide to assist in visualization of guide positioning.

Select the correct reamer to match the cone size.

Slide back the bushing on the reamer and place the reamer into the slot of the guide (**Figure 59**).



Figure 59

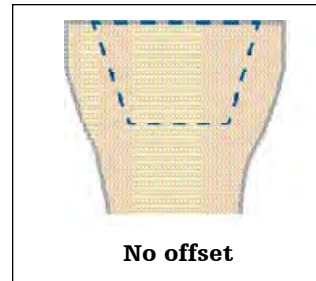


Figure 58

**Sizing example**

**No stem offset**

Symmetric reamer depth (C)
Alignment Guide level of embedment (C)
Asymmetric Lobe reamer size (C)
Asymmetric implant size

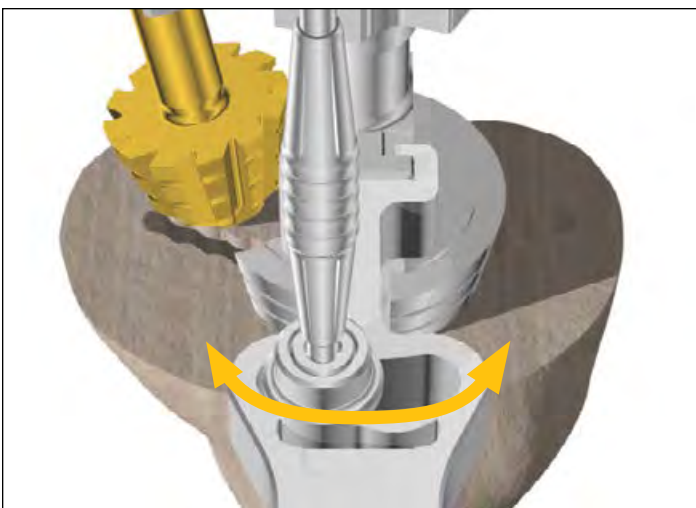


Figure 60

Insert the Alignment Rod into the bushing on the Tibial Cone Alignment Guide Handle.

► **Note:** The Universal Alignment Rod is only intended to help align anterior rotation markings to help ensure proper cone positioning/rotation.

Lower the Tibial Asymmetric Cone Reamer down to the desired location.

Use the Tibial Cone Alignment Guide Handle to position the reamer and rotate the guide. The assembly can be rotated by using the built-in rotational constraints (+/-10 degrees) (**Figure 60**).



Figure 61

Once the desired positioning is established, move the Alignment Rod so that it aligns with the anterior rotational marking previously set using the Universal Tibial Template. This will ensure that desired tibial rotation is maintained.

If the Alignment Rod does not line up with the anterior marking, reduce rotation until it does so.

The Tibial Cone Reamer Guide has micro-flutes at its base to maintain rotation once set.

After alignment has been set, seat the Tibial Cone Reamer Guide so that it sits at the same depth/size as the Tibial Symmetric Cone Reamer (**Figure 61**).

If reaming under power, confirm that the drill is set to ream mode before reaming begins.

Before reaming begins, ensure that the bushing is fully engaged.

- ▶ **Caution:** If the bone is soft, osteopenic, fractured, or sclerotic, consider initially reaming by hand using the T-Handle.

Hold the Tibial Cone Alignment Guide Handle in the previously determined location to maintain rotation.

Start the reamer before engaging the bone. Ream down to the stop (**Figure 62**).

Remove the reamer from the guide. If necessary, the slap hammer can be connected to the end of the Tibial Cone Alignment Guide to assist with guide removal.

Remove the IM Reamer.



Figure 62

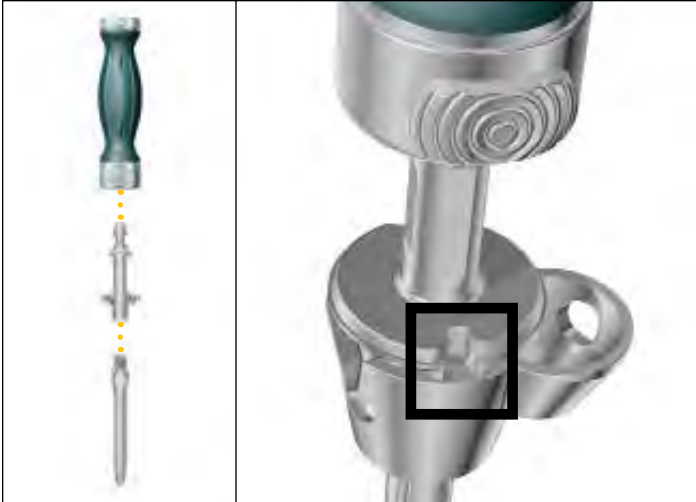


Figure 63



Figure 64

### Asymmetric Cone trialing

- ▶ **Note:** The Cone Trial can be placed into the prepared bone before the Stem Trial and the Cone Introducer.

Assemble the desired Stem Trial with the Tibial Cone Introducer, TS Impaction Handle, and the selected Asymmetric Cone Trial (100mm stem maximum).

Tibial Cone Introducers are intended for use with both Symmetric and Asymmetric Cones.

- ▶ **Note:** Downsize the Stem Trial by 1mm.

Align the orientation key on the trial with the key feature on the Cone Introducer. The orientation key is located posteriorly on the trial. See **Figure 63**.

- ▶ **Note:** There is no positive lock on the Cone Trial and the Cone Introducer. The trial may disconnect from the introducer.

Insert the trial until it is seated at the appropriate depth (**Figure 64**). Remove the Cone Introducer and the Stem Trial so that only the Cone Trial remains in the void.

- ▶ **Caution:** Do not impact or implant Cone Trials.
- ▶ **Note:** Stem trials with product code 5560-T-XXX cannot be used with cone augment instrumentation. This includes trials 5560-T-109, 5560-T-112 and 5560-T-115.

Options if added Cone stability is required:

Ream for a larger Asymmetric Cone (Repeat steps from the Asymmetric Cone Preparation section of the protocol).

Or implant the Cone with cement.

Proceed to the Femoral Preparation: Hinge Femur section of this protocol.



Figure 65



Figure 66

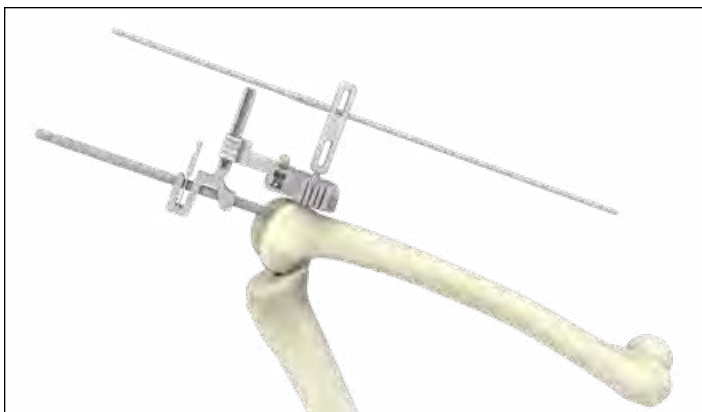


Figure 67

## Femoral preparation: Hinge Femur

There are two femoral preparation techniques that can be used. Proceed to the desired section.

- Hinge 3-in-1 Cutting Block preparation
- Hinge Trial Cutting Guide Femoral preparation
- ▶ **Note:** The Trial Cutting Guide workflow is only applicable for revisions as previous bone cuts are required for the component to fit.
- ▶ **Attention:** The Triathlon Hinge Femur cannot be used with offsets. This should be considered if revising an implant that used offset adaptors.

### Hinge 3-in-1 Cutting Block preparation

#### Extension gap assessment

Put the knee into Extension (0 degrees).

To help ensure that there is adequate joint space to fit the Triathlon Hinge components, place the Triathlon Hinge Spacer Block into the joint space (**Figure 65**).

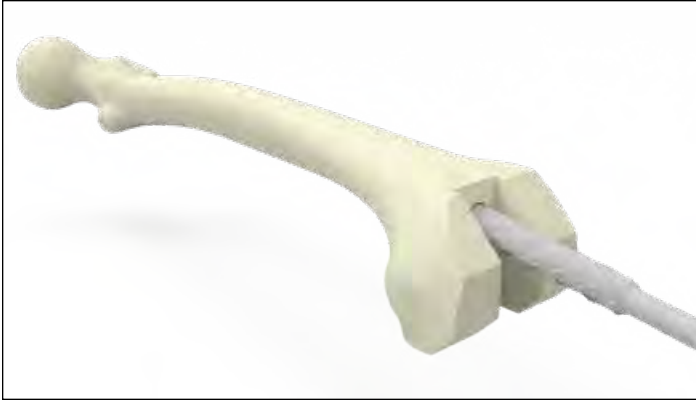
One end of the Triathlon Hinge Spacer Block represents the minimum total joint space of 29mm. The other end corresponds to 26mm which accounts for the thickness of the Revision Baseplate or Revision Baseplate trial (**Figure 66**).

If the Triathlon Hinge Spacer Block cannot fit into the joint space, additional resection is required from the distal femur, proximal tibia, or both; a distal resection cut may be required on native bone.

**For a Triathlon Hinge Femur, the minimum distal femoral resection, from the native bone, is 13mm representing the standard 8mm for a Triathlon TS and a 5mm built-in distal femoral augment.**

#### Technical points

- ▶ **Caution:** If there are previous cuts on the femur, make the necessary cuts to remove any undesired femoral flexion in the femoral component.
- ▶ **Attention:** If revising a femoral component, verify flexion angle of the distal femoral cut. Attach the universal alignment handle to Hinge distal femoral resection guide and insert the alignment rod. If the flexion angle of the distal femoral cut is not desirable, additional resection may be required from the distal femur to adjust the flexion angle (**Figure 67**).



**Figure 68**

**Intramedullary femoral preparation**

Assemble the 8mm Starter Awl to either the T-Handle or the power unit using the Universal Driver.

Referencing the desired femoral resection, ream the femoral intramedullary canal to the desired depth of stem or length of fixation preferred for femoral alignment. Grooves along the shank of the reamer indicate the depth of the reamer in the canal. Refer to the table below.

Progressively ream, increasing diameter in 1mm increments until purchase is achieved, and leave the final reamer in the femoral intramedullary canal (**Figure 68**).

**Depth markings (mm): Femoral components**

Stem length	Hinge femur w/3-in-1 prep
100mm	150
150mm	200
Femoral Cone	175*

\*When preparing for size 7-8 Cones, ream an additional 5mm deeper to help prevent the Cone Reamer from bottoming out on the IM Reamer.

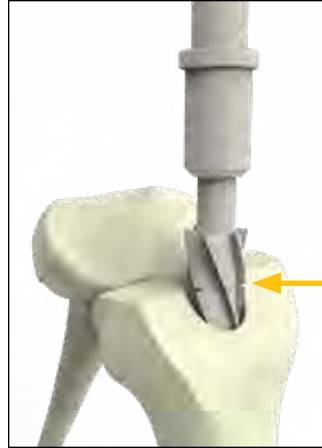
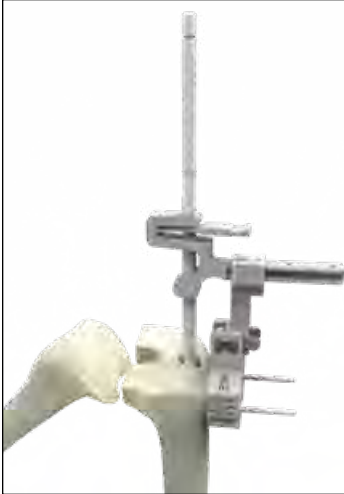
- ▶ **Note:** When reaming for stem extenders (5571-S-025 and 5571-S-050), ream an additional 25mm or 50mm accordingly. Note that the stem extender implants have a 16mm diameter; ream accordingly based on desired stem type.

**Technical points**

Tap the final reamer gently with a mallet to assure that it is firmly seated.

- ▶ **Note:** The Triathlon Hinge Femur requires a 100mm or longer Stem Extension.

► **Caution:** Be aware that other steps throughout this protocol may not use this reference point to determine boss reaming depth.



**Figure 69**

### Boss ream

#### Technical point

If preferred, the boss reaming step may be completed after the distal femoral resection.

If the final IM reamer diameter is less than 16mm, prepare for the boss of the femoral component by reaming over the top of the IM Reamer shank. Ream with the Revision Boss Reamer until the **groove** in the cutting flutes on the Revision Boss Reamer lines up with the planned resected bone depth (**Figure 69**).

- Optionally, the Offset/Boss Reamer can be used to help preserve more bone. Ream until the groove on the Offset/Boss Reamer lines up with the planned resected bone depth.

#### Technical point

If reaming is difficult, the Revision Boss Reamer may be attached to power. Attach the Revision Boss Reamer to the power unit using the Universal Driver.



**Figure 70**

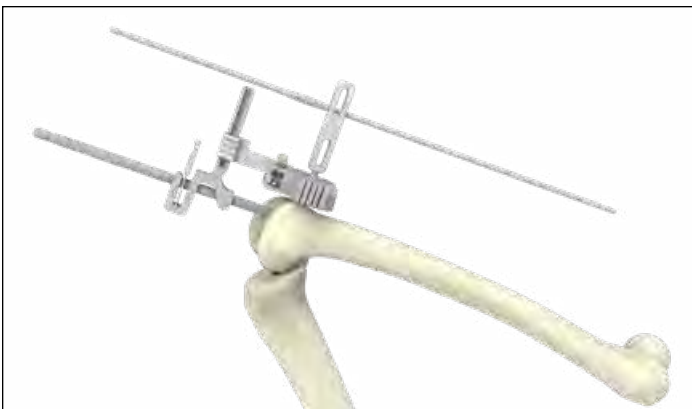
### Distal femoral resection

- **Caution:** If there are previous cuts on the femur, make the necessary cuts to remove any undesired femoral flexion in the femoral component.

Assemble the Resection Guide Tower, Resection Guide Support Arm, and the Hinge Revision Distal Resection Guide over the IM Reamer. Verify that the Hinge Distal Femoral Resection Guide reads “L” for left leg or “R” for right leg on the side facing away from the femur.

Set distal/proximal resection level and orientation by depressing the finger tab on the Resection Guide Tower and aligning the Hinge Distal Femoral Resection Guide with the medial epicondyle to recreate the anatomical joint line (**Figure 70**).

To verify flexion angle of distal femoral cut, attach universal alignment to Hinge distal femoral resection guide and insert alignment rod (**Figure 71**).



**Figure 71**





Figure 72

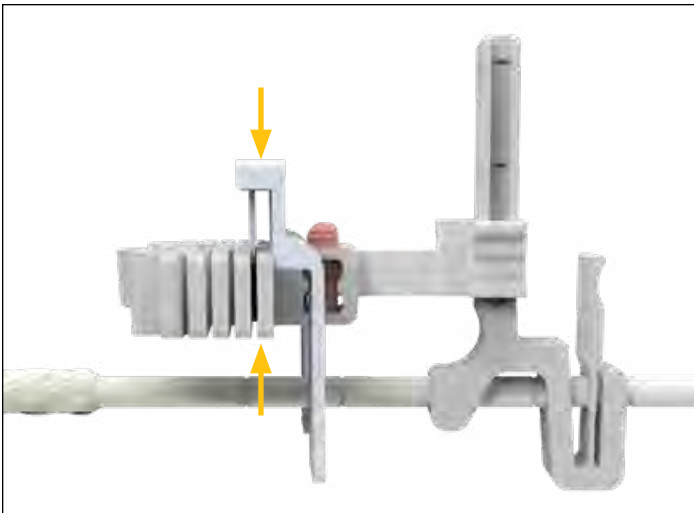


Figure 73



Figure 74

### Technical points

**For a Triathlon Hinge femur, the minimum distal femoral resection, from the native bone, is 13mm representing the standard 8mm for a Triathlon TS and 5mm built-in distal femoral augment.**

The ME scribe line is 28mm from the distal surface of the Hinge femur. If converting the femur from a TS to a Hinge femur with a well-fixed Revision Baseplate, consider the impact of the tibial position on the joint-line.

The joint-line can be estimated using pre-operative radiographs and anatomic landmarks using a surgical ruler.

For primary Triathlon Hinge bone cuts, the Distal Resection Plate can be inserted (See **Figures 72** and **73**) into the 0mm cut slot. Once the feet of this plate touch the distal aspect of the femur, the minimum depth of cut will be set.

- ▶ **Attention:** If the Distal Resection Plate is used, ensure the 0mm cut slot is used when making the distal cut.

Pin the Distal Resection Guide (**Figure 74**). Ensure that the Resection Plate (if used) is removed, as cuts are completed through the 0mm cut slot (**Figure 75**).

### Technical points

- ▶ **Caution:** Do not pin the cross pin until the IM reamer is removed as it will interfere with the IM reamer flutes in the subsequent steps.

Resect the distal femur.

5mm and 10mm distal augment resections can be made at this point with the corresponding Hinge Revision Distal Resection Guide.

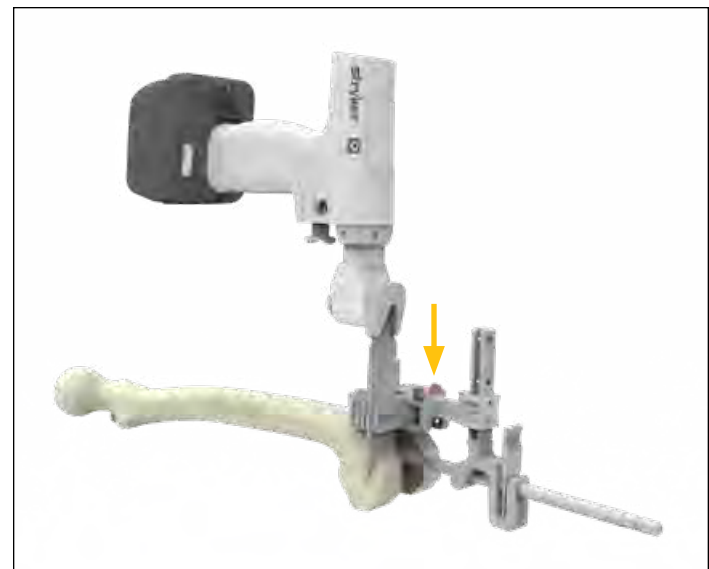


Figure 75

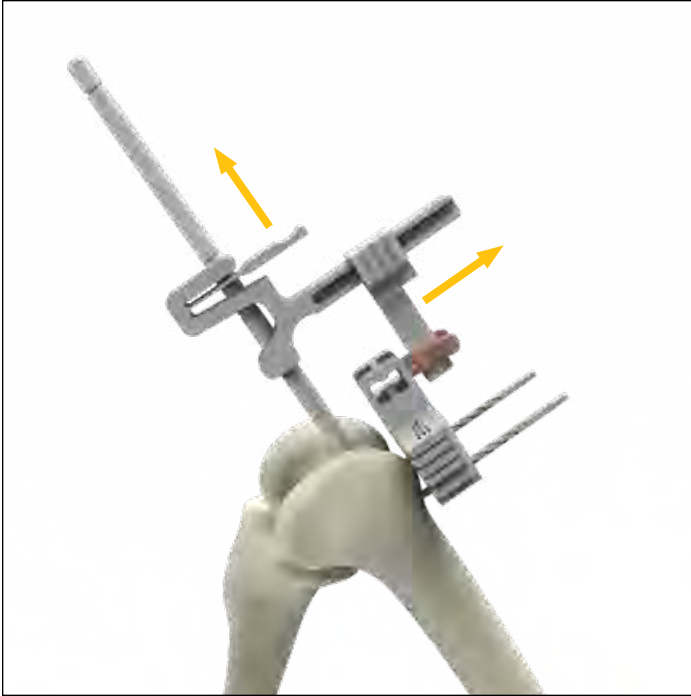


Figure 76

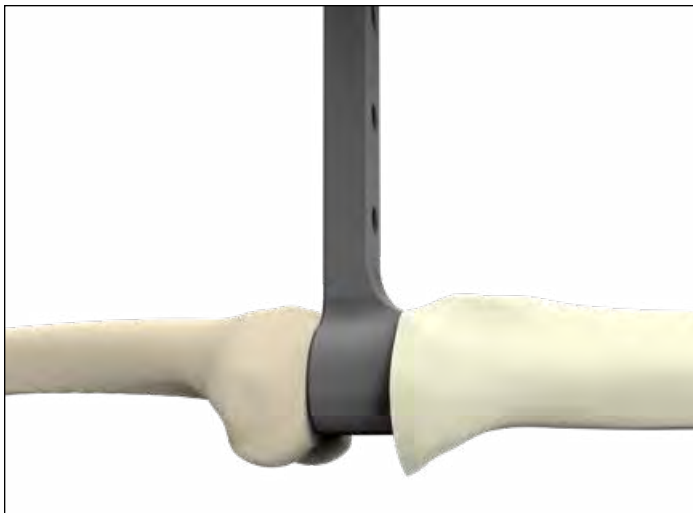


Figure 77

### Technical points

Surgeons who prefer a non-captured cut can use the top of the Hinge Distal Resection Guide. The 0mm and 5mm slots can then be used for 5mm and 10mm distal augment resections, respectively.

- ▶ **Note:** The 10mm slot should not be used in this case.
- ▶ **Note:** If using the non-captured cut, the ME scribe line on the guide will not represent 28mm from the distal surface of the Hinge femur.
- ▶ **Note:** If the Distal Resection Plate is used to ascertain resection depth, the depth will not correspond with the non-captured top surface, therefore the surgeon must complete the distal resection cut through the 0mm captured slot.

If desired, the Support Arm, Resection Guide Tower and IM Reamer can be removed before completing the femoral resections. To do so, depress the tabs on the Support Arm to disengage it from the Revision Distal Femoral Resection Guide. Slide the Support Arm anterior. Depress the tab on the Resection Guide Tower and slide it off the IM Reamer. Use a T-Handle to remove the IM Reamer (**Figure 76**).

- ▶ **Note:** The spacer block may be used again to check the extension gap to confirm the proper resection depth has been taken (**Figure 77**).



Figure 78



Figure 79

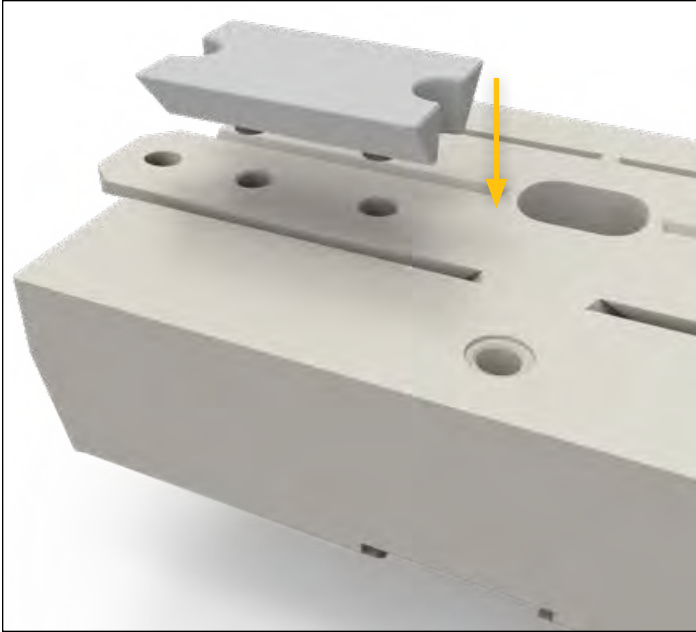
## Hinge Femur size selection

To determine femoral size, match a Femoral Sizing Template to the femur in the sagittal orientation to determine approximate A/P sizing (**Figure 78**).

- ▶ **Note:** The internal cut representations on the Femoral Sizing Templates represent that of the correspondingly sized TS Femoral Component, not the Hinge Femoral Component.
- ▶ **Note:** The Triathlon Hinge Femur cannot be used with offsets.

Pay careful attention to match the femoral size to the planned restored joint line as opposed to flush with the surfaces of the femur. A long engraved line on the sagittal profile of the Femoral Sizing Templates is designed to indicate the boss position of the femoral component. In addition, along the handle of each Femoral Sizing Template are two additional tick marks, which are designed to represent the M/L width of the corresponding size femoral component (**Figure 79**).

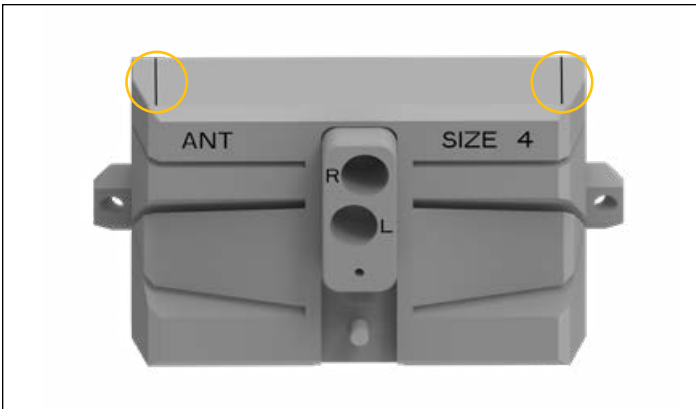
Alternative sizing techniques include comparing the femoral component removed to the templates and trials or pre-operatively X-ray templating.



**Figure 80**



**Figure 81**



**Figure 82**

**Femoral resections**

Put the knee into Flexion (90 degrees).

Replace the IM Reamer in the femoral canal.

If needed, place the appropriately sized distal spacers to the appropriate side of the bone-facing side of the 3-in-1 Cutting Block by aligning the pegs on the blocks with the holes on the cut guide. The distal spacers are not size specific and can be used with any size 3-in-1 Cutting Block **(Figure 80)**.

Place the appropriately sized 3-in-1 Cutting Block with corresponding distal spacers over the shank of the IM reamer, paying careful attention that either "L" or "R" on the 3-in-1 block shuttle are aligned to the shank depending on which is appropriate **(Figure 81)**.

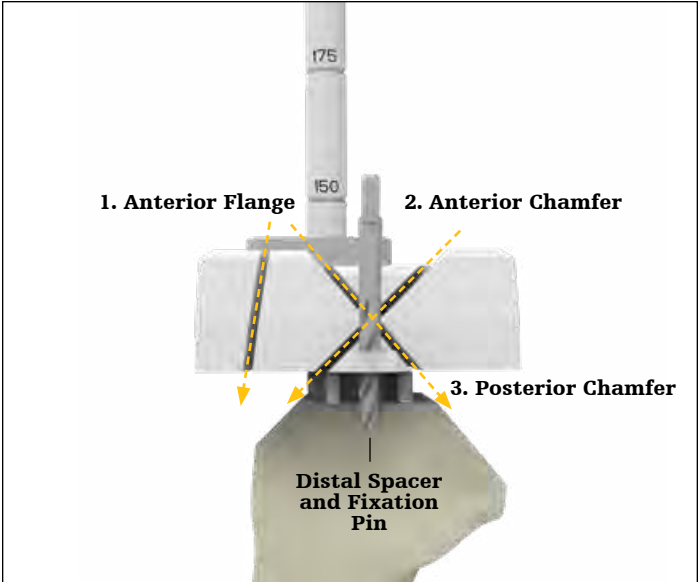
Vertical markings on either side of the 3-in-1 Cutting Block are designed to correspond to the M/L width of the femoral components **(Figure 82)**.

External rotation can be set by positioning the 3-in-1 Cutting Block in relation to transepicondylar axis. Pin holes may be used as a reference/visual aid.

Once the position of the 3-in-1 Cutting Block is optimized, pin it to the distal femur.

Complete the three femoral resections using a 15mm-wide 0.050" thick oscillating saw blade **(Figure 83)**.

If using cones proceed to the Triathlon Tritanium Femoral Cone Augment Preparation for Hinge section of this protocol. If no cones are being used, proceed to the Component Trialing section of this protocol.



**Figure 83**



Figure 84

### Hinge Trial Cutting Guide femoral preparation

- ▶ **Note:** The Trial Cutting Guide workflow is only applicable for revisions as previous bone cuts are required for the Trial Cutting Guide to fit.
- ▶ **Attention:** The Triathlon Hinge Femur cannot be used with offsets. This should be considered if revising an implant that used offset adapters.
- ▶ **Caution:** Consider the flexion angle of the previous distal resection and ensure that all undesired femoral flexion in the femoral component is removed.
- ▶ **Note:** The constraint provided by the TCG is not representative of the implant. Formal trial reduction assessments shall be performed with trialing components.

### Hinge TCG: Extension gap assessment

Put the knee into Extension (0 degrees).

To help ensure that there is adequate joint space to fit the Triathlon Hinge components, place the Triathlon Hinge Spacer Block into the joint space (**Figure 84**).

One end of the Triathlon Hinge Spacer Block represents the minimum total joint space of 29mm. The other end corresponds to 26mm which accounts for the thickness of the Revision Baseplate or Revision Baseplate trial (**Figures 85 and 86**).

**For a Triathlon Hinge femur, the minimum distal femoral resection, from the native bone, is 13mm representing the standard 8mm for a Triathlon TS and a 5mm built-in distal femoral augment.**

If the Triathlon Hinge Spacer Block cannot fit into the joint space, additional resection is required from the distal femur, proximal tibia, or both. Resection of tibia or femur should take into consideration patellar position related to the anticipated joint line.

Bone loss during the implant removal step will impact how much bone needs to be removed from the distal femur.



Figure 85

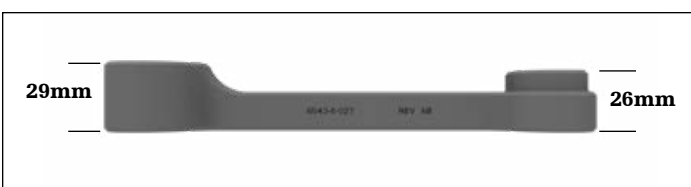
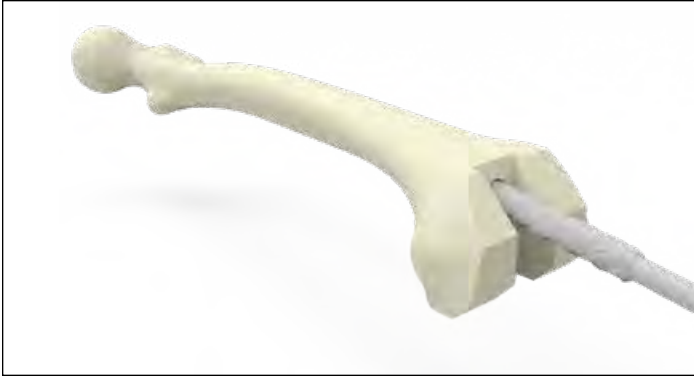


Figure 86



**Figure 87**

### Hinge TCG: Intramedullary femoral preparation

Assemble the 8mm Starter Awl to either the T-Handle or the power unit using the Universal Driver.

Referencing the desired femoral resection, ream the femoral intramedullary canal to the desired depth of stem or length of fixation preferred for femoral alignment. Grooves along the shank of the reamer indicate the depth of the reamer in the canal. Refer to the table below.

Progressively ream, increasing diameter in 1mm increments until purchase is achieved, and leave the final reamer in the femoral intramedullary canal (**Figure 87**).

#### Depth markings (mm): Femoral components

Stem length	Hinge femur w/TCG prep
100mm	175
150mm	225
Central Femoral Cone	175*

\*When preparing for size 7-8 Cones, ream an additional 5mm deeper to prevent the Cone Reamer from bottoming out on the IM Reamer.

- ▶ **Note:** When reaming for stem extenders (5571-S-025 and 5571-S-050), ream an additional 25mm or 50mm accordingly. Note that the stem extender implants have a 16mm diameter; ream accordingly based on desired stem type.

#### Technical point

Tap the final reamer gently with a mallet to assure that it is firmly seated.

► **Caution:** Be aware that other steps throughout this protocol may not use this reference point to determine boss reaming depth.



Figure 88

### Hinge TCG: Boss ream

If the final reamer is less than 19mm, prepare for the TCG box feature and boss of the femoral component by reaming over the top of the IM Reamer shank with the Revision Boss reamer until the **end of the flutes** on the Revision Boss Reamer are flush with the distal bone cut surface of the femur. If the final reamer is 16-18mm, ensure the reamer is at a depth of 200mm before using the Revision Boss Reamer (**Figure 88**).

If the final reamer is 19mm boss reaming is not required as the IM reamer has prepared for the TCG box feature and boss diameter.

Remove the IM reamer and Revision Boss Reamer from the canal.

### Technical point

If reaming is difficult, the Revision Boss Reamer may be attached to power. Attach the Revision Boss Reamer to the power unit using the Universal Driver.

### Hinge TCG: Femoral size selection

To determine femoral size, match a Femoral Sizing Template to the femur in the sagittal orientation to determine approximate A/P sizing (**Figure 89**).

- **Note:** The internal cut representations on the Femoral Sizing Templates represent that of the correspondingly sized TS Femoral Component, not the Hinge Femoral Component.
- **Note:** The Triathlon Hinge Femur cannot be used with offsets.

Pay careful attention to match the femoral size to the planned restored joint line as opposed to flush with the surfaces of the femur. A long engraved line on the sagittal profile of the Femoral Sizing Templates is designed to indicate the boss position of the femoral component. In addition, along the handle of each Femoral Sizing Template are two additional tick marks, which are designed to represent the M/L width of the corresponding size femoral component (**Figure 90**).

Alternative sizing techniques include comparing the femoral component removed to the templates and trials or pre-operatively X-ray templating.



Figure 89



Figure 90

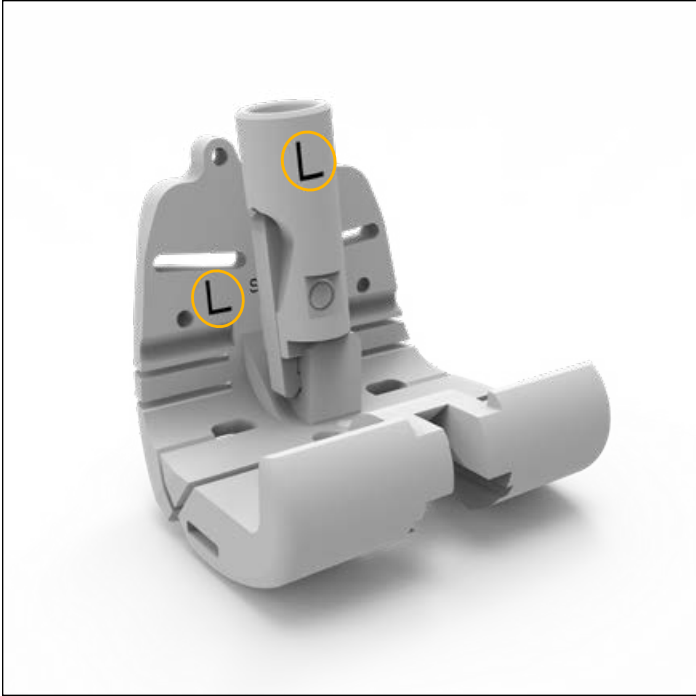


Figure 91

### Hinge TCG: Assembly

First, thread the appropriate size trial stem to the Valgus Adapter.

Assemble the Valgus Adapter to the appropriately sized Triathlon Hinge Trial Cutting Guide by depressing the pawl thumb lever of the Valgus Adapter and ensure the pawl hook of the valgus adaptor locks to the square through-hole of the TCG to ensure full assembly.

The TCG can be assembled for either a left or right knee. Depending on the affected knee, the inscribing of L (left) or R (right) on the valgus adaptor should be facing posteriorly, with the valgus adaptor oriented towards the L or R inscribing on the posterior face of the anterior flange of the TCG (Figure 91).

### Hinge TCG: Tibial Trial preparation

► **Attention:** The Triathlon Hinge Femur is only compatible with the Revision Tibial Baseplate.

Assemble all Tibial Augment Trials to the appropriate size Tibial Baseplate Trial.

Thread the appropriate size Stem Trial into the Tibial Baseplate Trial.

Assemble the tibial trial construct to the Revision Baseplate Impactor/Extractor and impact onto the Tibia (Figure 92). Ensure the tab of the Impactor/Extractor is engaged under the posterior lip of the baseplate before impacting (Figure 93).

Assemble the appropriate size Hinge Insert Trial into the Revision Tibial Baseplate Trial. Do not impact the Insert Trial during assembly.



Figure 92



Figure 93



### Hinge TCG: Trial Cutting Guide orientation

#### Hinge TCG: distal/proximal location

Insert the Hinge TCG assembly into the femoral canal and align to the medial epicondyle (ME) scribe line reference mark with the medial epicondyle (**Figure 94**).

- If the ME line on the TCG is located distally to the anatomic ME than additional distal resection may be required. Proceed to the Hinge TCG: Distal Femoral Resection step in order to make an additional distal cut.
- ▶ **Attention:** If the femoral canal does not allow for proper placement of the TCG with respect to the ME/IPP line, then revisit the boss reaming step to ensure enough bone is cleared to accommodate the TCG assembly.

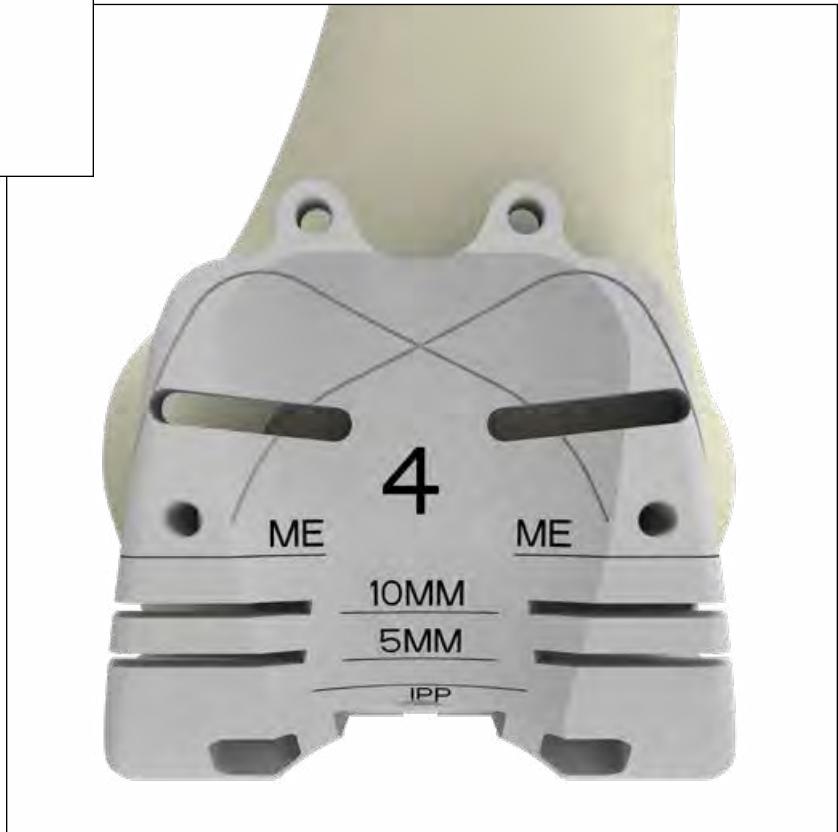
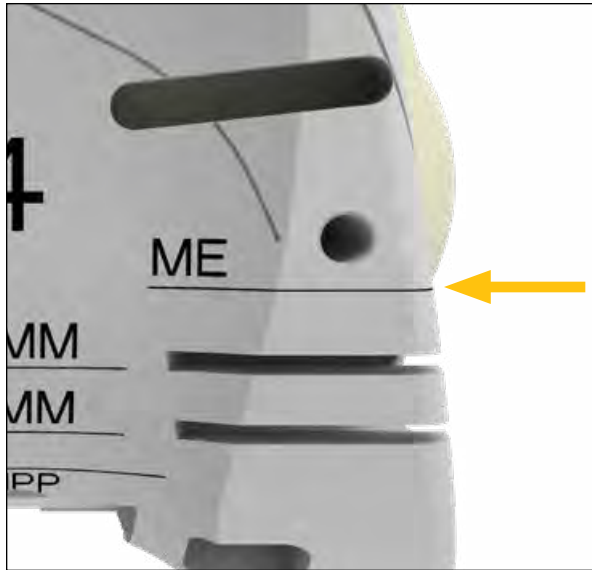


Figure 94



**Figure 95**



**Figure 96**

**Technical points**

The ME scribe line is 28mm from the distal surface of the TCG. When the ME scribe line is equal with the anatomic ME, the distal surface of the TCG will be approximately located at the joint-line.

The joint-line can be estimated using pre-operative radiographs and anatomic landmarks using a surgical ruler.

If converting the femur from a TS to a Hinge femur with a well-fixed Revision Baseplate, consider the impact of the tibial position on the joint line. Resection of the femur should take into consideration patellar position related to the anticipated joint line.

Place a Fixation Pin in the middle of the medial slot on the anterior flange of the TCG. Pinning the medial slot will fix the proximal/distal position while allowing for slight internal and external rotation of the TCG (**Figure 95**).

With the knee flexed at 90° and if not already done so, place the Hinge Insert Trial corresponding to the size of the baseplate into the baseplate trial. Do not impact the Insert Trial during assembly.

Insert the corresponding Hinge TCG Bearing Post Trial into the Revision Tibial Baseplate Trial.

Attach the Hinge TCG Bearing Post Trial to the Hinge TCG by sliding up the post retainer in the TCG and inserting the TCG Bearing Post (**Figure 96**).

Assemble the Insertion Removal Handle to the Hinge Trial Bearing Plate that corresponds to the Hinge Tibial Bearing Post Trial; see table below.

			Triathlon Hinge TCG					
			6543-6-001	6543-6-002	6543-6-003	6543-6-004	6543-6-005	6543-6-006
			Bushing trials N/A Axle trial N/A Bumper trial N/A					
Triathlon Revision Tibial Baseplate Trials	5612-T-100	No sleeve	Insert Trials		X		X	
	5612-T-200		TCG Bearing Post Trial 6543-6-008		TCG Bearing Post Trial 6543-6-009		TCG Bearing Post Trial 6543-6-010	
	5612-T-300		6543-6-061		6543-6-073		6543-6-075	
	5612-T-400		6543-6-062		6543-6-071			
	5612-T-500		6543-6-063					
	5612-T-600		6543-6-064					
	5612-T-700		6543-6-065					



Figure 97

**Technical points**

Assemble the Insertion Removal handle to the anterior holes of the Hinge Trial Bearing Plate to insert and reposition the Trial Bearing Plate (Figure 97).

With the knee at 90 degrees, manually distract the knee and insert the Hinge Trial Bearing Plate into the desired slot of the TCG Bearing Post Trial to replicate the desired insert thickness. **Insert thickness should be dictated by the desired leg length rather than tension.** Each slot represents the thickness of a definitive insert.

If utilized, remove the Insertion Removal Handle and bring the knee to full extension (0 degrees).

- Assess the location of the patella. In extension this should be proximal to the inferior pole of the patella (IPP) line. Patella placement too far proximally during extension will adversely impact patella tracking (Figure 99).
- Assess the joint line. Adjust the insert thickness as required by reattaching the Insertion Removal Handle, or surgical forceps, to the Hinge Trial Bearing Plate and shifting the plate to the next increment. The thickness of the insert can be viewed through the window in the Hinge Trial Bearing Plate (Figure 98).



Figure 98

**Technical points**

If needed, the pin can be removed and the TCG can be moved more distally or proximally and repined to obtain appropriate distal/proximal location of the TCG.

If the ME scribe line on the TCG is located distally to the anatomic medial epicondyle this may indicate that the TCG is positioned too far distally, and more bone may need to be removed.

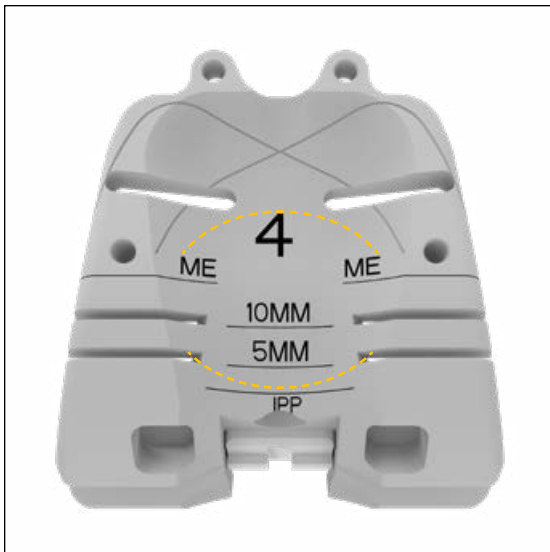


Figure 99

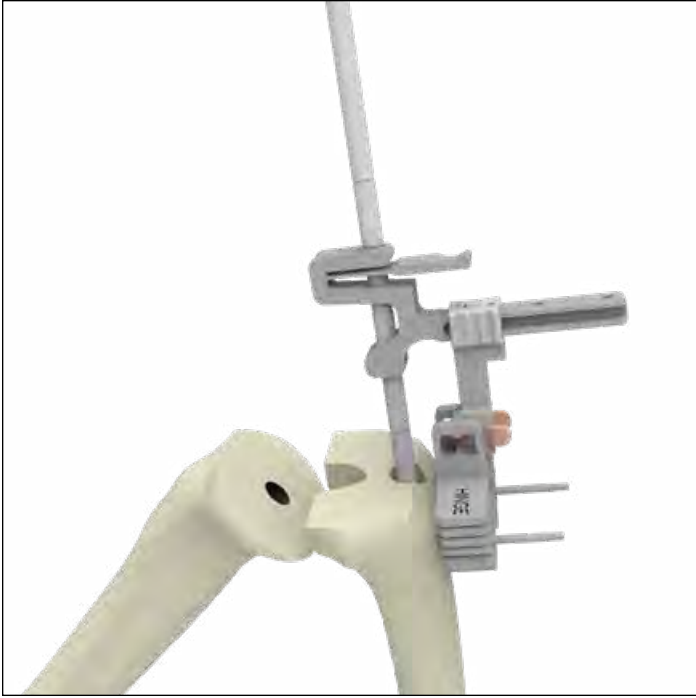


Figure 100

Hinge TCG: Distal femoral resection  
(only required if distal resection is needed)

Assemble the Resection Guide Tower, Resection Guide Support Arm, and the Hinge Revision Distal Resection Guide over the IM Reamer. Verify that the Hinge Distal Femoral Resection Guide reads “L” for left leg or “R” for right leg on the side facing away from the femur.

Set distal/proximal resection level and orientation by depressing the finger tab on the Resection Guide Tower.

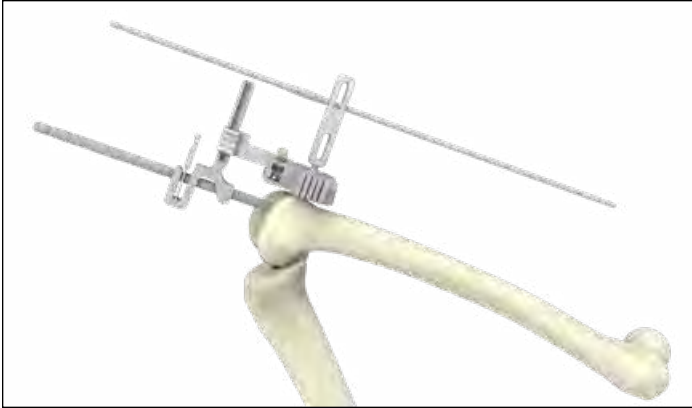
Align the Hinge Distal Femoral Resection Guide with the medial epicondyle to recreate the anatomical joint line. Resection of the femur should take into consideration patellar position related to the anticipated joint line. A groove on the resection guide marked “ME” can be used in conjunction with the blade runner to align the Hinge Distal Femoral Resection Guide with the medial epicondyle (**Figure 101**).

Pin the Distal Resection Guide (**Figure 100**).

If the blade runner can be passed through the 0mm cut slot without hitting bone no femoral resection is required. If it engages bone further resection is required.



Figure 101



**Figure 102**

**Technical points**

The ME scribe line is 28mm from the distal surface of the Hinge femur.

The joint-line can be estimated using pre-operative radiographs and anatomic landmarks using a surgical ruler. The position of the patella can help determine the proper proximal/distal placement of the femoral component as well.

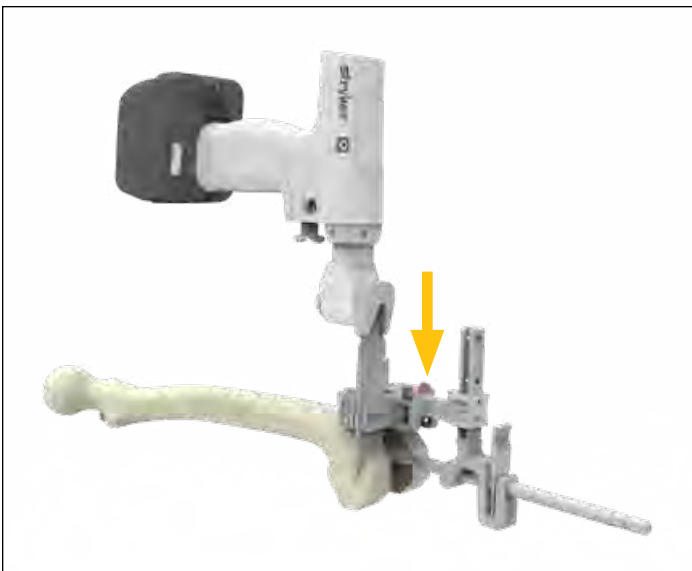
If converting the femur from a TS to a Hinge femur with a well-fixed Revision Baseplate, consider the impact of the tibial position on the joint line.

- ▶ **Caution:** Do not pin the cross pin until the IM reamer is removed as it will interfere with the IM reamer flutes in the subsequent steps.

To verify flexion angle of distal femoral cut, attach universal alignment handle to Hinge distal femoral resection guide and insert alignment rod (**Figure 102**).

If flexion angle of distal femoral cut is not desirable, additional resection may be required from the distal femur.

Resect the distal femur (**Figure 103**).



**Figure 103**

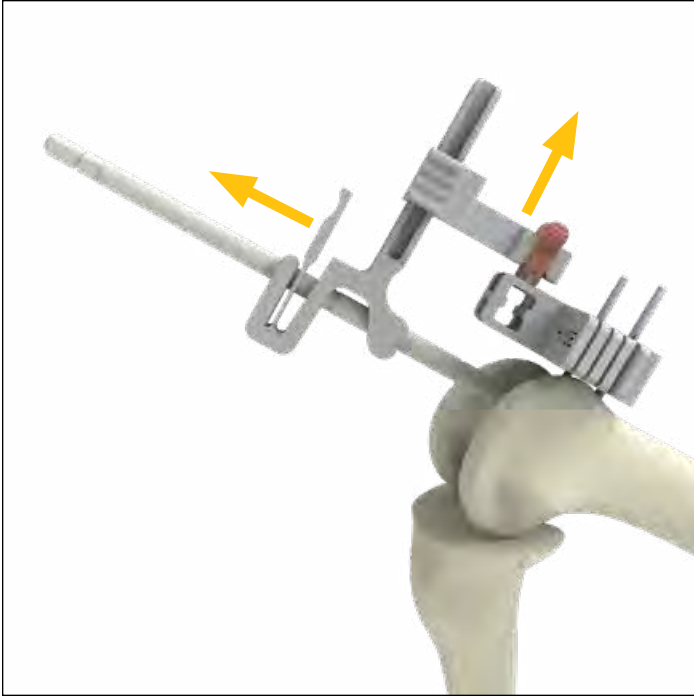


Figure 104

**Technical points**

If desired, the Support Arm, Resection Guide Tower and IM Reamer can be removed before completing the femoral resections. To do so, depress the tabs on the Support Arm to disengage it from the Revision Distal Femoral Resection Guide. Slide the Support Arm anterior. Depress the tab on the Resection Guide Tower and slide it off the IM Reamer. Use a T-Handle to remove the IM Reamer (**Figure 104**).

Once the distal femoral resection is complete reinsert the assembled TCG, valgus adapter and stem trial into canal in order to assess distal proximal location per Hinge TCG: Distal/proximal location.

**Hinge TCG: Rotation assessment**

With the knee flexed at 90°, with the TCG bearing post trial disassembled from the TCG, approximate external rotation can be set by positioning the Hinge TCG in relation to the proximal tibial surface, transepicondylar axis or Whiteside’s axis. A transepicondylar axis (TEA) scribe line is marked on the Hinge TCG component and can be used as a reference.

Once rotation is set, an additional fixation pin should be placed in the Hinge TCG’s distal medial pin hole.

You may consider downsizing the TCG if there is a gap between the TCG anterior flange and the anterior femur that cannot be addressed with cement. If downsizing the TCG consider the impact this will have on cone size compatibility.

**Hinge TCG: Final assessment**

Assemble the TCG bearing post trial to the TCG and bring the leg into full extension and assess the patella location and the joint line as a final check prior to making bone cuts (**Figure 105**).



Figure 105



Figure 106



Figure 107

## Hinge TCG: Femoral bone cuts

With the TCG properly positioned, use a blade runner to determine the appropriate anterior chamfer, posterior chamfer and distal augment resections required. To help prevent anterior lift off of the TCG ensure the distal medial pin hole is being used for fixation (**Figure 107**).

- The TCG bearing post trial can be disassembled from the TCG in order to allow better access to the femur.

Make the bone resections. A Stryker 152 saw blade (narrow-thick) or a reciprocating saw blade are recommended for the bone resection (**Figure 106**).

It is recommended that the posterior cut be last.

### Technical points

A blade runner can be inserted into one of the distal augment slots to provide stability as the other cuts are made.

If an augment cannot effectively “fill the gap,” i.e., deficiencies greater than 10mm distally, consider using a Tritanium Cone Augment or bone graft.

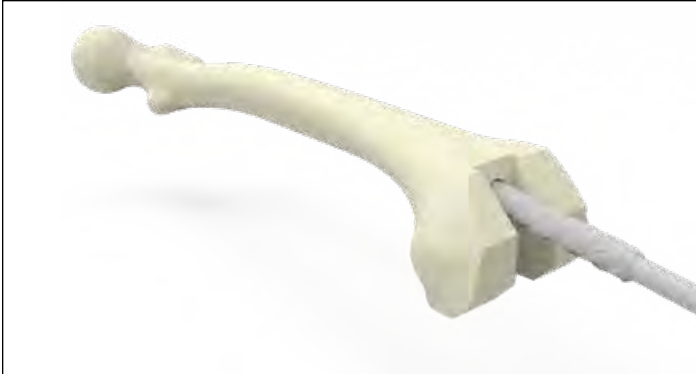
Once complete, remove the pins, Hinge TCG assembly, TCG Bearing Post Trial and Hinge Trial Bearing plate.

If using cones proceed to the Triathlon Tritanium Femoral Cone Augment Preparation for Hinge section of this protocol. If no cones are being used proceed to the Component Trialing section of this protocol.



**Central Femoral Cone**

**Figure 108**



**Figure 109**

### Triathlon Tritanium Femoral Cone Augment preparation for Hinge

► **Attention:** The Central Femoral Cone is the only cone augment intended for use with the Triathlon Hinge Femur (**Figure 108**). Triathlon Tritanium Femoral Cone Augments' lobed design is not compatible with the Triathlon Hinge Femur.

To prepare the femur, reference previous femoral preparation steps.

### Intramedullary reaming for Femoral Cones

Insert a reamer at least 2mm smaller in diameter to previously selected femoral IM Reamer.

Progressively ream to a minimum of 175mm, increasing diameter in 1mm increments until adequate purchase is achieved, and leave the final reamer in the canal (**Figure 109**).



Central Femoral Cone size is within the shaded regions		Femoral Cone reamer marking				
		1-2	3-4	5	6	7-8
Hinge Femoral Component size	1	1-2	1-2	3-4	3-4	5
	2	1-2	3-4	3-4	5	6
	3	1-2	3-4	5	5	6
	4	1-2	3-4	5	6	7-8
	5	1-2	3-4	5	6	7-8
	6	1-2	3-4	5	6	7-8
5mm augments	1	-	1-2	3-4	3-4	5
	2	-	1-2	3-4	5	6
	3	-	1-2	3-4	5	6
	4	-	1-2	3-4	5	6
	5	-	1-2	3-4	5	6
	6	-	1-2	3-4	5	6
10mm augments	1	-	-	1-2	3-4	5
	2	-	-	1-2	3-4	5
	3	-	-	1-2	3-4	5
	4	-	-	1-2	3-4	5
	5	-	-	1-2	3-4	5
	6	-	-	1-2	3-4	5

### Central Femoral Cone sizing table

Example: When reaming to the size 6 marker for a size 3 femur, a size 5 Central Femur Cone will be implanted.

- Implant the cone that corresponds to the marking on the reamer.
- Implant the cone that is one size smaller than the marking on the reamer.
- Implant the cone that is two sizes smaller than the marking on the reamer.
- Not compatible with Hinge femur when augments are used

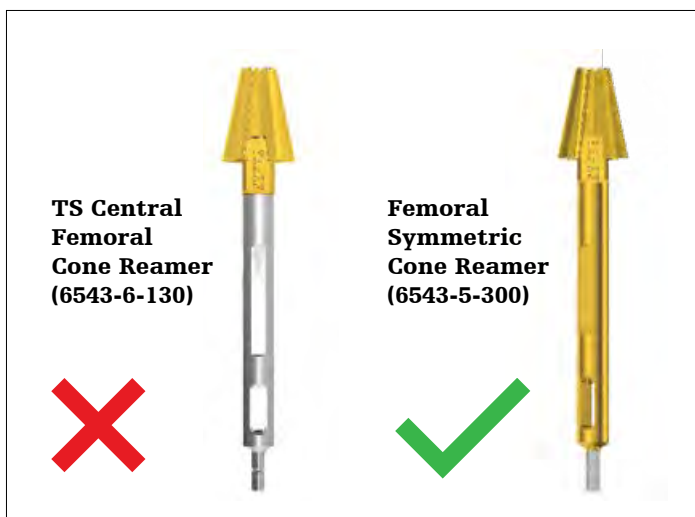


Figure 110

## Preliminary Cone selection and sizing

Based on the proper femoral implant size, use the sizing table to help determine possible constraints between the Femoral Component, Central Femoral Cone and Hinge Femoral Augments.

Invert a contralateral leg Cone Trial over the resected bone defect. Assess cone coverage and determine if a Central Cone is required.

Ensure the Cone Trial is centered on the IM reamer. Centering the trial helps to ensure proper positioning.

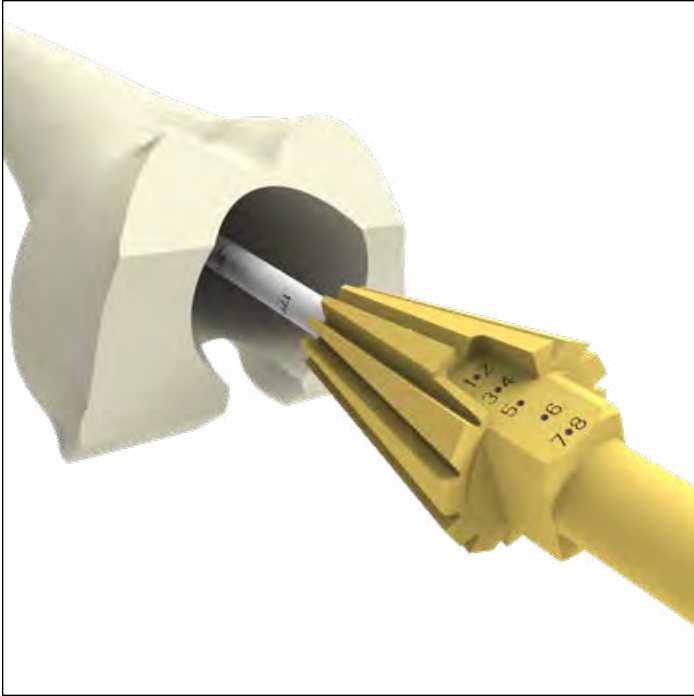
- Size 3 femur
- 5mm augment
- Ream depth to 3-4
- Implant a 1-2 Central Femoral Cone



## Central Femoral Cone preparation Triathlon Hinge

### Option 1: Central Femoral Cone preparation

Ensure that the Femoral Symmetric Cone Reamer (6543-5-300) is being used. This can be confirmed by checking that the reamer shaft is gold and that it reads "Femoral Cone Reamer" (Figure 110).

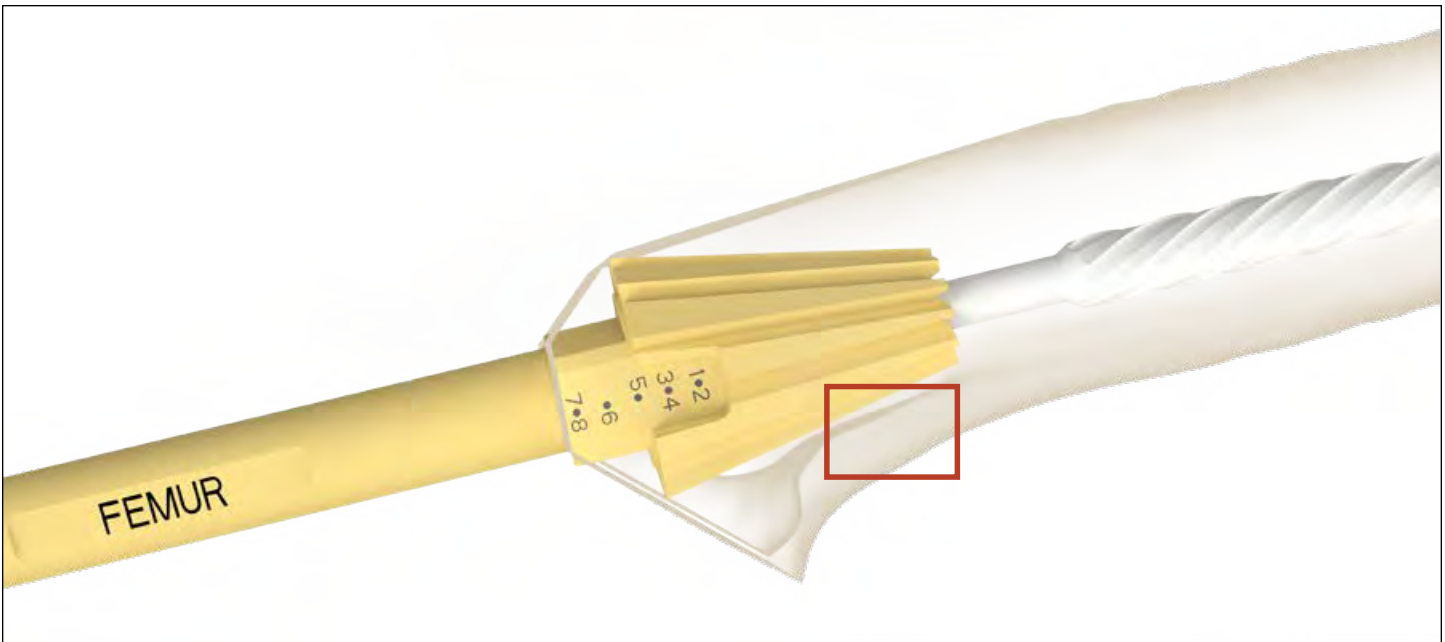


**Figure 111**

Insert the Femoral Symmetric Cone Reamer over the IM reamer or Stem Extender. If reaming under power, confirm that the drill is to ream mode before reaming begins (**Figure 111**).

Start the reamer before engaging the bone. Ream down to the desired depth for bone void coverage.

- ▶ **Caution:** If bone is soft, osteopenic, fractured or sclerotic, consider initially reaming by hand using the T-Handle.
- ▶ **Caution:** Stop reaming if contact with the posterior cortex of the femur causes the Femoral Symmetric Cone Reamer to deflect anteriorly (**Figure 112**). If the bone void is not adequately filled by the corresponding size Central Femoral Cone, consider using alternative methods to fill the bone void.



**Figure 112**

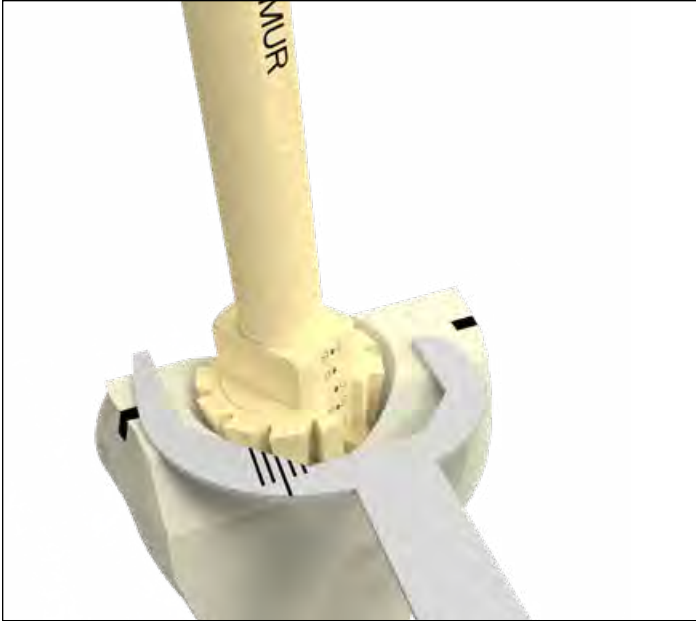


Figure 113

To determine size of the Central Femoral Cone, utilize the femoral sizing templates. Ensure that the distal femoral cut intersects the dot marking. The dot signifies the surface of the resected plane (**Figure 113**).

- ▶ **Caution:** Stop the reamer before using the femoral sizing templates.
- ▶ **Note:** Ream until the dot marking is flush with the most distal surface of the cut. Dot marking must be directly anterior.
- ▶ **Note:** Confirm that the Femoral Symmetric Cone Reamer is not being hindered by the cutting surface of the flutes on the IM reamer. If so, the IM Reamer may need to be placed in a more proximal position.
- ▶ **Note:** Dot markings on the reamer increase in depth by 5mm.

Refer to the Central Femoral Cone sizing table to determine the appropriate cone implant size based on the depth of ream, femoral size and augment selection.

For trialing refer to the Component Trialing section of this protocol.



Figure 114

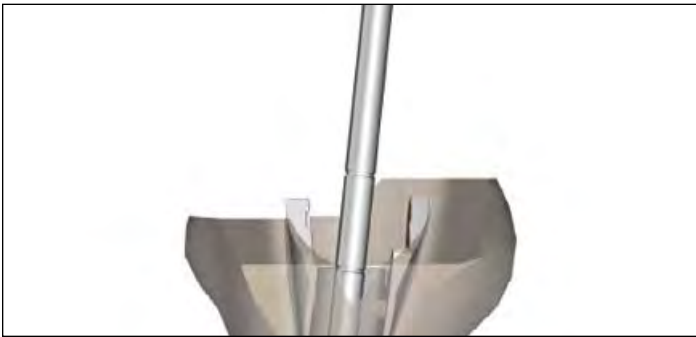


Figure 115

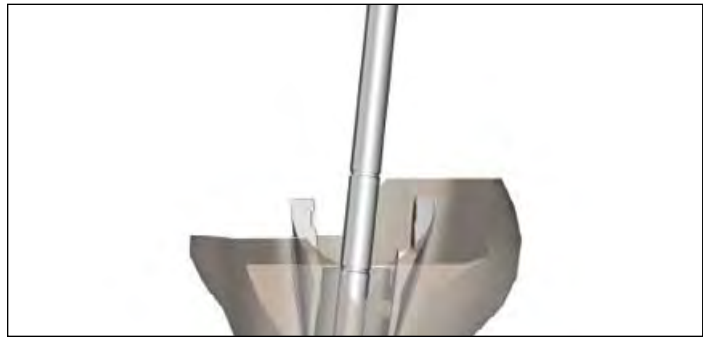


Figure 116

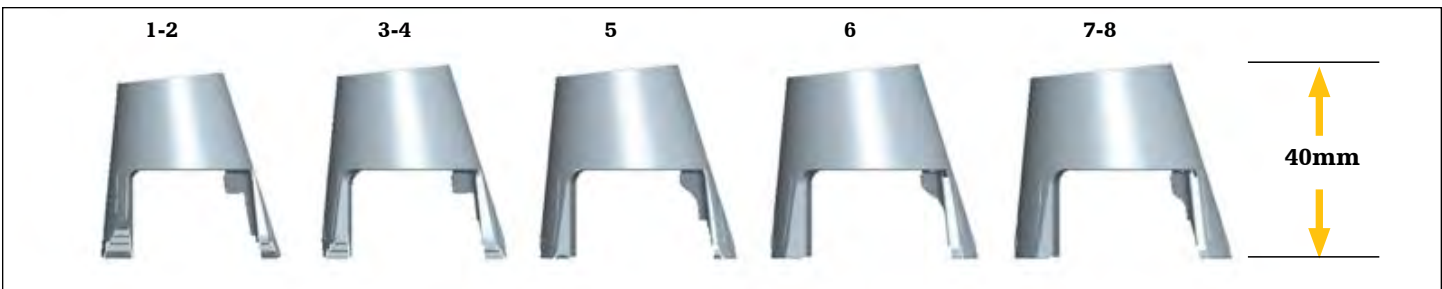


Figure 117



Figure 118

## Central Femoral Cone trialing

The Central Femoral Cone Trial can be placed in the prepared bone. Assemble the desired Stem Trial with the corresponding Central Femoral Cone Introducer and TS Impaction Handle. There are two Central Femoral Cone introducers: One for sizes 1-4 Central Femoral Cones and another for sizes 5-8. Ensure correct side (L or R marking) is facing anterior (**Figure 118**).

- ▶ **Note:** Stem trials with product code 5560-T-XXX cannot be used with cone augment instrumentation. This includes trials 5560-T-109, 5560-T-112 and 5560-T-115.

Align the orientation keys on the Introducer with the feature on the Cone Trial. The orientation keys are located medially and laterally on the trial.

- ▶ **Caution:** There is no positive lock on the Central Femoral Cone Trial and the Cone Introducer. If inserting the Trial on the Introducer, be aware that the Cone Trial may disconnect from the Introducer.
- ▶ **Caution:** Do not impact or implant the Central Femoral Cone Trials.

### Options if added Cone stability is required:

Ream to a larger Central Femoral Cone (repeat steps from the Femoral Cone preparation section of the protocol).

Convert to a Femoral Cone (starting at Femoral Cone Reamer Guide assembly step of the protocol).

Implant the Central Femoral Cone with cement.

For trialing proceed to the Component Trialing section of this protocol.



Figure 119



Figure 120



Figure 121A



Figure 121B



Figure 122A



Figure 122B

**Component trialing**

To avoid kinematic conflict of the hinge mechanism, it is advised to resect both collateral ligaments. This step should not be done before the femoral preparation. The collateral ligaments can be resected at any point after the femoral bone preparation.

**Tibial Trial assembly**

If you are planning for Cone Augments begin with Cone Augment trialing it has not already been completed.

**Tritanium Tibial Cone Augment trialing**

Assemble the desired Stem Trial (100mm stem maximum) with the Tibial Cone Introducer, Impaction Handle and the previously selected Symmetric or Asymmetric Cone Trial.

Tibial Cone Introducers are size specific and intended for use with both Symmetric and Asymmetric Cones (Figure 120).

Align the orientation key on the trial with the key feature on the Cone Introducer. The orientation key is located posteriorly on the trial. See Figure 121 (Symmetric) Figure 122 (Asymmetric).

**Technical points**

- ▶ **Caution:** There is no positive lock on the Cone Trial and the Cone Introducer. The trial may disconnect from the introducer.

The Cone Trial can be placed into the prepared bone before the Stem Trial and the Cone Introducer.

Downsize the Stem Trial by 1mm.

When inserting the Cone Trial, ensure that the anterior rotational alignment marking on the trial is aligned with the anterior surface marking previously determined by the Universal Tibial Template (**Figure 123** (Symmetric) **Figure 124** (Asymmetric)).

Insert the trial until it is seated at the appropriate depth. Remove the Cone Introducer and the Stem Trial so that only the Cone Trial remains in the void.

**Technical points**

- ▶ **Caution:** Do not impact or implant the Cone Trials.

Stem trials with product code 5560-T-XXX cannot be used with cone augment instrumentation. This includes trials 5560-T-109, 5560-T-112 and 5560-T-115.



Figure 123



Figure 124



Figure 125

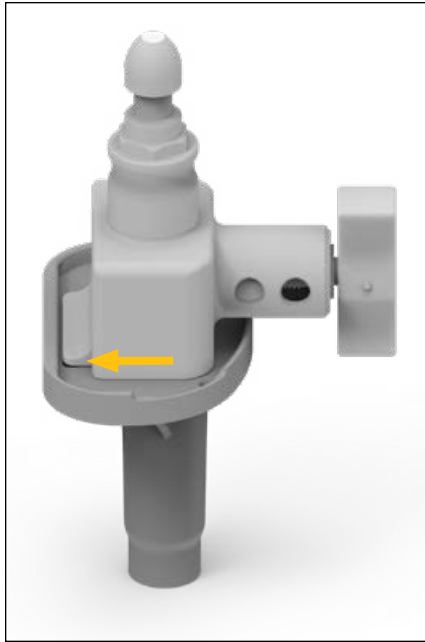


Figure 126

**Revision Baseplate Trial assembly**

► **Attention:** The Revision Baseplate is not available with offset adaptors

Assemble all Tibial Augment Trials to the appropriate size Tibial Baseplate Trial.

Thread the appropriate size Stem Trial into the Tibial Baseplate Trial.

Assemble the tibial trial construct to the Revision Baseplate Impactor/Extractor and impact onto the Tibia (**Figure 125**). Ensure the tab of the Impactor/Extractor is engaged under the posterior lip of the baseplate before impacting (**Figures 126-128**).

Assemble the appropriate size Hinge Insert Trial into the Revision Tibial Baseplate Trial. Do not impact the Insert Trial during assembly.

**Femoral Trial assembly**

If you are planning for Cone Augments begin with Cone Augment trialing if it has not already been completed.



Figure 127



Figure 128



Figure 129



Figure 130

## Central Femoral Cone trialing

The Central Femoral Cone Trial can be placed in the prepared bone. Assemble the desired Stem Trial with the corresponding Central Femoral Cone Introducer and TS Impaction Handle. There are two Central Femoral Cone introducers: One for sizes 1-4 Central Femoral Cones and another for sizes 5-8. Ensure correct side (L or R marking) is facing anterior (**Figure 130**).

- ▶ **Note:** Stem Trials with product code 5560-T-XXX cannot be used with cone augment instrumentation. This includes trials 5560-T-109, 5560-T-112 and 5560-T-115.

Align the orientation keys on the Introducer with the feature on the Cone Trial. The orientation keys are located medially and laterally on the trial.

- ▶ **Caution:** There is no positive lock on the Central Femoral Cone Trial and the Cone Introducer. If inserting the Trial on the Introducer, be aware that the Cone Trial may disconnect from the Introducer.
- ▶ **Caution:** Do not impact or implant the Central Femoral Cone Trials.

Confirm the depth of the Central Femoral Cone Trial by ensuring that the trial sits sub flush to the distal surface of the femur.

### Options if added Cone stability is required:

Ream to a larger Central Femoral Cone (repeat steps from the Femoral Cone preparation section of the protocol).

Convert to a Femoral Cone (starting at Femoral Cone Reamer Guide assembly step of the protocol).

Implant the Central Femoral Cone with cement.

Proceed to the appropriate femoral trialing section of this protocol.





**Figure 131**



**Figure 132**



**Figure 133**



**Figure 134**



**Figure 135**

### Triathlon Hinge Trial assembly

Assemble all Femoral Distal Augment Trials prepared for onto the appropriate size Hinge Femoral Trial. Ensure that both ends of the Hinge Femoral Distal Augment Trial have engaged the undercuts of the Femoral Trial (**Figures 131 and 132**).

Femoral Distal Augment Trials are size specific and are offered in 5mm and 10mm thicknesses.

Thread the appropriate size Stem Trial into the Hinge Femoral Trial (**Figure 133**).

Assemble the femoral trial construct to the Femoral Impactor/Extractor and with the knee flexed at 90°, insert the femoral trial assembly into the canal and impact onto the femur (**Figure 134**).

- ▶ **Note:** A gap between the Femoral Trial and the resected Femur is acceptable and can be addressed with cement mantle between the implant and femur.

A headless pin can be inserted into the fixation pin hole for additional fixation (**Figure 135**).

- ▶ **Attention:** When using any size Central Femoral Cone Trial in the femur, the pin fixation hole **cannot** be used.
- ▶ **Attention:** The headless pin can be removed if it does not allow for patella tracking assessment through range of motion.

Ensure the correct Hinge Insert Trial size is in the Revision Baseplate Trial. Do not impact the Insert Trial during assembly.

Ensure the posterior lip of the insert trial is engaged under the posterior lip of the baseplate trial (**Figure 136**).



**Figure 136**

			Insert Trials	Triathlon Hinge Femoral Component Trials					
				5612-T-101/2	5612-T-201/2	5612-T-3401/2	5612-T-401/2	5612-T-501/2	5612-T-601/2
				Bushing trials N/A for full trials, 6543-6-018 for trialing with implants Axle trial 6543-6-020 Bumper trial 6543-6-101/3					
Triathlon Revision Tibial Baseplate Trials	5612-T-100	No sleeve	6543-6-061	Bearing Post Trial 6543-6-058 Trial Bearing Plate 6543-6-071	X  Bearing Post Trial 6543-6-059 Trial Bearing Plate 6543-6-073	X	Bearing Post Trial 6543-6-060 Trial Bearing Plate 6543-6-075		
	5612-T-200		6543-6-062						
	5612-T-300		6543-6-063						
	5612-T-400		6543-6-064						
	5612-T-500		6543-6-065						
	5612-T-600		6543-6-066						
	5612-T-700		6543-6-067						



Figure 137

Insert the corresponding Hinge Tibial Bearing Post Trial into the Revision Tibial Baseplate Trial; see table above.

Assemble the Alignment Guide to the Trial Bearing Post. Position the Hinge Tibial Bearing Post Trial into the intercondylar notch of the Hinge Femoral Trial.

With the knee in 90 degrees of flexion, seat the femur on the Alignment Guide, ensuring both condyles are flush to the guide. This will help ensure that the axle holes on the femoral trial are aligned with the Trial bearing post axle hole.

Slide the Trial Axle through the Hinge Femoral Component Trial and Hinge Tibial Bearing Post Trial (**Figure 137**). Do not impact the Trial Axle during assembly.

► **Optional:** The Alignment Guide may also be used at the end of trialing to help remove the Trial Axle.

Assemble the appropriately angled Trial Bumper in the Hinge Tibial Bearing Post Trial by hand.

Assemble the insertion removal tool to the Hinge Trial Bearing Plate that corresponds to the Hinge Tibial Bearing Post Trial; refer to table above.

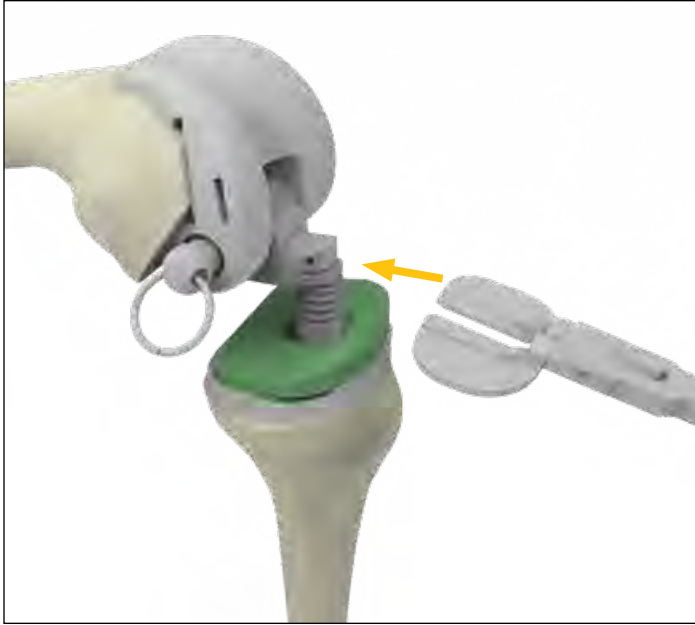


Figure 138

### Technical points

Assemble the Insertion Removal Handle to the anterior holes of the Hinge Trial Bearing Plate to insert and reposition the Trial Bearing Plate (**Figure 138**).

With the knee at 90 degrees, manually distract the knee and insert the Hinge Trial Bearing Plate into the desired slot of the Bearing Post. **The insert thickness should be dictated by the desired leg length rather than tension.** Each slot represents the thickness of a definitive insert.

If utilized, remove the Insertion Removal Handle and bring the knee to full extension (0 degrees), determine if the extension gap is adequately filled.

Perform the trial reduction and evaluate patella tracking.

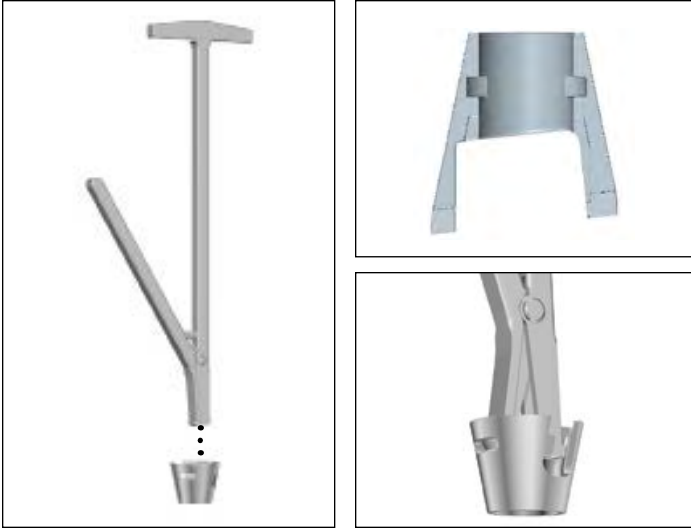
Adjust the insert thickness as required by reattaching the Insertion Removal Handle, or surgical forceps, to the Hinge Trial Bearing Plate and shifting the bearing plate to the next increment or fully disassociate the Femoral Trial and Bearing Post assembly from the Revision Tibial Baseplate trial to shift the bearing plate to the next increment.

Adjust the Trial Bumper angle as required.

### Technical points

The surgeon has the option to use two different bumpers; 0 degree (grey trial) and an alternative with 3 degrees (black trial) of flexion built-in based on the patient needs.

If required, it is often easiest to adjust the thickness of the insert in flexion (90 degrees).



**Figure 139**

### Trial and Cone Augment Trial removal

Extract the Hinge Trial components, Revision Baseplate trial and Femoral component trial using the corresponding impactor/extractor instruments.

Use the Cone Extractor to remove the Cone Trials (**Figure 139**).

Insert the extractor into the Cone Trial (jaws closed). Squeeze the extractor handles to open the jaws. The jaws will engage the slots within the proximal end of the Cone Trial.

Once the jaws engage with the slots, remove the trial. Strike the handle of the extractor to assist in removal of the Cone Trial.

#### **Technical points**

A Lamina Spreader (with narrow fixed pads) or a Curette (reverse angle) may also be used to remove the Cone Trials. Insert the Lamina Spreader or Curette into the Cone Trial and apply back pressure.

Proceed to the Definitive Component Assembly section of this protocol.

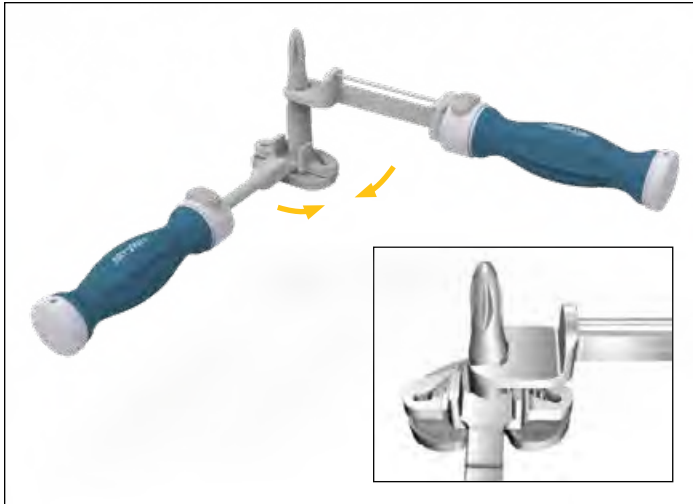


Figure 140A



Figure 140B

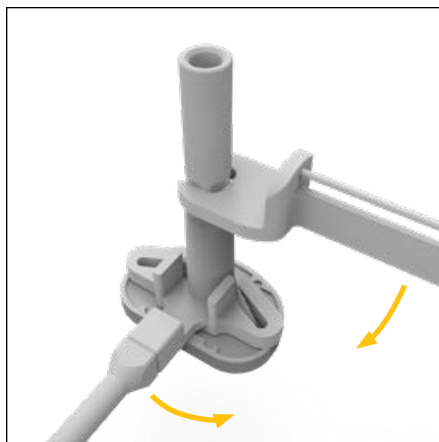


Figure 141

## Definitive component assembly

### Revision Baseplate Tibial Implant assembly

Assemble the stem to the baseplate prior to assembling augments.

#### Tibia with stem

Using the Universal Counter Wrench with the **tibia** side up, hold the Revision Baseplate in place by placing the slots of the counter wrench down over the keel fins of the baseplate.

Thread the appropriate size stem into the Tibial Baseplate Boss.

Place the open face end of the Torque Wrench on the flats of the stem.

Tighten by pulling the wrenches **together (Figure 140A)**. Torque Stem to 120 in-lbs. as indicated on the Torque Wrench (**Figure 140B**).

#### Optional Tibia with Stem Extender

Using the Universal Counter Wrench with the **tibia** side up, hold the Revision Baseplate in place by placing the keel fins into the slots. Thread the Stem Extender into the Tibial Baseplate boss.

Place the open face end of the Universal Torque Wrench on the flats of the Stem Extender. Tighten by pulling the wrenches together (**Figure 141**).

Torque stem extender to 120 in-lbs. as indicated on the Universal Torque Wrench.

Thread the appropriate size stem into the Stem Extender.

Place the open face end of the Torque Wrench on the flats of the stem.

Tighten by pulling the wrenches **together**. Torque Stem to 120 in-lbs. as indicated on the Torque Wrench.

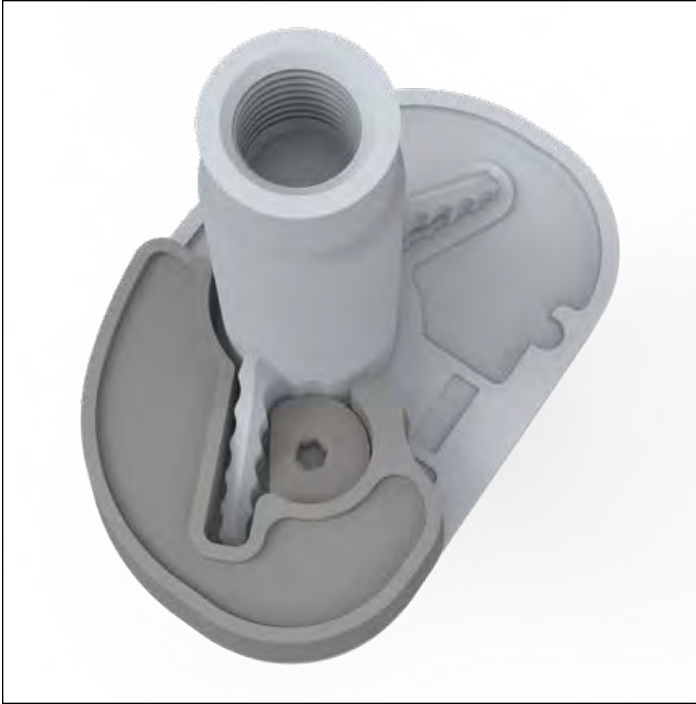


Figure 142

### Tibial Augmentation Revision Baseplate

Assemble the 1/8" Universal Joint (or Straight) Hex Drive into the Slip Torque Handle.

Place the Tibial Augment on the distal side of the Baseplate. Verify both pins of the Tibial Augment are engaged into the slots on the underside of the Revision Baseplate and that the Tibial Augment is seated flush (**Figure 142**).

Using the 1/8" Universal Joint (or Straight) Hex Drive, torque the helical bolt captured within the tibial augment until the torque driver slips; the driver is designed to emit an audible click (**Figure 143**).

Verify that the helical bolt is engaged into the slot on the keel of the Revision Baseplate. Repeat on a second augment if required on the other side.

### Technical points

Triathlon Tibial Augments are not intended to be cemented together and stacked to fill voids.



Figure 143

### Triathlon Hinge Femur assembly

#### Triathlon Hinge Femur with Stem assembly

Using the Hinge Femoral Counter Wrench with the TOP orientation up, hold the Femoral component in place with the counter wrench, assembling the Counter Wrench between the boss and anterior flange of the femoral component (**Figure 144**).

Thread the appropriate size stem into the femoral component.

Place the open face end of the Torque Wrench onto the flats of the stem.

Tighten by pulling the wrenches **together**. Torque Stem to 120 in-lbs. as indicated on the Torque Wrench (**Figure 144**).

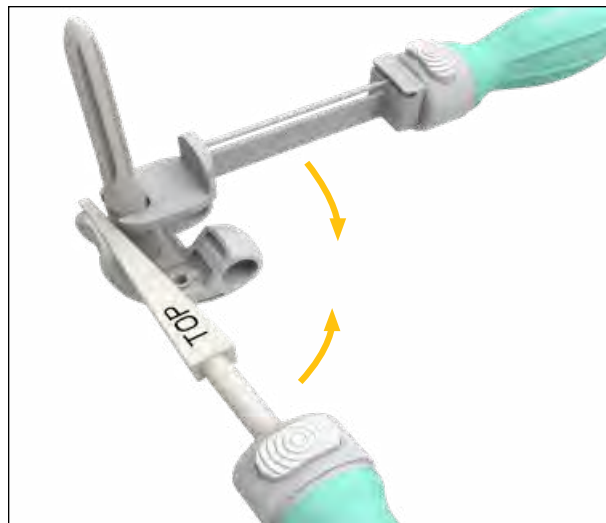


Figure 144

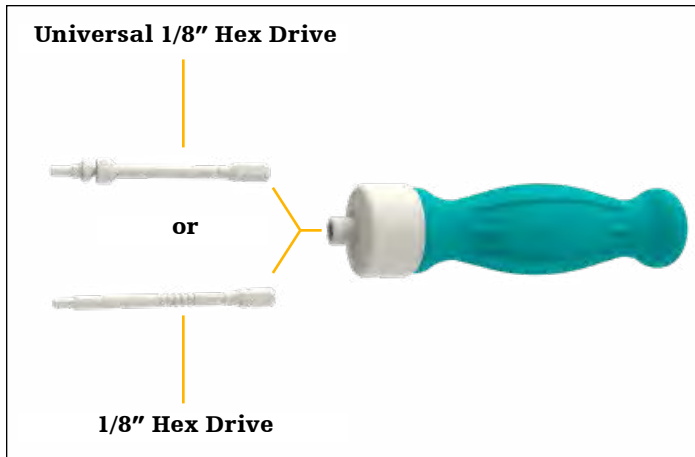


Figure 145

**Femoral Augments: Hinge Femur**

Assemble the 1/8" Hex Driver or the 1/8" Universal Hex Driver into the Slip Torque Handle (**Figure 145**).

Place the Femoral Augment on the distal surface of the Femoral Component.

Assemble the Augment Screw through the Femoral Augment into the threaded hole in the Femoral Component.

Ensure the Femoral Augment does not overhang medially or laterally on the femoral implant (**Figures 146 and 147**).

Torque the Augment Screw until the torque driver slips. The driver is designed to emit an audible click when the required torque is achieved (**Figures 148 and 149**). Repeat this sequence on all required femoral augments.

- ▶ **Tip:** Using a finger to keep the augment from rotating during final tightening may help prevent augment overhang.

**Technical points**

Assembly of the augment can be done prior to the stem assembly.

Proceed to the Implantation section of this protocol.

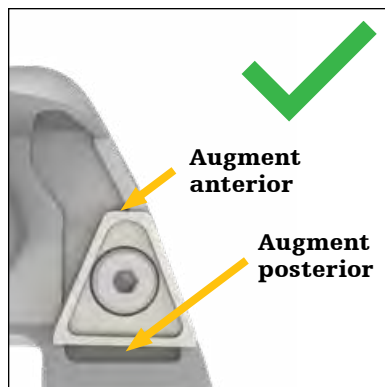


Figure 146



Figure 147



Figure 148



Figure 149

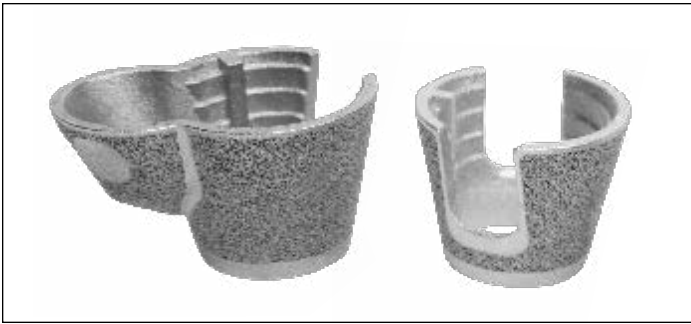


Figure 150



Figure 151

## Implantation

If needed, further prepare resected bone surfaces using an osteotome, oscillating saw blade, or bone file.

If using a cemented stem, it is advised to implant a cement restrictor prior to Cone implantation.

### Tritanium Cone Augment implantation

#### Tritanium Tibial Cone implantation

- ▶ **Reminder:** The Revision Baseplate is only compatible with Symmetric and Asymmetric Tibial Cones sizes B-E.

Assemble the desired Stem Trial (1mm smaller than reamed for) with the Tibial Cone Introducer, TS Impaction Handle, and the selected Symmetric/Asymmetric Cone Implant (**Figure 150**).

Tibial Cone Introducers are size specific.

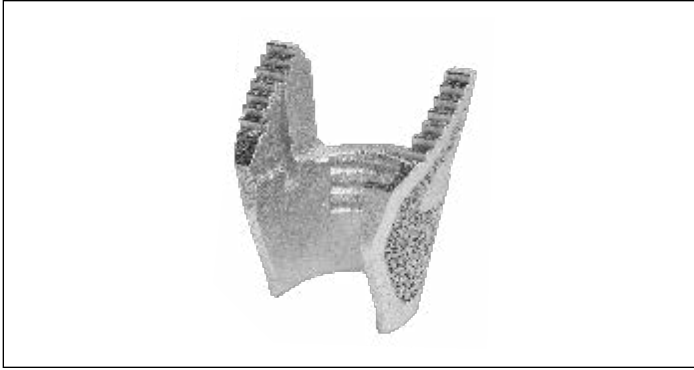
Align the orientation key on the implant with the key feature on the Cone Introducer. The orientation key is located posteriorly on the implant.

- ▶ **Note:** There is no positive lock on the Cone Implant and the Cone Introducer. The implant may disconnect from the introducer.
- ▶ **Note:** The Cone can be placed into the prepared bone before the Stem Trial and the Cone Introducer.
- ▶ **Note:** When inserting a Symmetric Cone Implant, ensure that the anterior rotational alignment marking on the implant is aligned with the anterior surface marking previously determined by the Universal Tibial Template.

Gently impact the Symmetric/Asymmetric Cone Implant and confirm that it is fully seated at the appropriate depth (**Figure 151**).

- ▶ **Note:** Stem trials with product code 5560-T-XXX cannot be used with cone augment instrumentation. This includes trials 5560-T-109, 5560-T-112 and 5560-T-115.





**Figure 152**



**Figure 153**

### Triathlon Tritanium Femoral Cone implantation

Assemble the desired Stem Trial (1mm smaller than reamed for) with the corresponding Central Femoral Cone Introducer, Impaction Handle, and the selected Central Femoral Cone Implant (**Figure 152**).

There are two introducers for the Central Cones and one for the Femoral Cones.

Align the orientation key on the implant with the key feature on the Central Cone Introducer. The orientation keys are located medially and laterally on the implant.

- ▶ **Note:** There is no positive lock on the Cone Implant and the Cone Introducer. The implant may disconnect from the introducer.
- ▶ **Note:** The Cone can be placed into the prepared bone before the Stem Trial and the Cone Introducer.

Gently tap the Central Femoral Cone Implant and confirm that it is fully seated at the appropriate depth (**Figure 153**).

- ▶ **Note:** Stem trials with product code 5560-T-XXX cannot be used with cone augment instrumentation. This includes trials 5560-T-109, 5560-T-112 and 5560-T-115.



Figure 154

## Adjustment of Cone Implant before cementation

### Cone Implants

For Femoral and Tibial Trial assembly, refer to the Femoral Trial assembly and Tibial Trial assembly sections of the protocol.

Introduce the Hinge Femoral and Tibial Trials.

Perform final trial reduction with the Cone implants and evaluate joint stability.

Remove the trial components.

### Component implantation with Cone Implants

For assembly of Tibial and Femoral Components refer to the Triathlon Hinge Femur assembly and Revision Baseplate Tibial Implant assembly sections of the protocol.

Cone implants must be fully seated before cementing the entire construct.

- ▶ **Caution:** Only use the Cone Extractor if the implant is seated in the wrong orientation and must be repositioned (before cementing).

Insert the extractor into the Cone Implant (jaws closed). Ensure that the flared edges of the jaws are positioned outside of the distal end of the cone. Squeeze the extractor handles to open the jaws (**Figure 154**).

- ▶ **Note:** A lamina spreader (with fixed narrow pads) or a curette (reverse angle) may also be used to remove the Cone Implants. Insert the lamina spreader or curette into the Cone ensuring that the ends of either instrument are positioned outside of the distal end of the implant. Apply back pressure.
- ▶ **Caution:** If the Cone Implant is extracted (before cementing), inspect the Cone for damage before reinsertion.

See next section for component and cone cementing techniques.

- ▶ **Note:** All stem implants are compatible with the cone augments. Refer to sizing charts to see maximum stem diameter per cone size.

## Tibial Implant implantation

Revision Baseplate implantation

### Revision Baseplate with Cemented Stem and Cone Augment

Assess length of the construct and determine the appropriate depth of cement restrictor.

Insert corresponding restrictor.

Attach Revision Baseplate Impactor/Extractor to the Impaction Handle.

Assemble the Tibial Implant Assembly to the Revision Baseplate Tibial Impactor/ Extractor by turning the knob.

Ensure the tab of the Impactor/Extractor is engaged under the posterior lip of the baseplate (**Figures 155-157**).

Irrigate the joint and then dry.

Mix cement.

### Technical points

Tibial Cone Implant used with a cemented stem will require at least two doses without major bone voids. The same is true for bones with IM canals greater than 20mm to fill the cone volume and help facilitate solid fixation to the cone.

Apply a thin layer of wet cement on the underside of the baseplate. Allow the cement to dough.

Use the standard cementing technique with a cement gun to retrograde fill the canal and cone.

Pressurize the cement into the cone, the metaphysis and onto the flat tibial surface.

Impact the tibial implant assembly onto the tibia until fully seated (do so when the cement is in its doughy state) and remove excess cement. Ensure proper rotation and alignment of the baseplate prior and during impaction.



Figure 155



Figure 156



Figure 157

### Revision Baseplate with Cemented Stem without Cone Augment

Assess length of the construct and determine the appropriate depth of cement restrictor.

Insert corresponding restrictor.

Attach Revision Baseplate Impactor/Extractor to the Impaction Handle.

Assemble the Tibial Implant Assembly to the Revision Baseplate Tibial Impactor/Extractor by turning the knob.

Ensure the tab of the Impactor/Extractor is engaged under the posterior lip of the baseplate (**Figures 158-160**).

Irrigate the joint and then dry.

Mix cement.

Apply cement to the appropriate sections of the tibial implant assembly and the proximal tibia.

- Use the standard cementing technique with a cement gun to retrograde fill the canal.
- Apply doughy cement to the back surface of the baseplate and build the cement up along the stem implant junction proximally.

Pressurize the cement into the metaphysis and onto the flat tibial surface.

Impact the tibial implant assembly onto the tibia until fully seated (do so when the cement is in its doughy state) and remove excess cement. Ensure proper rotation and alignment of the baseplate prior and during impaction.



Figure 158



Figure 159



Figure 160

### Revision Baseplate with Fluted Stem and Cone Augment

Attach Revision Baseplate Impactor/Extractor to the Impaction Handle.

Assemble the Tibial Implant Assembly to the Revision Baseplate Tibial Impactor/Extractor by turning the knob.

Ensure the tab of the Impactor/Extractor is engaged under the posterior lip of the baseplate (**Figures 161-163**).

Irrigate the joint and then dry.

Mix cement.

#### Technical points

Tibial Cone Implant used with Fluted stems will require at least one dose of cement for Cone sizes B and C and 2 doses for Cone sizes D and E will be required in the absence of major bone voids.

When using Fluted Stems with Cone implants, wipe the inside surface of the cone with a thin layer of wet cement (avoid cement moving distally beyond the inferior edge of the cone). Apply doughy cement to the back surface of the baseplate and build the cement up along the stem implant junction proximally so that the cement can fill the full depth of the cone.

Make sure the stem tray construct has enough cement coating the implant, with enough volume to fill the Cone and cover the stem tray junction.

Pressurize the cement into the flat tibial surface.

Impact the tibial implant assembly onto the tibia until fully seated (do so when the cement is in its dough-like state) and remove excess cement. Ensure proper rotation and alignment of the baseplate prior and during impaction.



Figure 161



Figure 162



Figure 163

### Revision Baseplate with Fluted Stem without Cone Augment

Assess length of the construct and determine the appropriate depth of cement restrictor.

Insert corresponding restrictor.

Attach Revision Baseplate Impactor/Extractor to the Impaction handle.

Assemble the Tibial Implant Assembly to the Revision Baseplate Tibial Impactor/ Extractor by turning the knob.

Ensure the tab of the Impactor/Extractor is engaged under the posterior lip of the baseplate (**Figures 164-166**).

Irrigate the joint and then dry.

Mix cement.

Apply cement to the appropriate sections of the tibial implant assembly and the proximal tibia.

Pressurize the cement into the flat tibial surface.

Impact the tibial implant assembly onto the tibia until fully seated and remove all excess cement. Ensure proper rotation and alignment of the baseplate prior and during impaction.



Figure 164



Figure 165



Figure 166



## Femoral Implant implantation

### Triathlon Hinge Femur implantation

#### Triathlon Hinge Femur with Cemented Stem

Assess length of the construct and determine the appropriate cement restrictors.

Insert corresponding restrictor.

Attach the Femoral Impactor/Extractor to the Impaction Handle.

Assemble the Femoral Implant Assembly to the Femoral Impactor/Extractor (**Figure 167**).

Irrigate the joint and then dry.

Mix cement.

#### Technical points

When using any Central Femoral Cone Implants with a cemented stem, at least two doses will be required without major bone voids. The same is true for bones with IM canals greater than 20mm to fill the cone volume and help facilitate solid fixation to the cone.

Apply a thin layer of wet cement on the backside of the femoral component. Allow the cement to dough.

Use the standard cementing technique with a cement gun to retrograde fill the canal and cone (if applicable).

Pressurize the cement into the cone (if applicable), the metaphysis, and onto the cut distal femoral surfaces.

Impact the femoral implant assembly onto the femur until fully seated (do so when the cement is in a doughy state) and remove excess cement.

Figure 167



### Triathlon Hinge Femur with Fluted Stem

Attach the Femoral Impactor/Extractor to the Impaction Handle.

Assemble the Femoral Implant Assembly to the Femoral Impactor/Extractor (**Figure 168**).

Irrigate the joint and then dry.

Mix cement.

#### Technical points

When using any Central Femoral Cone Implants with a Fluted Stem, at least one dose of cement for Cone sizes 1-2 and 3, and 2 doses for Cone sizes 4, 5, 6, and 7-8 will be required in the absence of major bone voids.

If a Central Femoral Cone is used:

- Wipe the inside surface of the cone with a thin layer of wet cement (avoid cement moving proximally beyond the superior edge of the cone).
- Apply a thin layer of wet cement on the backside of the femoral component and build up the doughy cement along the stem implant junction proximally so the cement can fill the full depth of the cone.
- Make sure the stem tray construct has enough cement coating the implant, with enough volume to fill the Cone and cover the stem tray junction.

If a Central Femoral Cone is not used:

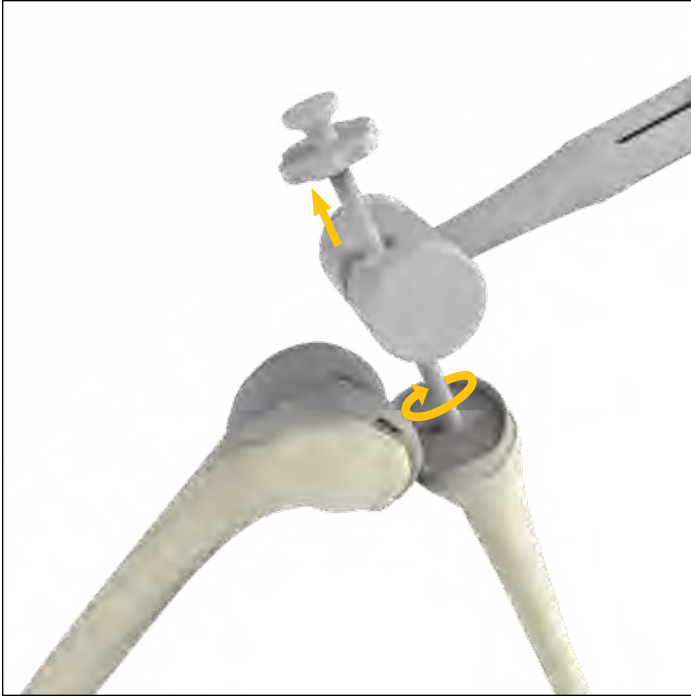
- Apply a thin layer of wet cement on the backside of the femoral component, and make sure there is enough volume to cover the stem and femur junction.

Pressurize the cement into the cut distal femoral surfaces.

Impact the femoral implant assembly onto the femur until fully seated (do so when the cement is in a dough-like state) and remove excess cement.

**Figure 168**





**Figure 169**

## Hinge Tibial Insert implantation

If a trial reduction with the definitive tibial and femoral Hinge components in place, is required, refer to Addendum 2: Trialing with Definitive Triathlon Hinge Femur & Revision Baseplate Components.

Ensure the Filler Bushing is not present in the Revision Baseplate.

In cases where the filler bushing is present, prior to preparing for the hinge inserts, the Filler Bushing must be removed.

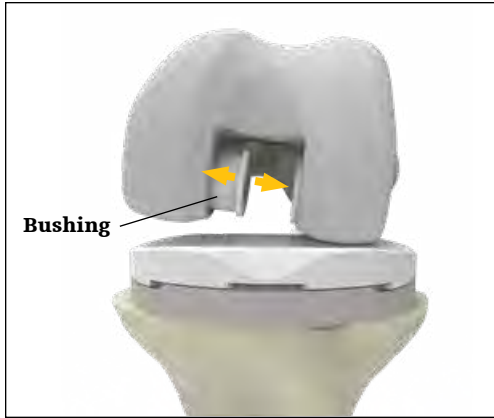
- Thread the Filler Bushing Removal Tool into the Filler Bushing and gently retro-impact the Removal Tool for bushing removal. In cases where a mallet is insufficient, the Removal Tool is compatible for use with the Triathlon Slap Hammer (**Figure 169**).

Flex the knee to 90 degrees. Inspect the inner surface of the bearing post hole to ensure it is free of debris. Insert the Tibial Sleeve into the baseplate.

Ensure that the Revision Baseplate is completely free of debris.

Once definitive Hinge Tibial Insert is selected, attach the Tibial Insert Impactor to the Impaction Handle.

Angle the Hinge Tibial Insert posteriorly into the Revision Baseplate. Impact the insert to snap it into place anteriorly.



**Figure 170**

**Hinge Mechanism assembly**

Place both Bushings into the Hinge Femur. Bushings are placed with the flanges facing the inside of the intercondylar notch (**Figure 170**).

Place the appropriate Tibial Bearing Component into the Tibial Baseplate/Insert construct.

Attach the Axle Guide Rod to the Axle (**Figure 172**).

With the knee in 90 degrees of flexion, insert the Alignment Guide into the Tibial Bearing Component. Position the Tibial Bearing Component into the intercondylar notch of the Hinge Femur (**Figure 171**).

Seat the femur on the Alignment Guide, ensuring both condyles are flush to the guide. This will help ensure that the axle holes on the bushings are aligned with the tibial bearing component axle hole.

Slide the Axle through the Femur and Tibial Bearing Component. Once inserted, the Alignment Guide may be removed (**Figure 172**).

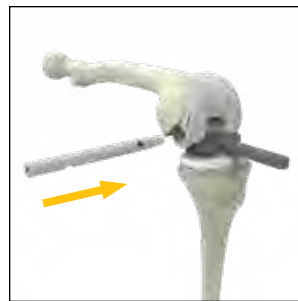
Check the orientation of the Bumper relief on the Axle (**Figures 173 and 174**). Adjust the orientation of the bumper relief using the hole on the Axle Guide Rod.

Insert the appropriate Bumper into the Tibial Rotating Component. Ensure engagement by confirming that the anterior lip is visible (**Figure 175**)

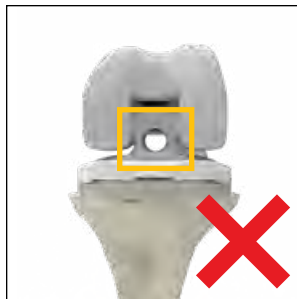
Disengage the Axle Guide Rod from the Axle.



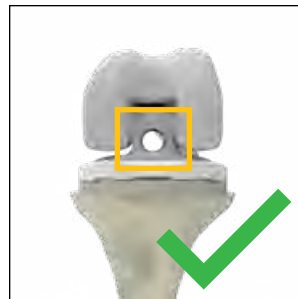
**Figure 171**



**Figure 172**



**Figure 173**



**Figure 174**

**Closure**

After cement polymerization and removal of all residual cement, thoroughly irrigate the joint. Hemostasis is achieved after deflation of the tourniquet.

Close soft tissues in the normal, layered fashion.



**Figure 175**



Figure 176



Figure 177

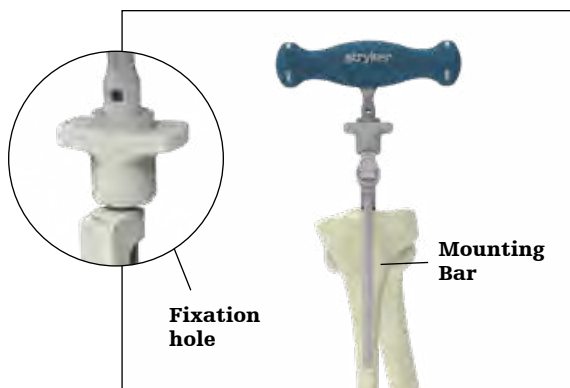


Figure 178

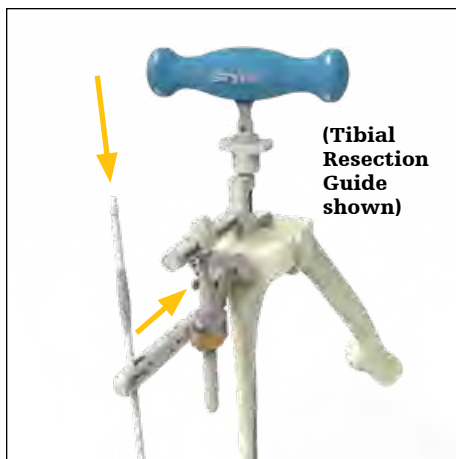


Figure 179

## Addendums

### Addendum 1

#### Revision Baseplate Tibial Preparation with Primary Tibial Instrumentation

To alleviate the potential for tibial eminence interference with the Hinge tibial resection guide tower, follow the Triathlon primary tibial IM workflow per TRIATH-SP-30 using the Hinge Tibial Stylus as substitute to ensure proper resection depth is created. The workflow is also detailed below.

#### Revision Baseplate: Proximal tibial resection IM workflow

**For the Revision Baseplate with Hinge Insert, the minimum tibial resection, from the native bone is 16mm.** For primary bone resections, a Hinge Tibial Stylus with corresponding 16mm depth has been included.

Attach the 3/8" IM Drill to the Universal Driver and create a hole in the location determined by the preoperative X-rays (**Figure 176**).

Attach the T-Handle Driver to the 5/16" IM Rod and slowly pass into the canal, ensuring clearance. Remove the 5/16" IM Rod and insert it into the body of the Tibial Alignment Jig IM. The assembly is then inserted into the canal until the isthmus is engaged (**Figure 177**).

With the body of the tibial alignment jig IM resting on the proximal tibia, proper rotational alignment can be achieved by rotating the instrument about the 5/16" IM rod so that the vertical mounting bar is over the medial 1/3 of the tibial tubercle. A headless pin or the 1/8" drill is then inserted into the fixation hole to fix rotation (see **Figure 178**).

Assemble the appropriate Tibial Resection Guide (left or right) on the Tibial Adjustment Housing.

Ensure posterior slope is set to 0 degrees.

Attach the assembly onto the mounting bar by pressing the bronze wheel on the Tibial Adjustment Housing. Attach the Universal Alignment Handle to the Tibial Resection Guide and slide a Universal Alignment Rod through the handle for sagittal assessment. When alignment is confirmed, the Universal Alignment Handle should be centered over the ankle (**Figure 179**).

The Hinge Tibial Stylus with corresponding 16mm depth attaches to the Tibial Resection Guide referencing the lowest level of the unaffected compartment (**Figure 180**).

The height of the Tibial Resection Guide, Tibial Stylus and Tibial Adjustment Housing can be adjusted using the bronze wheel on the Tibial Adjustment Housing. For coarse adjustment, press the bronze wheel and slide the assembly up or down. For fine adjustment, turn the bronze wheel to the right to move the assembly up the Proximal Rod or turn left to move the assembly down the Proximal Rod (**Figure 181**).



**Figure 180**

Place two Headless Pins into the “0” (neutral) holes, fixing the level of the Tibial Resection Guide.

If additional stability of the guide is required, utilize the oblique “X” pin-hole.

Remove all alignment instruments leaving only the Tibial Resection Guide in place. Squeeze the bronze tabs on the Tibial Adjustment Housing to disengage the assembly from the Tibial Resection Guide. Slide the Tibial Adjustment Housing anteriorly. Remove the 5/16” IM Rod, the Tibial Alignment Jig IM, the Tibial Adjustment Housing and the Universal Alignment Handle.

Resection of the proximal tibia is now completed. An optional Tibial Resection Guide Modular Capture (Left or Right) may be added.

Remove the Tibial Resection Guide.

For the remaining tibial preparation technique proceed to the Tibial Template sizing section of the desired technique guide.



**Figure 181**

Addendum 2

**Trialing with definitive Triathlon Hinge Femur and Revision Baseplate components**

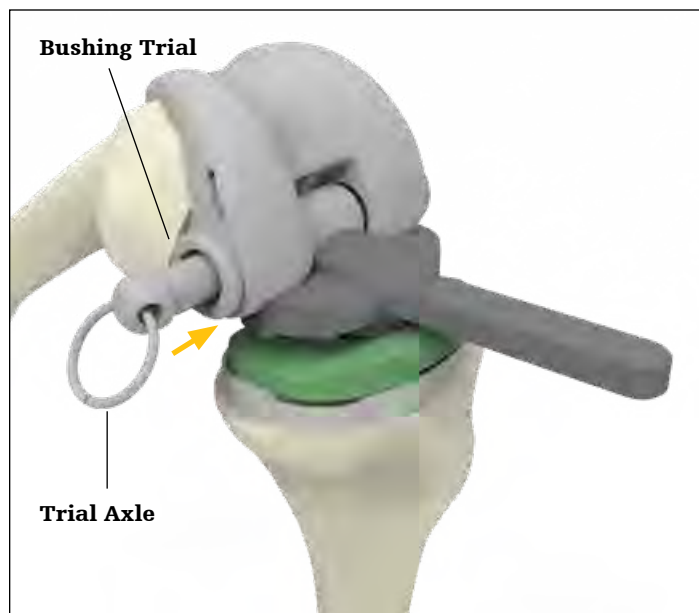
Ensure the definitive Revision Baseplate and Femoral Hinge components are implanted.

Select and insert the Hinge Insert Trial corresponding to the size of the baseplate. Do not impact the Insert Trial during assembly.

Refer to the table below and insert the corresponding Hinge Tibial Bearing Post Trial into the Tibial Baseplate and Hinge Insert Trial construct.

**Trialing with Triathlon Hinge Femur (implant) and Triathlon Revision Baseplate (implant) compatibility**

			Insert Trials	Triathlon Hinge Femoral Component Trials					
				5612-F-101/2	5612-F-201/2	5612-F-301/2	5612-F-401/2	5612-F-501/2	5612-F-601/2
			<b>Bushing trials</b> 6543-6-018 for trialing with implants <b>Axle trial</b> 6543-6-020 <b>Bumper trial</b> 6543-6-101/3						
Triathlon Revision Tibial Baseplate	5612-B-100	No sleeve	6543-6-061	<b>Bearing Post Trial</b> 6543-6-058 <b>Trial Bearing Plate</b> 6453-6-071	X	<b>Bearing Post Trial</b> 6543-6-059 <b>Trial Bearing Plate</b> 6453-6-073	<b>Bearing Post Trial</b> 6543-6-060 <b>Trial Bearing Plate</b> 6453-6-075		
	5612-B-200		6543-6-062					X	
	5612-B-300		6543-6-063						
	5612-B-400		6543-6-064						
	5612-B-500		6543-6-065						
	5612-B-600		6543-6-066						
	5612-B-700		6543-6-067						



**Figure 182**

Assemble Femoral Bushing Trial into hinge femur implant until the trial bushing seats fully into femur. Unlike the implant Bushings, Bushing trials are placed with the flanges on the outside of the femur.

With the knee in 90 degrees of flexion, insert the Alignment Guide into the Hinge Bearing Post Trial. Position the Bearing Post Trial into the intercondylar notch of the Hinge Femur.

Seat the femur on the Alignment Guide, ensuring both condyles are flush to the guide. This will help ensure that the axle holes on the bushing trial are aligned with the Bearing Post Trial axle hole (**Figure 182**).

After the Hinge Femoral Component is properly aligned, slide the Trial Axle through the Femoral Bushing Trial, Hinge Femoral Component and Hinge Bearing Post Trial. Do not impact the Trial Axle during assembly.

Assemble the appropriately angled Trial Bumper into the Hinge Bearing Post Trial by hand.

Assemble the Insertion Removal Handle to the Hinge Trial Bearing Plate that corresponds to the Hinge Bearing Post Trial.

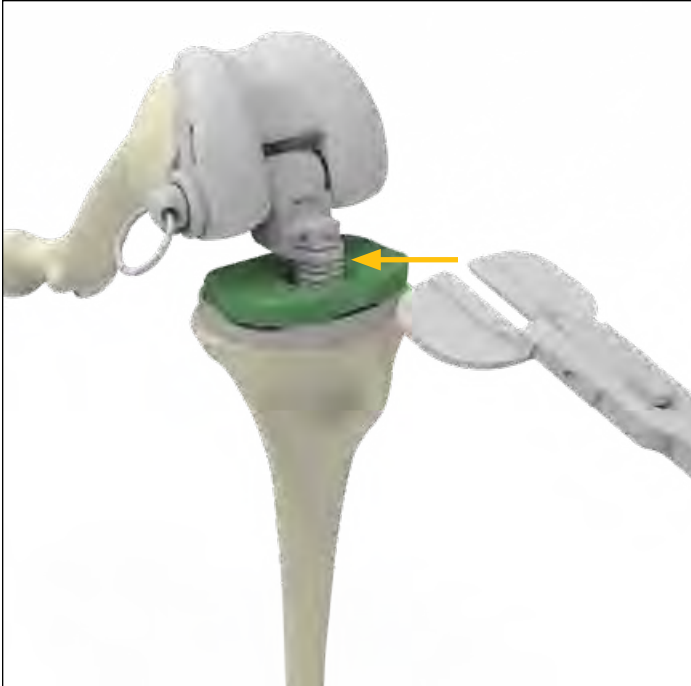


Figure 183

### Technical points

Assemble the Insertion Removal Handle to the anterior holes of the Hinge Trial Bearing Plate to insert and reposition the Trial Bearing Plate (**Figure 183**).

With the knee at 90 degrees, manually distract the knee and insert the Hinge Trial Bearing Plate into the desired slot of the Bearing Post. Each slot represents the thickness of the definitive insert. **The insert thickness should be dictated by the desired leg length rather than tension.**

If utilized, remove the Insertion Removal Handle, and bring the knee to full extension (0 degrees). Determine if the extension gap is adequately filled.

Perform the trial reduction and evaluate patella tracking.

Adjust the insert thickness as required by reattaching the Insertion Removal Handle or surgical forceps to the Hinge Trial Bearing Plate and shifting the bearing plate to the next increment.

Adjust the Trial Bumper angle as required.

### Technical points

If required, it is often easiest to adjust the thickness of the insert in flexion (90 degrees).

The surgeon has the option to use two different bumpers; 0 degree (grey trial) and an alternative with 3 degrees (black trial) of flexion built-in based on the patient needs.

Once the insert thickness has been determined, proceed to the Hinge Tibial Insert and Final Assembly section of this protocol.

## Triathlon Revision instruments

Item number	Description	Quantity in set
6543-6-501	Revision IM Reamers (8-19mm)-- Tray	1
6543-7-527	Boss/Offset Reamer	1
6543-6-019	Revision Boss Reamer	1
6543-7-508	8mm Starter Awl	1
6543-7-509	IM Reamer - 9mm	1
6543-7-510	IM Reamer - 10mm	1
6543-7-511	IM Reamer - 11mm	1
6543-7-512	IM Reamer - 12mm	1
6541-4-800	T-Handle Driver	1
6541-4-538	3/8" IM Drill	1
6543-7-513	IM Reamer - 13mm	1
6543-7-514	IM Reamer - 14mm	1
6543-7-515	IM Reamer - 15mm	1
6543-7-516	IM Reamer - 16mm	1
6543-7-517	IM Reamer - 17mm	1
6543-7-518	IM Reamer - 18mm	1
6543-7-519	IM Reamer - 19mm	1
5560-T-109	Cemented Stem Trial 9 x 50mm	2
5560-T-112	12 x 50mm Stem Trial	2
5560-T-115	15 x 50mm Stem Trial	2
6543-6-502	Revision General-- Tray	1
6541-4-602	Universal Alignment Rod	1
6541-4-806	Universal Alignment Handle	1
6541-4-803	Slap Hammer	1
6541-4-801	Universal Driver	1
6541-4-400	Blade Runner	1
6543-1-603	Size 1-8 Femoral Sizing Templates	1
6541-4-804	Headless Pin Extractor	1
6541-4-518	1/8" Drill	1
6541-4-300	Headed Nail Impactor/Extractor	1
6541-4-003A	Headless Pins - 3"	4
6541-4-515	Headed Nails - 1 1/2"	2
6541-4-575	Headed Nails - 3/4"	2
6541-4-809	Headless Pin Driver	1

**Triathlon Revision instruments** continued

Item number	Description	Quantity in set
6543-6-503	Revision Tibial Prep-- Tray	1
5545-T-102	Tibial Augment Trial, Size 1 RM/LL - 5mm	1
5545-T-101	Tibial Augment Trial, Size 1 LM/RL - 5mm	1
5545-T-202	Tibial Augment Trial, Size 2 RM/LL - 5mm	1
5545-T-201	Tibial Augment Trial, Size 2 LM/RL - 5mm	1
5545-T-302	Tibial Augment Trial, Size 3 RM/LL - 5mm	1
5545-T-301	Tibial Augment Trial, Size 3 LM/RL - 5mm	1
5545-T-402	Tibial Augment Trial, Size 4 RM/LL - 5mm	1
5545-T-401	Tibial Augment Trial, Size 4 LM/RL - 5mm	1
5545-T-502	Tibial Augment Trial, Size 5 RM/LL - 5mm	1
5545-T-501	Tibial Augment Trial, Size 5 LM/RL - 5mm	1
5545-T-602	Tibial Augment Trial, Size 6 RM/LL - 5mm	1
5545-T-601	Tibial Augment Trial, Size 6 LM/RL - 5mm	1
5545-T-702	Tibial Augment Trial, Size 7 RM/LL - 5mm	1
5545-T-701	Tibial Augment Trial, Size 7 LM/RL - 5mm	1
5545-T-802	Tibial Augment Trial, Size 8 RM/LL - 5mm	1
5545-T-801	Tibial Augment Trial, Size 8 LM/RL - 5mm	1
5546-T-102	Tibial Augment Trial, Size 1 RM/LL - 10mm	1
5546-T-101	Tibial Augment Trial, Size 1 LM/RL - 10mm	1
5546-T-202	Tibial Augment Trial, Size 2 RM/LL - 10mm	1
5546-T-201	Tibial Augment Trial, Size 2 LM/RL - 10mm	1
5546-T-302	Tibial Augment Trial, Size 3 RM/LL - 10mm	1
5546-T-301	Tibial Augment Trial, Size 3 LM/RL - 10mm	1
5546-T-402	Tibial Augment Trial, Size 4 RM/LL - 10mm	1
5546-T-401	Tibial Augment Trial, Size 4 LM/RL - 10mm	1
5546-T-502	Tibial Augment Trial, Size 5 RM/LL - 10mm	1
5546-T-501	Tibial Augment Trial, Size 5 LM/RL - 10mm	1
5546-T-602	Tibial Augment Trial, Size 6 RM/LL - 10mm	1
5546-T-601	Tibial Augment Trial, Size 6 LM/RL - 10mm	1
5546-T-702	Tibial Augment Trial, Size 7 RM/LL - 10mm	1
5546-T-701	Tibial Augment Trial, Size 7 LM/RL - 10mm	1
5546-T-802	Tibial Augment Trial, Size 8 RM/LL - 10mm	1
5546-T-801	Tibial Augment Trial, Size 8 LM/RL - 10mm	1
6543-7-601	Resection Guide Tower	1
6543-7-600	Support Arm Assembly	1
6543-6-700	Revision Tibial Resection Guides - Slotted -Left	1
6543-6-701	Revision Tibial Resection Guides - Slotted -Right	1
6541-2-807	Alignment Handle	1
6541-2-429Y	Tibial Stylus	1
6541-2-601	Universal Tibial Template Size 1	1
6541-2-602	Universal Tibial Template Size 2	1
6541-2-603	Universal Tibial Template Size 3	1
6541-2-604	Universal Tibial Template Size 4	1
6541-2-605	Universal Tibial Template Size 5	1
6541-2-606	Universal Tibial Template Size 6	1
6541-2-607	Universal Tibial Template Size 7	1
6541-2-608	Universal Tibial Template Size 8	1



**Triathlon Revision instruments** continued

Item number	Description	Quantity in set
6543-6-504	Revision 100mm Stem Trial (9-25mm)-- Tray	1
5565-T-009A	9 x 100mm Stem Trial	1
5565-T-010A	10 x 100mm Stem Trial	2
5565-T-011A	11 x 100mm Stem Trial	2
5565-T-012A	12 x 100mm Stem Trial	2
5565-T-013A	13 x 100mm Stem Trial	2
5565-T-014A	14 x 100mm Stem Trial	2
5565-T-015A	15 x 100mm Stem Trial	2
5565-T-016A	16 x 100mm Stem Trial	2
5565-T-017A	17 x 100mm Stem Trial	2
5565-T-018A	18 x 100mm Stem Trial	2
5565-T-019A	19 x 100mm Stem Trial	2
5565-T-020A	20 x 100mm Stem Trial	2
5565-T-021A	21 x 100mm Stem Trial	1
5565-T-022A	22 x 100mm Stem Trial	1
5565-T-023A	23 x 100mm Stem Trial	1
5565-T-024A	24 x 100mm Stem Trial	1
5565-T-025A	25 x 100mm Stem Trial	1
6543-6-505	Revision Finishing-- Tray	1
6541-4-810	Impaction Handle	2
6541-4-813	Tibial Insert Impactor	1
6543-4-818	Universal Torque Wrench	1
6543-6-801	Universal Counter Wrench	1
6541-4-807	Femoral Impactor/Extractor	1
6541-4-811	Femoral Impactor	1
6541-4-812	Baseplate Impactor	1
6543-6-850	Revision Baseplate Impactor/Extractor	1
6543-6-030	Hinge Femoral Counter Wrench	1
6541-4-825	Slip Torque Handle	1
6541-4-805	Tibial Baseplate Impactor/Extractor	1
6541-4-802	1/8" Hex Drive	1
6543-4-802	Universal 1/8" Hex Driver	1
6543-4-600	Stabilizer Post Impactor	1
6543-6-512	Revision Baseplate Finishing-- TRAY	1
6543-6-038	IM Reamer Neutral Bushing Guide	1
5612-T-100	Revision Baseplate Trial, Size 1	1
5612-T-200	Revision Baseplate Trial, Size 2	1
5612-T-300	Revision Baseplate Trial, Size 3	1
5612-T-400	Revision Baseplate Trial, Size 4	1
5612-T-500	Revision Baseplate Trial, Size 5	1
5612-T-600	Revision Baseplate Trial, Size 6	1
5612-T-700	Revision Baseplate Trial, Size 7	1
6543-6-313	Revision Baseplate Keel Punch, Size 1-3	1
6543-6-346	Revision Baseplate Keel Punch, Size 4-6	1
6543-6-347	Revision Baseplate Keel Punch, Size 7	1
6543-6-413	Revision Baseplate Keel Punch Guide, Size 1-3	1
6543-6-447	Revision Baseplate Keel Punch Guide, Size 4-7	1
6543-6-039	Hinge Tibial Stylus	1

**Triathlon Revision instruments** continued

<b>Item number</b>	<b>Description</b>	<b>Quantity in set</b>
6543-6-513	Hinge Insert Trials-- TRAY	1
6543-6-018	Femoral Bushing Trial	2
6543-6-020	Hinge Trial Axle	1
6543-6-049	Filler Bushing Removal Tool	1
6543-6-050	Alignment Guide	1
6543-6-058	Hinge Tibial Bearing Post Trial, Size 1-2	1
6543-6-059	Hinge Tibial Bearing Post Trial, Size 3-4	1
6543-6-060	Hinge Tibial Bearing Post Trial, Size 5-6	1
6543-6-061	Hinge Bearing Insert Trial, Size 1	1
6543-6-062	Hinge Bearing Insert Trial, Size 2	1
6543-6-063	Hinge Bearing Insert Trial, Size 3	1
6543-6-064	Hinge Bearing Insert Trial, Size 4	1
6543-6-065	Hinge Bearing Insert Trial, Size 5	1
6543-6-066	Hinge Bearing Insert Trial, Size 6	1
6543-6-067	Hinge Bearing Insert Trial, Size 7	1
6543-6-071	Hinge Trial Bearing Plate, Size 1-2	1
6543-6-073	Hinge Trial Bearing Plate, Size 3-4	1
6543-6-075	Hinge Trial Bearing Plate, Size 5-6	1
6543-6-101	Triathlon Hinge Trial Bumper 0°	1
6543-6-103	Triathlon Hinge Trial Bumper 3°	1
6481-1-008	Axle Guide Rod	2
6543-6-070	Triathlon Hinge Insertion/Removal Handle	1
6543-6-514	Hinge Femoral Prep -- TRAY	1
6543-6-011	Triathlon Hinge 3-in-1 Cutting Block, Size 1	1
6543-6-012	Triathlon Hinge 3-in-1 Cutting Block, Size 2	1
6543-6-013	Triathlon Hinge 3-in-1 Cutting Block, Size 3	1
6543-6-014	Triathlon Hinge 3-in-1 Cutting Block, Size 4	1
6543-6-015	Triathlon Hinge 3-in-1 Cutting Block, Size 5	1
6543-6-016	Triathlon Hinge 3-in-1 Cutting Block, Size 6	1
6543-6-027	Hinge Spacer Block	1
6543-6-040	Hinge Distal Femoral Resection Guide	1
6543-6-125	Primary Hinge Distal Resection Plate	1
6543-6-170	Hinge Femoral Distal Augment Trial, Size 1-2, 5mm	2
6543-6-171	Hinge Femoral Distal Augment Trial, Size 1-2, 10mm	2
6543-6-173	Hinge Femoral Distal Augment Trial, Size 3-4, 5mm	2
6543-6-174	Hinge Femoral Distal Augment Trial, Size 3-4, 10mm	2
6543-6-176	Hinge Femoral Distal Augment Trial, Size 5-6, 5mm	2
6543-6-177	Hinge Femoral Distal Augment Trial, Size 5-6, 10mm	2
6543-6-555	Femoral Trial Augments and Distal Spacers caddy	1
6543-6-205	Hinge 5mm Distal Spacer	2
6543-6-210	Hinge 10mm Distal Spacer	2

**Triathlon Revision instruments** continued

Item number	Description	Quantity in set
6543-6-515	Hinge Femoral Trials - Left-- TRAY	1
5612-T-101	Triathlon Hinge Femoral Trial, Size 1, Left	1
5612-T-201	Triathlon Hinge Femoral Trial, Size 2, Left	1
5612-T-301	Triathlon Hinge Femoral Trial, Size 3, Left	1
5612-T-401	Triathlon Hinge Femoral Trial, Size 4, Left	1
5612-T-501	Triathlon Hinge Femoral Trial, Size 5, Left	1
5612-T-601	Triathlon Hinge Femoral Trial, Size 6, Left	1
6543-6-516	Hinge Femoral Trials - Right-- TRAY	1
5612-T-102	Triathlon Hinge Femoral Trial, Size 1, Right	1
5612-T-202	Triathlon Hinge Femoral Trial, Size 2, Right	1
5612-T-302	Triathlon Hinge Femoral Trial, Size 3, Right	1
5612-T-402	Triathlon Hinge Femoral Trial, Size 4, Right	1
5612-T-502	Triathlon Hinge Femoral Trial, Size 5, Right	1
5612-T-602	Triathlon Hinge Femoral Trial, Size 6, Right	1
6543-6-517	Revision IM Reamers (20-25mm)-- TRAY	1
6543-7-520	IM Reamer - 20mm	1
6543-7-521	IM Reamer - 21mm	1
6543-7-522	IM Reamer - 22mm	1
6543-7-523	IM Reamer - 23mm	1
6543-7-524	IM Reamer - 24mm	1
6543-7-525	IM Reamer - 25mm	1
5571-T-025	Triathlon Stem Extender Trial - 25mm	2
5571-T-050	Triathlon Stem Extender Trial - 50mm	2
6543-6-518	Revision 150mm Stem Trial (9-25mm)	1
5566-T-009A	9 x 150mm Stem Trial	1
5566-T-010A	10 x 150mm Stem Trial	1
5566-T-011A	11 x 150mm Stem Trial	2
5566-T-012A	12 x 150mm Stem Trial	2
5566-T-013A	13 x 150mm Stem Trial	2
5566-T-014A	14 x 150mm Stem Trial	2
5566-T-015A	15 x 150mm Stem Trial	2
5566-T-016A	16 x 150mm Stem Trial	1
5566-T-017A	17 x 150mm Stem Trial	1
5566-T-018A	18 x 150mm Stem Trial	1
5566-T-019A	19 x 150mm Stem Trial	1
5566-T-020A	20 x 150mm Stem Trial	1
5566-T-021A	21 x 150mm Stem Trial	1
5566-T-022A	22 x 150mm Stem Trial	1
5566-T-023A	23 x 150mm Stem Trial	1
5566-T-024A	24 x 150mm Stem Trial	1
5566-T-025A	25 x 150mm Stem Trial	1

**Triathlon Revision instruments** continued

Item number	Description	Quantity in set
6543-6-525	Hinge TCG-- TRAY	1
6543-6-000	Triathlon Hinge TCG Valgus Adaptor	1
6543-6-001	Triathlon Hinge TCG, Size 1	1
6543-6-002	Triathlon Hinge TCG, Size 2	1
6543-6-003	Triathlon Hinge TCG, Size 3	1
6543-6-004	Triathlon Hinge TCG, Size 4	1
6543-6-005	Triathlon Hinge TCG, Size 5	1
6543-6-006	Triathlon Hinge TCG, Size 6	1
6543-6-008	Triathlon Hinge TCG Bearing Post Trial Size 1-2	1
6543-6-009	Triathlon Hinge TCG Bearing Post Trial Size 3-4	1
6543-6-010	Triathlon Hinge TCG Bearing Post Trial Size 5-6	1
6543-5-200	Tibial Symmetric Cone Reamer	1
6543-5-220	Tibial Asymmetric Cone Reamer Size B	1
6543-5-230	Tibial Asymmetric Cone Reamer Size C	1
6543-5-240	Tibial Asymmetric Cone Reamer Size D	1
6543-5-250	Tibial Asymmetric Cone Reamer Size E	1
6543-5-201	Tibial Cone Reamer Guide LM/RL	1
6543-5-202	Tibial Cone Reamer Guide RM/LL	1
6543-5-203	Tibial Cone Alignment Guide	1
6543-8-017	Tibial Cone Upper Tray	1
6543-5-211	Tibial Cone Introducer Size A	1
6543-5-221	Tibial Cone Introducer Size B	1
6543-5-231	Tibial Cone Introducer Size C	1
6543-5-241	Tibial Cone Introducer Size D	1
6543-5-251	Tibial Cone Introducer Size E	1
6541-5-100	Cone Extractor	1
5549-T-110	Tibial Symmetric Cone Augment Trial Size A	1
5549-T-120	Tibial Symmetric Cone Augment Trial Size B	1
5549-T-130	Tibial Symmetric Cone Augment Trial Size C	1
5549-T-140	Tibial Symmetric Cone Augment Trial Size D	1
5549-T-150	Tibial Symmetric Cone Augment Trial Size E	1
5549-T-221	Tibial Asymmetric Cone Augment Trial Size B LM/RL	1
5549-T-222	Tibial Asymmetric Cone Augment Trial Size B RM/LL	1
5549-T-231	Tibial Asymmetric Cone Augment Trial Size C LM/RL	1
5549-T-232	Tibial Asymmetric Cone Augment Trial Size C RM/LL	1
5549-T-241	Tibial Asymmetric Cone Augment Trial Size D LM/RL	1
5549-T-242	Tibial Asymmetric Cone Augment Trial Size D RM/LL	1
5549-T-251	Tibial Asymmetric Cone Augment Trial Size E LM/RL	1
5549-T-252	Tibial Asymmetric Cone Augment Trial Size E RM/LL	1
6543-8-117	Tibial Cone Lower Tray	1
5900-8114	Stryker Case	1

**Triathlon Revision instruments** continued

<b>Item number</b>	<b>Description</b>	<b>Quantity in set</b>
6543-6-128	Central Femoral Cone Introducer Size 1 - 4	1
6543-6-129	Central Femoral Cone Introducer Size 5 - 8	1
6543-6-130	TS Central Femoral Cone Reamer	1
6543-5-300	Femoral Symmetric Cone Reamer	1
6543-6-131	Central Femoral Cone Augment Trial Size 1-2, Left	1
6543-6-132	Central Femoral Cone Augment Trial Size 1-2, Right	1
6543-6-135	Central Femoral Cone Augment Trial Size 3-4, Left	1
6543-6-136	Central Femoral Cone Augment Trial Size 3-4, Right	1
6543-6-137	Central Femoral Cone Augment Trial Size 5, Left	1
6543-6-138	Central Femoral Cone Augment Trial Size 5, Right	1
6543-6-139	Central Femoral Cone Augment Trial Size 6, Left	1
6543-6-140	Central Femoral Cone Augment Trial Size 6, Right	1
6543-6-141	Central Femoral Cone Augment Trial Size 7-8, Left	1
6543-6-142	Central Femoral Cone Augment Trial Size 7-8, Right	1
6541-5-100	Cone Extractor	1
6543-6-960	Triathlon Tritanium Central Femoral Cone Preparation Tray	1

## Triathlon Revision implants

### Triathlon Hinge accessory implant part numbers

Item number	Description
5612-0-001	Triathlon Hinge Tibial Bearing Component Size 1-2
5612-0-003	Triathlon Hinge Tibial Bearing Component Size 3-4
5612-0-005	Triathlon Hinge Tibial Bearing Component Size 5-6
5612-4-000	Triathlon Hinge Bumper Neutral
5612-4-003	Triathlon Hinge Bumper +3 Degrees
6481-2-110	MRH Femoral bushings
6481-2-120	MRH Axle
6481-2-150	MRH bushings, Sleeve, Neutral Bumper Package *Optional package used for sleeve and bushings.
5612-3-000	Triathlon Bushings and Axle Standard Assembly Pack

### Triathlon Revision Tibial Augment part numbers

Item number	Description
5612-A-110	Triathlon Revision Tibial Augment Size 1, RM/LL, 10mm
5612-A-111	Triathlon Revision Tibial Augment Size 1, LM/RL, 10mm
5612-A-150	Triathlon Revision Tibial Augment Size 1, RM/LL, 5mm
5612-A-151	Triathlon Revision Tibial Augment Size 1, LM/RL, 5mm
5612-A-210	Triathlon Revision Tibial Augment Size 2, RM/LL, 10mm
5612-A-211	Triathlon Revision Tibial Augment Size 2, LM/RL, 10mm
5612-A-250	Triathlon Revision Tibial Augment Size 2, RM/LL, 5mm
5612-A-251	Triathlon Revision Tibial Augment Size 2, LM/RL, 5mm
5612-A-310	Triathlon Revision Tibial Augment Size 3, RM/LL, 10mm
5612-A-311	Triathlon Revision Tibial Augment Size 3, LM/RL, 10mm
5612-A-350	Triathlon Revision Tibial Augment Size 3, RM/LL, 5mm
5612-A-351	Triathlon Revision Tibial Augment Size 3, LM/RL, 5mm
5612-A-410	Triathlon Revision Tibial Augment Size 4, RM/LL, 10mm
5612-A-411	Triathlon Revision Tibial Augment Size 4, LM/RL, 10mm
5612-A-450	Triathlon Revision Tibial Augment Size 4, RM/LL, 5mm
5612-A-451	Triathlon Revision Tibial Augment Size 4, LM/RL, 5mm
5612-A-510	Triathlon Revision Tibial Augment Size 5, RM/LL, 10mm
5612-A-511	Triathlon Revision Tibial Augment Size 5, LM/RL, 10mm
5612-A-550	Triathlon Revision Tibial Augment Size 5, RM/LL, 5mm
5612-A-551	Triathlon Revision Tibial Augment Size 5, LM/RL, 5mm
5612-A-610	Triathlon Revision Tibial Augment Size 6, RM/LL, 10mm
5612-A-611	Triathlon Revision Tibial Augment Size 6, LM/RL, 10mm
5612-A-650	Triathlon Revision Tibial Augment Size 6, RM/LL, 5mm
5612-A-651	Triathlon Revision Tibial Augment Size 6, LM/RL, 5mm
5612-A-710	Triathlon Revision Tibial Augment Size 7, RM/LL, 10mm
5612-A-711	Triathlon Revision Tibial Augment Size 7, LM/RL, 10mm
5612-A-750	Triathlon Revision Tibial Augment Size 7, RM/LL, 5mm
5612-A-751	Triathlon Revision Tibial Augment Size 7, LM/RL, 5mm
5612-A-810	Triathlon Revision Tibial Augment Size 8, RM/LL, 10mm
5612-A-811	Triathlon Revision Tibial Augment Size 8, LM/RL, 10mm
5612-A-850	Triathlon Revision Tibial Augment Size 8, RM/LL, 5mm
5612-A-851	Triathlon Revision Tibial Augment Size 8, LM/RL, 5mm

**Triathlon Revision implants** continued

**Triathlon Revision Tibial Baseplate part numbers**

Item number	Description
5612-B-100	Triathlon Revision Tibial Baseplate Size 1
5612-B-200	Triathlon Revision Tibial Baseplate Size 2
5612-B-300	Triathlon Revision Tibial Baseplate Size 3
5612-B-400	Triathlon Revision Tibial Baseplate Size 4
5612-B-500	Triathlon Revision Tibial Baseplate Size 5
5612-B-600	Triathlon Revision Tibial Baseplate Size 6
5612-B-700	Triathlon Revision Tibial Baseplate Size 7

**Triathlon Revision Femoral Distal Augment part numbers**

Item number	Description
5612-D-105	Triathlon Hinge Femoral Distal Augment Size 1, 5mm
5612-D-110	Triathlon Hinge Femoral Distal Augment Size 1, 10mm
5612-D-205	Triathlon Hinge Femoral Distal Augment Size 2, 5mm
5612-D-210	Triathlon Hinge Femoral Distal Augment Size 2, 10mm
5612-D-305	Triathlon Hinge Femoral Distal Augment Size 3, 5mm
5612-D-310	Triathlon Hinge Femoral Distal Augment Size 3, 10mm
5612-D-405	Triathlon Hinge Femoral Distal Augment Size 4, 5mm
5612-D-410	Triathlon Hinge Femoral Distal Augment Size 4, 10mm
5612-D-505	Triathlon Hinge Femoral Distal Augment Size 5, 5mm
5612-D-510	Triathlon Hinge Femoral Distal Augment Size 5, 10mm
5612-D-605	Triathlon Hinge Femoral Distal Augment Size 6, 5mm
5612-D-610	Triathlon Hinge Femoral Distal Augment Size 6, 10mm

**Triathlon Revision Femoral Component part numbers**

Item number	Description
5612-F-101	Triathlon Hinge Femoral Component Size 1 Left
5612-F-102	Triathlon Hinge Femoral Component Size 1 Right
5612-F-201	Triathlon Hinge Femoral Component Size 2 Left
5612-F-202	Triathlon Hinge Femoral Component Size 2 Right
5612-F-301	Triathlon Hinge Femoral Component Size 3 Left
5612-F-302	Triathlon Hinge Femoral Component Size 3 Right
5612-F-401	Triathlon Hinge Femoral Component Size 4 Left
5612-F-402	Triathlon Hinge Femoral Component Size 4 Right
5612-F-501	Triathlon Hinge Femoral Component Size 5 Left
5612-F-502	Triathlon Hinge Femoral Component Size 5 Right
5612-F-601	Triathlon Hinge Femoral Component Size 6 Left
5612-F-602	Triathlon Hinge Femoral Component Size 6 Right

**Triathlon Revision implants** continued

**Triathlon Hinge Inserts**

<b>Item number</b>	<b>Description</b>
5612-P-111	Triathlon Hinge Insert Size 1, 11mm
5612-P-113	Triathlon Hinge Insert Size 1, 13mm
5612-P-116	Triathlon Hinge Insert Size 1, 16mm
5612-P-119	Triathlon Hinge Insert Size 1, 19mm
5612-P-122	Triathlon Hinge Insert Size 1, 22mm
5612-P-211	Triathlon Hinge Insert Size 2, 11mm
5612-P-213	Triathlon Hinge Insert Size 2, 13mm
5612-P-216	Triathlon Hinge Insert Size 2, 16mm
5612-P-219	Triathlon Hinge Insert Size 2, 19mm
5612-P-222	Triathlon Hinge Insert Size 2, 22mm
5612-P-311	Triathlon Hinge Insert Size 3, 11mm
5612-P-313	Triathlon Hinge Insert Size 3, 13mm
5612-P-316	Triathlon Hinge Insert Size 3, 16mm
5612-P-319	Triathlon Hinge Insert Size 3, 19mm
5612-P-322	Triathlon Hinge Insert Size 3, 22mm
5612-P-411	Triathlon Hinge Insert Size 4, 11mm
5612-P-413	Triathlon Hinge Insert Size 4, 13mm
5612-P-416	Triathlon Hinge Insert Size 4, 16mm
5612-P-419	Triathlon Hinge Insert Size 4, 19mm
5612-P-422	Triathlon Hinge Insert Size 4, 22mm
5612-P-511	Triathlon Hinge Insert Size 5, 11mm
5612-P-513	Triathlon Hinge Insert Size 5, 13mm
5612-P-516	Triathlon Hinge Insert Size 5, 16mm
5612-P-519	Triathlon Hinge Insert Size 5, 19mm
5612-P-522	Triathlon Hinge Insert Size 5, 22mm
5612-P-611	Triathlon Hinge Insert Size 6, 11mm
5612-P-613	Triathlon Hinge Insert Size 6, 13mm
5612-P-616	Triathlon Hinge Insert Size 6, 16mm
5612-P-619	Triathlon Hinge Insert Size 6, 19mm
5612-P-622	Triathlon Hinge Insert Size 6, 22mm
5612-P-711	Triathlon Hinge Insert Size 7, 11mm
5612-P-713	Triathlon Hinge Insert Size 7, 13mm
5612-P-716	Triathlon Hinge Insert Size 7, 16mm
5612-P-719	Triathlon Hinge Insert Size 7, 19mm
5612-P-722	Triathlon Hinge Insert Size 7, 22mm



**Triathlon Revision implants** continued

**Triathlon Tritanium Cone Augments part numbers**

Item number	Description
5549-A-120	Triathlon Tritanium Symmetric Cone Augment Size B
5549-A-130	Triathlon Tritanium Symmetric Cone Augment Size C
5549-A-140	Triathlon Tritanium Symmetric Cone Augment Size D
5549-A-150	Triathlon Tritanium Symmetric Cone Augment Size E
5549-A-221	Triathlon Tritanium Asymmetric Cone Augment Size B LM/RL
5549-A-222	Triathlon Tritanium Asymmetric Cone Augment Size B RM/LL
5549-A-231	Triathlon Tritanium Asymmetric Cone Augment Size C LM/RL
5549-A-232	Triathlon Tritanium Asymmetric Cone Augment Size C RM/LL
5549-A-241	Triathlon Tritanium Asymmetric Cone Augment Size D LM/RL
5549-A-242	Triathlon Tritanium Asymmetric Cone Augment Size D RM/LL
5549-A-251	Triathlon Tritanium Asymmetric Cone Augment Size E LM/RL
5549-A-252	Triathlon Tritanium Asymmetric Cone Augment Size E RM/LL
5549-A-621	Triathlon Tritanium Central Femoral Cone Augment Size 1&2 Left
5549-A-622	Triathlon Tritanium Central Femoral Cone Augment Size 1&2 Right
5549-A-641	Triathlon Tritanium Central Femoral Cone Augment Size 3&4 Left
5549-A-642	Triathlon Tritanium Central Femoral Cone Augment Size 3&4 Right
5549-A-651	Triathlon Tritanium Central Femoral Cone Augment Size 5 Left
5549-A-652	Triathlon Tritanium Central Femoral Cone Augment Size 5 Right
5549-A-661	Triathlon Tritanium Central Femoral Cone Augment Size 6 Left
5549-A-662	Triathlon Tritanium Central Femoral Cone Augment Size 6 Right
5549-A-671	Triathlon Tritanium Central Femoral Cone Augment Size 7&8 Left
5549-A-672	Triathlon Tritanium Central Femoral Cone Augment Size 7&8 Right

**Triathlon TS Stems – Cemented – part numbers**

Item number	Description
5560-S-109	Triathlon Cemented Stem 9mm x 50mm
5560-S-112	Triathlon Cemented Stem 12mm x 50mm
5560-S-115	Triathlon Cemented Stem 15mm x 50mm
5560-S-209	Triathlon Cemented Stem 9mm x 100mm
5560-S-212	Triathlon Cemented Stem 12mm x 100mm
5560-S-215	Triathlon Cemented Stem 15mm x 100mm
5560-S-309	Triathlon Cemented Stem 9mm x 150mm
5560-S-312	Triathlon Cemented Stem 12mm x 150mm
5560-S-315	Triathlon Cemented Stem 15mm x 150mm

**Triathlon Revision implants** continued

**Triathlon TS Stems – Fluted – part numbers**

Item number	Description
5565-S-010	Triathlon Fluted Stem, Titanium 10mm x 100mm
5565-S-011	Triathlon Fluted Stem, Titanium 11mm x 100mm
5565-S-012	Triathlon Fluted Stem, Titanium 12mm x 100mm
5565-S-013	Triathlon Fluted Stem, Titanium 13mm x 100mm
5565-S-014	Triathlon Fluted Stem, Titanium 14mm x 100mm
5565-S-015	Triathlon Fluted Stem, Titanium 15mm x 100mm
5565-S-016	Triathlon Fluted Stem, Titanium 16mm x 100mm
5565-S-017	Triathlon Fluted Stem, Titanium 17mm x 100mm
5565-S-018	Triathlon Fluted Stem, Titanium 18mm x 100mm
5565-S-019	Triathlon Fluted Stem, Titanium 19mm x 100mm
5565-S-020	Triathlon Fluted Stem, Titanium 20mm x 100mm
5565-S-021	Triathlon Fluted Stem, Titanium 21mm x 100mm
5565-S-022	Triathlon Fluted Stem, Titanium 22mm x 100mm
5565-S-023	Triathlon Fluted Stem, Titanium 23mm x 100mm
5565-S-024	Triathlon Fluted Stem, Titanium 24mm x 100mm
5565-S-025	Triathlon Fluted Stem, Titanium 25mm x 100mm
5566-S-010	Triathlon Fluted Stem, Titanium 10mm x 150mm
5566-S-011	Triathlon Fluted Stem, Titanium 11mm x 150mm
5566-S-012	Triathlon Fluted Stem, Titanium 12mm x 150mm
5566-S-013	Triathlon Fluted Stem, Titanium 13mm x 150mm
5566-S-014	Triathlon Fluted Stem, Titanium 14mm x 150mm
5566-S-015	Triathlon Fluted Stem, Titanium 15mm x 150mm
5566-S-016	Triathlon Fluted Stem, Titanium 16mm x 150mm
5566-S-017	Triathlon Fluted Stem, Titanium 17mm x 150mm
5566-S-018	Triathlon Fluted Stem, Titanium 18mm x 150mm
5566-S-019	Triathlon Fluted Stem, Titanium 19mm x 150mm
5566-S-020	Triathlon Fluted Stem, Titanium 20mm x 150mm
5566-S-021	Triathlon Fluted Stem, Titanium 21mm x 150mm
5566-S-022	Triathlon Fluted Stem, Titanium 22mm x 150mm
5566-S-023	Triathlon Fluted Stem, Titanium 23mm x 150mm
5566-S-024	Triathlon Fluted Stem, Titanium 24mm x 150mm
5566-S-025	Triathlon Fluted Stem, Titanium 25mm x 150mm

**Triathlon TS Stem Extender part numbers**

Item number	Description
5571-S-025	Triathlon Stem Extender 25mm
5571-S-050	Triathlon Stem Extender 50mm

# GMRS Distal Femur and Revision Baseplate



**Surgical protocol**

**Instruments**


**Implants**

## Surgical protocol

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**Femoral component size options**



	M/L	A/P			
Small	52mm	45mm			
Standard	60mm	54mm			

Femur used	Femur ref # (L/R)	Axle required	Bushings required
Small	6495-2-010/020	6495-2-115	6495-2-105
Standard	6495-2-030/040	6481-2-120 OR 5612-3-000	6481-2-110 OR 5612-3-000



## Triathlon Revision Baseplate and GMRS Distal Femur surgical protocol

### System description

The GMRS Distal Femur accepts the Triathlon Hinge System Bearing Component, Bushings and Axle for seamless integration with the Triathlon Revision Baseplate.

### Description of the Global Modular Replacement System

The GMRS was developed for reconstruction of large segmental defects for tumors, failed previous arthroplasty, or trauma. This system is designed to:

- Reconstruct large segmental defects of the knee
- Reconstruct osteoarticular defects of varying sizes
- Allow for variation and intra-operative changes of the surgical plan.

The system consists of distal femoral components, extension pieces and stems.

It also includes a complete set of trial components and instrumentation. The modular implants are assembled by impacting a male/female taper design, securely locking them together.

### Distal femoral components

All distal femoral components have a built-in 6° Valgus offset and utilize some of the Triathlon Hinge Knee components.

- ▶ **Note:** The small distal femoral component uses dedicated small bushings and a small axle.

### Stem components

The GMRS cemented stems are available in six styles: straight, curved and long curved; each style with or without extra-cortical porous-coated body sections. The extra-cortical porous-coated body section has a 40mm replacement length. The stems are also available without the extra-cortical porous-coated body section, with an 11mm replacement length. All stems are available in 8mm, 9mm, 10mm, 11mm, 13mm, 15mm and 17mm diameters. Their respective seat diameters at the resection level are as follows:

Stem diameter	Seat diameter
Ø 8,9mm	Ø 22mm
Ø 10,11mm	Ø 24mm
Ø 13mm	Ø 28mm
Ø 15mm	Ø 32mm
Ø 17mm	Ø 36mm

The stems are designed to be cemented into the medullary canal.

- ▶ **Note: The small cemented stems (8mm, 9mm and 10mm diameters) are intended to be used with the small distal femoral component.**



### **Extension pieces**

The Extension Pieces are used to customize the replacement length and are available in 30mm, 40mm, 50mm, 60mm, 70mm, 80mm, 100mm, 120mm, 140mm, 160mm, 180mm, 200mm and 220mm lengths. This component features a male and female taper, which attaches a stem to a distal femoral component.

### **Tibial components**

The Triathlon Revision Baseplate is available in 7 sizes (1-7), with modular stem options. The Tibial inserts are available in Sizes 1-7 in 11, 13, 16, 19, 22mm thicknesses. The Triathlon Revision Baseplate is designed to accept the Triathlon Hinge Tibial Bearing Component.

### **Trial components**

The implant system is complemented with a complete set of trial components. The trial components are replicas of their corresponding implants; however, they have non-locking trunnions. The trials are satin-finished and have no coatings, so that they can easily be distinguished from the implants. A 30mm Trial Extension Piece also functions as the Trial Extra-Cortical Body. Together with the Trial Cemented Stem, it forms the Trial Stem with extra-cortical porous-coated body.

## Indications and contraindications

### Indications

See Triathlon Revision Baseplate Indications.

The Global Modular Replacement System is intended for use in patients requiring extensive reconstruction of the hip joint and/or knee joint, including knee fusions, necessitated by extensive bone loss due to trauma, failed previous prosthesis and/or tumor resection.

### Contraindications

See Triathlon Revision Baseplate Contraindications.

For the Global Modular Replacement System

A. As related to bone tumors: Not all bone tumors may be treated successfully by segmental resection. Any condition that may have already resulted in either local or distant spread of the tumor may be a contraindication. Examples of such conditions include:

- Pathological fracture;
- Overt infection;
- Inopportune placement of biopsy incision; and,
- Rapid disease progression beyond a respectable margin.

Each patient must therefore be individualized and carefully evaluated by appropriate staging techniques prior to consideration of segmental replacement.

B. As related to failed previous prosthesis and trauma:

- Any active or suspected latent infection in or about the operative joint.
- Any mental or neuromuscular disorder which would create an unacceptable risk of prosthesis instability, prosthesis fixation failure, or complication in postoperative care.
- Bone stock compromised by disease, infection, or prior implantation, which cannot provide adequate support and fixation of the prosthesis.
- HA coated stems are contraindicated in situations where bone stock is inadequate to support cementless application.

**See package insert for warnings, precautions, adverse effects, information for patients and other essential product information.**

Before using GMRS instrumentation, verify:

- Instruments have been properly disassembled prior to cleaning and sterilization;
- Instruments have been properly assembled post-sterilization;
- Instruments have maintained design integrity; and,
- Proper size configurations are available.

For Instructions for Cleaning, Sterilization, Inspection and Maintenance of Orthopaedic Medical Devices, refer to LSTPI-B and SLI0001.

## Compatibility

### GMRS Distal Femoral Component and Triathlon Revision Baseplate

All sizes of the Triathlon Revision Baseplate (5612-B-X00) are compatible with the Small and Standard GMRS Distal Femur. For all construct assemblies the Size 1-2 Tibial Bearing Component 5612-0-001 must be used.

### Tibial insert/baseplate compatibility

The tibial insert size matches the baseplate size, e.g., size 4 insert to be used only with size 4 baseplate.

The Hinge insert can only be used with the cemented Revision Baseplate.

### Triathlon Revision Baseplate Augments

Tibial Augments come in left medial/right lateral or right medial/left lateral configurations.

Tibial Augments are size specific, e.g., size 4 tibial augments are for the size 4 Revision Baseplate.

### Tritanium Tibial Cone Augments

Size A tibial cone is not compatible with the Revision Baseplate due to the boss diameter.

Size B is the minimum size for tibial cone augment compatibility.

### Triathlon TS Stems

The Triathlon Revision Tibial Baseplate (5612-B-X00) requires a 50mm or longer Stem Extension.

The Triathlon Revision Tibial Baseplate (5612-B-X00) is compatible with cemented and fluted stems.

### Triathlon Stem Extenders

The 50mm Stem Extender cannot be used with the Triathlon Revision Tibial Baseplate Components (5612-B-X00) when used with a 150mm Triathlon TS Stem.

For all **Triathlon Revision Baseplate and GMRS SMALL Distal Femur** (6495-2-010/20) constructs use the following hinge implant accessories:

- Size 1-2 Tibial Bearing Component 5612-0-001
- Tibial Sleeve 5612-5-002 (packaged with the Hinge Insert); alternatively 6481-2-140
- Bushings (x2) 6495-2-105
- Axle 6495-2-115
- Bumper 6481-2-130 or 6481-2-133

For all **Triathlon Revision Baseplate and GMRS STANDARD Distal Femur** (6495-2-030/40) constructs use the following hinge implant accessories:

- Size 1-2 Tibial Bearing Component 5612-0-001
- Tibial Sleeve 5612-5-002 (packaged with the Hinge Insert); alternatively 6481-2-140
- Bushings (x2) from pack 5612-3-000 (alternatively 6481-2-110)
- Axle from pack 5612-3-000 (alternatively 6481-2-120)
- Bumper 6481-2-130 or 6481-2-133
- Optional alternative assembly package 6481-2-150: Contains 6481-2-140 Tibial Sleeve, 6481-2-130 Bumper Neutral, and two 6481-2-110 Femoral bushings.





**Figure 1**

## Preoperative templates

The surgeon may overlay the outlines on the following implant surgical templates to an X-ray image to assist in preoperative sizing.

LTEMK29      Global Modular Replacement System  
X-Ray Templates

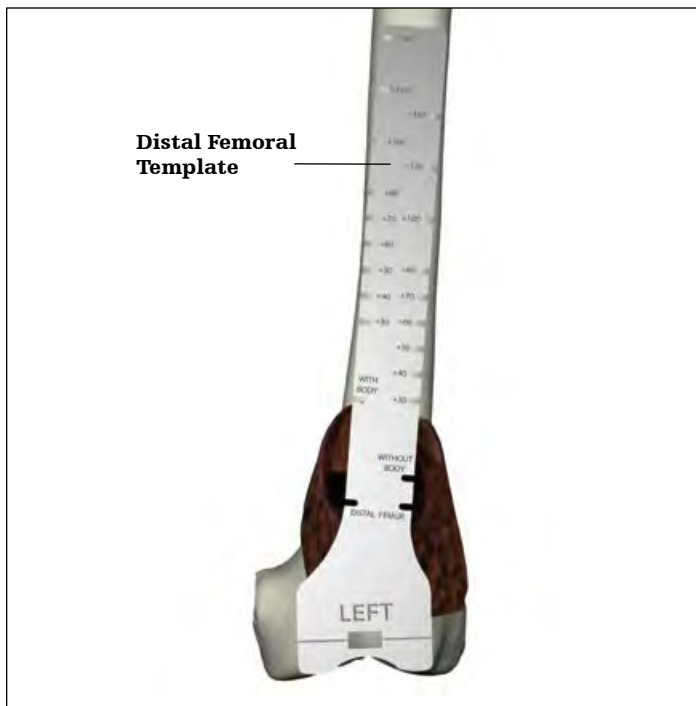
## Exposure

A standard anterior mid-line incision can be utilized (**Figure 1**). Any previous incision can be used or incorporated to decrease the risk of skin slough and breakdown.

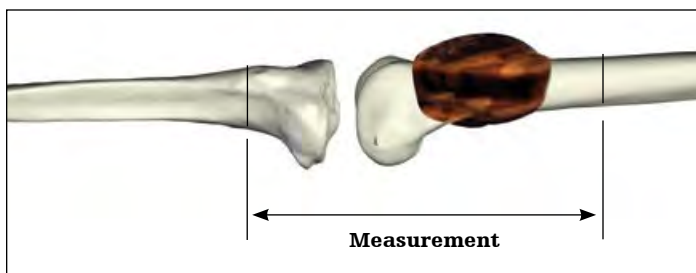
The capsule is entered through a medial parapatellar approach or using an approach that allows the surgeon to deal best with the underlying pathology.

For revision procedures: Component removal

When removing the components to be revised, great care must be taken to preserve as much of the remaining bone stock as possible and to avoid the risk of fracture of the residual bone. Bone preservation can usually be achieved using small flexible osteotomes, saws, and high-speed burring instruments.



**Figure 2**



**Figure 3**

## Measuring resection length

The Distal Femoral Template is designed to guide the resection to a level that can be reproduced by the available implants. The Distal Femoral Template is placed on the bone so that the silhouette of the template coincides with the distal condyles of the femur (**Figure 2**).

The Distal Femoral Template is read at the appropriate marking depending on whether the stem being used is with or without extra-cortical porous-coated body section. The anterior cortex of the femur is marked with a bovie or similar device to indicate the resection level. It is important to note that if the condyles of the prosthesis are placed at the level of the pre-operative condyles (i.e., the femoral prosthesis is the exact length of the resected distal femur), a 16mm tibial resection is required for a Triathlon Revision baseplate. Typically, 10-12mm are removed from the proximal tibia. The femoral resection is therefore usually about 4-6mm longer than the prosthesis.

- ▶ **Note:** It is important to ensure proper patellar tracking. The length of the femoral resection and prosthetic replacement must be considered with the tibial resection to recreate leg length and establish proper patellar tracking. Patellar tracking, tibial cut and leg length must be taken into consideration when making the femoral resection.
- ▶ **Surgical tip:** As an aid to restoring leg length, a reference measurement can be established across the joint. With a bovie or similar device, a mark is made on the femur, proximal to the femoral resection, along with a mark on the tibia, distal to the tibial resection. The distance between these marks can be measured before the resection is made, and checked again, with the trials or implants in place, after the resection is made (**Figure 3**).

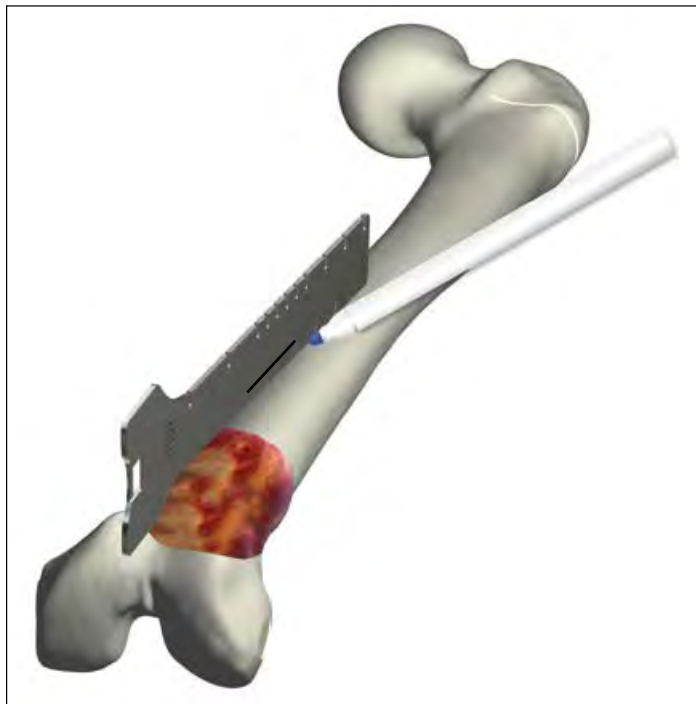


Figure 4



Figure 5

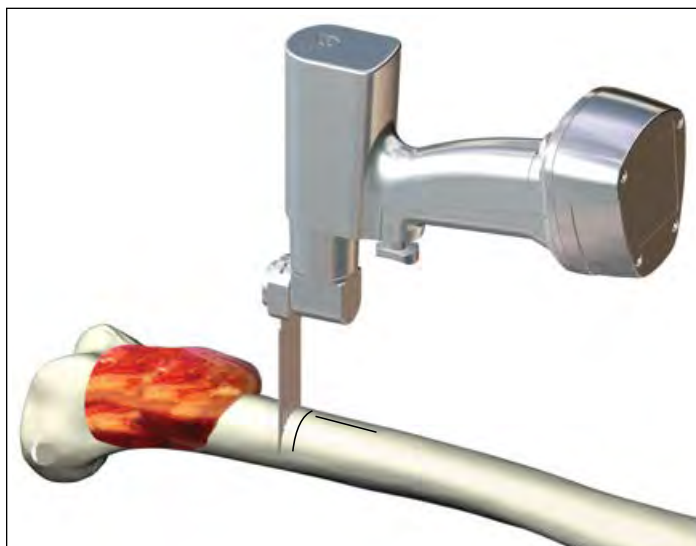


Figure 6

## Rotational alignment

Using a straight edge (e.g., the Distal Femoral Template), the anterior cortex of the distal femur is marked above the resection level in line with the trochlear groove of the distal femur (**Figure 4**).

The line should be directly anterior to the linea aspera. This reference mark will be used later to aid in rotational orientation of the prosthetic components. Rotational alignment can also be determined or verified during trial evaluation.

The stem implants and trials are marked in line with the trochlear groove of the Distal Femoral Component.

As a guide to rotational orientation, the alignment marking on the implant stem can be oriented to the mark made on the anterior cortex above the resection level (**Figure 5**).

## Femoral osteotomy

All remaining soft tissue at the level of transection is cleared. The osteotomy, perpendicular to the femoral shaft, is performed after the posterior and medial structures have been protected and retracted (**Figure 6**); special care is taken to protect the Femoral Artery.

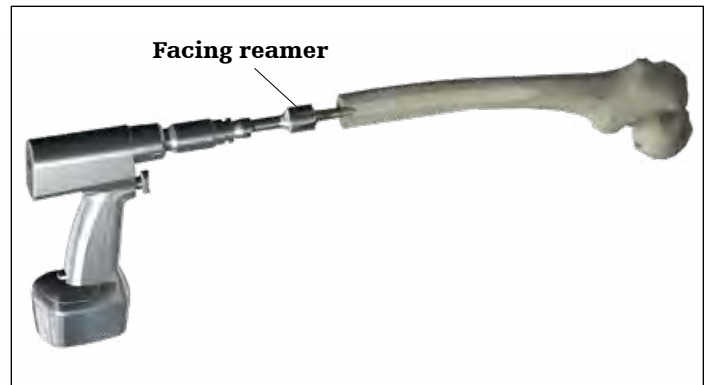
- ▶ **Surgical tip:** It is preferable to resect the femur a millimeter or two distal to the marked resection level. This will allow the facing reamer (**Figure 7**) to plane accurately up to the mark at a 90° angle.
- ▶ **Note:** It is extremely important not to distract the extremity following the resection. The end of the femoral osteotomy should be kept well padded to avoid injuring the femoral vessels. The length of the resected specimen should be checked and measured again following resection.

## Preparation of the femur

A Flexible Guide Wire is inserted into the femoral canal. Flexible Reamers are utilized to progressively ream the canal to the appropriate diameter. To permit an adequate cement mantle, the canal should be reamed to 2mm larger than the selected stem of the prosthesis.

- ▶ **Note:** The seven stem diameters are 8mm, 9mm, 10mm, 11mm, 13mm, 15mm and 17mm.

The appropriate Facing Reamer (**Figure 7**) is used to plane the osteotomy site so as to facilitate direct contact and accurate seating of the prosthesis upon the cortices.



**Figure 7**

The chosen Trial Stem is inserted to evaluate ease of insertion and an appropriate cement mantle. The trial cemented stems are designed to be exactly size for size as compared to the implant and do not include the cement mantle.

If there is any difficulty inserting the trial stem, continue reaming until the Trial Stem fits freely into the canal, or re-assess the Trial Stem size. It is extremely important to verify the close apposition of the seat of the Trial Stem to the cortex.

<b>Stem diameter</b>	<b>Suggested Flexible Reamer diameter</b>	<b>Seat diameter</b>
Ø 8mm	Ø 10mm	Ø 22mm
Ø 9mm	Ø 11mm	Ø 22mm
Ø 10mm	Ø 12mm	Ø 24mm
Ø 11mm	Ø 13mm	Ø 24mm
Ø 13mm	Ø 15mm	Ø 28mm
Ø 15mm	Ø 17mm	Ø 32mm
Ø 17mm	Ø 19mm	Ø 36mm

## Tibial preparation: Revision Baseplate

### Revision Baseplate with Cemented Stems

Cemented stems come in 9, 12, and 15mm diameters in 50, 100 and 150mm lengths.

If Fluted stems are preferred, use the technique described in the Fluted stem section. Revision Baseplate with Fluted stems.

If the tibial preparation is on a native tibia removal of the anterior portion of the central eminence will be required after IM reaming to allow the Resection Guide Tower to fully seat. General surgical instruments can be used to remove the necessary bone (**Figure 8**). Alternatively, the Triathlon Primary IM referencing tibial resection instruments can be used, see the Addendum 1: Revision Baseplate Tibial Preparation with Primary tibial instrumentation portion of this protocol.

- ▶ **Attention:** The Revision Baseplate is not indicated for use with Size A Tibial Cones. The smallest compatible size is Size B.



Figure 8

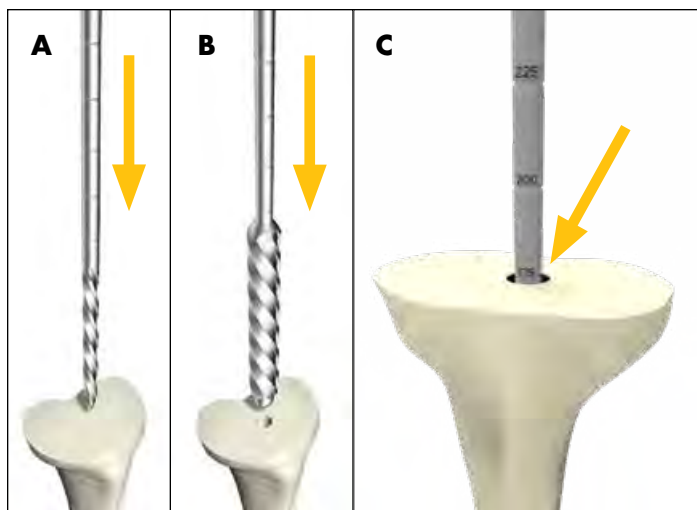


Figure 9

### Revision Baseplate: Intramedullary tibial preparation

Assemble the 8mm Starter Awl to either the T-handle or power unit using the Universal Driver.

Ream the tibial intramedullary canal (**Figure 9A**).

#### Technical points

If determining the appropriate pilot hole is challenging, considering using AP and lateral x-rays to determine the appropriate starting point.

Referencing the desired tibial resection, ream to desired stem depth (refer to depth chart) or to a length of fixation preferred for tibial alignment. Grooves along the shank of the reamer indicate the depth of the reamer in the canal (**Figure 9C**).

- ▶ **Note:** If Cone Augment usage is anticipated, a 175mm reamer depth will be required.

Progressively ream, increasing diameter in 1mm increments until adequate purchase is achieved, and leave the final reamer in the canal (**Figure 9B**). Tap the final reamer gently with a mallet to assure that it is firmly seated.

#### Depth markings: Cemented Stem components

Stem length	Depth marking
50mm	125
100mm	175
150mm	225

- ▶ **Note:** The Revision Baseplate is not compatible with offset adapters.

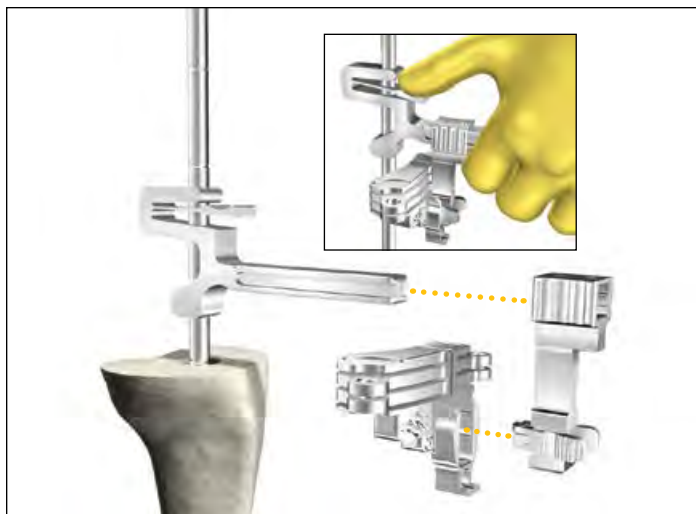


Figure 10

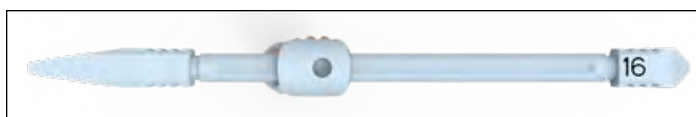


Figure 11



Figure 12



Figure 13

### Technical points

- **Attention:** Tibial offsetting with the Revision baseplate is not possible.

If Tibial Augments are to be used, ream until the depth marking is flush with the expected augment cut. Use the bottom of the line marking as the depth reference.

When using a cemented stem, it is not necessary to gain cortical chatter as cancellous bone may be unnecessarily removed.

Be sure to completely remove cement and sclerotic bone from the center of the canal.

### Revision Baseplate: Proximal tibial resection

Slide the Resection Guide Tower over top of the IM Reamer by depressing the finger tab as shown (**Figure 10**). Assemble the Revision Tibial Resection Guide to the Support Arm. Slide the assembly on to the Resection Guide Tower.

Depress the finger tab on the Resection Guide Tower and slide the assembly to the desired distal/proximal position on the IM Reamer.

Use the Blade Runner through the cutting slot to approximate the resection level.

- When determining the tibial resection consider the native joint line and patella tracking.
- In a revision procedure a **2mm cleanup** resection cut can be performed. 2mm of bone will be resected with the initial proximal resection when using the “2” end of the Triathlon Stylus.
- In a native joint for a hinge procedure, where Triathlon Revision Baseplate is used, to maintain the joint line, the minimum tibial resection from the **native joint line is 16mm**. 16mm of bone will be resected with the initial proximal resection when using the “16” end of the Hinge Tibial Stylus (**Figure 11**).
  - In a native joint the Hinge Tibial Stylus “11” end of the Hinge Tibial Stylus may be used for a reduced resection. 11mm of bone will be resected with the initial proximal resection when using the “11” end of the Hinge Stylus.

Use the Blade Runner through the cutting slots to approximate any augment resection level and rotational alignment of the guide when planning for an augment on one side of the tibia (**Figure 12**).

The Universal Alignment Rod can be used to aid in setting the final component position by inserting it through the Universal Alignment Handle and assembling the Universal Alignment Handle to the Revision Tibial Resection Guide (**Figure 13**).

- **Note:** In a bowed tibia, a surgeon may need to retract the reamer from 175mm depth to set the proper tibial cut slope.

Pin the Revision Tibial Resection Guide to the proximal tibia when the resection level has been determined.

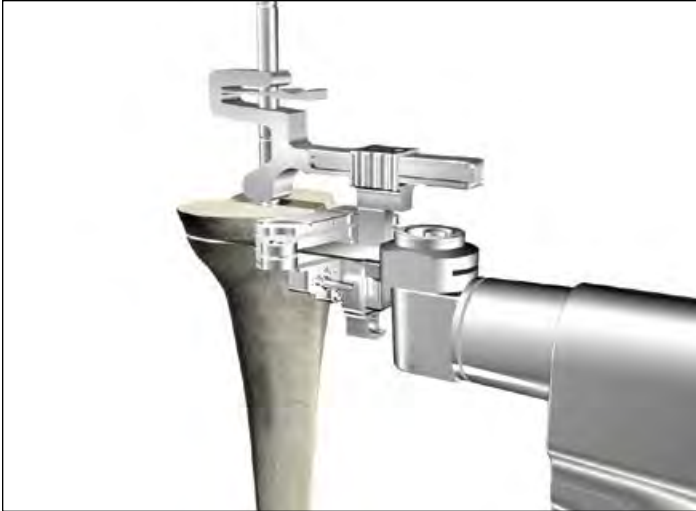


Figure 14

**Technical points**

- ▶ **Tip:** To help facilitate easy removal of the Resection Guide Tower and Support Arm, place pins perpendicular to the bone.

Make a cut to produce a resected surface with a neutral slope (**Figure 14**).

Tibial augment resections can be made at this point with the Revision Tibial Resection Guide using a narrow, 15mm-wide, 0.050" thick oscillating saw blade. Make a 5mm or 10mm augment resection as appropriate.

After completing the cut around the reamer shaft, remove the Support Arm, Resection Guide Tower, and IM Reamer before completing the tibial resection. To do so, depress the tabs on the Support Arm to disengage it from the Revision Tibial Resection Guide. Slide the Support Arm anterior (**Figure 15**). Depress the tab on the Resection Guide Tower and slide it off the IM Reamer (**Figure 16**). Use a T-handle to remove the IM Reamer.

Once the IM reamer is removed, an additional cross pin can be added to the Revision Tibial Resection Guide.

Using a reciprocating saw blade through the Revision Tibial Resection Guide (**Figure 17**), complete the sagittal augment resection.

Remove the pins and Tibial Resection Guide.



Figure 15



Figure 16

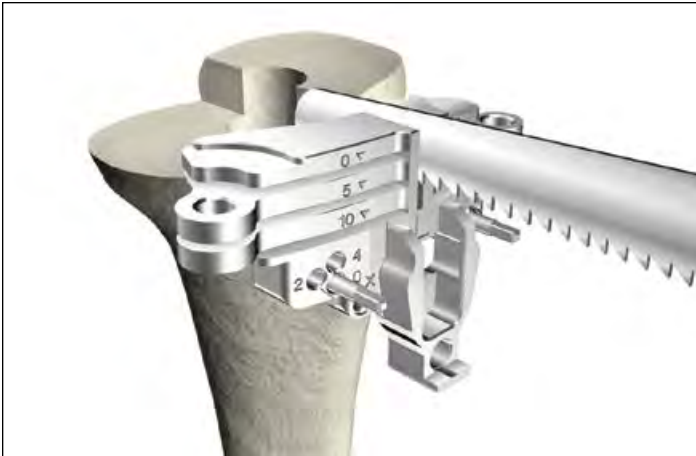


Figure 17



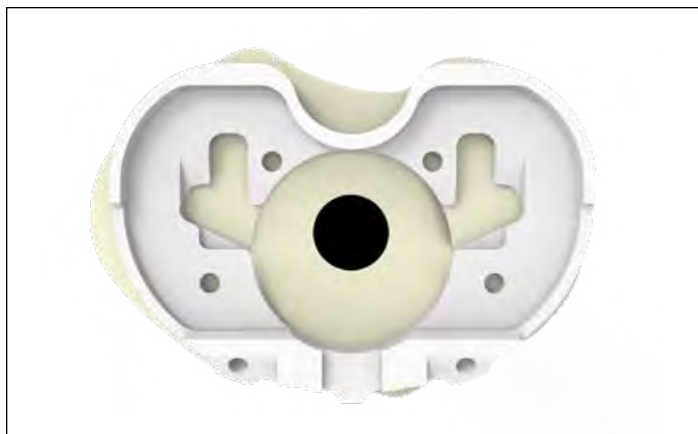


Figure 18

### Technical points

Surgeons who prefer a non-captured cut can use the top of the resection guide. The 0mm and 5mm cut slots can then be used for 5mm and 10mm augment resections, respectively.

- ▶ **Note:** The 10mm slot should not be used if executing a non-captured cut.
- ▶ **Note:** If a tibial stylus is used to ascertain resection depth, the depth will not correspond with the non-captured top surface.

### Revision Baseplate: Tibial Template sizing and positioning

- ▶ **Attention:** Tibial offsetting with the Revision baseplate is not possible.

Size the proximal tibia with a Universal Tibial Template (**Figure 18**).

The Tibial Alignment Handle can be attached to the Universal Tibial Template if desired for tibial sizing.

- Attach Tibial Augment Trials (if tibial augment cuts were made) to the underside of the Universal Tibial Template.

Rotational alignment of the Universal Tibial Template should be checked. An alignment rod can be used to aid in setting the final component position. To check alignment, attach the Revision Keel Punch Guide to the Universal Tibial Template ensuring the slider is engaged (**Figure 19**). Insert the Universal Alignment Rod through the hole in the Revision Keel Punch Guide (**Figure 20**).

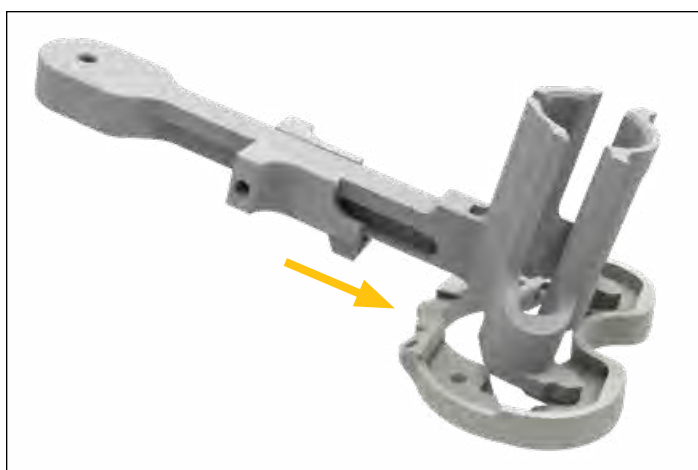


Figure 19



Figure 20

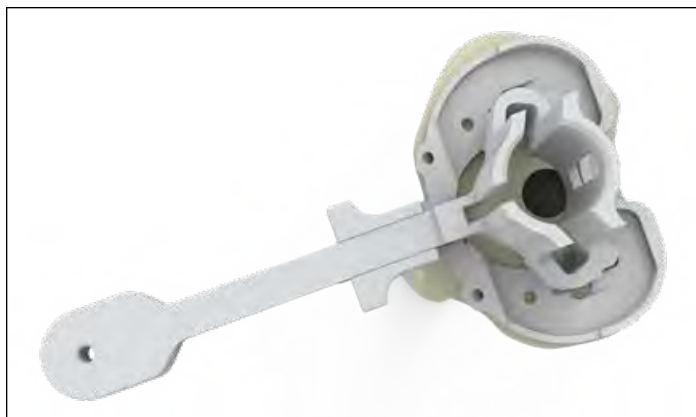


Figure 21

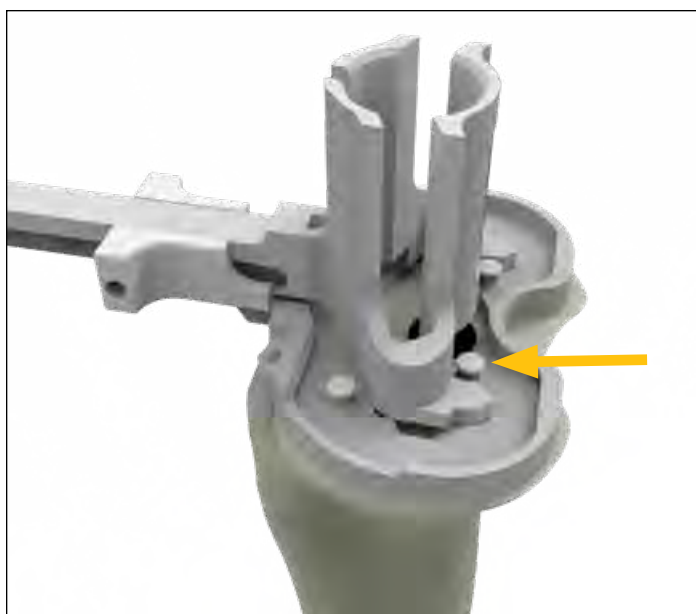


Figure 22



Figure 23

### Technical points

Offsetting is not possible with the Revision Baseplate. In some tibias, especially small tibias, prior to pinning the template it is recommended to visually assess if downsizing and/or repositioning the tibial template or downsizing the stem may be required to avoid impingement with the anterior cortices in subsequent reaming or keel punching steps. In order to assess this, complete the steps as follows:

- Insert last size reamer into the canal and lightly tap to seat it.
- Assemble the appropriately sized tibial template and keel punch guide. Assemble the template and guide over the shaft of the reamer onto the resected tibia.
- The magnitude of the offset observed between the IM reamer and the diameter of the keel punch guide should be used as a reference to determine if downsizing and/or repositioning the template may be required.

If adequate coverage and position is attained, pin the Universal Tibial Template to the proximal tibia using headed pins in the anterior template tray pin holes or headless pins in the anterior angled pin holes (**Figure 21**).

### Technical points

If additional fixation is needed for the Universal Tibial Template to the proximal tibia, remove the Revision Keel Punch Guide from the template (if assembled) and place headed nails into the posterior template pin holes (**Figure 22**). Once completed, reassemble the Revision Keel Punch Guide.

It is optional to mark the anterior surface of the tibia. Align the marks to the two engravings on the template to ensure that rotation in subsequent steps matches the planned rotation (**Figure 23**).

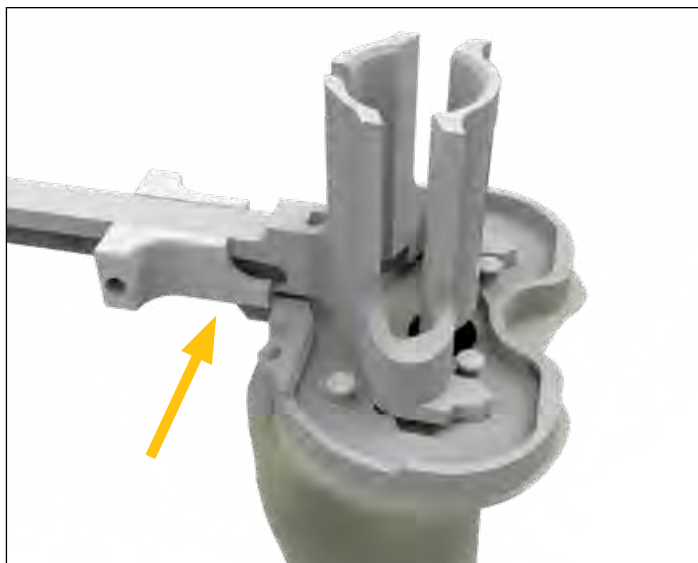


Figure 24



Figure 25

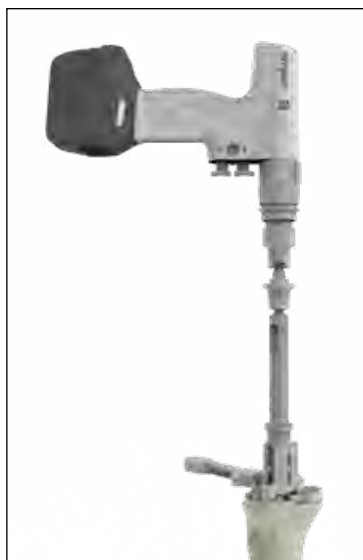


Figure 26



Figure 27

### Revision Baseplate: Boss preparation

If not already assembled, assemble the Revision Keel Punch Guide to the Universal Tibial Template. Ensure the slider is engaged with the tibial template (**Figure 24**).

Attach the Modular T-Handle to the Revision Boss Reamer and ream by hand until the physical stop is reached (**Figure 25**). If fully seating the reamer is difficult, the Revision Boss Reamer may be attached to power only if the solid cylinder of the boss reamer has engaged the Revision Keel Punch Guide (**Figures 26 and 27**). Attach the Revision Boss Reamer to the power unit using the Universal Driver.

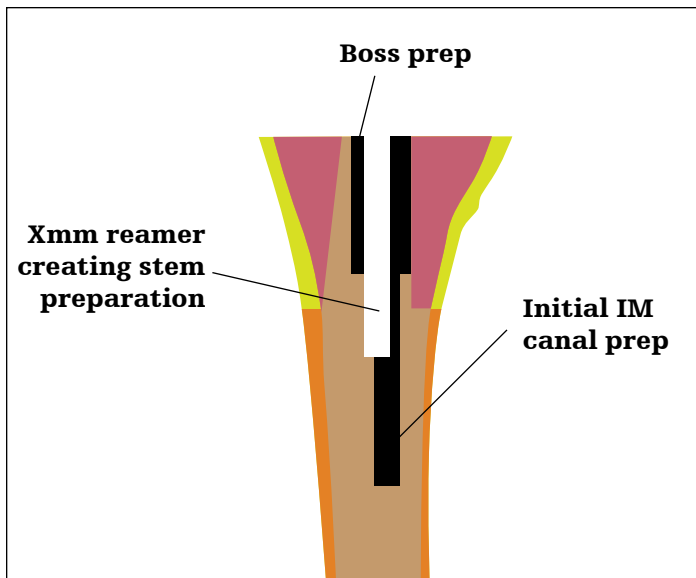
- ▶ **Attention:** Caution should be used to avoid perforating the anterior cortices during reaming.

Remove Revision Boss Reamer.

### Technical points

- ▶ **Attention:** If the Revision Boss Reamer engages cortical bone or the pinned template begins to lift off the tibia, consider downsizing and/or repositioning the tibial template. In this position, the boss of the Revision Baseplate may prevent the baseplate from fully seating. This may happen in small tibias or tibias with a significant bow. Caution should be used to avoid perforating the anterior cortices.

In sclerotic bone, the use of a saw prior to the Revision Keel Punch may be advisable.



**Figure 28**

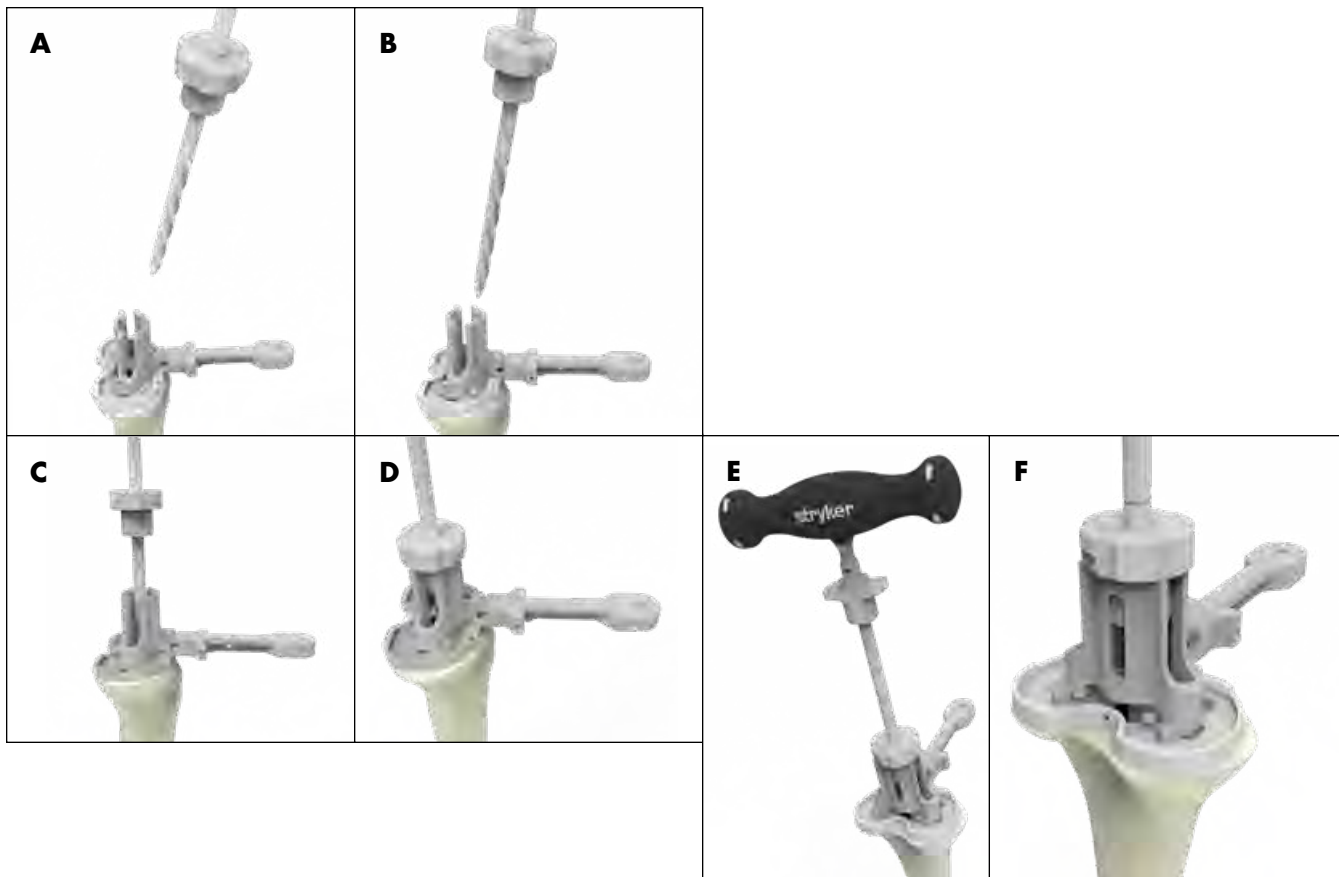
### Revision Baseplate: Cemented Stem preparation

To facilitate proper stem preparation coaxial to the boss preparation (**Figure 28**), the Neutral Bushing Guide should be used to ream for the stem.

Assemble the Neutral Bushing Guide to the 8mm Starter Awl (or downsized reamer size of choice) and insert the reamer through the keel punch guide. Once the reamer is seated in the boss preparation, allow the Neutral Bushing Guide to bottom out in the Revision Keel Punch Guide (**Figure 29**). This will help ensure the stem preparation will be coaxial to the Revision Boss Reamer preparation.

► **Note:** Do not impact the Neutral Bushing Guide into the Keel Punch Guide.

Ream using the T-handle or power unit attached to the Universal Driver.



**Figure 29**

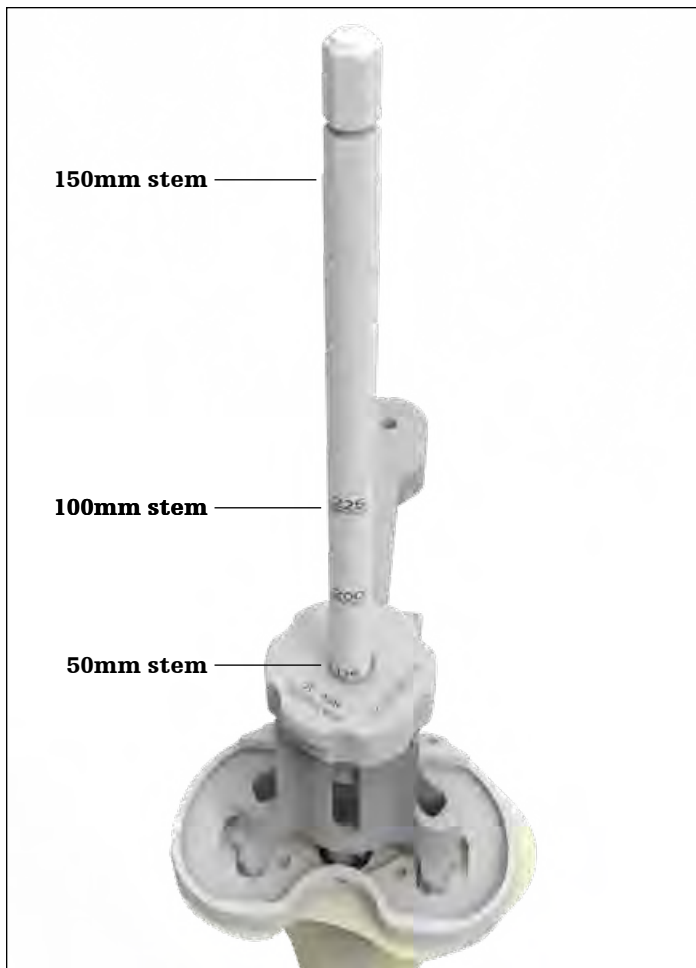


Figure 30

For a 50mm stem, ream until the 175mm marker on the IM reamer is flush with the proximal surface of the Neutral Bushing Guide (**Figure 30**). For other stem lengths refer to the table below. Incrementally ream until the desired stem diameter and cement mantle is reached.

**Technical point**

If the reamer cannot reach 175mm, consider downsizing and/or repositioning the tibial baseplate. In this position, the stem may prevent the baseplate from fully seating. If repositioning is desired, preparation of the bone will be required again.

**Depth markings: Cemented stem components**

Stem length	Depth marking
50mm	175
100mm	225
150mm	Bottom of the power tool where it attaches to the reamer

- ▶ **Note:** The Revision Baseplate is not compatible with offset adapters.
- ▶ **Note:** If using stem extender implants (5571-S-025 and 5571-S-050), ream an additional 25mm or 50mm. Note that the stem extender implants have a 16mm diameter; ream accordingly based on desired stem type. **The 50mm Stem Extender cannot be used with the Triathlon Revision Tibial Baseplate Components (5612-B-X00) when used with a 150mm Triathlon TS Stem.**

Remove the reamer.



Figure 31

Keel preparation

Place the appropriate Revision Keel Punch into the Revision Keel Punch Guide, and ensure the tab is engaged with the guide. Use a mallet to impact the punch. Advance the Revision Keel Punch until it seats fully in the Revision Keel Punch Guide (**Figure 31**).

To extract the Revision Keel Punch, lift the Revision Keel Punch handle slightly proximal and rotate the handle anteriorly, engaging the anterior tab of the Revision Keel Punch Guide, to cantilever the Revision Keel Punch out of the tibia (**Figure 32**).

Remove the Revision Keel Punch Guide, Keel Punch and Universal Tibial Template.

If desired, a Trial Baseplate and Stem trial can be used to confirm the tibial preparation is appropriate for the desired construct.

If using cones proceed to the Triathlon Tritanium Tibial Cone Augment Preparation section of this protocol. If cones are not being used proceed to the Femoral Preparation: Hinge Femur section of this protocol.



Figure 32



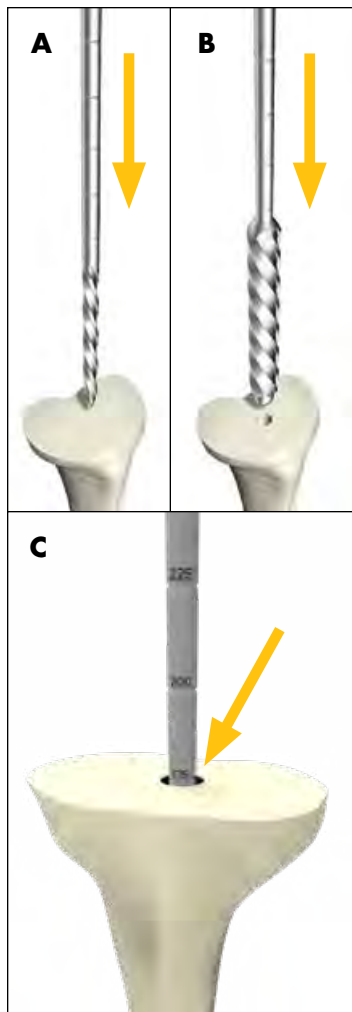
**Figure 33**

Revision Baseplate with Fluted Stems

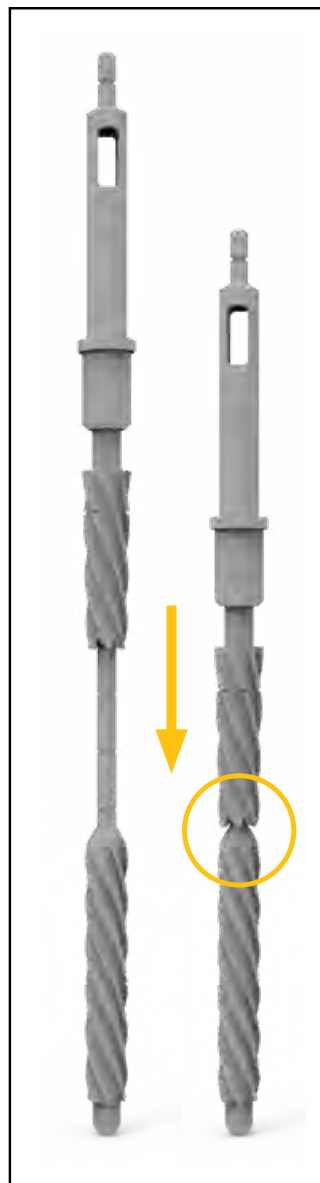
► **Attention:** Tibial offsetting with the Revision baseplate is not possible. In clinical scenarios where baseplate overhang may occur, consider using cemented stems.

If the tibial preparation is on a native tibia, removal of the anterior portion of the central eminence will be required after IM reaming to allow the Resection Guide Tower to fully seat. General surgical instruments can be used to remove the necessary bone (**Figure 33**). Alternatively, the Triathlon Primary IM referencing tibial resection instruments can be used, see the Addendum 1: Revision Baseplate Tibial Preparation with Primary tibial instrumentation portion of this protocol.

► **Attention:** The Revision Baseplate is not indicated for use with Size A Tibial Cones. The smallest compatible size is Size B.



**Figure 34**



**Figure 35**

Revision Baseplate: Intramedullary tibial preparation

Assemble the 8mm Starter Awl to either the T-Handle or power unit using the Universal Driver.

Ream the tibial intramedullary canal (**Figure 34A**).

**Technical points**

If determining the appropriate pilot hole is challenging, considering using AP and lateral x-rays to determine the appropriate starting point.

Referencing the desired tibial resection, ream to the desired stem depth (refer to depth chart) or to a length of fixation preferred for tibial alignment. Grooves along the shank of the reamer indicate the depth of the reamer in the canal (**Figure 34C**).

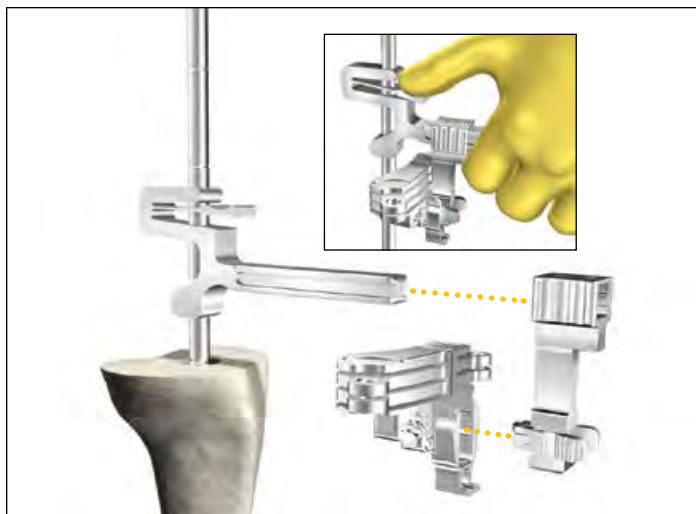
Progressively ream, increasing diameter in 1mm increments until adequate purchase is achieved, and leave the final reamer in the canal (**Figure 34B**). Tap the final reamer gently with a mallet to assure that it is firmly seated.

**Ream depth (mm): Fluted Stem components**

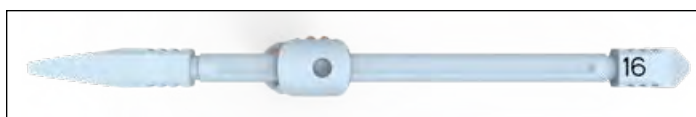
Stem length	Depth marking
100mm	175*
Tibial Cone	175*
150mm	225

\* If the final IM reamer is 16-18mm in diameter, an additional 25mm of reaming is required, resulting in a 200mm ream depth. This is required to avoid interference between the Revision Boss Reamer and the IM reamer cutting flutes (**Figure 35**).

- **Note:** The Revision Baseplate is not compatible with offset adapters.
- **Note:** When reaming for stem extenders (5571-S-025 and 5571-S-050), ream an additional 25mm or 50mm accordingly. Note that the stem extender implants have a 16mm diameter; ream accordingly based on desired stem type. **The 50mm Stem Extender cannot be used with the Triathlon Revision Tibial Baseplate Components (5612-B-X00) when used with a 150mm Triathlon TS Stem.**



**Figure 36**



**Figure 37**



**Figure 38**



**Figure 39**

### Technical points

If Tibial Augments are to be used, ream until the depth marking is flush with the expected augment cut. Use the bottom of the line marking as the depth reference.

Be sure to completely remove cement and sclerotic bone from the center of the canal.

### Revision Baseplate: Proximal tibial resection

Slide the Resection Guide Tower over top of the IM Reamer by depressing the finger tab as shown (**Figure 36**). Assemble the Revision Tibial Resection Guide to the Support Arm. Slide the assembly on to the Resection Guide Tower.

Depress the finger tab on the Resection Guide Tower and slide the assembly to the desired distal/proximal position on the IM Reamer.

Use the Blade Runner through the cutting slot to approximate the resection level.

- When determining the tibial resection consider the native joint line and patella tracking.
- In a revision procedure a **2mm cleanup** resection cut can be performed. 2mm of bone will be resected with the initial proximal resection when using the “2” end of the Triathlon Stylus.
- In a native joint for a hinge procedure, where Triathlon Revision Baseplate is used, to maintain the joint line, the minimum tibial resection from the **native joint line is 16mm**. 16mm of bone will be resected with the initial proximal resection when using the “16” end of the Hinge Tibial Stylus (**Figure 37**).
  - In a native joint the Hinge Tibial Stylus “11” end of the Hinge Tibial Stylus may be used for a reduced resection. 11mm of bone will be resected with the initial proximal resection when using the “11” end of the Hinge Stylus.

Use the Blade Runner through the cutting slot to approximate any augment resection level and rotational alignment of the guide when planning for an augment on one side of the tibia (**Figure 38**).

The Universal Alignment Rod can be used to aid in setting the final component position by inserting it through the Universal Alignment Handle and assembling the Universal Alignment Handle to the Revision Tibial Resection Guide (**Figure 39**).

- ▶ **Note:** In a bowed tibia, a surgeon may need to retract the reamer from 175mm depth to set the proper tibial cut slope.

Pin the Revision Tibial Resection Guide to the proximal tibia when the resection level and rotational alignment has been determined.





Figure 40

**Technical points**

- ▶ **Tip:** To help facilitate easy removal of the Resection Guide Tower and Support Arm, place pins perpendicular to the bone.

Make a cut to produce a resected surface with a neutral slope.

After completing the cut around the reamer shaft, remove the Support Arm, Resection Guide Tower, and IM Reamer before completing the tibial resection. To do so, depress the tabs on the Support Arm to disengage it from the Revision Tibial Resection Guide. Slide the Support Arm anterior (**Figure 40**). Depress the tab on the Resection Guide Tower and slide it off the IM Reamer (**Figure 41**). Use a T-Handle to remove the IM Reamer.

Once the IM reamer is removed, an additional cross pin can be added to the Revision Tibial Resection Guide.

Tibial augment resections can be made at this point with the Revision Tibial Resection Guide using a narrow, 15mm-wide, 0.050" thick oscillating saw blade. Make a 5mm or 10mm augment resection as appropriate.

Using a reciprocating saw blade through the Revision Tibial Resection Guide, complete the sagittal augment resection (**Figure 42**).

Remove the pins and Tibial Resection Guide.



Figure 41

**Technical points**

Surgeons who prefer a non-captured cut can use the top of the resection guide. The 0mm and 5mm slots can then be used for 5mm and 10mm augment resections, respectively.

- ▶ **Note:** The 10mm slot should not be used if executing a non-captured cut.
- ▶ **Note:** If a tibial stylus is used to ascertain resection depth the depth will not correspond with the non-captured top surface.

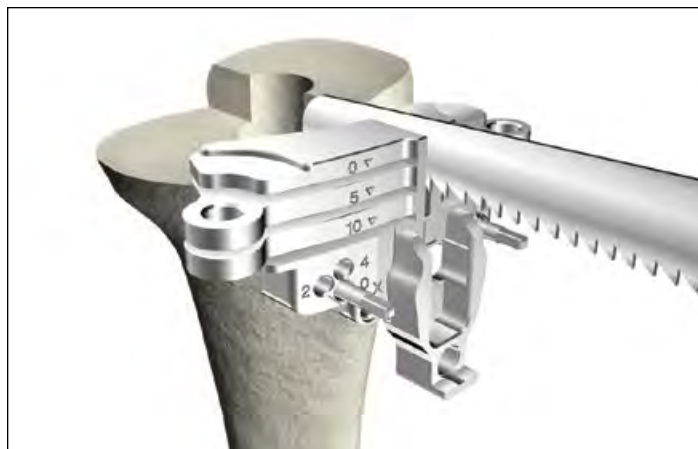


Figure 42



Figure 43

### Revision Baseplate: Tibial Template sizing and positioning

Reinsert the last IM reamer.

Size the proximal tibia with a Revision Tibial Template, Revision Keel Punch Guide, and Neutral Bushing Guide placed over the reamer and onto the resected surface of the tibia (**Figure 43**). Ensure that the slider is engaged with tibial template (**Figure 44**).

- Attach Tibial Augment Trials (if tibial augment cuts were made) to the underside of the Universal Tibial Template.
- ▶ **Attention:** Tibial offsetting with the Revision Baseplate is not possible.

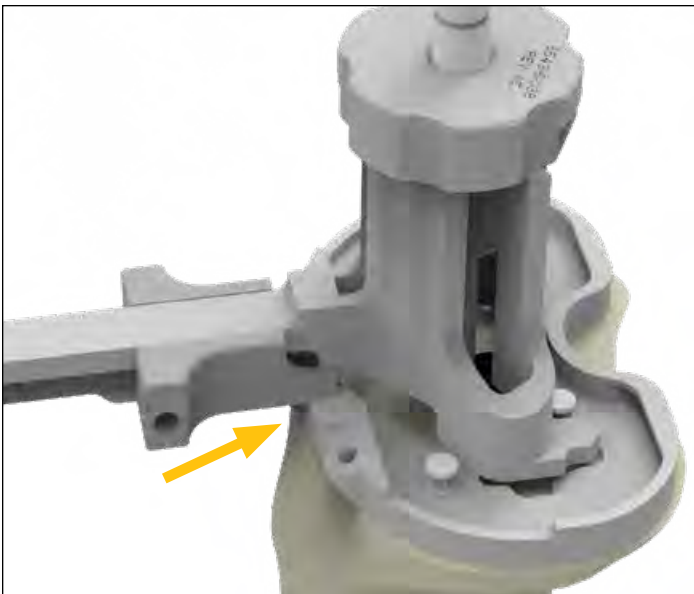


Figure 44



Figure 45

Rotational and alignment of the Universal Tibial Template should be checked. An alignment rod can be used to aid in setting the final component position.

- To check alignment, attach the Revision Keel Punch Guide to the Universal Tibial Template ensuring the slider is engaged. Insert the Universal Alignment Rod through the hole in the Revision Keel Punch Guide (**Figure 45**).

If adequate coverage and position is attained, pin the Universal Tibial Template to the proximal tibia using headless pins in the anterior angled pin holes or headed pins in the anterior template tray pin holes.

If adequate coverage and position is not attained, consider downsizing the tibial template.

### Technical points

If additional fixation is needed for the Universal Tibial Template to the proximal tibia, remove the IM Reamer Neutral Bushing Guide and Revision Keel Punch Guide and place headed nails into the posterior template pin holes (**Figure 46**). Once completed, reassemble the Revision Keel Punch Guide.

It is optional to mark the anterior surface of the tibia. Align the marks to the two engravings on the template to ensure that rotation in subsequent steps matches the planned rotation (**Figure 47**).



Figure 46



Figure 47



**Figure 48**



**Figure 49**



**Figure 50**

## Revision Baseplate: Boss preparation

If the IM reamer is greater than or equal to 19mm, the Revision Boss Reamer is not necessary. The IM reamer has prepared for the Revision Baseplate boss diameter.

Remove the Neutral Bushing Guide from the Revision Keel Punch Guide, leaving the IM reamer and Revision Keel Punch Guide in place.

Attach the Modular T-Handle to the Revision Boss Reamer. Place the Revision Boss Reamer over the shank of the IM reamer and into the Revision Keel Punch Guide (**Figures 48 and 49**). Ream until the physical stop is reached.

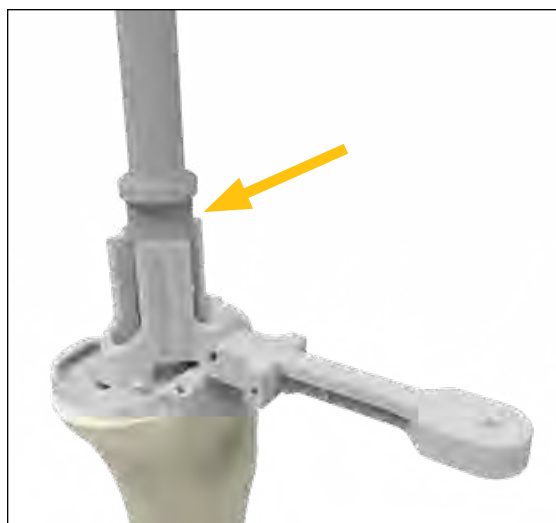
If reaming is difficult, the Revision Boss Reamer may be attached to power only if the solid cylinder of the boss reamer has engaged the Revision Keel Punch Guide (**Figures 50 and 51**). Attach the Revision Boss Reamer to the power unit using the Universal Driver.

► **Attention:** Caution should be used to avoid perforating the anterior cortices.

Remove Revision Boss Reamer and IM Reamer.

### Technical points

In sclerotic bone, the use of a saw prior to the Revision Keel Punch may be advisable.



**Figure 51**



Figure 52

Keel preparation

Place the appropriate Revision Keel Punch into the Revision Keel Punch Guide, and ensure the tab is engaged with the guide. Use a mallet to impact the punch. Advance the Revision Keel Punch until it seats fully in the Revision Keel Punch Guide (**Figure 52**).

To extract the Revision Keel Punch, lift the Revision Keel Punch handle slightly proximal and rotate the handle anteriorly, engaging the anterior tab of the Revision Keel Punch Guide, to cantilever the Revision Keel Punch out of the tibia (**Figure 53**).

Once the tibia is fully prepared, remove the Universal Tibial Template and Revision Keel Punch Guide Assembly (**Figure 54**).

If using cones proceed to the Triathlon Tritanium Tibial Cone Augment Preparation section of this protocol.



Figure 53

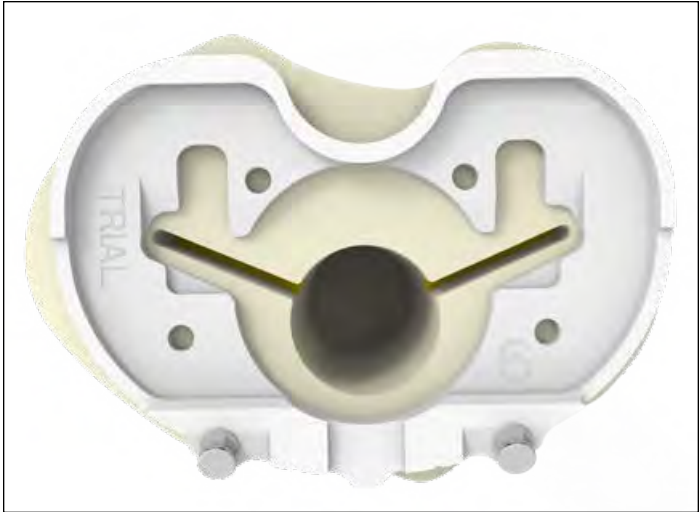


Figure 54

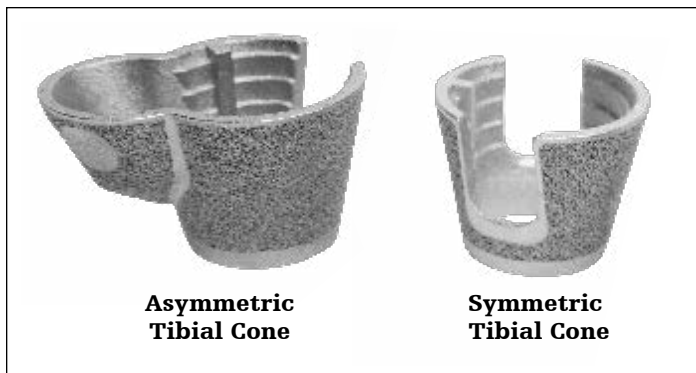


Figure 55

### Triathlon Tritanium Tibial Cone Augment preparation

Triathlon Tritanium Tibial Cone Augments come in two different shapes (Figure 55).

#### Tibial Canal Preparation for Tibial Cone Augments

► **Attention:** Tibial Cone size A is not intended for use with the Revision Baseplate.

#### Option 1: Reamer-based

When using a Symmetric/Asymmetric Cone, a minimum depth of 175mm is recommended for the IM reamer to facilitate accurate cone reaming and to ensure that the flutes on the Tibial Symmetric Cone Reamer do not interfere with the flutes on the IM Reamer.

Tap the final IM Reamer gently with a mallet to ensure that it is fully seated.

► **Note:** If Tibial Augments are to be used, ream until the 175mm marking is flush with the augment cut. Use the bottom of the 175mm line marking as the depth reference. See Figure 56.

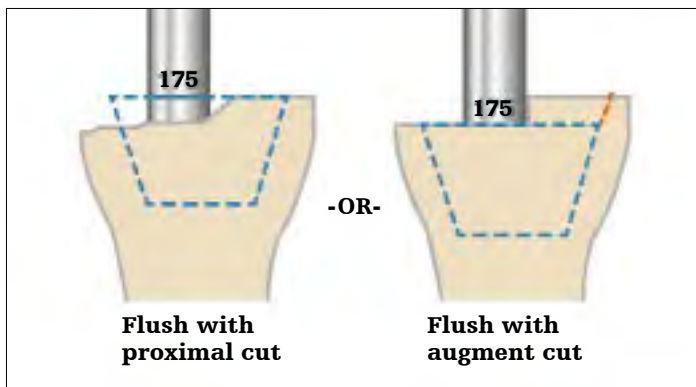


Figure 56

**Option 2: Stem Extender Shaft-based**

If desired, the IM reamer can be removed and subsequent preparation can be based off of a Stem Trial utilizing the required Stem Trial and the Stem Extender Shaft.

Assemble the Stem Extender Shaft (6543-4-516) to the appropriate diameter Stem Trial and place the assembly into the canal.

Continue with Tibial Preparation as described in the protocol.

**Ream depth: Tibial components with cones**

<b>Stems (with Cones)</b>	<b>Depth</b>
100mm	175 (3rd groove)
150mm	175 (3rd groove)

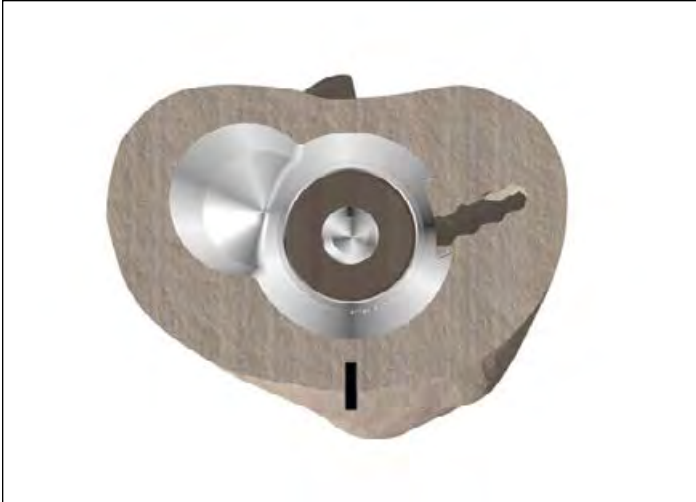


Figure 57

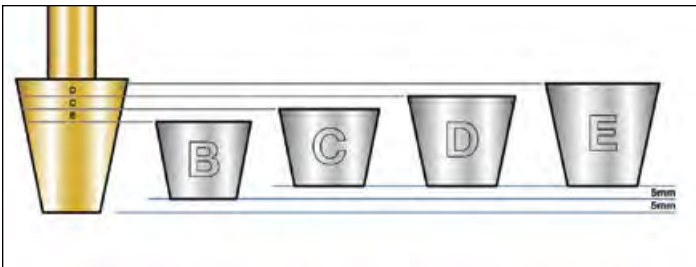


Figure 58



Figure 59



Figure 60

Preliminary Cone sizing

Depending on the size and geometry of bone defect, either a symmetric or asymmetric tibial cone augment may be selected. Inverting a contralateral leg cone trial may help determine bone defect, assess cone coverage, and determine if symmetric or asymmetric cone is required.

- ▶ **Note:** Invert the Cone Trial over the resected tibial bone and ensure that the trial is centered on the IM Reamer (Figure 57). Centering the trial helps to ensure proper positioning.

Revision Baseplate with Symmetric Tibial Cone

**Symmetric Tibial Cone preparation**

Ensure that the Tibial Symmetric Cone Reamer is being used. This can be confirmed by checking that the reamer shaft reads "TIBIA."

Grooves on the reamer specify cone size (Figure 58). Reference the sizing chart to help determine appropriate cone sizing (See chart on the next page for Cone and Baseplate sizing options).

- ▶ **Note:** Use the top line of the groove (of the desired size) as the depth reference.

Insert the Tibial Symmetric Cone Reamer over the IM Reamer (Figure 59). If reaming under power, confirm that the drill is set to ream mode before reaming begins. Start the reamer before engaging the bone. Ream down to the desired depth/size (Figure 60).

- ▶ **Caution:** If the bone is soft, osteopenic, fractured, or sclerotic, consider initially reaming by hand using the T-Handle.

Remove both the Tibial Symmetric Cone Reamer and the IM Reamer.

If using an augment, see the next page to help determine proper preparation depth.

- ▶ **Note:** If the Cone needs to be placed in a slightly more posterior position, remove the IM Reamer and replace it with an IM Reamer of a smaller diameter. Place the Tibial Symmetric Cone Reamer over the IM reamer and gently flex it posteriorly. Ream down to the desired depth/size.
- ▶ **Note:** Confirm that the Tibial Symmetric Cone Reamer is not being hindered by the cutting surface of the flutes on the IM Reamer. If so, the IM Reamer may need to be placed in a more distal position.
- ▶ **Note:** Reamer depth increases by 5mm per size.



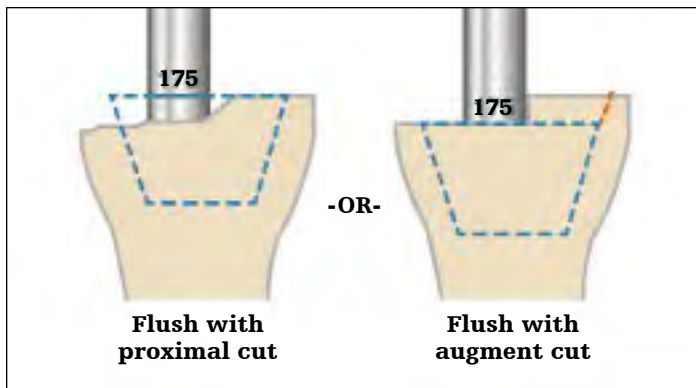


Figure 61

If augments are to be used, the size marking of the Tibial Symmetric Cone Reamer will indicate where the Cone will sit. Ream until the marking is flush with the augment cut (Figure 61).

**Technical points**

- ▶ **Attention:** Tibial Cone size A (Symmetric) are not intended for use with the Revision Baseplate.
- ▶ **Attention:** The Revision Baseplate is not intended for use with offset adapters.

Remove both the Tibial Symmetric Cone Reamer and the IM Reamer.

**Tibial Cone sizes**

		B	C	D	E
Implant sizes	Size 1	*			
	Size 2	*			
	Size 3	X			
	Size 4	X	X		
	Size 5	X	X	X	
	Size 6	X	X	X	X
	Size 7			X	X
<b>Distal Diameter (OD)</b>		23mm	25mm	25mm	25mm
<b>Max Stem Diameter (ID)</b>		19mm	21mm	21mm	21mm

**Revision Baseplate and Tibial Cone Augment compatibility**

Tibial Cone sizing per Tibial Baseplate. Blue represents optimal size conditions.

- ▶ **Note:** Cones B, C, D and E also have an asymmetric lobed option. Cones smaller than those marked with an X are still compatible but need to be positioned at least 5mm deeper. If these sizes are to be used, rotational freedom between the tibial implant and the cone may be limited with non size on size combinations. Trial to assess compatibility.
- ▶ **\*Note:** Cone B, with baseplate sizes 1 and 2, has less freedom between the tibial implant and the cone than other sizes. The cone may protrude anteriorly with respect to the baseplate.

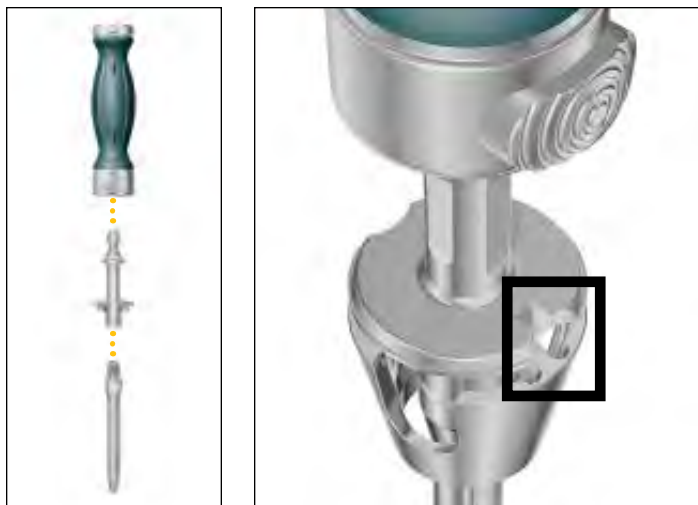


Figure 62



Figure 63

## Symmetric Cone trialing

If bone voids are such that Asymmetric Cone preparation is necessary, refer to the Asymmetric Cone Preparation section of the protocol.

- ▶ **Note:** Cone trial may be placed in the prepared bone prior to assembling the instruments as described below.

Assemble the desired Stem Trial with the Tibial Cone Introducer, TS Impaction Handle, and the selected Symmetric Cone Trial (100mm stem maximum).

Tibial Cone Introducers are size specific.

- ▶ **Note:** Downsize the Trial Stem by 1mm.

Align the orientation key on the trial with the key feature on the Cone Introducer. The orientation key is located posteriorly on the trial (**Figure 62**).

- ▶ **Note:** There is no positive lock on the Cone Trial and the Cone Introducer. The trial may disconnect from the introducer.

- ▶ **Note:** The Cone Trial can be placed into the prepared bone before the Stem Trial and the Cone Introducer.

When inserting the Cone Trial, ensure that the anterior rotational alignment marking on the trial is aligned with the anterior surface marking previously determined by the Universal Tibial Template (**Figure 63**).

Insert the trial until it is seated at the appropriate depth. Remove the Cone Introducer and the Stem Trial so that only the Cone Trial remains in the void.

- ▶ **Caution:** Do not impact or implant the Cone Trials.

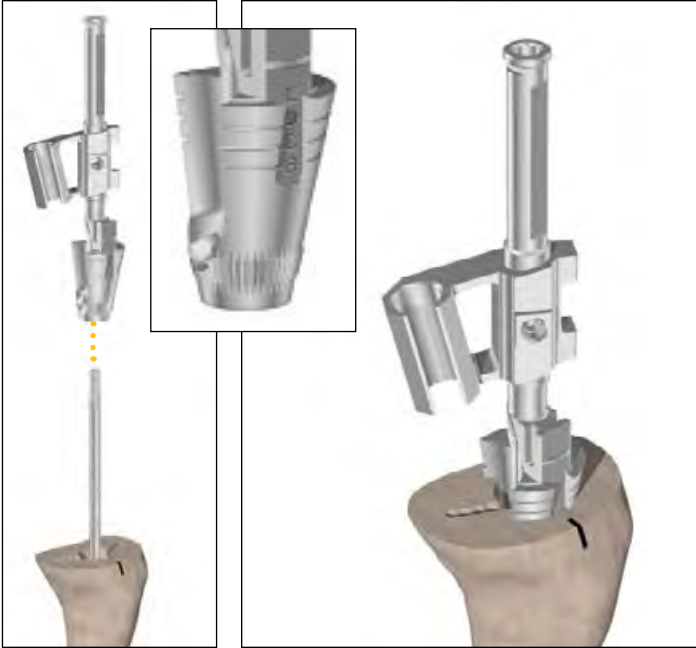
- ▶ **Note:** Stem trials with product code 5560-T-XXX cannot be used with cone augment instrumentation. This includes trials 5560-T-109, 5560-T-112 and 5560-T-115.

### Options if added cone stability is required:

Ream to a larger Symmetric Cone (Repeat steps from the Symmetric Cone Preparation section of the protocol).

Or prepare for an Asymmetric Cone (Follow the steps from the Asymmetric Cone Preparation section of the protocol).

Or implant the Cone with cement.



**Figure 64**

### Revision Baseplate and Asymmetric Tibial Cone preparation

#### Asymmetric Tibial Cone preparation

Asymmetric Cone preparation is an option for increased stability and void filling after Symmetric Cone reaming has been completed.

Symmetric Cone preparation must be performed before Asymmetric Cone preparation can begin. Refer to the Symmetric Cone Preparation section of the protocol.

During Asymmetric Cone preparation, be sure to properly set cone rotation to ensure proper alignment with the Baseplate.

Slide the appropriate Tibial Cone Reamer Guide over the IM Reamer and into the prepared tibia (**Figure 64**).

- ▶ **Note:** There are two Tibial Cone Reamer Guides. One is designed for left medial / right lateral use, and the other is designed for right medial / left lateral use.
- ▶ **Note:** Do not fully seat the Tibial Cone Reamer Guide until after rotation is set.



Figure 65

Attach the Tibial Cone Alignment Guide Handle to the Tibial Cone Reamer Guide (**Figure 65**).

Insert the Tibial Asymmetric Cone Reamer into the Tibial Cone Reamer Guide to assist in visualization of guide positioning.

Select the correct reamer to match the cone size.

Slide back the bushing on the reamer and place the reamer into the slot of the guide (**Figures 65 and 66**).



Figure 66

Insert the Alignment Rod into the bushing on the Tibial Cone Alignment Guide Handle.

► **Note:** The Universal Alignment Rod is only intended to help align anterior rotation markings to help ensure proper cone positioning/rotation.

Lower the Tibial Asymmetric Cone Reamer down to the desired location.

Use the Tibial Cone Alignment Guide Handle to position the reamer and rotate the guide. The assembly can be rotated by using the built-in rotational constraints (+/-10 degrees) (**Figure 67**).

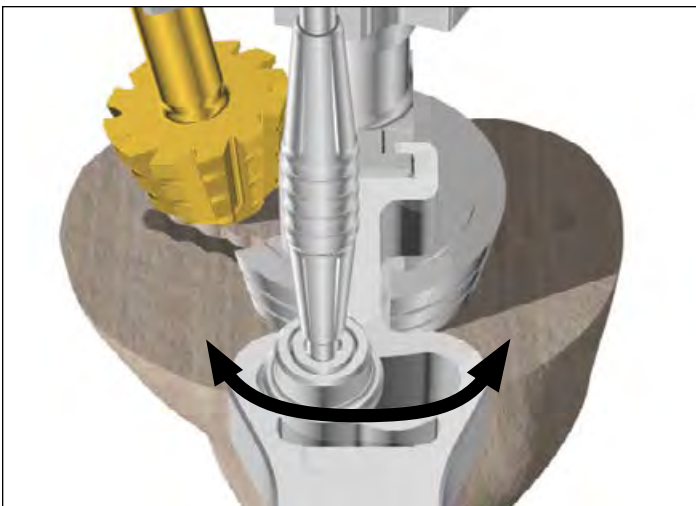


Figure 67



**Figure 68**

Once the desired positioning is established, move the Alignment Rod so that it aligns with the anterior rotational marking previously set using the Universal Tibial Template. This will ensure that desired tibial rotation is maintained.

If the Alignment Rod does not line up with the anterior marking, reduce rotation until it does so.

The Tibial Cone Reamer Guide has micro-flutes at its base to maintain rotation once set.

After alignment has been set, seat the Tibial Cone Reamer Guide so that it sits at the same depth/size as the Tibial Symmetric Cone Reamer (**Figure 68**).

If reaming under power, confirm that the drill is set to ream mode before reaming begins.

Before reaming begins, ensure that the bushing is fully engaged.

- ▶ **Caution:** If the bone is soft, osteopenic, fractured, or sclerotic, consider initially reaming by hand using the T-Handle.

Hold the Tibial Cone Alignment Guide Handle in the previously determined location to maintain rotation.

Start the reamer before engaging the bone. Ream down to the stop (**Figure 69**).

Remove the reamer from the guide. If necessary, the slap hammer can be connected to the end of the Tibial Cone Alignment Guide to assist with guide removal.

Remove the IM Reamer.



**Figure 69**

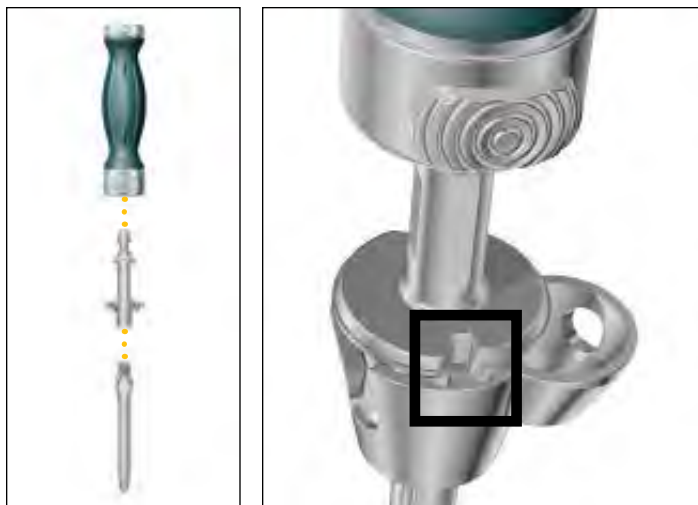


Figure 70



Figure 71

### Asymmetric Cone trialing

- ▶ **Note:** The Cone Trial can be placed into the prepared bone before the Stem Trial and the Cone Introducer.

Assemble the desired Stem Trial with the Tibial Cone Introducer, TS Impaction Handle, and the selected Asymmetric Cone Trial (100mm stem maximum).

Tibial Cone Introducers are intended for use with both Symmetric and Asymmetric Cones.

- ▶ **Note:** Downsize the Stem Trial by 1mm.

Align the orientation key on the trial with the key feature on the Cone Introducer. The orientation key is located posteriorly on the trial (**Figure 70**).

- ▶ **Note:** There is no positive lock on the Cone Trial and the Cone Introducer. The trial may disconnect from the introducer.

Insert the trial until it is seated at the appropriate depth (**Figure 71**). Remove the Cone Introducer and the Stem Trial so that only the Cone Trial remains in the void.

- ▶ **Caution:** Do not impact or implant Cone Trials.
- ▶ **Note:** Stem trials with product code 5560-T-XXX cannot be used with cone augment instrumentation. This includes trials 5560-T-109, 5560-T-112 and 5560-T-115.

#### **Options if added Cone stability is required:**

Ream for a larger Asymmetric Cone (Repeat steps from the Asymmetric Cone Preparation section of the protocol).

Or implant the Cone with cement.

## Component trialing

The purpose of the trial reduction is to determine the ease of insertion of the femoral and tibial components prior to cementing, and to determine whether the length of the prosthesis is appropriate. If the prosthesis is too long, too much tension will be placed upon the neurovascular structures when the knee is extended. In addition, the extensor mechanism will be tight, causing loss of flexion and difficulty in closing the soft tissues.

To determine the appropriate length, one must extend the knee and monitor the distal pulse with the trial prosthesis in place.

In a case of a revision scenario where one component is well fixed and trial reduction is desired, refer to the tables below for the trialing construct definition.

### Trialing GMRS Distal Femur (trial) and Revision Baseplate (implant) compatibility

			Insert Trials	GMRS Distal Femoral Component Trial	
				GMRS <b>Small</b> Distal Femur Trial 6496-2-010/20	GMRS <b>Standard</b> Distal Femur Trial 6496-2-030/40
				<b>Bushing trial</b> N/A <b>Axle trial</b> 6496-2-115 <b>Bumper trial</b> 6543-6-101/3	<b>Bushing trial</b> N/A OR 6543-6-018 <b>Axle trial</b> 6496-2-115 OR 6543-6-020 <b>Bumper trial</b> 6543-6-101/3
Triathlon Revision Tibial Baseplate	5612-B-100	No sleeve	6543-6-061	<b>Bearing Post Trial</b> 6543-6-058 <b>Trial Bearing Plate</b> 6543-6-071	
	5612-B-200		6543-6-062		
	5612-B-300		6543-6-063		
	5612-B-400		6543-6-064		
	5612-B-500		6543-6-065		
	5612-B-600		6543-6-066		
	5612-B-700		6543-6-067		

### Trialing GMRS Distal Femur (implant) and Revision Baseplate (trial) compatibility

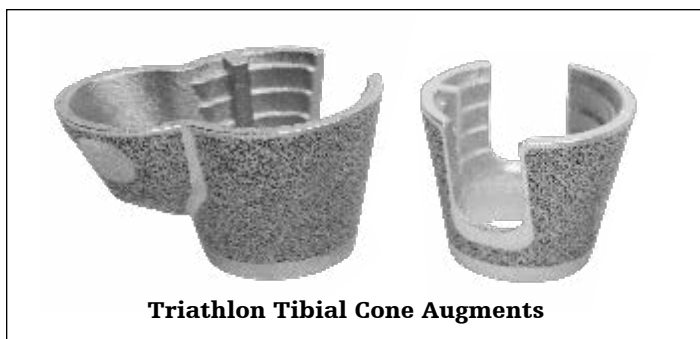
			Insert Trials	GMRS Distal Femoral Component	
				GMRS <b>Small</b> Distal Femur 6495-2-010/20	GMRS <b>Standard</b> Distal Femur 6495-2-030/40
				<b>Bushing trial</b> N/A <b>Axle trial</b> 6496-2-115 <b>Bumper trial</b> 6543-6-101/3	<b>Bushing trial</b> N/A OR 6543-6-018 <b>Axle trial</b> 6496-2-115 OR 6543-6-020 <b>Bumper trial</b> 6543-6-101/3
Triathlon Revision Tibial Baseplate Trial	5612-T-100	No sleeve	6543-6-061	<b>Bearing Post Trial</b> 6543-6-058 <b>Trial Bearing Plate</b> 6543-6-071	
	5612-T-200		6543-6-062		
	5612-T-300		6543-6-063		
	5612-T-400		6543-6-064		
	5612-T-500		6543-6-065		
	5612-T-600		6543-6-066		
	5612-T-700		6543-6-067		



**Figure 72**

### Tibial Trial assembly

If you are planning for Cone Augments, begin with Cone Augment trialing if it has not already been completed.



**Figure 73**





Figure 74

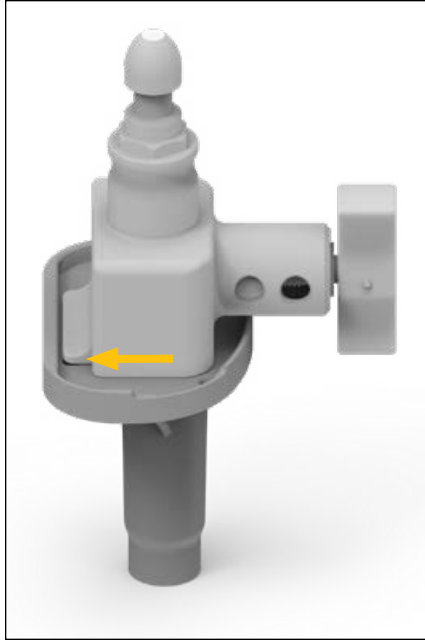


Figure 75

**Revision Baseplate Trial assembly**

► **Attention:** The Revision Baseplate is not available with offset adaptors.

Assemble all Tibial Augment Trials to the appropriate size Tibial Baseplate Trial.

Thread the appropriate size Stem Trial into the Tibial Baseplate Trial.

Assemble the tibial trial construct to the Revision Baseplate Impactor/Extractor and impact onto the Tibia (**Figure 74**). Ensure the tab of the Impactor/Extractor is engaged under the posterior lip of the baseplate before impacting (**Figures 75-77**).

Assemble the appropriate size Hinge Insert trial into the Revision Tibial Baseplate Trial. Do not impact the Insert Trial during assembly.



Figure 76



Figure 77



**Figure 78**

### Femoral Trial assembly

Assemble the trial femoral construct by joining the Trial Cemented Stem with the Trial Extension Piece, if required, and with the Trial Distal Femoral Component.

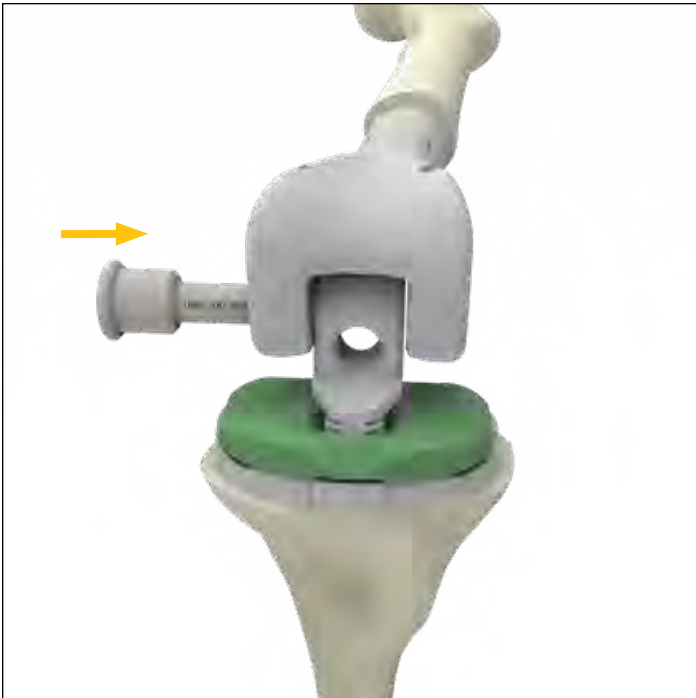
Insert the stem of the trial femoral assembly into the femur. As a guide to rotational orientation, align the rotational alignment mark on the femoral stem segment with the rotational reference mark previously made on the anterior cortex of the femur (**Figure 78**).

### Trial reduction

With the correct Revision Baseplate trial in place, insert the Hinge Tibial Bearing Post Trial (6543-6-058) into the baseplate trial.

With the knee in 90 degrees of flexion and the GMRS Distal Femoral trial in place, bring the Hinge Tibial Bearing Post Trial into the intercondylar notch of the GMRS Distal Femoral Trial.

Slide the appropriate GMRS Trial Axle (see the table on the next page) through the GMRS Distal Femoral Component Trial and Hinge Tibial Bearing Post Trial (**Figure 79**). Do not impact the Trial Axle during assembly.



**Figure 79**

**GMRS Distal Femur (trial) and Revision Baseplate (trial) compatibility**

			Inserts Trials	GMRS Distal Femoral Component Trial	
				GMRS <b>Small</b> Distal Femur Trial 6496-2-010/20	GMRS <b>Standard</b> Distal Femur Trial 6496-2-030/40
				<b>Bushing trial</b> N/A <b>Axle trial</b> 6496-2-115 <b>Bumper trial</b> 6543-6-101/3	<b>Bushing trial</b> N/A OR 6543-6-018 <b>Axle trial</b> 6496-2-115 OR 6543-6-020 <b>Bumper trial</b> 6543-6-101/3
Triathlon Revision Tibial Baseplate Trial	5612-T-100	No sleeve	6543-6-061	<b>Bearing Post Trial</b> 6543-6-058 <b>Trial Bearing Plate</b> 6543-6-071	
	5612-T-200		6543-6-062		
	5612-T-300		6543-6-063		
	5612-T-400		6543-6-064		
	5612-T-500		6543-6-065		
	5612-T-600		6543-6-066		
	5612-T-700		6543-6-067		

Assemble the appropriately angled Trial Bumper (6543-6-101/103) in the Hinge Tibial Bearing Post Trial by hand.

Assemble the Insertion Removal Handle (or surgical forceps) to the Hinge Trial Bearing Plate (6543-6-071).

With the knee at 90 degrees, manually distract the knee and insert the Hinge Trial Bearing Plate into the desired slot of the Bearing Post. Each slot represents the thickness of the definitive insert (**Figure 80**). The insert thickness should be dictated by the desired leg length rather than tension.

If utilized, remove the Insertion Removal Handle, and bring the knee to full extension (0 degrees). Determine if the extension gap is adequately filled.

Perform the trial reduction and evaluate patella tracking.

Adjust the insert thickness as required by reattaching the Insertion Removal Handle to the Hinge Trial Bearing Plate and shifting the bearing plate to the next increment in flexion or fully disassociate the Femoral Trial and Bearing Post assembly from Revision Tibial Baseplate trial to shift the bearing plate to the next increment.

Adjust the Trial Bumper angle as required.



**Figure 80**

### Technical points

Manipulating the knee through its range of motion may be used to determine the appropriate rotation of the femoral component. If the evaluation identifies a rotation different than that already marked, an additional mark should be made or the rotation should be noted relative to the existing mark. Slight external rotation may aid in patellar tracking.

Hold the trial femoral assembly in one hand to prevent rotation and extend the leg fully. Palpate the femoral vessels to determine the status of the pulse. If the pulse is diminished, flex the knee to determine if it increases. This will indicate the need for either modifying the length of the prosthesis or for removing additional bone from the distal femur or proximal tibia.

As an aid in checking leg length, the distance between the leg-length reference marks on the tibia and femur can now be rechecked.

If it is determined that the prosthetic construct is too long, the length of the distal femoral bone resected should be rechecked against the length of the assembled prosthesis. If the prosthesis is too long, either additional bone can be removed from the femur, the length of the prosthesis can be adjusted, or a thinner insert can be evaluated.

If the surgeon feels that removing additional bone from the femur or shortening the femoral prosthesis will have a negative effect on patellar tracking, additional bone must be removed from the tibial side.

A final test of the range of motion of the knee with the patella in place is then performed. If the patella will be resurfaced, this must be done with the patellar trial in place. A full range of motion should be obtained. Note whether the capsular mechanism can be closed. These factors, taken together, will determine the adequacy of the length of the resection.

The two most important factors in accepting final length are:

1. Proper patellar tracking
2. Distal pulses

The decision can now be made if a gastrocnemius flap or muscle transfer will be required, dependent upon the presence or absence of the capsule or portions of the quadriceps.

### Trial and Cone Augment Trial removal

Extract the GMRS Femoral Trial and Revision Baseplate trial using the corresponding impactor/extractor instruments.

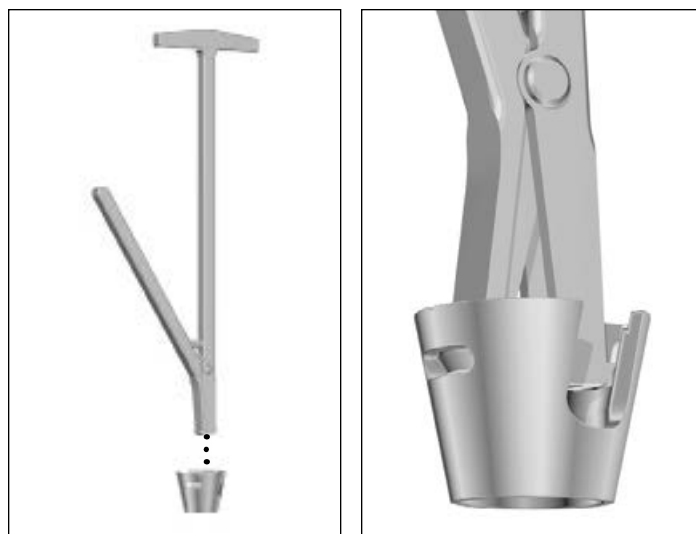
Use the Cone Extractor to remove the Cone Trials (**Figure 81**).

Insert the extractor into the Cone Trial (jaws closed). Squeeze the extractor handles to open the jaws. The jaws will engage the slots within the proximal end of the Cone Trial.

Once the jaws engage with the slots, remove the trial. Strike the handle of the extractor to assist in removal of the Cone Trial.

### Technical points

A Lamina Spreader (with narrow fixed pads) or a Curette (reverse angle) may also be used to remove the Cone Trials. Insert the Lamina Spreader or Curette into the Cone Trial and apply back pressure.



**Figure 81**

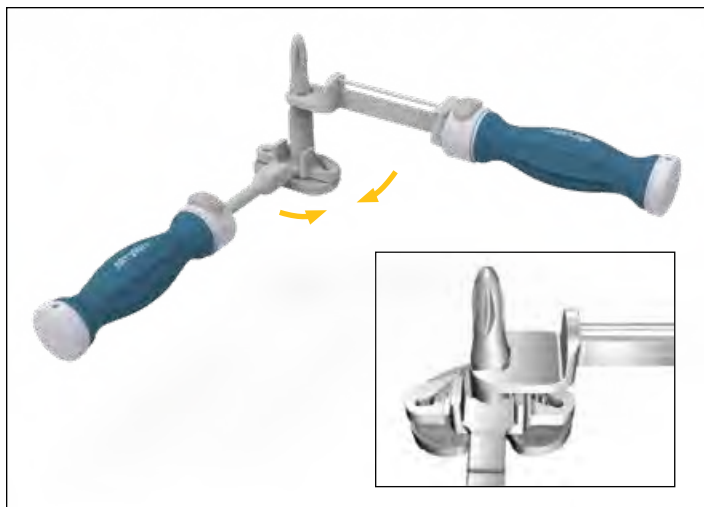


Figure 82

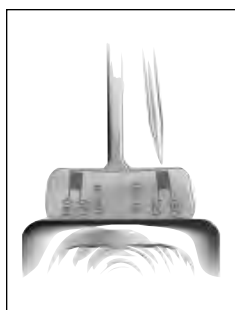


Figure 83

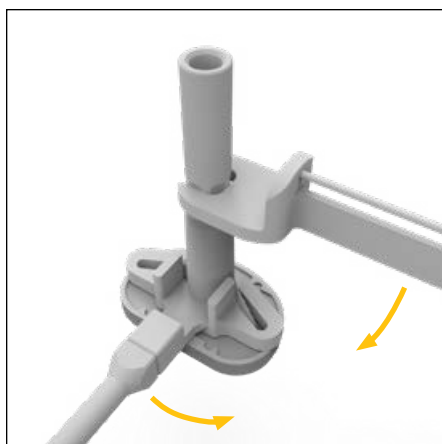


Figure 84

## Definitive component assembly

### Revision Baseplate Tibial Implant assembly

Assemble the stem to the baseplate prior to assembling augments.

#### Tibia with stem

Using the Universal Counter Wrench with the **tibia** side up, hold the Revision Baseplate in place by placing the slots of the counter wrench down over the keel fins of the baseplate.

Thread the appropriate size stem into the Tibial Baseplate Boss.

Place the open face end of the Torque Wrench on the flats of the stem (**Figure 82**).

Tighten by pulling the wrenches **together**. Torque Stem to 120 in-lbs. as indicated on the Torque Wrench (**Figure 83**).

#### Optional Tibia with Stem Extender

Using the Universal Counter Wrench with the **tibia** side up, hold the Revision Baseplate in place by placing the keel fins into the slots. Thread the Stem Extender into the Tibial Baseplate boss.

Place the open face end of the Universal Torque Wrench on the flats of the Stem Extender. Tighten by pulling the wrenches together (**Figure 84**).

Torque stem extender to 120 in-lbs. as indicated on the Universal Torque Wrench (**Figure 83**).

Thread the appropriate size stem into the Stem Extender.

Place the open face end of the Torque Wrench on the flats of the stem.

Tighten by pulling the wrenches **together**. Torque Stem to 120 in-lbs. as indicated on the Torque Wrench (**Figure 83**).

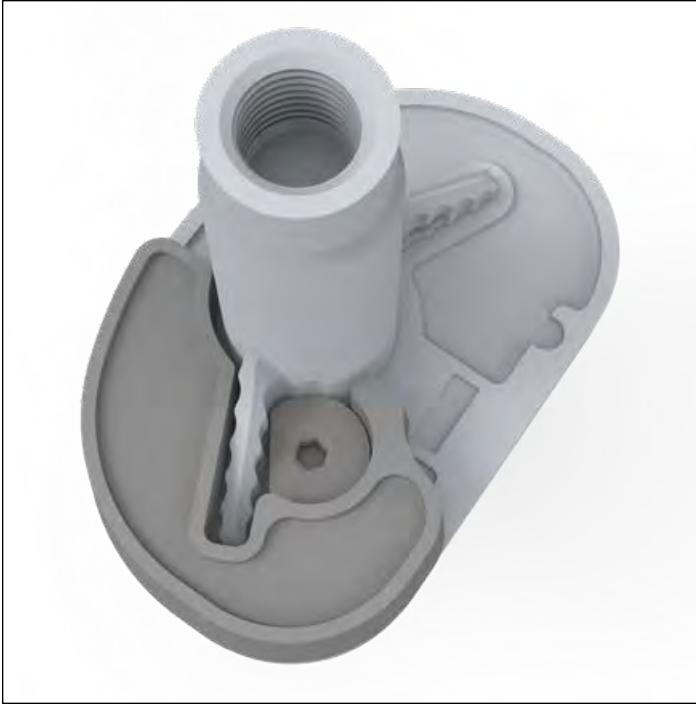


Figure 85

**Tibial Augmentation Revision Baseplate**

Assemble the 1/8" Universal Joint (or Straight) Hex Drive into the Slip Torque Handle.

Place the Tibial Augment on the distal side of the Baseplate. Verify both pins of the Tibial Augment are engaged into the slots on the underside of the Revision Baseplate and that the Tibial Augment is seated flush (**Figure 85**).

Using the 1/8" Universal Joint (or Straight) Hex Drive, torque the helical bolt captured within the tibial augment until the torque driver slips, at that time the driver is designed to emit an audible click (**Figure 86**).

Verify that the helical bolt is engaged into the slot on the keel of the Revision Baseplate. Repeat on a second augment if required on the other side.

**Technical points**

Triathlon Tibial Augments are not intended to be cemented together and stacked to fill voids.

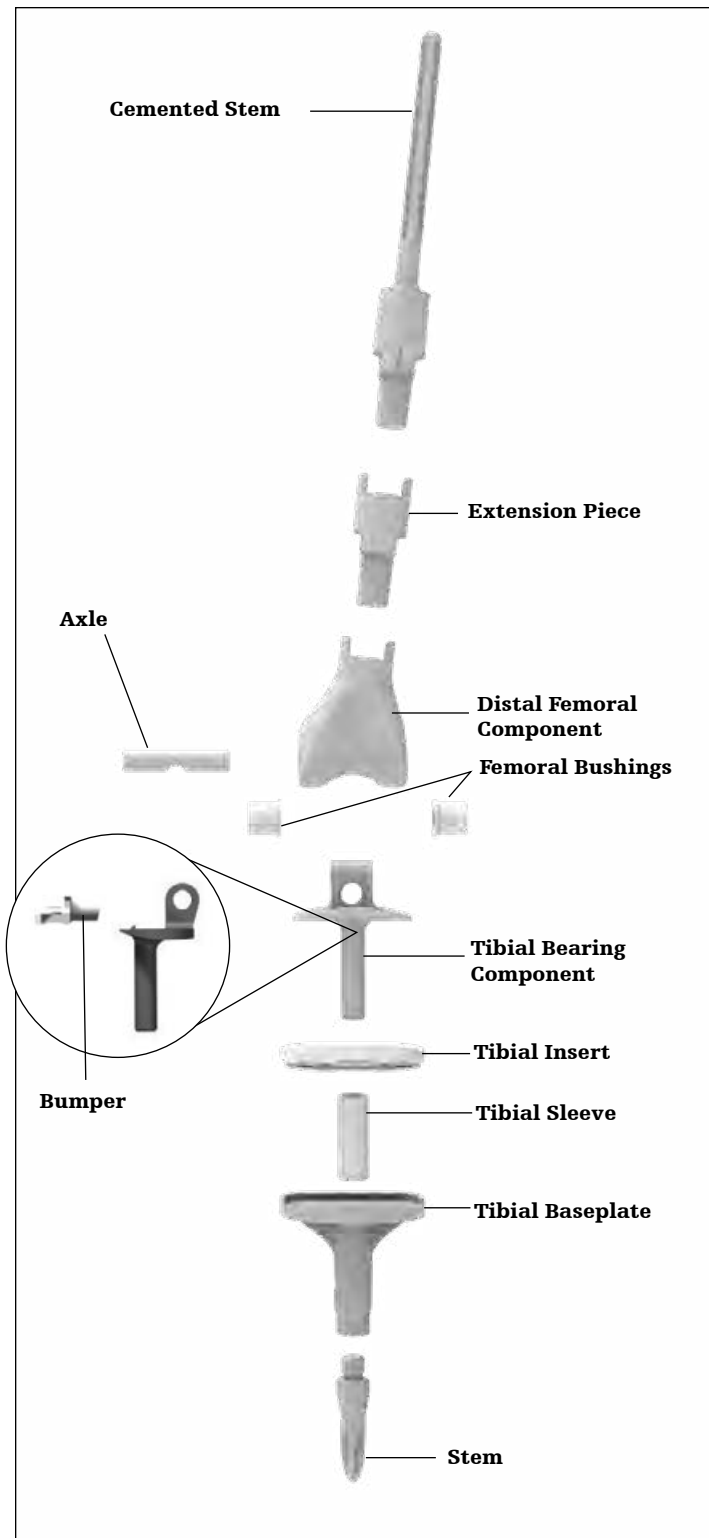


Figure 86

### Assembly of the femoral prosthesis

The femoral prosthesis consists of the Stem, Extension Piece (when needed based on the length of the reconstruction), and the Distal Femoral Component (**Figure 87**). Check that the correct side (left or right) and size (standard or small) of the Distal Femoral Component and the correct sizes of all components have been chosen before assembly. If necessary, it is acceptable to stack two Extension Pieces to construct the necessary length. The instruments used for the assembly of the prosthesis are the Impaction Tube, the appropriate Impaction Tube Insert, the 5-in-1 Impactor and the Impaction Block, if necessary, along with a Mallet.

- ▶ **Note: If the small Distal Femoral Component is selected, the small Femoral Bushings (6495-2-105) and the small Axle (6495-2-115) must be used.**



**Figure 87**

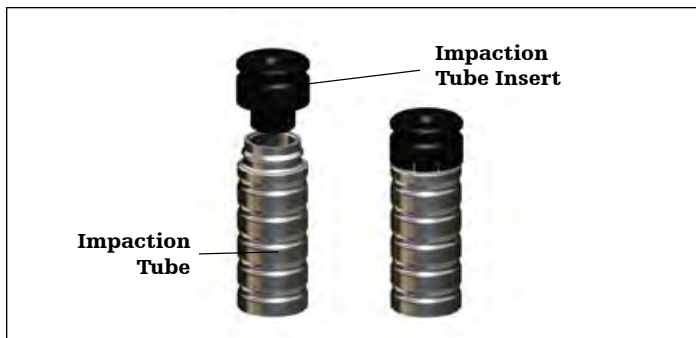


Figure 88

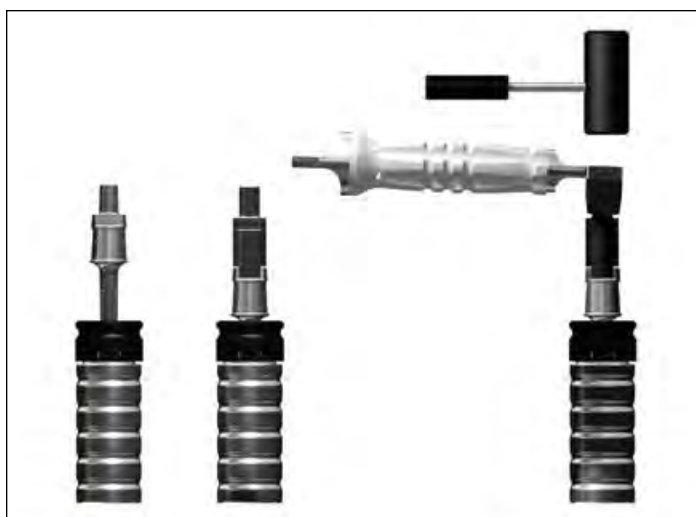


Figure 89



Figure 90

The Impaction Tube Insert corresponding to the stem diameter is assembled to the Impaction Tube (**Figure 88**).

The Extension Piece, if required, and the cemented Stem are assembled first. The cemented Stem is placed into the Impaction Tube and the Extension Piece is mated with it. The 5-in-1 Impactor is placed over the taper of the Extension Piece and impacted with several swift blows of a heavy Mallet to lock the tapers (**Figure 89**).

Next, the Stem/Extension piece construct is assembled to the Distal Femoral Component. Place the Distal Femoral Component onto the Extension Piece or Stem. The 5-in-1 Impactor is inserted between the condyles of the Distal Femoral Component so that its handle is parallel to the axis of the bushing holes and impacted with a Mallet (**Figure 90**).

If a 203mm long curved cemented Stem is to be implanted, the Distal Femoral Component is inserted into the Impaction Support Block. An Extension Piece, if required, is inserted into the Distal Femoral Component and then the appropriate diameter cemented Stem is inserted into the Extension Piece or Distal Femoral Component. Verify that the bow of the cemented Stem curves towards the posterior of the Distal Femoral Component. The Impaction Tube is inverted and placed over the cemented Stem and impacted with several blows of a heavy mallet, or by sliding the Impaction Tube over the stem like a Slap Hammer (**Figure 91**).



Figure 91



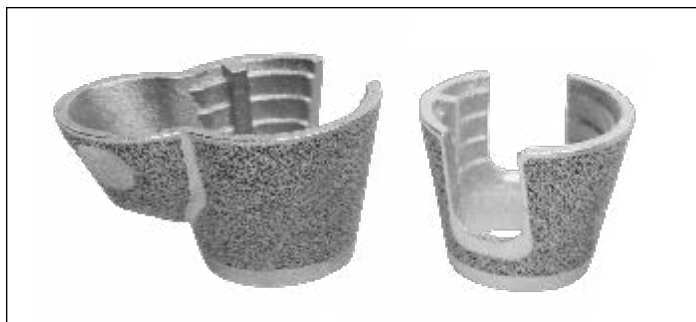


Figure 92

## Implantation

If needed, further prepare resected bone surfaces using an osteotome, oscillating saw blade, or bone file.

If using a cemented stem, it is advised to implant a cement restrictor prior to Cone implantation.

### Tritanium Tibial Cone Augment implantation

#### Tritanium Tibial Cone implantation

- ▶ **Reminder:** The Revision Baseplate is only compatible with Symmetric and Asymmetric Tibial Cones sizes B-E.

Assemble the desired Stem Trial (1mm smaller than reamed for) to the Tibial Cone Introducer, TS Impaction Handle, and the selected Symmetric/Asymmetric Cone Implant (**Figure 92**).

Tibial Cone Introducers are size specific.

Align the orientation key on the implant with the key feature on the Cone Introducer. The orientation key is located posteriorly on the implant.

- ▶ **Note:** There is no positive lock on the Cone Implant and the Cone Introducer. The implant may disconnect from the introducer.
- ▶ **Note:** The Cone can be placed into the prepared bone before the Stem Trial and the Cone Introducer.
- ▶ **Note:** When inserting a Symmetric Cone Implant, ensure that the anterior rotational alignment marking on the implant is aligned with the anterior surface marking previously determined by the Universal Tibial Template (**Figure 93**).

Gently impact the Symmetric/Asymmetric Cone Implant and confirm that it is fully seated at the appropriate depth.

- ▶ **Note:** Stem trials with product code 5560-T-XXX cannot be used with cone augment instrumentation. This includes trials 5560-T-109, 5560-T-112 and 5560-T-115.



Figure 93



**Figure 94**

## Adjustment of Cone Implant before cementation

### **Cone Implants**

For Tibial Trial assembly, refer to Symmetric Cone Trialing and Asymmetric Cone Trialing sections of the protocol.

Introduce Tibial Trials.

Perform final trial reduction with the Cone implants and evaluate joint stability.

Remove the trial components.

## Tibial component implantation with Cone Implants

For assembly of Tibial Components refer to Revision Baseplate Tibial Implant Assembly section of the protocol.

Cone implants must be fully seated before cementing the entire construct.

- ▶ **Caution:** Only use the Cone Extractor if the implant is seated in the wrong orientation and must be re-positioned (before cementing).  
  
Insert the extractor into the Cone Implant (jaws closed). Ensure that the flared edges of the jaws are positioned outside of the distal end of the cone. Squeeze the extractor handles to open the jaws.
- ▶ **Note:** A lamina spreader (with fixed narrow pads) or a curette (reverse angle) may also be used to remove the Cone Implants. Insert the lamina spreader or curette into the Cone ensuring that the ends of either instrument are positioned outside of the distal end of the implant. Apply back pressure.
- ▶ **Caution:** If the Cone Implant is extracted (before cementing), (**Figure 94**) inspect the Cone for damage before reinsertion.

See next section for component and cone cementing techniques.

- ▶ **Note:** All stem implants are compatible with the cone augments. Refer to sizing charts to see maximum stem diameter per cone size.

## Revision Baseplate implantation

### Revision Baseplate with Cemented Stem and Cone Augment

Attach Revision Baseplate Impactor/Extractor to the Impaction Handle.

Assemble the Tibial Implant Assembly to the Revision Baseplate Tibial Impactor/ Extractor by turning the knob.

Ensure the tab of the Impactor/Extractor is engaged under the posterior lip of the baseplate (**Figures 95-97**).

Irrigate the joint and then dry.

Mix cement.

#### Technical points

Tibial Cone Implant used with a cemented stem will require at least two doses without major bone voids. The same is true for bones with IM canals greater than 20mm to fill the cone volume and help facilitate solid fixation to the cone.

Apply a thin layer of wet cement on the underside of the baseplate. Allow the cement to dough.

Use the standard cementing technique with a cement gun to retrograde fill the canal and cone.

Pressurize the cement into the cone, the metaphysis and onto the flat tibial surface.

Impact the tibial implant assembly onto the tibia until fully seated (do so when the cement is in its doughy state) and remove excess cement. Ensure proper rotation and alignment of the baseplate prior and during impaction.



Figure 95



Figure 96



Figure 97

### Revision Baseplate with Cemented Stem without Cone Augment

Assess length of the construct and determine the appropriate depth of cement restrictor.

Insert corresponding restrictor.

Attach Revision Baseplate Impactor/Extractor to the Impaction Handle.

Assemble the Tibial Implant Assembly to the Revision Baseplate Tibial Impactor/Extractor by turning the knob.

Ensure the tab of the Impactor/Extractor is engaged under the posterior lip of the baseplate (**Figures 98-100**).

Irrigate the joint and then dry.

Mix cement.

Apply cement to the appropriate sections of the tibial implant assembly and the proximal tibia.

- Use the standard cementing technique with a cement gun to retrograde fill the canal.
- Apply doughy cement to the back surface of the baseplate and build the cement up along the stem implant junction proximally.

Pressurize the cement into the metaphysis and onto the flat tibial surface.

Impact the tibial implant assembly onto the tibia until fully seated (do so when the cement is in its doughy state) and remove excess cement. Ensure proper rotation and alignment of the baseplate prior and during impaction.



Figure 98



Figure 99



Figure 100

## Revision Baseplate with Fluted Stem and Cone Augment

Attach Revision Baseplate Impactor/Extractor to the Impaction Handle.

Assemble the Tibial Implant Assembly to the Revision Baseplate Tibial Impactor/Extractor by turning the knob.

Ensure the tab of the Impactor/Extractor is engaged under the posterior lip of the baseplate (**Figures 101-103**).

Irrigate the joint and then dry.

Mix cement.

### Technical points

Tibial Cone Implant used with a Fluted stems will require at least one dose of cement for Cone sizes B and C and 2 doses for Cone sizes D and E will be required in the absence of major bone voids.

When using Fluted Stems with Cone implants, wipe the inside surface of the cone with a thin layer of wet cement (avoid cement moving distally beyond the inferior edge of the cone). Apply doughy cement to the back surface of the baseplate and build the cement up along the stem implant junction proximally so that the cement can fill the full depth of the cone.

Make sure the stem tray construct has enough cement coating the implant, with enough volume to fill the Cone and cover the stem tray junction.

Pressurize the cement into the flat tibial surface.

Impact the tibial implant assembly onto the tibia until fully seated (do so when the cement is in its dough-like state) and remove excess cement. Ensure proper rotation and alignment of the baseplate prior and during impaction.



Figure 101



Figure 102



Figure 103

### Revision Baseplate with Fluted Stem without Cone Augment

Assess length of the construct and determine the appropriate depth of cement restrictor.

Insert corresponding restrictor.

Attach Revision Baseplate Impactor/Extractor to the Impaction Handle.

Assemble the Tibial Implant Assembly to the Revision Baseplate Tibial Impactor/ Extractor by turning the knob.

Ensure the tab of the Impactor/Extractor is engaged under the posterior lip of the baseplate (**Figures 104-106**).

Irrigate the joint and then dry.

Mix cement.

Apply cement to the appropriate sections of the tibial implant assembly and the proximal tibia.

Pressurize the cement into the flat tibial surface.

Impact the tibial implant assembly onto the tibia until fully seated (do so when the cement is in its dough-like state) and remove excess cement. Ensure proper rotation and alignment of the baseplate prior and during impaction.



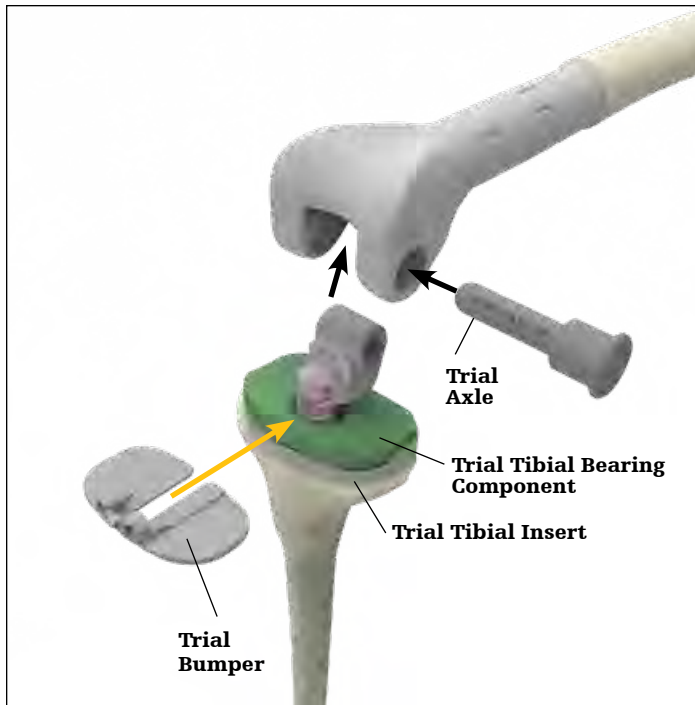
Figure 104



Figure 105



Figure 106



**Figure 107**

### GMRS Femoral Implant implantation

The femoral canal is thoroughly irrigated. A cement restrictor is placed at the appropriate depth. This depth is checked by inserting the trial femoral stem and verifying complete seating. The femoral canal is again irrigated and dried. The soft tissues, especially those that are near the neurovascular structures, are protected and packed off with wet lap pads. Bone cement is mixed and injected into the canal to facilitate proper filling of the canal. Some cement is then placed around the stem of the prosthesis.

- **Surgical tip:** If a stem centralizer is not being used, plug the hole in the stem with bone cement.

The prosthesis is then inserted into the femoral canal until the stem seat is flush with the host bone at the osteotomy site. Excess cement is removed from around the prosthesis. Care is taken to prevent cement from getting into the extra-medullary porous-coated section. It is firmly held in place at the rotational orientation determined by the trial reduction while the cement cures.

With the Femoral Prosthesis and Tibial Baseplate implanted, it is possible to use the Trial Axle (**6496-2-115**) with the Bearing Post Trial (**6543-6-058**), Trial Bearing Plate (**6543-6-071**), the Trial Bumper (**6543-6-101/3**) and Hinge Insert Trial (**6543-6-06X**) to verify that the appropriate motion, stability, and patellar tracking have been achieved (**Figure 107**). Having the knee in full extension while the cement is curing assists in loading the femoral and tibial baseplate components to provide the desired bond between implant and bone.

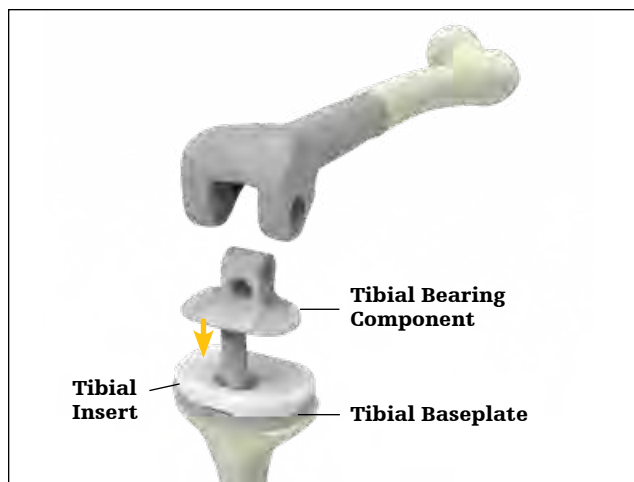


Figure 108

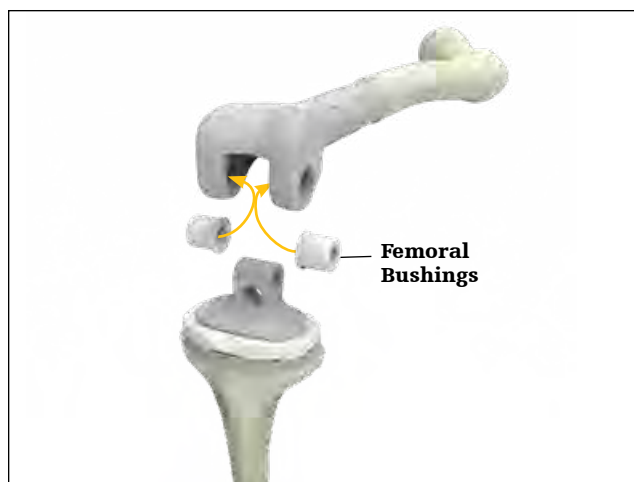


Figure 109

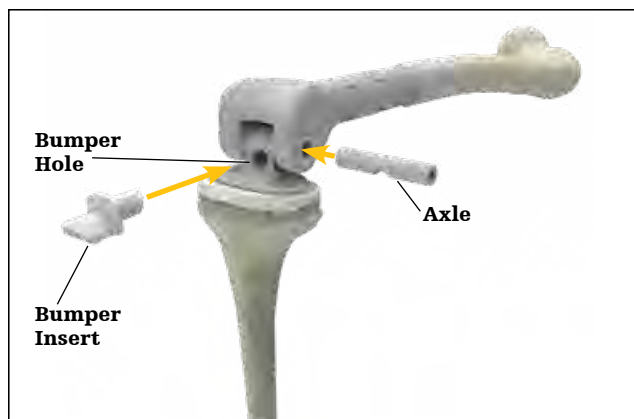


Figure 110

## Final Hinge Mechanism assembly

Once the appropriate Tibial Baseplate and GMRS Distal Femur is implanted, flex the knee to 90 degrees, insert the Tibial Sleeve (5612-5-002) into the baseplate until it is flush with the surface.

Ensure that the Baseplate is completely free of debris. Once the definitive Hinge Tibial Insert is selected, attach the Tibial Insert Impactor to the Impaction Handle.

Angle the Hinge Tibial Insert posteriorly into the Bearing Baseplate.

Impact the insert to snap it into place anteriorly.

Place the appropriate Triathlon Hinge Tibial Bearing Component into the Revision Baseplate Insert construct (**Figure 108**).

Place both Bushings into the GMRS Femur with the flanges facing the inside of the intercondylar notch (**Figure 109**).

With the knee in 90 degrees of flexion, line up the Tibial Bearing Component with the holes of the Femoral Component Bushings and slide the implant Axle into the assembly (**Figure 110**) until the “recess” in the Axle can be seen through the Tibial Bearing Component from the front. Rotate the axle so that the “recess” is inferior. The Axle Guide Rod can be used to align the Axle.

With the Axle correctly oriented, the Bumper can now be inserted. This should be impacted into the Tibial Bearing Component until it is flush with the hinge housing and has cleared the locking tab on the Tibial Bearing Component (**Figure 110**).

The Bumper implant is available in two options, neutral and 3° flexion.

- ▶ **Note:** With the Bumper inserted, the axle should not be further rotated.

If a patellar component is used, it is implanted by applying sufficient amount of bone cement to the patellar implant and bone. Cement should be applied to both the bone surface and the back of the patellar implant, including the pocket.

- ▶ **Surgical tip:** Application of cement in a doughy state will allow the implant to fully seat and facilitate interdigitation of cement into bone.

## Closure

After cement polymerization and removal of all residual cement, thoroughly irrigate the joint. Hemostasis is achieved after deflation of the tourniquet.

Close soft tissues in the normal, layered fashion.





Figure 111



Figure 112

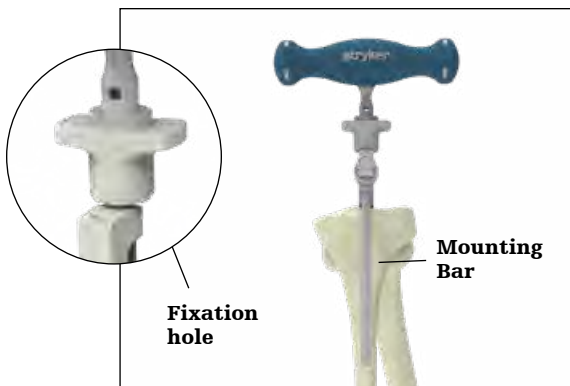


Figure 113

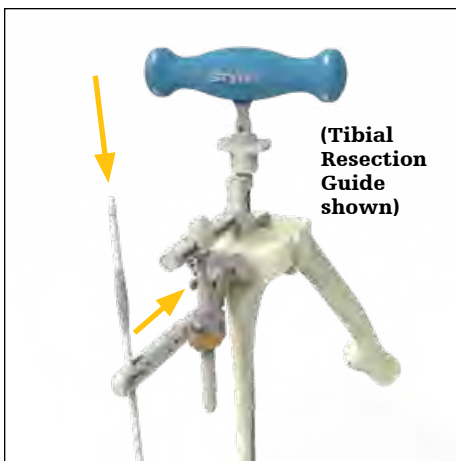


Figure 114

## Addendums

### Addendum 1

#### Revision Baseplate Tibial preparation with Primary Tibial Instrumentation

To alleviate the potential for tibial eminence interference with the Hinge tibial resection guide tower, follow the Triathlon primary tibial IM workflow per TRIATH-SP-30 using the Hinge Tibial Stylus as substitute to help ensure proper resection depth is created. The workflow is also detailed below.

#### Revision Baseplate: Proximal tibial resection IM workflow

**For the Revision Baseplate with Hinge Insert, the minimum tibial resection from the native bone is 16mm.** For primary bone resections, a Hinge Tibial Stylus with corresponding 16mm depth has been included.

Attach the 3/8" IM Drill to the Universal Driver and create a hole in the location determined by the preoperative X-rays (**Figure 111**).

Attach the T-Handle Driver to the 5/16" IM Rod and slowly pass into the canal, ensuring clearance. Remove the 5/16" IM Rod and insert it into the body of the Tibial Alignment Jig IM. The assembly is then inserted into the canal until the isthmus is engaged (**Figure 112**).

With the body of the tibial alignment jig IM resting on the proximal tibia, proper rotational alignment can be achieved by rotating the instrument about the 5/16" IM rod so that the vertical mounting bar is over the medial 1/3 of the tibial tubercle. A headless pin or the 1/8" drill is then inserted into the fixation hole to fix rotation (see inset **Figure 113**).

Assemble the appropriate Tibial Resection Guide (left or right) on the Tibial Adjustment Housing.

Ensure posterior slope is set to 0 degrees.

Attach the assembly onto the mounting bar by pressing the bronze wheel on the Tibial Adjustment Housing. Attach the Universal Alignment Handle to the Tibial Resection Guide and slide a Universal Alignment Rod through the handle for sagittal assessment (**Figure 114**). When alignment is confirmed, the Universal Alignment Handle should be centered over the ankle.

The Hinge Tibial Stylus with corresponding 16mm depth attaches to the Tibial Resection Guide referencing the lowest level of the unaffected compartment (**Figure 115**).

The height of the Tibial Resection Guide, Tibial Stylus and Tibial Adjustment Housing can be adjusted using the bronze wheel on the Tibial Adjustment Housing. For coarse adjustment, press the bronze wheel and slide the assembly up or down. For fine adjustment, turn the bronze wheel to the right to move the assembly up the Proximal Rod or turn left to move the assembly down the Proximal Rod (**Figure 116**).



**Figure 115**



**Figure 116**

Place two Headless Pins into the “0” [neutral] holes, fixing the level of the Tibial Resection Guide.

If additional stability of the guide is required, utilize the oblique “X” pin-hole.

Remove all alignment instruments leaving only the Tibial Resection Guide in place. Squeeze the bronze tabs on the Tibial Adjustment Housing to disengage the assembly from the Tibial Resection Guide. Slide the Tibial Adjustment Housing anteriorly. Remove the 5/16” IM Rod, the Tibial Alignment Jig IM, the Tibial Adjustment Housing and the Universal Alignment Handle.

Resection of the proximal tibia is now completed. An optional Tibial Resection Guide Modular Capture (Left or Right) may be added.

Remove the Tibial Resection Guide.

For the remaining tibial preparation technique proceed to the Tibial Template sizing section of the desired technique guide.

## Triathlon Revision instruments

For all GMRS instrument part numbers see GMRS\_SP\_3

Item number	Description	Quantity in set
6543-6-501	Revision IM Reamers (8-19mm)—Tray	1
6543-7-527	Boss/Offset Reamer	1
6543-6-019	Revision Boss Reamer	1
6543-7-508	8mm Starter Awl	1
6543-7-509	IM Reamer - 9mm	1
6543-7-510	IM Reamer - 10mm	1
6543-7-511	IM Reamer - 11mm	1
6543-7-512	IM Reamer - 12mm	1
6541-4-800	T-Handle Driver	1
6541-4-538	3/8" IM Drill	1
6543-7-513	IM Reamer - 13mm	1
6543-7-514	IM Reamer - 14mm	1
6543-7-515	IM Reamer - 15mm	1
6543-7-516	IM Reamer - 16mm	1
6543-7-517	IM Reamer - 17mm	1
6543-7-518	IM Reamer - 18mm	1
6543-7-519	IM Reamer - 19mm	1
5560-T-109	Cemented Stem Trial 9 x 50mm	2
5560-T-112	12 x 50mm Stem Trial	2
5560-T-115	15 x 50mm Stem Trial	2
6543-6-502	Revision General-- Tray	1
6541-4-602	Universal Alignment Rod	1
6541-4-806	Universal Alignment Handle	1
6541-4-803	Slap Hammer	1
6541-4-801	Universal Driver	1
6541-4-400	Blade Runner	1
6543-1-603	Size 1-8 Femoral Sizing Templates	1
6541-4-804	Headless Pin Extractor	1
6541-4-518	1/8" Drill	1
6541-4-300	Headed Nail Impactor/Extractor	1
6541-4-003A	Headless Pins - 3"	4
6541-4-515	Headed Nails - 1 1/2"	2
6541-4-575	Headed Nails - 3/4"	2
6541-4-809	Headless Pin Driver	1

**Triathlon Revision instruments** (continued)

For all GMRS instrument part numbers see GMRS\_SP\_3

Item number	Description	Quantity in set
6543-6-503	Revision Tibial Prep—Tray	1
5545-T-102	Tibial Augment Trial, Size 1 RM/LL - 5mm	1
5545-T-101	Tibial Augment Trial, Size 1 LM/RL - 5mm	1
5545-T-202	Tibial Augment Trial, Size 2 RM/LL - 5mm	1
5545-T-201	Tibial Augment Trial, Size 2 LM/RL - 5mm	1
5545-T-302	Tibial Augment Trial, Size 3 RM/LL - 5mm	1
5545-T-301	Tibial Augment Trial, Size 3 LM/RL - 5mm	1
5545-T-402	Tibial Augment Trial, Size 4 RM/LL - 5mm	1
5545-T-401	Tibial Augment Trial, Size 4 LM/RL - 5mm	1
5545-T-502	Tibial Augment Trial, Size 5 RM/LL - 5mm	1
5545-T-501	Tibial Augment Trial, Size 5 LM/RL - 5mm	1
5545-T-602	Tibial Augment Trial, Size 6 RM/LL - 5mm	1
5545-T-601	Tibial Augment Trial, Size 6 LM/RL - 5mm	1
5545-T-702	Tibial Augment Trial, Size 7 RM/LL - 5mm	1
5545-T-701	Tibial Augment Trial, Size 7 LM/RL - 5mm	1
5545-T-802	Tibial Augment Trial, Size 8 RM/LL - 5mm	1
5545-T-801	Tibial Augment Trial, Size 8 LM/RL - 5mm	1
5546-T-102	Tibial Augment Trial, Size 1 RM/LL - 10mm	1
5546-T-101	Tibial Augment Trial, Size 1 LM/RL - 10mm	1
5546-T-202	Tibial Augment Trial, Size 2 RM/LL - 10mm	1
5546-T-201	Tibial Augment Trial, Size 2 LM/RL - 10mm	1
5546-T-302	Tibial Augment Trial, Size 3 RM/LL - 10mm	1
5546-T-301	Tibial Augment Trial, Size 3 LM/RL - 10mm	1
5546-T-402	Tibial Augment Trial, Size 4 RM/LL - 10mm	1
5546-T-401	Tibial Augment Trial, Size 4 LM/RL - 10mm	1
5546-T-502	Tibial Augment Trial, Size 5 RM/LL - 10mm	1
5546-T-501	Tibial Augment Trial, Size 5 LM/RL - 10mm	1
5546-T-602	Tibial Augment Trial, Size 6 RM/LL - 10mm	1
5546-T-601	Tibial Augment Trial, Size 6 LM/RL - 10mm	1
5546-T-702	Tibial Augment Trial, Size 7 RM/LL - 10mm	1
5546-T-701	Tibial Augment Trial, Size 7 LM/RL - 10mm	1
5546-T-802	Tibial Augment Trial, Size 8 RM/LL - 10mm	1
5546-T-801	Tibial Augment Trial, Size 8 LM/RL - 10mm	1
6543-7-601	Resection Guide Tower	1
6543-7-600	Support Arm Assembly	1
6543-6-700	Revision Tibial Resection Guides - Slotted -Left	1
6543-6-701	Revision Tibial Resection Guides - Slotted -Right	1
6541-2-807	Alignment Handle	1
6541-2-429Y	Tibial Stylus	1
6541-2-601	Universal Tibial Template Size 1	1
6541-2-602	Universal Tibial Template Size 2	1
6541-2-603	Universal Tibial Template Size 3	1
6541-2-604	Universal Tibial Template Size 4	1
6541-2-605	Universal Tibial Template Size 5	1
6541-2-606	Universal Tibial Template Size 6	1
6541-2-607	Universal Tibial Template Size 7	1
6541-2-608	Universal Tibial Template Size 8	1

**Triathlon Revision instruments** (continued)

For all GMRS instrument part numbers see GMRS\_SP\_3

Item number	Description	Quantity in set
6543-6-504	Revision 100mm Stem Trial (9-25mm)-- Tray	1
5565-T-009A	9 x 100mm Stem Trial	1
5565-T-010A	10 x 100mm Stem Trial	2
5565-T-011A	11 x 100mm Stem Trial	2
5565-T-012A	12 x 100mm Stem Trial	2
5565-T-013A	13 x 100mm Stem Trial	2
5565-T-014A	14 x 100mm Stem Trial	2
5565-T-015A	15 x 100mm Stem Trial	2
5565-T-016A	16 x 100mm Stem Trial	2
5565-T-017A	17 x 100mm Stem Trial	2
5565-T-018A	18 x 100mm Stem Trial	2
5565-T-019A	19 x 100mm Stem Trial	2
5565-T-020A	20 x 100mm Stem Trial	2
5565-T-021A	21 x 100mm Stem Trial	1
5565-T-022A	22 x 100mm Stem Trial	1
5565-T-023A	23 x 100mm Stem Trial	1
5565-T-024A	24 x 100mm Stem Trial	1
5565-T-025A	25 x 100mm Stem Trial	1
6543-6-505	Revision Finishing-- Tray	1
6541-4-810	Impaction Handle	2
6541-4-813	Tibial Insert Impactor	1
6543-4-818	Universal Torque Wrench	1
6543-6-801	Universal Counter Wrench	1
6541-4-807	Femoral Impactor/Extractor	1
6541-4-811	Femoral Impactor	1
6541-4-812	Baseplate Impactor	1
6543-6-850	Revision Baseplate Impactor/Extractor	1
6543-6-030	Hinge Femoral Counter Wrench	1
6541-4-825	Slip Torque Handle	1
6541-4-805	Tibial Baseplate Impactor/Extractor	1
6541-4-802	1/8" Hex Drive	1
6543-4-802	Universal 1/8" Hex Driver	1
6543-4-600	Stabilizer Post Impactor	1

**Triathlon Revision instruments** (continued)

For all GMRS instrument part numbers see GMRS\_SP\_3

Item number	Description	Quantity in set
6543-6-512	Revision Baseplate Finishing-- TRAY	1
6543-6-038	IM Reamer Neutral Bushing Guide	1
5612-T-100	Revision Baseplate Trial, Size 1	1
5612-T-200	Revision Baseplate Trial, Size 2	1
5612-T-300	Revision Baseplate Trial, Size 3	1
5612-T-400	Revision Baseplate Trial, Size 4	1
5612-T-500	Revision Baseplate Trial, Size 5	1
5612-T-600	Revision Baseplate Trial, Size 6	1
5612-T-700	Revision Baseplate Trial, Size 7	1
6543-6-313	Revision Baseplate Keel Punch, Size 1-3	1
6543-6-346	Revision Baseplate Keel Punch, Size 4-6	1
6543-6-347	Revision Baseplate Keel Punch, Size 7	1
6543-6-413	Revision Baseplate Keel Punch Guide, Size 1-3	1
6543-6-447	Revision Baseplate Keel Punch Guide, Size 4-7	1
6543-6-039	Hinge Tibial Stylus	1
6543-6-513	Hinge Insert Trials-- TRAY	1
6543-6-018	Femoral Bushing Trial	2
6543-6-020	Hinge Trial Axle	1
6543-6-049	Filler Bushing Removal Tool	1
6543-6-050	Alignment Guide	1
6543-6-058	Hinge Tibial Bearing Post Trial, Size 1-2	1
6543-6-059	Hinge Tibial Bearing Post Trial, Size 3-4	1
6543-6-060	Hinge Tibial Bearing Post Trial, Size 5-6	1
6543-6-061	Hinge Bearing Insert Trial, Size 1	1
6543-6-062	Hinge Bearing Insert Trial, Size 2	1
6543-6-063	Hinge Bearing Insert Trial, Size 3	1
6543-6-064	Hinge Bearing Insert Trial, Size 4	1
6543-6-065	Hinge Bearing Insert Trial, Size 5	1
6543-6-066	Hinge Bearing Insert Trial, Size 6	1
6543-6-067	Hinge Bearing Insert Trial, Size 7	1
6543-6-071	Hinge Trial Bearing Plate, Size 1-2	1
6543-6-073	Hinge Trial Bearing Plate, Size 3-4	1
6543-6-075	Hinge Trial Bearing Plate, Size 5-6	1
6543-6-101	Triathlon Hinge Trial Bumper 0°	1
6543-6-103	Triathlon Hinge Trial Bumper 3°	1
6481-1-008	Axle Guide Rod	2
6543-6-070	Triathlon Hinge Insertion/Removal Handle	1

**Triathlon Revision instruments** (continued)

For all GMRS instrument part numbers see GMRS\_SP\_3

Item number	Description	Quantity in set
6543-6-517	Revision IM Reamers (20-25mm)-- TRAY	1
6543-7-520	IM Reamer - 20mm	1
6543-7-521	IM Reamer - 21mm	1
6543-7-522	IM Reamer - 22mm	1
6543-7-523	IM Reamer - 23mm	1
6543-7-524	IM Reamer - 24mm	1
6543-7-525	IM Reamer - 25mm	1
5571-T-025	Triathlon Stem Extender Trial - 25mm	2
5571-T-050	Triathlon Stem Extender Trial - 50mm	2
6543-6-518	Revision 150mm Stem Trial (9-25mm)	1
5566-T-009A	9 x 150mm Stem Trial	1
5566-T-010A	10 x 150mm Stem Trial	1
5566-T-011A	11 x 150mm Stem Trial	2
5566-T-012A	12 x 150mm Stem Trial	2
5566-T-013A	13 x 150mm Stem Trial	2
5566-T-014A	14 x 150mm Stem Trial	2
5566-T-015A	15 x 150mm Stem Trial	2
5566-T-016A	16 x 150mm Stem Trial	1
5566-T-017A	17 x 150mm Stem Trial	1
5566-T-018A	18 x 150mm Stem Trial	1
5566-T-019A	19 x 150mm Stem Trial	1
5566-T-020A	20 x 150mm Stem Trial	1
5566-T-021A	21 x 150mm Stem Trial	1
5566-T-022A	22 x 150mm Stem Trial	1
5566-T-023A	23 x 150mm Stem Trial	1
5566-T-024A	24 x 150mm Stem Trial	1
5566-T-025A	25 x 150mm Stem Trial	1

**Triathlon Revision instruments** (continued)

For all GMRS instrument part numbers see GMRS\_SP\_3

Item number	Description	Quantity in set
6543-5-200	Tibial Symmetric Cone Reamer	1
6543-5-220	Tibial Asymmetric Cone Reamer Size B	1
6543-5-230	Tibial Asymmetric Cone Reamer Size C	1
6543-5-240	Tibial Asymmetric Cone Reamer Size D	1
6543-5-250	Tibial Asymmetric Cone Reamer Size E	1
6543-5-201	Tibial Cone Reamer Guide LM/RL	1
6543-5-202	Tibial Cone Reamer Guide RM/LL	1
6543-5-203	Tibial Cone Alignment Guide	1
6543-8-017	Tibial Cone Upper Tray	1
6543-5-211	Tibial Cone Introducer Size A	1
6543-5-221	Tibial Cone Introducer Size B	1
6543-5-231	Tibial Cone Introducer Size C	1
6543-5-241	Tibial Cone Introducer Size D	1
6543-5-251	Tibial Cone Introducer Size E	1
6541-5-100	Cone Extractor	1
5549-T-110	Tibial Symmetric Cone Augment Trial Size A	1
5549-T-120	Tibial Symmetric Cone Augment Trial Size B	1
5549-T-130	Tibial Symmetric Cone Augment Trial Size C	1
5549-T-140	Tibial Symmetric Cone Augment Trial Size D	1
5549-T-150	Tibial Symmetric Cone Augment Trial Size E	1
5549-T-221	Tibial Asymmetric Cone Augment Trial Size B LM/RL	1
5549-T-222	Tibial Asymmetric Cone Augment Trial Size B RM/LL	1
5549-T-231	Tibial Asymmetric Cone Augment Trial Size C LM/RL	1
5549-T-232	Tibial Asymmetric Cone Augment Trial Size C RM/LL	1
5549-T-241	Tibial Asymmetric Cone Augment Trial Size D LM/RL	1
5549-T-242	Tibial Asymmetric Cone Augment Trial Size D RM/LL	1
5549-T-251	Tibial Asymmetric Cone Augment Trial Size E LM/RL	1
5549-T-252	Tibial Asymmetric Cone Augment Trial Size E RM/LL	1
6543-8-117	Tibial Cone Lower Tray	1
5900-8114	Stryker Case	1



## Triathlon Revision implants

For all GMRS implant part numbers see GMRS\_SP\_3

### Triathlon Hinge accessory implant part numbers

Item number	Description
5612-0-001	Triathlon Hinge Tibial Bearing Component Size 1-2
6481-2-110	MRH Femoral bushings
6481-2-120	MRH Axle
6481-2-150	MRH bushings, Sleeve, Neutral Bumper Package *Optional package used for sleeve and bushings and bumper
5612-3-000	Triathlon Bushings and Axle Standard Assembly Pack
6481-2-130	MRH Neutral bumper
6481-2-133	MRH 3 degree bumper

### Triathlon Revision Tibial Baseplate part numbers

Item number	Description
5612-B-100	Triathlon Revision Tibial Baseplate Size 1
5612-B-200	Triathlon Revision Tibial Baseplate Size 2
5612-B-300	Triathlon Revision Tibial Baseplate Size 3
5612-B-400	Triathlon Revision Tibial Baseplate Size 4
5612-B-500	Triathlon Revision Tibial Baseplate Size 5
5612-B-600	Triathlon Revision Tibial Baseplate Size 6
5612-B-700	Triathlon Revision Tibial Baseplate Size 7

## Triathlon Revision implants

For all GMRS implant part numbers see GMRS\_SP\_3

### Triathlon Revision Tibial Augment part numbers

Item number	Description
5612-A-110	Triathlon Revision Tibial Augment Size 1, RM/LL, 10mm
5612-A-111	Triathlon Revision Tibial Augment Size 1, LM/RL, 10mm
5612-A-150	Triathlon Revision Tibial Augment Size 1, RM/LL, 5mm
5612-A-151	Triathlon Revision Tibial Augment Size 1, LM/RL, 5mm
5612-A-210	Triathlon Revision Tibial Augment Size 2, RM/LL, 10mm
5612-A-211	Triathlon Revision Tibial Augment Size 2, LM/RL, 10mm
5612-A-250	Triathlon Revision Tibial Augment Size 2, RM/LL, 5mm
5612-A-251	Triathlon Revision Tibial Augment Size 2, LM/RL, 5mm
5612-A-310	Triathlon Revision Tibial Augment Size 3, RM/LL, 10mm
5612-A-311	Triathlon Revision Tibial Augment Size 3, LM/RL, 10mm
5612-A-350	Triathlon Revision Tibial Augment Size 3, RM/LL, 5mm
5612-A-351	Triathlon Revision Tibial Augment Size 3, LM/RL, 5mm
5612-A-410	Triathlon Revision Tibial Augment Size 4, RM/LL, 10mm
5612-A-411	Triathlon Revision Tibial Augment Size 4, LM/RL, 10mm
5612-A-450	Triathlon Revision Tibial Augment Size 4, RM/LL, 5mm
5612-A-451	Triathlon Revision Tibial Augment Size 4, LM/RL, 5mm
5612-A-510	Triathlon Revision Tibial Augment Size 5, RM/LL, 10mm
5612-A-511	Triathlon Revision Tibial Augment Size 5, LM/RL, 10mm
5612-A-550	Triathlon Revision Tibial Augment Size 5, RM/LL, 5mm
5612-A-551	Triathlon Revision Tibial Augment Size 5, LM/RL, 5mm
5612-A-610	Triathlon Revision Tibial Augment Size 6, RM/LL, 10mm
5612-A-611	Triathlon Revision Tibial Augment Size 6, LM/RL, 10mm
5612-A-650	Triathlon Revision Tibial Augment Size 6, RM/LL, 5mm
5612-A-651	Triathlon Revision Tibial Augment Size 6, LM/RL, 5mm
5612-A-710	Triathlon Revision Tibial Augment Size 7, RM/LL, 10mm
5612-A-711	Triathlon Revision Tibial Augment Size 7, LM/RL, 10mm
5612-A-750	Triathlon Revision Tibial Augment Size 7, RM/LL, 5mm
5612-A-751	Triathlon Revision Tibial Augment Size 7, LM/RL, 5mm
5612-A-810	Triathlon Revision Tibial Augment Size 8, RM/LL, 10mm
5612-A-811	Triathlon Revision Tibial Augment Size 8, LM/RL, 10mm
5612-A-850	Triathlon Revision Tibial Augment Size 8, RM/LL, 5mm
5612-A-851	Triathlon Revision Tibial Augment Size 8, LM/RL, 5mm

## Triathlon Revision implants (continued)

For all GMRS implant part numbers see GMRS\_SP\_3

### Triathlon Hinge Inserts

Item number	Description
5612-P-111	Triathlon Hinge Insert Size 1, 11mm
5612-P-113	Triathlon Hinge Insert Size 1, 13mm
5612-P-116	Triathlon Hinge Insert Size 1, 16mm
5612-P-119	Triathlon Hinge Insert Size 1, 19mm
5612-P-122	Triathlon Hinge Insert Size 1, 22mm
5612-P-211	Triathlon Hinge Insert Size 2, 11mm
5612-P-213	Triathlon Hinge Insert Size 2, 13mm
5612-P-216	Triathlon Hinge Insert Size 2, 16mm
5612-P-219	Triathlon Hinge Insert Size 2, 19mm
5612-P-222	Triathlon Hinge Insert Size 2, 22mm
5612-P-311	Triathlon Hinge Insert Size 3, 11mm
5612-P-313	Triathlon Hinge Insert Size 3, 13mm
5612-P-316	Triathlon Hinge Insert Size 3, 16mm
5612-P-319	Triathlon Hinge Insert Size 3, 19mm
5612-P-322	Triathlon Hinge Insert Size 3, 22mm
5612-P-411	Triathlon Hinge Insert Size 4, 11mm
5612-P-413	Triathlon Hinge Insert Size 4, 13mm
5612-P-416	Triathlon Hinge Insert Size 4, 16mm
5612-P-419	Triathlon Hinge Insert Size 4, 19mm
5612-P-422	Triathlon Hinge Insert Size 4, 22mm
5612-P-511	Triathlon Hinge Insert Size 5, 11mm
5612-P-513	Triathlon Hinge Insert Size 5, 13mm
5612-P-516	Triathlon Hinge Insert Size 5, 16mm
5612-P-519	Triathlon Hinge Insert Size 5, 19mm
5612-P-522	Triathlon Hinge Insert Size 5, 22mm
5612-P-611	Triathlon Hinge Insert Size 6, 11mm
5612-P-613	Triathlon Hinge Insert Size 6, 13mm
5612-P-616	Triathlon Hinge Insert Size 6, 16mm
5612-P-619	Triathlon Hinge Insert Size 6, 19mm
5612-P-622	Triathlon Hinge Insert Size 6, 22mm
5612-P-711	Triathlon Hinge Insert Size 7, 11mm
5612-P-713	Triathlon Hinge Insert Size 7, 13mm
5612-P-716	Triathlon Hinge Insert Size 7, 16mm
5612-P-719	Triathlon Hinge Insert Size 7, 19mm
5612-P-722	Triathlon Hinge Insert Size 7, 22mm

**Triathlon Revision implants** (continued)

For all GMRS implant part numbers see GMRS\_SP\_3

**Triathlon Tritanium Cone Augments part numbers**

Item number	Description
5549-A-120	Triathlon Tritanium Symmetric Cone Augment Size B
5549-A-130	Triathlon Tritanium Symmetric Cone Augment Size C
5549-A-140	Triathlon Tritanium Symmetric Cone Augment Size D
5549-A-150	Triathlon Tritanium Symmetric Cone Augment Size E
5549-A-221	Triathlon Tritanium Asymmetric Cone Augment Size B LM/RL
5549-A-222	Triathlon Tritanium Asymmetric Cone Augment Size B RM/LL
5549-A-231	Triathlon Tritanium Asymmetric Cone Augment Size C LM/RL
5549-A-232	Triathlon Tritanium Asymmetric Cone Augment Size C RM/LL
5549-A-241	Triathlon Tritanium Asymmetric Cone Augment Size D LM/RL
5549-A-242	Triathlon Tritanium Asymmetric Cone Augment Size D RM/LL
5549-A-251	Triathlon Tritanium Asymmetric Cone Augment Size E LM/RL
5549-A-252	Triathlon Tritanium Asymmetric Cone Augment Size E RM/LL

**Triathlon TS Stems - Cemented - part numbers**

Item number	Description
5560-S-109	Triathlon Cemented Stem 9mm x 50mm
5560-S-112	Triathlon Cemented Stem 12mm x 50mm
5560-S-115	Triathlon Cemented Stem 15mm x 50mm
5560-S-209	Triathlon Cemented Stem 9mm x 100mm
5560-S-212	Triathlon Cemented Stem 12mm x 100mm
5560-S-215	Triathlon Cemented Stem 15mm x 100mm
5560-S-309	Triathlon Cemented Stem 9mm x 150mm
5560-S-312	Triathlon Cemented Stem 12mm x 150mm
5560-S-315	Triathlon Cemented Stem 15mm x 150mm

**Triathlon Revision implants** (continued)

For all GMRS implant part numbers see GMRS\_SP\_3

**Triathlon TS Stems – Fluted – part numbers**

Item number	Description
5565-S-010	Triathlon Fluted Stem, Titanium 10mm x 100mm
5565-S-011	Triathlon Fluted Stem, Titanium 11mm x 100mm
5565-S-012	Triathlon Fluted Stem, Titanium 12mm x 100mm
5565-S-013	Triathlon Fluted Stem, Titanium 13mm x 100mm
5565-S-014	Triathlon Fluted Stem, Titanium 14mm x 100mm
5565-S-015	Triathlon Fluted Stem, Titanium 15mm x 100mm
5565-S-016	Triathlon Fluted Stem, Titanium 16mm x 100mm
5565-S-017	Triathlon Fluted Stem, Titanium 17mm x 100mm
5565-S-018	Triathlon Fluted Stem, Titanium 18mm x 100mm
5565-S-019	Triathlon Fluted Stem, Titanium 19mm x 100mm
5565-S-020	Triathlon Fluted Stem, Titanium 20mm x 100mm
5565-S-021	Triathlon Fluted Stem, Titanium 21mm x 100mm
5565-S-022	Triathlon Fluted Stem, Titanium 22mm x 100mm
5565-S-023	Triathlon Fluted Stem, Titanium 23mm x 100mm
5565-S-024	Triathlon Fluted Stem, Titanium 24mm x 100mm
5565-S-025	Triathlon Fluted Stem, Titanium 25mm x 100mm
5566-S-010	Triathlon Fluted Stem, Titanium 10mm x 150mm
5566-S-011	Triathlon Fluted Stem, Titanium 11mm x 150mm
5566-S-012	Triathlon Fluted Stem, Titanium 12mm x 150mm
5566-S-013	Triathlon Fluted Stem, Titanium 13mm x 150mm
5566-S-014	Triathlon Fluted Stem, Titanium 14mm x 150mm
5566-S-015	Triathlon Fluted Stem, Titanium 15mm x 150mm
5566-S-016	Triathlon Fluted Stem, Titanium 16mm x 150mm
5566-S-017	Triathlon Fluted Stem, Titanium 17mm x 150mm
5566-S-018	Triathlon Fluted Stem, Titanium 18mm x 150mm
5566-S-019	Triathlon Fluted Stem, Titanium 19mm x 150mm
5566-S-020	Triathlon Fluted Stem, Titanium 20mm x 150mm
5566-S-021	Triathlon Fluted Stem, Titanium 21mm x 150mm
5566-S-022	Triathlon Fluted Stem, Titanium 22mm x 150mm
5566-S-023	Triathlon Fluted Stem, Titanium 23mm x 150mm
5566-S-024	Triathlon Fluted Stem, Titanium 24mm x 150mm
5566-S-025	Triathlon Fluted Stem, Titanium 25mm x 150mm

**Triathlon TS Stem Extender part numbers**

Item number	Description
5571-S-025	Triathlon Stem Extender 25mm
5571-S-050	Triathlon Stem Extender 50mm

**X-ray Templates**

Item number	Description
LTEMK29	Global Modular Replacement System X-ray Templates

# MRH Femur

## and Revision Tibial Baseplate



**Surgical protocol**

**Instruments**

**Implants**

## Surgical protocol

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## Triathlon Revision Baseplate and MRH Femur surgical protocol

### System description

This protocol describes the technique for revising an existing MRH Hinge knee joint replacement in which a Triathlon Revision Baseplate will replace the existing tibial component, leaving the existing MRH Femoral component in place.

### The Modular Rotating Hinge Knee System

The system has been designed for knees with severe joint destruction and/or ligament instability where a condylar style implant is not thought appropriate.

Please refer to MRH\_SP\_2 for a full description of the Modular Rotating Hinge System.





## Indications and contraindications

### Indications

See Triathlon Revision Baseplate indications.

Rotating Hinge Knee Systems are intended to be implanted with bone cement for the following condition(s):

1. There is destruction of the joint surfaces, with or without significant bone deformity.
2. The cruciate and/or collateral ligaments do not stabilize the knee joint.
3. The ligaments are inadequate and/or the musculature is weak. And/or,
4. Revision is required of a failed prostheses where there has been gross instability, with or without bone loss or inadequate soft tissue.

### Contraindications

See Triathlon Revision Baseplate contraindications.

Absolute contraindications include:

1. overt infection;
2. distant foci of infections (which may cause hematogenous spread to the implant site);
3. rapid disease progression as manifested by joint destruction or bone resorption apparent on roentgenogram;
4. skeletally immature patients;
5. cases where there is poor bone stock which would make the procedure unjustifiable.

Conditions presenting an increased risk of failure include::

1. uncooperative patient or patient with neurologic disorder, incapable of following instructions;
2. osteoporosis;
3. metabolic disorders which may impair bone formation or cause bone loss;
4. osteomalacia; and,
5. previous arthrodesis

A higher incidence of implant failure has also occurred in paraplegics, cerebral palsy and patients with Parkinson's disease.

See package insert for warnings precautions, adverse effects, information for patients, and other essential product information.

Before using Monogram IM Revision Instrumentation, verify:

- Instruments have been properly disassembled prior to cleaning and sterilization;
- Instruments have been properly assembled post-sterilization;
- Instruments have maintained design integrity; and,
- Proper size configurations are available.

For Instructions for Cleaning, Sterilization, Inspection and Maintenance of Orthopaedic Medical Devices, refer to LSTPI-B and SLI0001.

## Compatibility

### MRH Femoral Component and Triathlon Revision Baseplate

All sizes of the Triathlon Revision Baseplate are compatible with all the MRH Femoral Components. The indicated bearing component size for each construct iteration is listed in the table below.

MRH Femur size and part number	Revision Baseplate size	Compatible Bearing Component part number
X-Small 6481-1-100/1	1-7	5612-0-003
Small 6481-1-110/1	1-7	5612-0-003
Medium 6481-1-120/1	1-7	5612-0-003
Large 6481-1-130/1	1-3	5612-0-003
	4-7	5612-0-005
X-Large 6481-1-140/1	1-3	5612-0-003
	4-7	5612-0-005

### Tibial insert/baseplate compatibility

The tibial insert size matches the baseplate size, e.g., size 4 insert to be used only with size 4 baseplate.

The Hinge insert can only be used with the cemented Revision Baseplate.

### Triathlon Revision Baseplate and Tritanium Cone Augment Compatibility

The Triathlon Revision Baseplate is compatible with Symmetric and Asymmetric Cone Augments. The smallest compatible cone size is Size B. Size A Symmetric Cone is not intended to be used with the Triathlon Revision Baseplate.

### Triathlon Revision Baseplate Augments

Tibial Augments come in left medial/right lateral or right medial/left lateral configurations.

Tibial Augments are size specific, e.g., size 4 tibial augments are for the size 4 Revision Baseplate.

### Triathlon TS Stems

The Triathlon Revision Tibial Baseplate (5612-B-X00) requires a 50mm or longer Stem Extension.

The Triathlon Revision Tibial Baseplate (5612-B-X00) is compatible with cemented and fluted stems.

### Triathlon Stem Extenders

The 50mm Stem Extender cannot be used with the Triathlon Revision Tibial Baseplate Components (5612-B-X00) when used with a 150mm Triathlon TS Stem.

### Hinge assembly compatibility

For all **Triathlon Revision Baseplate and MRH femur** constructs use the following hinge implant accessories:

- Tibial Sleeve 5612-5-002, packaged with the Hinge Insert (alternatively 6481-2-140)
- Bushings (x2) from pack 5612-3-000 (alternatively 6481-2-110)
- Axle from pack 5612-3-000 (alternatively 6481-2-120)
- Bumper 6481-2-130 or 6481-2-133
- Optional alternative assembly package 6481-2-150: Contains 6481-2-140 Tibial Sleeve, 6481-2-130 Bumper Neutral, and two 6481-2-110 Femoral bushings.



Figure 1



Figure 2

## Exposure

A standard anterior mid-line incision can be utilized (**Figure 1**). Any previous incision can be used or incorporated to decrease the risk of skin slough and breakdown.

The capsule is entered through a medial parapatellar approach or using an approach that allows the surgeon to deal best with the underlying pathology.

## Component removal

When removing the components to be revised, great care must be taken to preserve as much of the remaining bone stock as possible and to avoid the risk of fracture of the residual bone. Bone preservation can usually be facilitated using small flexible osteotomes, saws, and high-speed burring instruments.

## Tibial preparation: Revision Baseplate

### Revision Baseplate with Cemented Stems

Cemented stems come in 9, 12, and 15mm diameters in 50, 100 and 150mm lengths.

If Fluted stems are preferred, use the technique described in the Fluted stem section, Revision Baseplate with Fluted stems

- **Attention:** The Revision Baseplate is not indicated for use with Size A Tibial Cones. The smallest compatible size is Size B.

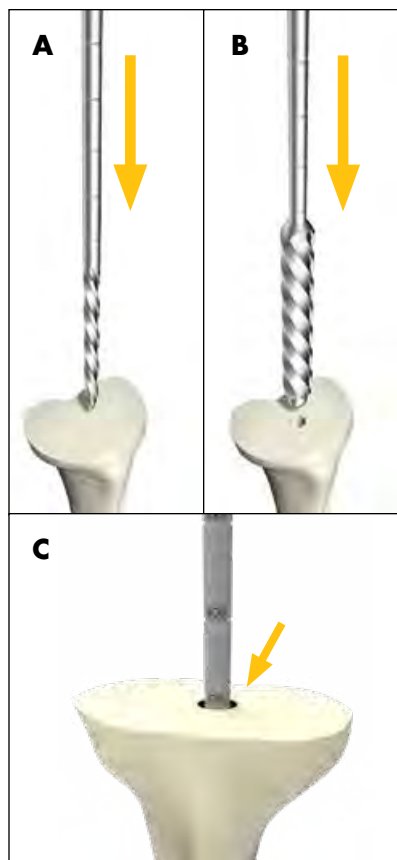


Figure 3

## Revision Baseplate: Intramedullary Tibial preparation

Assemble the 8mm Starter Awl to either the T-handle or power unit using the Universal Driver.

Ream the tibial intramedullary canal (**Figure 3A**).

### Technical points

If determining the appropriate pilot hole is challenging, considering using AP and lateral x-rays to determine the appropriate starting point.

Referencing the desired tibial resection, ream to desired stem depth (refer to depth chart) or to a length of fixation preferred for tibial alignment. Grooves along the shank of the reamer indicate the depth of the reamer in the canal (**Figure 3C**).

- ▶ **Note:** If Cone Augment usage is anticipated a 175mm reamer depth will be required.

Progressively ream, increasing diameter in 1mm increments until adequate purchase is achieved, and leave the final reamer in the canal (**Figure 3B**). Tap the final reamer gently with a mallet to assure that it is firmly seated.

### Depth markings: Cemented stem components

Stem length	Depth marking
50mm	125
100mm	175
150mm	225

- ▶ **Note:** The Revision Baseplate is not compatible with offset adapters.
- ▶ **Note:** If using stem extender implants (5571-S-025 and 5571-S-050), ream an additional 25mm or 50mm accordingly. The stem extender implants have a 16mm diameter; ream accordingly based on desired stem type. **The 50mm Stem Extender cannot be used with the Triathlon Revision Tibial Baseplate Components (5612-B-X00) when used with a 150mm Triathlon TS Stem.**

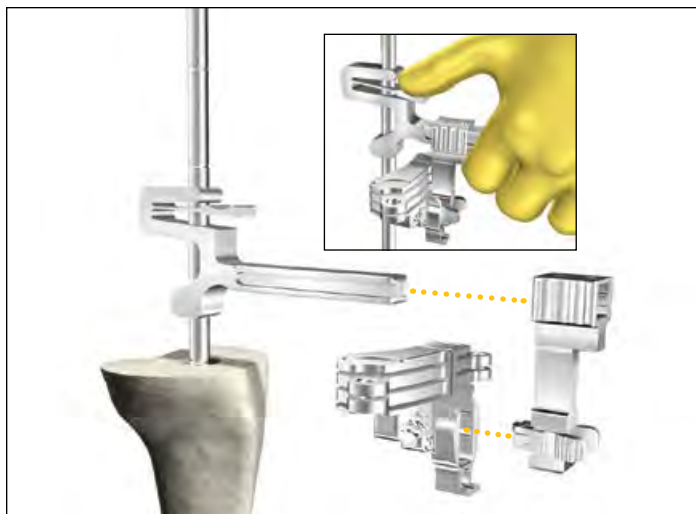


Figure 4



Figure 5



Figure 6



Figure 7

### Technical points

- ▶ **Attention:** Tibial offsetting with the Revision baseplate is not possible.

If Tibial Augments are to be used, ream until the depth marking is flush with the expected augment cut. Use the bottom of the line marking as the depth reference.

When using a cemented stem, it is not necessary to gain cortical chatter as cancellous bone may be unnecessarily removed.

Be sure to completely remove cement and sclerotic bone from the center of the canal.

### Revision Baseplate: Proximal tibial resection

Slide the Resection Guide Tower over top of the IM Reamer by depressing the finger tab as shown (**Figure 4**). Assemble the Revision Tibial Resection Guide to the Support Arm. Slide the assembly on to the Resection Guide Tower.

Depress the finger tab on the Resection Guide Tower and slide the assembly to the desired distal/proximal position on the IM Reamer.

Use the Blade Runner through the cutting slot to approximate the resection level.

- When determining the tibial resection consider the native joint line and patella tracking.
- In a revision procedure a **2mm cleanup** resection cut can be performed. 2mm of bone will be resected with the initial proximal resection when using the "2" end of the Triathlon Stylus (**Figure 5**).

Use the Blade Runner through the cutting slots to approximate any augment resection level and rotational alignment of the guide when planning for an augment on one side of the tibia (**Figure 6**).

The Universal Alignment Rod can be used to aid in setting the final component position by inserting it through the Universal Alignment Handle and assembling the Universal Alignment Handle to the Revision Tibial Resection Guide (**Figure 7**).

- ▶ **Note:** In a bowed tibia, a surgeon may need to retract the reamer from 175mm depth to set the proper tibial cut slope.

Pin the Revision Tibial Resection Guide to the proximal tibia when the resection level has been determined.



Figure 8

**Technical points**

- ▶ **Tip:** To help facilitate easy removal of the Resection Guide Tower and Support Arm, place pins perpendicular to the bone.

Make a cut to produce a resected surface with a neutral slope (**Figure 8**).

Tibial augment resections can be made at this point with the Revision Tibial Resection Guide using a narrow, 15mm-wide, 0.050" thick oscillating saw blade. Make a 5mm or 10mm augment resection as appropriate.

After completing the cut around the reamer shaft, remove the Support Arm, Resection Guide Tower, and IM Reamer before completing the tibial resection. To do so, depress the tabs on the Support Arm to disengage it from the Revision Tibial Resection Guide. Slide the Support Arm anterior (**Figure 9**). Depress the tab on the Resection Guide Tower and slide it off the IM Reamer (**Figure 10**). Use a T-handle to remove the IM Reamer.

Once the IM reamer is removed, an additional cross pin can be added to the Revision Tibial Resection Guide.

Using a reciprocating saw blade through the Revision Tibial Resection Guide, complete the sagittal augment resection (**Figure 11**).

Remove the pins and Tibial Resection Guide.

**Technical points**

Surgeons who prefer a non-captured cut can use the top of the resection guide. The 0mm and 5mm slots can then be used for 5mm and 10mm augment resections, respectively.

- ▶ **Note:** The 10mm slot should not be used if executing a non-captured cut.
- ▶ **Note:** If a tibial stylus is used to ascertain resection depth the depth will not correspond with the non-captured top surface.



Figure 9



Figure 10

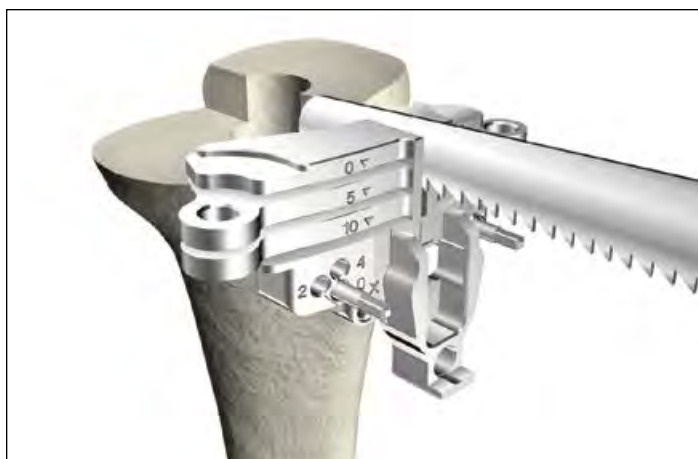


Figure 11

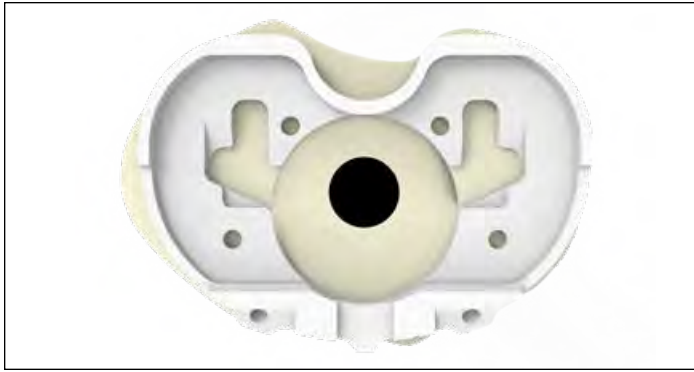


Figure 12

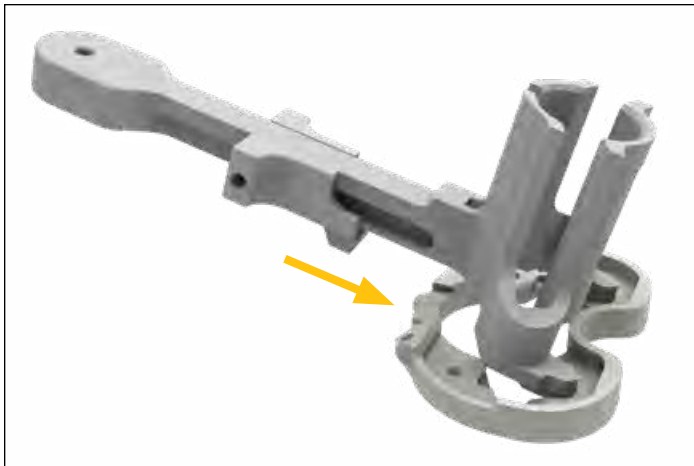


Figure 13



Figure 14

## Revision Baseplate: Tibial Template sizing and positioning

- ▶ **Attention:** Tibial offsetting with the Revision baseplate is not possible.

Size the proximal tibia with a Universal Tibial Template (**Figure 12**).

- Attach Tibial Augment Trials (if tibial augment cuts were made) to the underside of the Universal Tibial Template.

The Tibial Alignment Handle can be attached to the Universal Tibial Template if desired for tibial sizing.

Rotational alignment of the Universal Tibial Template should be checked. An alignment rod can be used to aid in setting the final component position. To check alignment, attach the Revision Keel Punch Guide to the Universal Tibial Template ensuring the slider is engaged (**Figure 13**). Insert the Universal Alignment Rod through the hole in the Revision Keel Punch Guide (**Figure 14**).

### Technical points

Offsetting is not possible with the Revision Baseplate. In some tibias, especially small tibias, prior to pinning the template it is recommended to visually assess if downsizing and/or repositioning the tibial template or downsizing the stem may be required to avoid impingement with the anterior cortices in subsequent reaming or keel punching steps. In order to assess this, complete the steps as follows:

- Insert last size reamer into the canal and lightly tap to seat it.
- Assemble the appropriately sized tibial template and keel punch guide. Assemble the template and guide over the shaft of the reamer onto the resected tibia.
- The magnitude of the offset observed between the IM reamer and the diameter of the keel punch guide should be used as a reference to determine if downsizing and/or repositioning the template may be required.

If adequate coverage and position is attained, pin the Universal Tibial Template to the proximal tibia using headed pins in the anterior template tray pin holes or headless pins in the anterior angled pin holes (**Figure 15**).

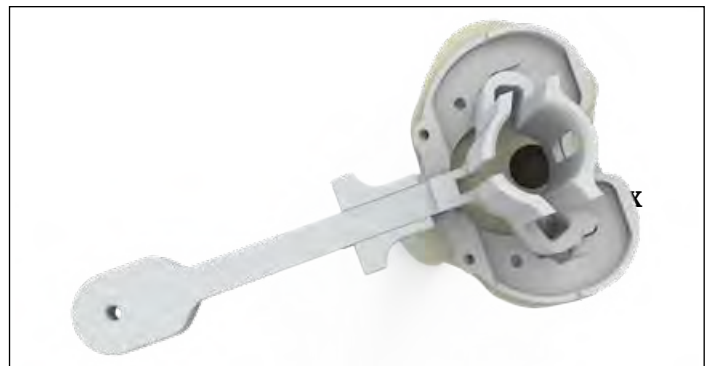
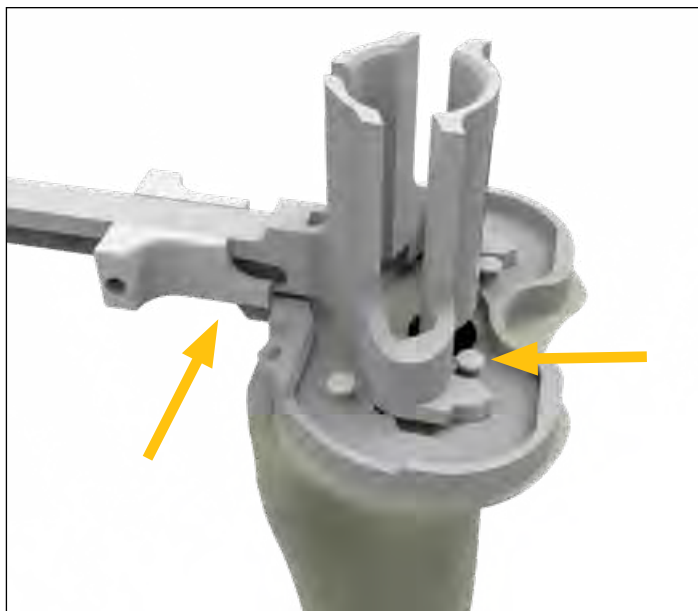
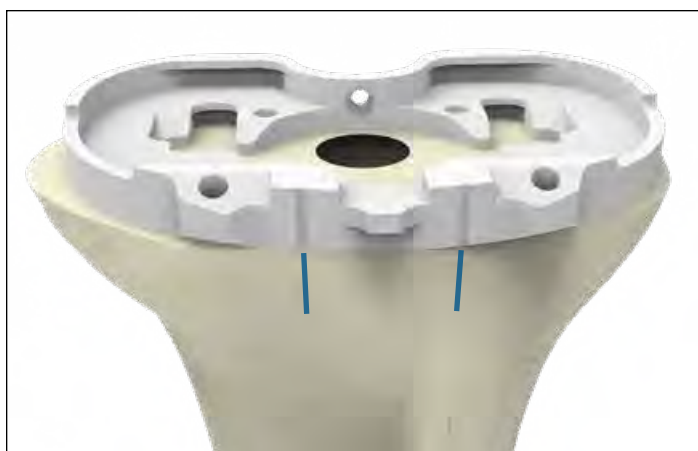


Figure 15



**Figure 16**



**Figure 17**



**Figure 18**



**Figure 19**



**Figure 20**

**Technical points**

If additional fixation is needed for the Universal Tibial Template to the proximal tibia, remove the Revision Keel Punch Guide from the template (if assembled) and place headed nails into the posterior template pin holes (**Figure 16**). Once completed, reassemble the Revision Keel Punch Guide.

It is optional to mark the anterior surface of the tibia. Align the marks to the two engravings on the template to help ensure that rotation in subsequent steps matches the planned rotation (**Figure 17**).

**Revision Baseplate: Boss preparation**

If not already assembled, assemble the Revision Keel Punch Guide to the Universal Tibial Template. Ensure the slider is engaged with the tibial template (**Figure 16**).

Attach the Modular T-Handle to the Revision Boss Reamer and ream by hand until the physical stop is reached (**Figure 18**). If fully seating the reamer is difficult, the Revision Boss Reamer may be attached to power only if the solid cylinder of the boss reamer has engaged the Revision Keel Punch Guide (**Figures 19 and 20**). Attach the Revision Boss Reamer to the power unit using the Universal Driver.

- ▶ **Attention:** Caution should be used to avoid perforating the anterior cortices during reaming.

Remove Revision Boss Reamer.



**Technical points**

- ▶ **Attention:** If the Revision Boss Reamer engages cortical bone or the pinned template begins to lift off the tibia, consider downsizing and/or repositioning the tibial template. In this position, the boss of the Revision Baseplate may prevent the baseplate from fully seating. This may happen in small tibias or tibias with a significant bow. Caution should be used to avoid perforating the anterior cortices.

In sclerotic bone, the use of a saw prior to the Revision Keel Punch may be advisable.

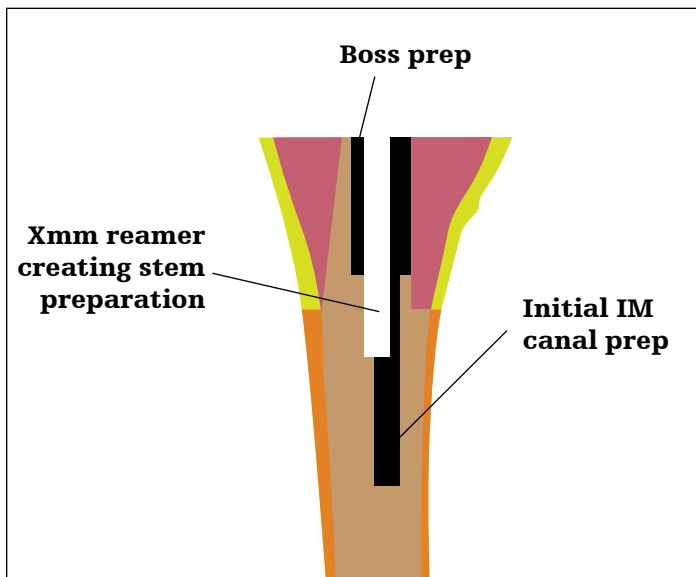
Revision Baseplate: Cemented stem preparation

To help facilitate proper stem preparation coaxial to the boss preparation (**Figure 21**), the Neutral Bushing Guide should be used to ream for the stem.

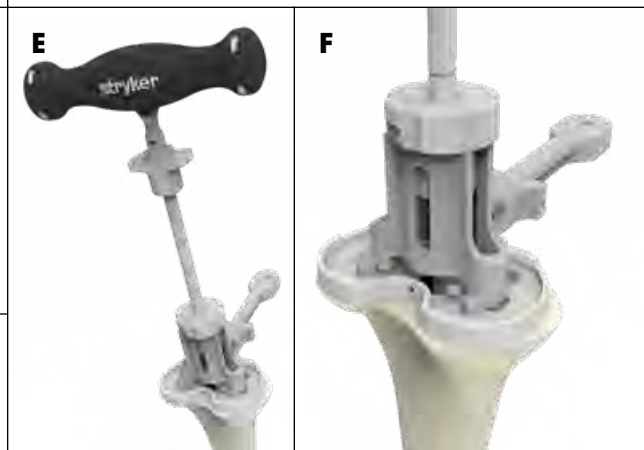
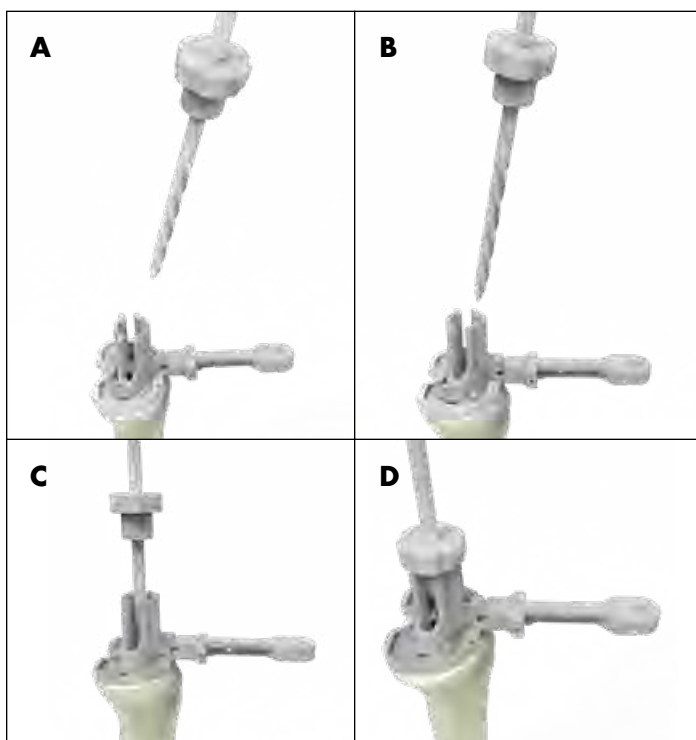
Assemble the Neutral Bushing Guide to the 8mm Starter Awl (or downsized reamer size of choice) and the insert reamer through the keel punch guide. Once the reamer is seated in the boss preparation allow the Neutral Bushing Guide to bottom out in the Revision Keel Punch Guide (**Figure 22**). This will help ensure the stem preparation will be coaxial to the Revision Boss Reamer preparation.

- ▶ **Note:** Do not impact the Neutral Bushing Guide into the Keel Punch Guide.

Ream using the T-handle or power unit attached to the Universal Driver.



**Figure 21**



**Figure 22**

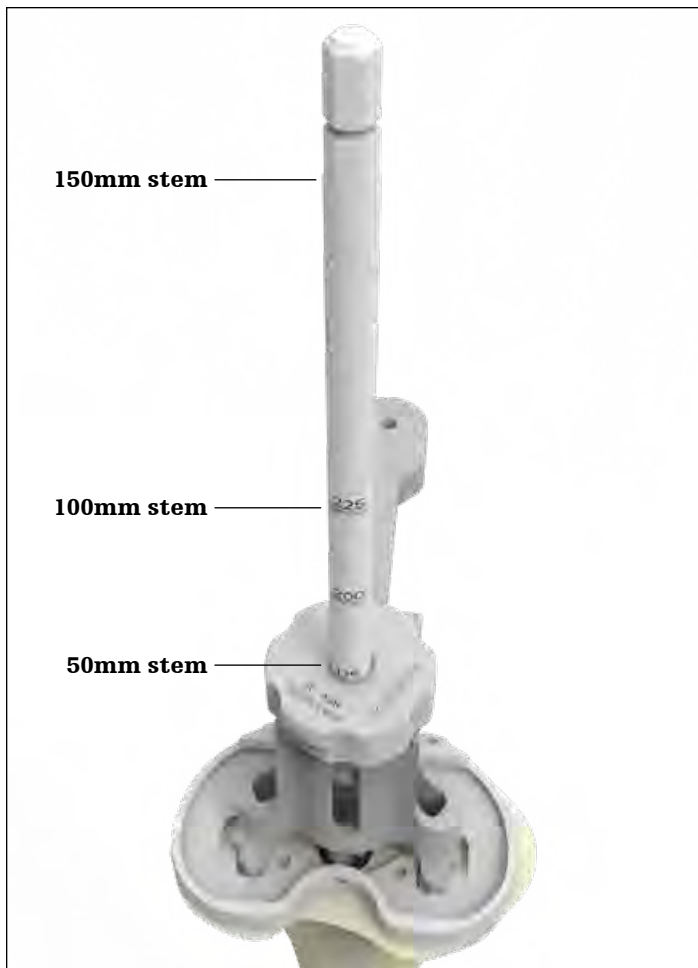


Figure 23

For a 50mm stem, ream until the 175mm marker on the IM reamer is flush with the proximal surface of the Neutral Bushing Guide (**Figure 23**). For other stem lengths refer to the table below. Incrementally ream until the desired stem diameter and cement mantle is reached.

**Technical point**

If the reamer cannot reach 175mm, consider downsizing and/or repositioning the tibial baseplate. In this position, the stem may prevent the baseplate from fully seating. If repositioning is desired, preparation of the bone will be required again.

**Depth markings: Cemented Stem components**

Stem length	Depth marking
50mm	175
100mm	225
150mm	Bottom of the power tool where it attaches to the reamer

- ▶ **Note:** The Revision Baseplate is not compatible with offset adapters.
- ▶ **Note:** If using stem extender implants (5571-S-025 and 5571-S-050), ream an additional 25mm or 50mm. Note that the stem extender implants have a 16mm diameter; ream accordingly based on desired stem type. **The 50mm Stem Extender cannot be used with the Triathlon Revision Tibial Baseplate Components (5612-B-X00) when used with a 150mm Triathlon TS Stem.**

Remove the reamer.



Figure 24

### Keel preparation

Place the appropriate Revision Keel Punch into the Revision Keel Punch Guide, and ensure the tab is engaged with the guide. Use a mallet to impact the punch. Advance the Revision Keel Punch until it seats fully in the Revision Keel Punch Guide (**Figure 24**).

To extract the Revision Keel Punch, lift the Revision Keel Punch handle slightly proximal and rotate the handle anteriorly, engaging the anterior tab of the Revision Keel Punch Guide, to cantilever the Revision Keel Punch out of the tibia (**Figure 25**).

Remove the Revision Keel Punch Guide, Keep Punch and Universal Tibial Template.

If desired, a Trial Baseplate and Stem trial can be used to confirm the tibial preparation is appropriate for the desired construct.

If using cones proceed to the Triathlon Tritanium Tibial Cone Augment Preparation section of this protocol.



Figure 25

Revision Baseplate with Fluted Stems

- ▶ **Attention:** Tibial offsetting with the Revision baseplate is not possible. In clinical scenarios where baseplate overhang may occur, consider using cemented stems.
- ▶ **Attention:** The Revision Baseplate is not indicated for use with Size A Tibial Cones. The smallest compatible size is Size B.



Figure 26

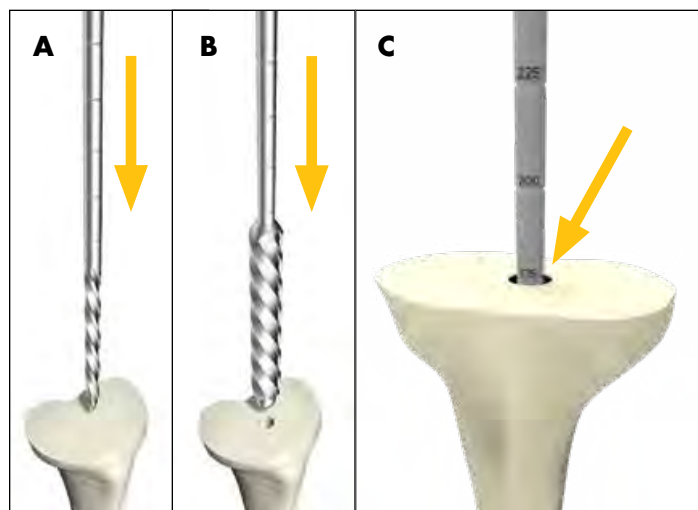


Figure 27

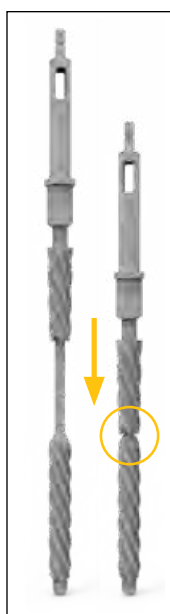


Figure 28

Revision Baseplate: Intramedullary tibial preparation

Assemble the 8mm Starter Awl to either the T-handle or power unit using the Universal Driver.

Ream the tibial intramedullary canal (**Figure 27A**).

**Technical points**

If determining the appropriate pilot hole is challenging, considering using AP and lateral x-rays to determine the appropriate starting point.

Referencing the desired tibial resection, ream to the desired stem depth (refer to depth chart) or to a length of fixation preferred for tibial alignment. Grooves along the shank of the reamer indicate the depth of the reamer in the canal (**Figure 27C**).

Progressively ream, increasing diameter in 1mm increments until adequate purchase is achieved, and leave the final reamer in the canal (**Figure 27B**). Tap the final reamer gently with a mallet to assure that it is firmly seated.

**Ream depth (mm): Fluted Stem components**

Stem length	Depth marking
100mm	175*
Tibial Cone	175*
150mm	225

\* If the final IM reamer is 16-18mm in diameter, an additional 25mm of reaming is required, resulting in a 200mm ream depth. This is required to avoid interference between the Revision Boss Reamer and the IM reamer cutting flutes (**Figure 28**).

- ▶ **Note:** The Revision Baseplate is not compatible with offset adapters.
- ▶ **Note:** If using stem extender implants (5571-S-025 and 5571-S-050), ream an additional 25mm or 50mm accordingly. The stem extender implants have a 16mm diameter; ream accordingly based on desired stem type. **The 50mm Stem Extender cannot be used with the Triathlon Revision Tibial Baseplate Components (5612-B-X00) when used with a 150mm Triathlon TS Stem.**

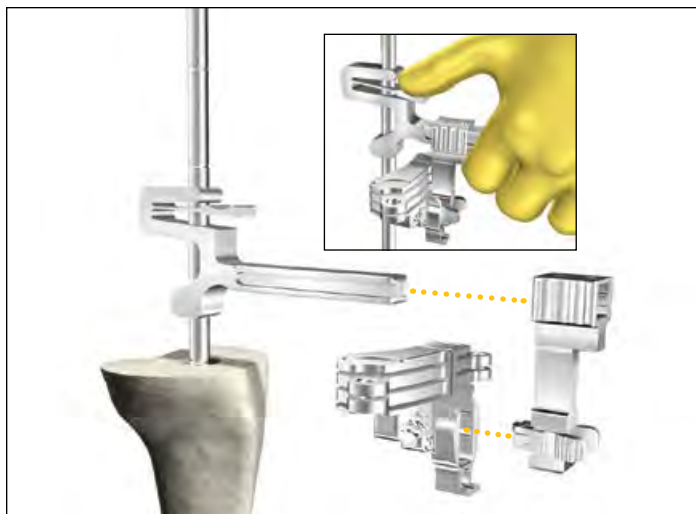


Figure 29



Figure 30



Figure 31



Figure 32

### Technical points

If Tibial Augments are to be used, ream until the depth marking is flush with the expected augment cut. Use the bottom of the line marking as the depth reference.

Be sure to completely remove cement and sclerotic bone from the center of the canal.

### Revision Baseplate: Proximal tibial resection

Slide the Resection Guide Tower over top of the IM Reamer by depressing the finger tab as shown (**Figure 29**). Assemble the Revision Tibial Resection Guide to the Support Arm. Slide the assembly on to the Resection Guide Tower.

Depress the finger tab on the Resection Guide Tower and slide the assembly to the desired distal/proximal position on the IM Reamer.

Use the Blade Runner through the cutting slot to approximate the resection level.

- When determining the tibial resection consider the native joint line and patella tracking.
- In a revision procedure a **2mm cleanup** resection cut can be performed. 2mm of bone will be resected with the initial proximal resection when using the “2” end of the Triathlon Stylus (**Figure 30**).

Use the Blade Runner through the cutting slot to approximate any augment resection level and rotational alignment of the guide when planning for an augment on one side of the tibia (**Figure 31**).

The Universal Alignment Rod can be used to aid in setting the final component position by inserting it through the Universal Alignment Handle and assembling the Universal Alignment Handle to the Revision Tibial Resection Guide (**Figure 32**).

- ▶ **Note:** In a bowed tibia, a surgeon may need to retract the reamer from 175mm depth to set the proper tibial cut slope.

Pin the Revision Tibial Resection Guide to the proximal tibia when the resection level and rotational alignment has been determined.



Figure 33

**Technical points**

- ▶ **Tip:** To help facilitate easy removal of the Resection Guide Tower and Support Arm, place pins perpendicular to the bone.

Make a cut to produce a resected surface with a neutral slope.

After completing the cut around the reamer shaft, remove the Support Arm, Resection Guide Tower, and IM Reamer before completing the tibial resection. To do so, depress the tabs on the Support Arm to disengage it from the Revision Tibial Resection Guide. Slide the Support Arm anterior (**Figure 33**). Depress the tab on the Resection Guide Tower and slide it off the IM Reamer (**Figure 34**). Use a T-Handle to remove the IM Reamer.

Once the IM reamer is removed, an additional cross pin can be added to the Revision Tibial Resection Guide.

Tibial augment resections can be made at this point with the Revision Tibial Resection Guide using a narrow, 15mm-wide, 0.050" thick oscillating saw blade. Make a 5mm or 10mm augment resection as appropriate.

Using a reciprocating saw blade through the Revision Tibial Resection Guide, complete the sagittal augment resection (**Figure 35**).

Remove the pins and Tibial Resection Guide.



Figure 34

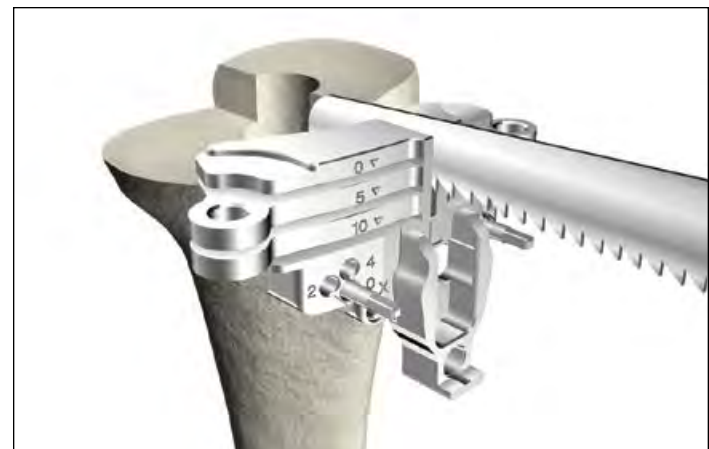


Figure 35



Figure 36

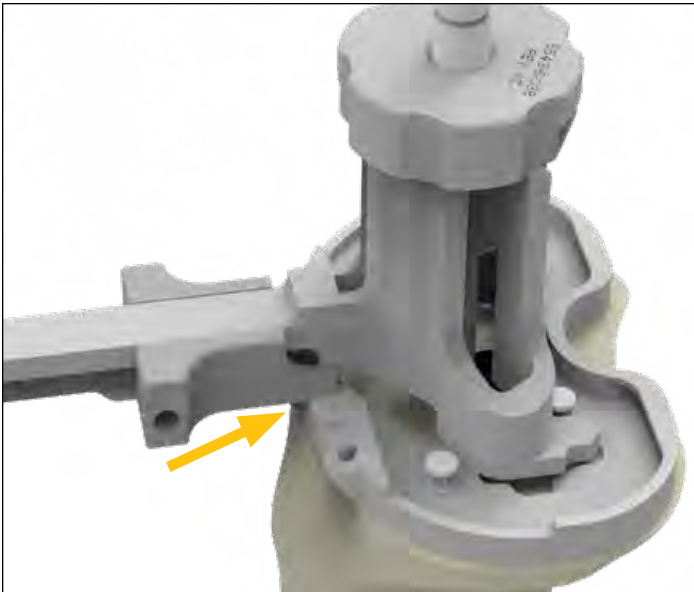


Figure 37

### Technical points

Surgeons who prefer a non-captured cut can use the top of the resection guide. The 0mm and 5mm slots can then be used for 5mm and 10mm augment resections, respectively .

- ▶ **Note:** The 10mm slot should not be used if executing a non-captured cut.
- ▶ **Note:** If a tibial stylus is used to ascertain resection depth the depth will not correspond with the non-captured top surface.

### Revision Baseplate: Tibial Template sizing and positioning

Reinsert the last IM reamer.

Size the proximal tibia with a Revision Tibial Template, Revision Keel Punch Guide, and Neutral Bushing Guide placed over the reamer and onto the resected surface of the tibia (**Figure 36**). Ensure that the slider is engaged with tibial template (**Figure 37**).

- Attach Tibial Augment Trials (if tibial augment cuts were made) to the underside of the Universal Tibial Template.
- ▶ **Attention:** Tibial offsetting with the Revision Baseplate is not possible.



Figure 38

Rotational and alignment of the Universal Tibial Template should be checked. An alignment rod can be used to aid in setting the final component position.

- To check alignment, attach the Revision Keel Punch Guide to the Universal Tibial Template ensuring the slider is engaged. Insert the Universal Alignment Rod through the hole in the Revision Keel Punch Guide (Figure 38).

If adequate coverage and position is attained, pin the Universal Tibial Template to the proximal tibia using headless pins in the anterior angled pin holes or headed pins in the anterior template tray pin holes.

If adequate coverage and position is not attained, consider downsizing the tibial template.

**Technical points**

If additional fixation is needed for the Universal Tibial Template to the proximal tibia, remove the IM Reamer Neutral Bushing Guide and Revision Keel Punch Guide and place headed nails into the posterior template pin holes (Figure 39). Once completed, reassemble the Revision Keel Punch Guide.

Mark the anterior surface of the tibia, aligning marks to the two engravings on the template to ensure rotation in subsequent steps matched planned rotation (Figure 40).



Figure 39

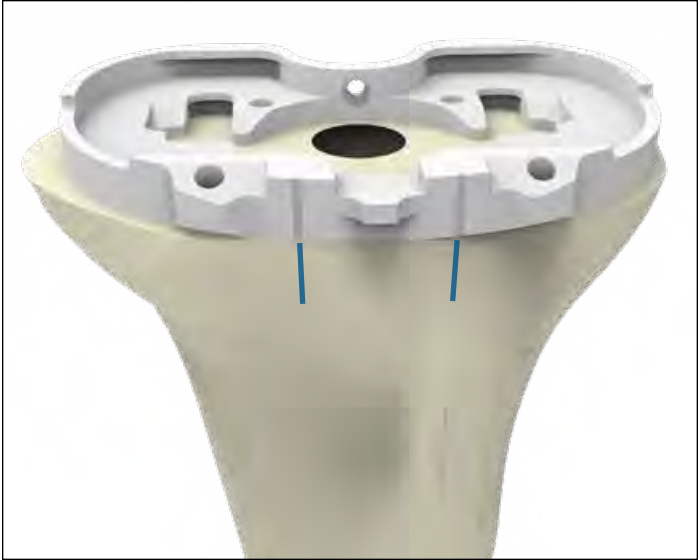


Figure 40





Figure 41



Figure 42



Figure 43

### Revision Baseplate: Boss preparation

If the IM reamer is greater than or equal to 19mm, the Revision Boss Reamer is not necessary, the IM reamer has prepared for the Revision Baseplate boss diameter.

Remove the Neutral Bushing Guide from the Revision Keel Punch Guide, leaving the IM reamer and Revision Keel Punch Guide in place.

Attach the Modular T-Handle to the Revision Boss Reamer. Place the Revision Boss Reamer over the shank of the IM reamer and into the Revision Keel Punch Guide (**Figures 41 and 42**). Ream until the physical stop is reached.

If reaming is difficult, the Revision Boss Reamer may be attached to power only if the solid cylinder of the boss reamer has engaged the Revision Keel Punch Guide (**Figures 43 and 44**). Attach the Revision Boss Reamer to the power unit using the Universal Driver.

► **Attention:** Caution should be used to avoid perforating the anterior cortices.

Remove Revision Boss Reamer and IM Reamer.

### Technical points

In sclerotic bone, the use of a saw prior to the Revision Keel Punch may be advisable.



Figure 44



Figure 45

### Keel preparation

Place the appropriate Revision Keel Punch into the Revision Keel Punch Guide, and ensure the tab is engaged with the guide. Use a mallet to impact the punch. Advance the Revision Keel Punch until it seats fully in the Revision Keel Punch Guide (**Figure 45**).

To extract the Revision Keel Punch, lift the Revision Keel Punch handle slightly proximal and rotate the handle anteriorly, engaging the anterior tab of the Revision Keel Punch Guide, to cantilever the Revision Keel Punch out of the tibia (**Figure 46**).

Once the tibia is fully prepared, remove the Universal Tibial Template and Revision Keel Punch Guide Assembly (**Figure 47**).

If using cones proceed to the Triathlon Tritanium Tibial Cone Augment Preparation section of this protocol.



Figure 46

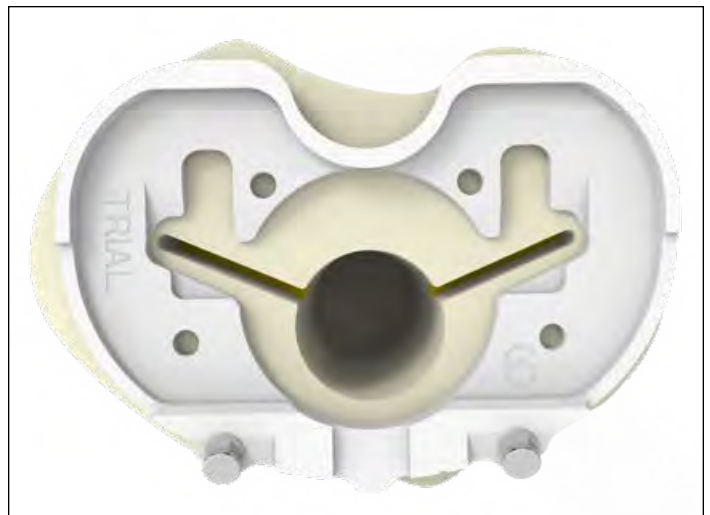


Figure 47

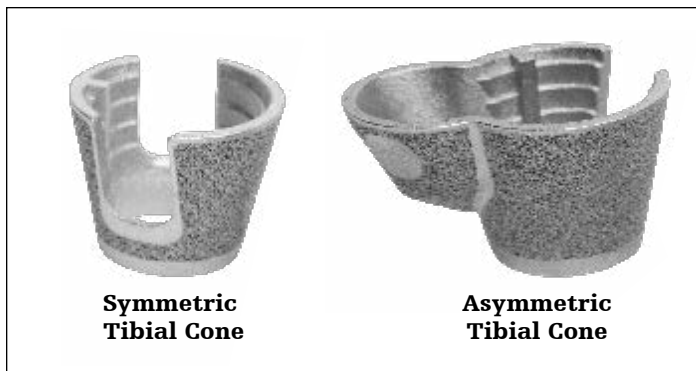


Figure 48

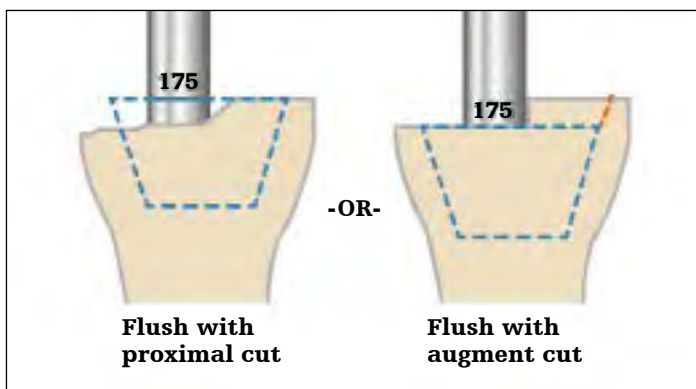


Figure 49

## Triathlon Tritanium Tibial Cone Augment preparation

Triathlon Tritanium Tibial Cone Augments come in two different shapes (**Figure 48**).

Tibial canal preparation for Tibial Cone Augments

► **Attention:** Tibial Cone size A is not intended for use with the Revision Baseplate.

### Option 1: Reamer-based

When using a Symmetric/Asymmetric Cone, a minimum depth of 175mm is recommended for the IM reamer to facilitate accurate cone reaming and to ensure that the flutes on the Tibial Symmetric Cone Reamer do not interfere with the flutes on the IM Reamer.

Tap the final IM Reamer gently with a mallet to ensure that it is fully seated.

► **Note:** If Tibial Augments are to be used, ream until the 175mm marking is flush with the augment cut. Use the bottom of the 175mm line marking as the depth reference. See **Figure 49**.

**Option 2: Stem Extender Shaft-based**

If desired, the IM reamer can be removed and subsequent preparation can be based off of a Stem Trial utilizing the required Stem Trial and the Stem Extender Shaft.

Ream to 175mm with the desired diameter IM Reamer. Ensure that purchase into the canal has been achieved.

Assemble the Stem Extender Shaft (6543-4-516) to the appropriate diameter Stem Trial and place the assembly into the canal.

Continue with Tibial Preparation as described in the protocol.

**Ream depth: Tibial components with cones**

<b>Stems (with Cones)</b>	<b>Depth</b>
100mm	175 (3rd groove)
150mm	175 (3rd groove)

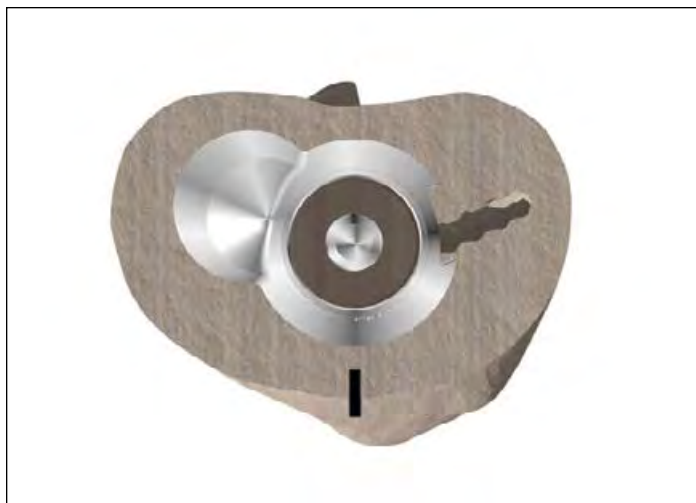


Figure 50



Figure 51



Figure 52



Figure 53

## Preliminary Cone sizing

Depending on the size and geometry of bone defect, either a symmetric or asymmetric tibial cone augment may be selected. Inverting a contralateral leg cone trial may help determine bone defect, assess cone coverage, and determine if symmetric or asymmetric cone is required.

- **Note:** Invert the Cone Trial over the resected tibial bone and ensure that the trial is centered on the IM Reamer (**Figure 50**). Centering the trial helps to ensure proper positioning.

## Revision Baseplate with Symmetric Tibial Cone

Ensure that the Tibial Symmetric Cone Reamer is being used. This can be confirmed by checking that the reamer shaft reads "TIBIA."

Grooves on the reamer specify cone size (**Figure 51**). Reference the sizing chart to help determine appropriate cone sizing (See chart on the next page for Cone and Baseplate sizing options).

- **Note:** Use the top line of the groove (of the desired size) as the depth reference.

Insert the Tibial Symmetric Cone Reamer over the IM Reamer (**Figure 52**). If reaming under power, confirm that the drill is set to ream mode before reaming begins.

Start the reamer before engaging the bone. Ream down to the desired depth/size (**Figure 53**).

- **Caution:** If the bone is soft, osteopenic, fractured, or sclerotic, consider initially reaming by hand using the T-Handle.

Remove both the Tibial Symmetric Cone Reamer and the IM Reamer.

If using an augment, see the next page to help determine proper preparation depth.

- **Note:** If the Cone needs to be placed in a slightly more posterior position, remove the IM Reamer and replace it with an IM Reamer of a smaller diameter. Place the Tibial Symmetric Cone Reamer over the IM reamer and gently flex it posteriorly. Ream down to the desired depth/size.
- **Note:** Confirm that the Tibial Symmetric Cone Reamer is not being hindered by the cutting surface of the flutes on the IM Reamer. If so, the IM Reamer may need to be placed in a more distal position.
- **Note:** Reamer depth increases by 5mm per size.

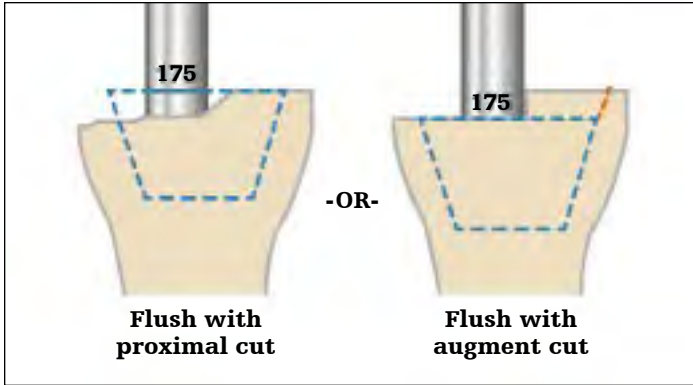


Figure 54

If augments are to be used, the size marking of the Tibial Symmetric Cone Reamer will indicate where the Cone will sit. Ream until the marking is flush with the augment cut (Figure 54).

**Technical points**

- ▶ **Attention:** Tibial Cone size A (Symmetric ) are not intended for use with the Revision Baseplate.
- ▶ **Attention:** The Revision Baseplate is not intended for use with offset adapters.

Remove both the Tibial Symmetric Cone Reamer and the IM Reamer.

**Tibial Cone sizes**

		B	C	D	E
Implant sizes	Size 1	*			
	Size 2	*			
	Size 3	X			
	Size 4	X	X		
	Size 5	X	X		
	Size 6	X	X	X	
	Size 7			X	X
<b>Distal Diameter (OD)</b>		23mm	25mm	25mm	25mm
<b>Max Stem Diameter (ID)</b>		19mm	21mm	21mm	21mm

**Revision Baseplate and Tibial Cone Augment compatibility**

Tibial Cone sizing per tibial baseplate. Blue represents optimal size conditions.

- ▶ **Note:** Cones B, C, D and E also have an asymmetric lobed option. Cones smaller than those marked with an X are still compatible but need to be positioned at least 5mm deeper. If these sizes are to be used, rotational freedom between the tibial implant and the cone may be limited with non size on size combinations. Trial to assess compatibility.
- ▶ **\* Note:** Cone B, with baseplate sizes 1 and 2, has less freedom between the tibial implant and the cone than other sizes. The cone may protrude anteriorly with respect to the baseplate.

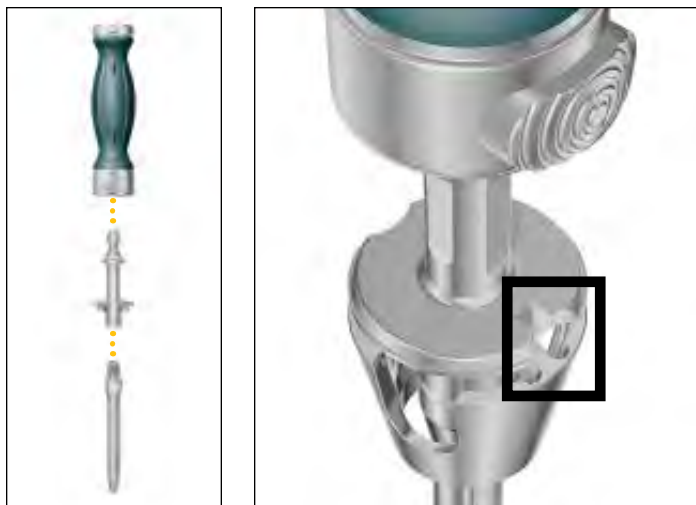


Figure 55



Figure 56

## Symmetric Cone trialing

If bone voids are such that Asymmetric Cone preparation is necessary, refer to the Asymmetric Cone Preparation section of the protocol.

- ▶ **Note:** Cone trial may be placed in the prepared bone prior to assembling the instruments as described below.

Assemble the desired Stem Trial with the Tibial Cone Introducer, TS Impaction Handle, and the selected Symmetric Cone Trial (100mm stem maximum).

Tibial Cone Introducers are size specific.

- ▶ **Note:** Downsize the Trial Stem by 1mm.

Align the orientation key on the trial with the key feature on the Cone Introducer. The orientation key is located posteriorly on the trial (**Figure 55**).

- ▶ **Note:** There is no positive lock on the Cone Trial and the Cone Introducer. The trial may disconnect from the introducer.

- ▶ **Note:** The Cone Trial can be placed into the prepared bone before the Stem Trial and the Cone Introducer.

When inserting the Cone Trial, ensure that the anterior rotational alignment marking on the trial is aligned with the anterior surface marking previously determined by the Universal Tibial Template (**Figure 56**).

Insert the trial until it is seated at the appropriate depth. Remove the Cone Introducer and the Stem Trial so that only the Cone Trial remains in the void.

- ▶ **Caution:** Do not impact or implant the Cone Trials.

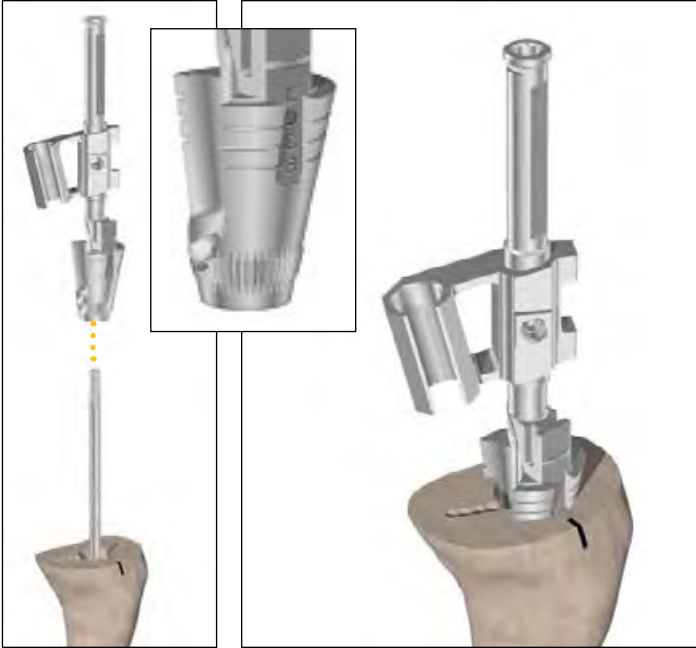
- ▶ **Note:** Stem trials with product code 5560-T-XXX cannot be used with cone augment instrumentation. This includes trials 5560-T-109, 5560-T-112 and 5560-T-115.

### Options if added cone stability is required:

Ream to a larger Symmetric Cone (Repeat steps from the Symmetric Cone Preparation section of the protocol).

Or prepare for an Asymmetric Cone (Follow the steps from the Asymmetric Cone Preparation section of the protocol).

Or implant the Cone with cement.



**Figure 57**

### Revision Baseplate and Asymmetric Tibial Cone preparation

Asymmetric Cone preparation is an option for increased stability and void filling after Symmetric Cone reaming has been completed.

Symmetric Cone preparation must be performed before Asymmetric Cone preparation can begin. Refer to the Symmetric Cone Preparation section of the protocol.

During Asymmetric Cone preparation, be sure to properly set cone rotation to ensure proper alignment with the Baseplate.

Slide the appropriate Tibial Cone Reamer Guide over the IM Reamer and into the prepared tibia (**Figure 57**).

- ▶ **Note:** There are two Tibial Cone Reamer Guides. One is designed for left medial / right lateral use, and the other is designed for right medial / left lateral use.
- ▶ **Note:** Do not fully seat the Tibial Cone Reamer Guide until after rotation is set.

Attach the Tibial Cone Alignment Guide Handle to the Tibial Cone Reamer Guide (**Figure 58**).





Figure 58

Insert the Tibial Asymmetric Cone Reamer into the Tibial Cone Reamer Guide to assist in visualization of guide positioning.

Select the correct reamer to match the cone size.

Slide back the bushing on the reamer and place the reamer into the slot of the guide (**Figures 58 and 59**).



Figure 59

Insert the Alignment Rod into the bushing on the Tibial Cone Alignment Guide Handle.

► **Note:** The Universal Alignment Rod is only intended to help align anterior rotation markings to help ensure proper cone positioning/rotation.

Lower the Tibial Asymmetric Cone Reamer down to the desired location.

Use the Tibial Cone Alignment Guide Handle to position the reamer and rotate the guide. The assembly can be rotated by using the built-in rotational constraints ( $\pm 10$  degrees) (**Figure 60**).

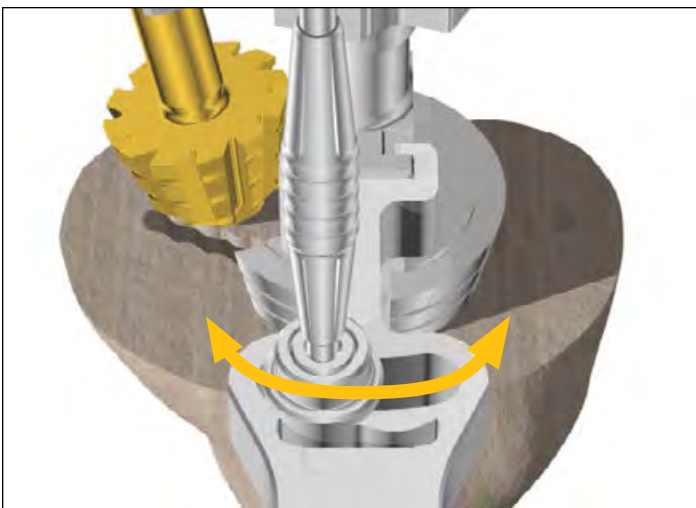


Figure 60



Figure 61



Figure 62

Once the desired positioning is established, move the Alignment Rod so that it aligns with the anterior rotational marking previously set using the Universal Tibial Template. This will ensure that desired tibial rotation is maintained.

If the Alignment Rod does not line up with the anterior marking, reduce rotation until it does so.

The Tibial Cone Reamer Guide has micro-flutes at its base to maintain rotation once set.

After alignment has been set, seat the Tibial Cone Reamer Guide so that it sits at the same depth/size as the Tibial Symmetric Cone Reamer (Figure 61).

If reaming under power, confirm that the drill is set to ream mode before reaming begins.

Before reaming begins, ensure that the bushing is fully engaged.

► **Caution:** If the bone is soft, osteopenic, fractured, or sclerotic, consider initially reaming by hand using the T-Handle.

Hold the Tibial Cone Alignment Guide Handle in the previously determined location to maintain rotation.

Start the reamer before engaging the bone. Ream down to the stop (Figure 62).

Remove the reamer from the guide. If necessary, the slap hammer can be connected to the end of the Tibial Cone Alignment Guide to assist with guide removal.

Remove the IM Reamer.

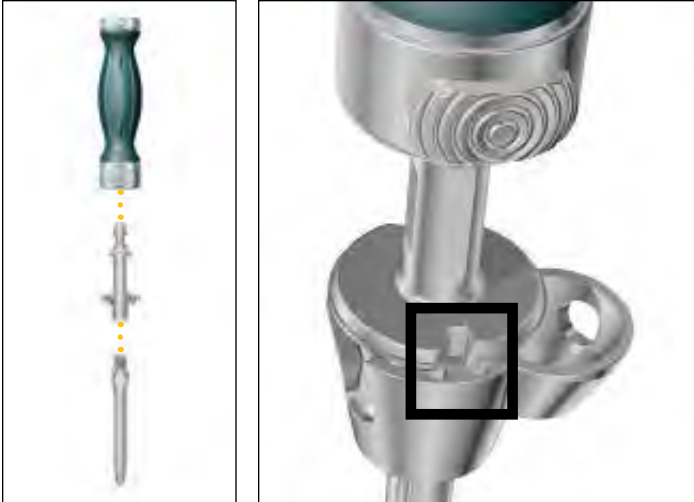


Figure 63



Figure 64

### Asymmetric Cone trialing

- ▶ **Note:** The Cone Trial can be placed into the prepared bone before the Stem Trial and the Cone Introducer.

Assemble the desired Stem Trial with the Tibial Cone Introducer, TS Impaction Handle, and the selected Asymmetric Cone Trial (100mm stem maximum).

Tibial Cone Introducers are intended for use with both Symmetric and Asymmetric Cones.

- ▶ **Note:** Downsize the Stem Trial by 1mm.

Align the orientation key on the trial with the key feature on the Cone Introducer. The orientation key is located posteriorly on the trial (**Figure 63**).

- ▶ **Note:** There is no positive lock on the Cone Trial and the Cone Introducer. The trial may disconnect from the introducer.

Insert the trial until it is seated at the appropriate depth (**Figure 64**). Remove the Cone Introducer and the Stem Trial so that only the Cone Trial remains in the void.

- ▶ **Caution:** Do not impact or implant Cone Trials.
- ▶ **Note:** Stem trials with product code 5560-T-XXX cannot be used with cone augment instrumentation. This includes trials 5560-T-109, 5560-T-112 and 5560-T-115.

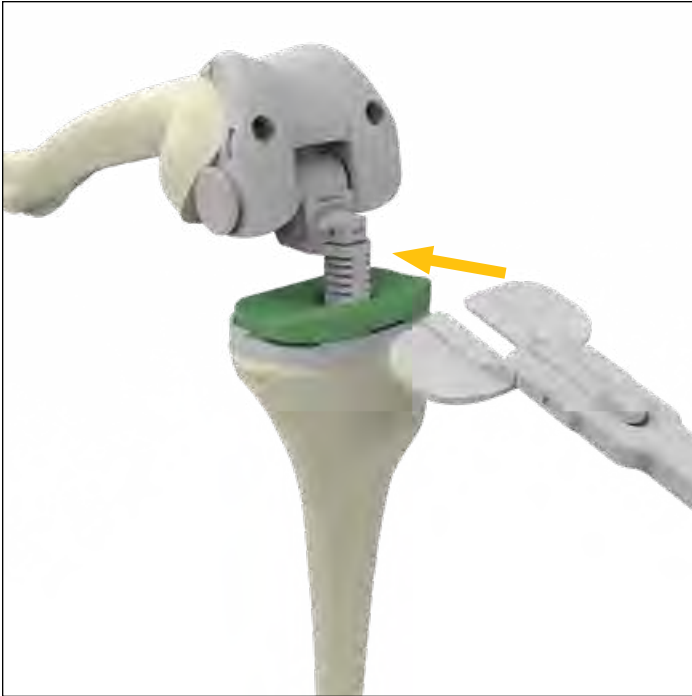
Options if added Cone stability is required:

Ream for a larger Asymmetric Cone (Repeat steps from the Asymmetric Cone Preparation section of the protocol).

Or implant the Cone with cement.

## Component trialing

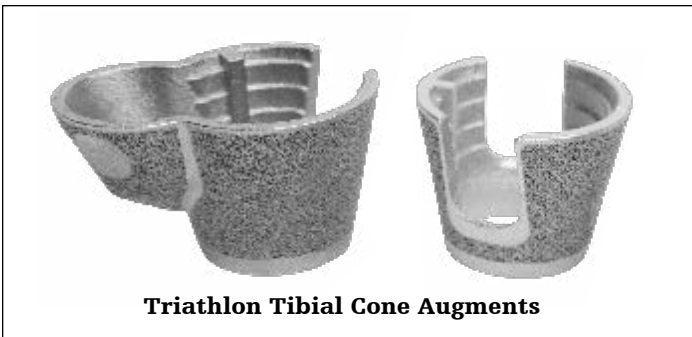
On completion of the tibial bone preparation, a trial reduction should then be performed to confirm that appropriate motion, stability and patellar tracking have been achieved.



**Figure 65**

### Tibial Trial assembly

If you are planning for Cone Augments, begin with Cone Augment trialing if it has not already been completed.



**Triathlon Tibial Cone Augments**

**Figure 66**



Figure 67

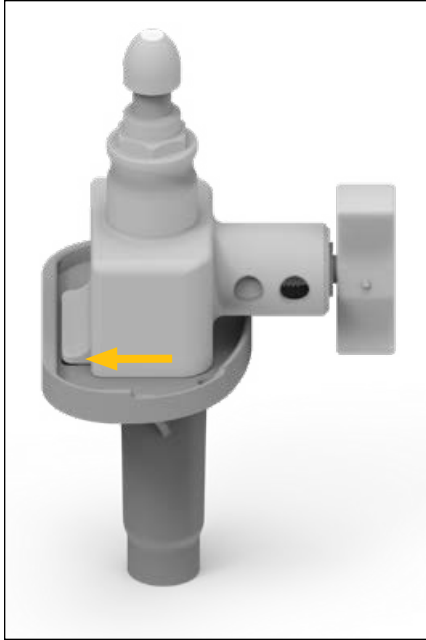


Figure 68

### Revision Baseplate Trial assembly

- ▶ **Attention:** The Revision Baseplate is not available with offset adaptors.

Assemble all Tibial Augment Trials to the appropriate size Tibial Baseplate Trial.

Thread the appropriate size Stem Trial into the Tibial Baseplate Trial.

Assemble the tibial trial construct to the Revision Baseplate Impactor/Extractor and impact onto the Tibia (**Figure 67**). Ensure the tab of the Impactor/Extractor is engaged under the posterior lip of the baseplate before impacting (**Figures 68-70**).

Assemble the appropriate size Hinge Insert Trial into the Revision Tibial Baseplate Trial. Do not impact the Insert Trial during assembly.



Figure 69



Figure 70

**Trial reduction**

With the correct Revision Baseplate trial in place, insert the appropriate Hinge Tibial Bearing Post Trial (6543-6-059 or 6543-6-060) into the baseplate trial; see table below.

**Trialing MRH Femur (implant) and Revision Baseplate (trial) compatibility**

			Insert Trials	MRH Femoral Component Implant				
				6481-1-100/1	6481-1-110/1	6481-1-120/1	6481-1-130/1	6481-1-140/1
				Bushing trials N/A OR 6543-6-018 Axle trial 6496-2-115 OR 6543-6-020 Bumper trial 6543-6-101/3				
Triathlon Revision Tibial Baseplate Trial	5612-T-100	No sleeve	6543-6-061	Bearing Post Trial 6543-6-059 Trial Bearing Plate 6543-6-073				Bearing Post Trial 6543-6-059 Trial Bearing Plate 6543-6-073
	5612-T-200		6543-6-062					
	5612-T-300		6543-6-063					
	5612-T-400		6543-6-064					
	5612-T-500		6543-6-065					
	5612-T-600		6543-6-066					
	5612-T-700		6543-6-067					Bearing Post Trial 6543-6-060 Trial Bearing Plate 6543-6-075



Figure 71

With the knee in 90 degrees of flexion, bring the Hinge Tibial Bearing Post Trial into the intercondylar notch of the existing MRH Femoral Implant.

Slide the Trial Axle (**6496-2-115** or **6543-6-020**) through the MRH and Hinge Tibial Bearing Post Trial (**Figure 71**). Do not impact the Trial Axle during assembly.

- If using the **6543-6-020** Triathlon Hinge Axle trial the bushing trials (**6543-6-018**) need to be placed into the posterior condyles of the femur.

Assemble the appropriately angled Trial Bumper (**6543-6-101/103**) in the Hinge Tibial Bearing Post Trial by hand.

Assemble the Insertion Removal Handle (or surgical forceps) to the Hinge Trial Bearing Plate (**6543-6-073** or **6543-6-075**).

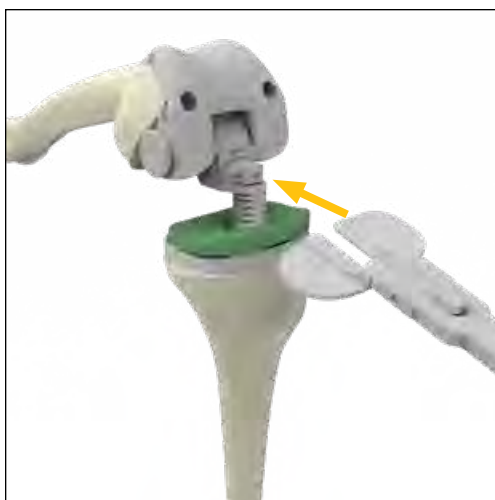


Figure 72

Manually distract the knee and insert the Hinge Trial Bearing Plate into the desired slot of the Bearing Post. Each slot represents the thickness of the definitive insert (**Figure 72**).

If utilized, remove the Insertion Removal Handle, and bring the knee to full extension (0 degrees). Determine if the extension gap is adequately filled.

Perform the trial reduction and evaluate joint stability.

Adjust the insert thickness as required by reattaching the Insertion Removal Handle to the Hinge Trial Bearing Plate and shifting the bearing plate to the next increment in flexion or fully disassociate the MRH femoral implant and the Bearing Post assembly from Revision Tibial Baseplate trial to shift the bearing plate to the next increment.

Adjust the Trial Bumper angle as required.

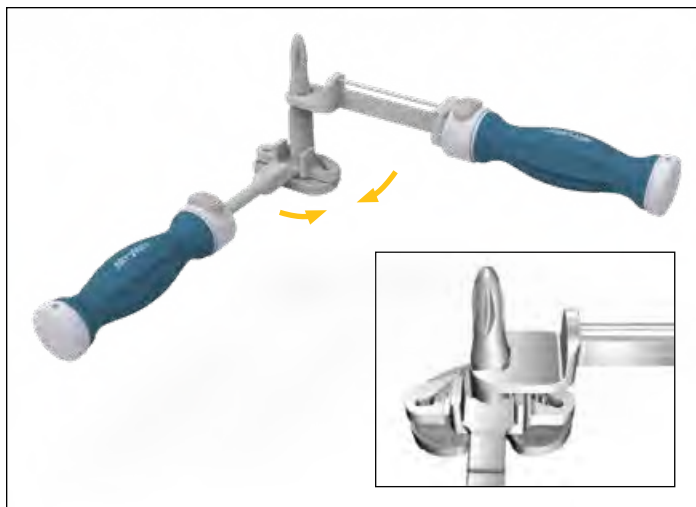


Figure 73



Figure 74

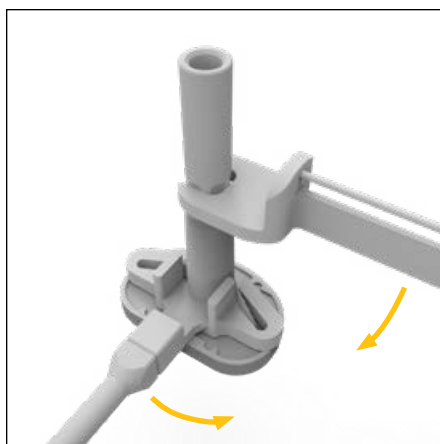


Figure 75

## Definitive component assembly

### Revision Baseplate Tibial Implant assembly

Assemble the stem to the baseplate prior to assembling augments.

#### Tibia with stem

Using the Universal Counter Wrench with the **tibia** side up, hold the Revision Baseplate in place by placing the slots of the counter wrench down over the keel fins of the baseplate.

Thread the appropriate size stem into the Tibial Baseplate Boss.

Place the open face end of the Torque Wrench on the flats of the stem (**Figure 73**).

Tighten by pulling the wrenches **together**. Torque Stem to 120 in-lbs. as indicated on the Torque Wrench (**Figure 74**).

#### Optional Tibia with Stem Extender

Using the Universal Counter Wrench with the **tibia** side up, hold the Revision Baseplate in place by placing the keel fins into the slots. Thread the Stem Extender into the Tibial Baseplate boss.

Place the open face end of the Universal Torque Wrench on the flats of the Stem Extender. Tighten by pulling the wrenches together (**Figure 75**).

Torque stem extender to 120 in-lbs. as indicated on the Universal Torque Wrench (**Figure 74**).

Thread the appropriate size stem into the Stem Extender.

Place the open face end of the Torque Wrench on the flats of the stem.

Tighten by pulling the wrenches **together**. Torque Stem to 120 in-lbs. as indicated on the Torque Wrench (**Figure 74**).

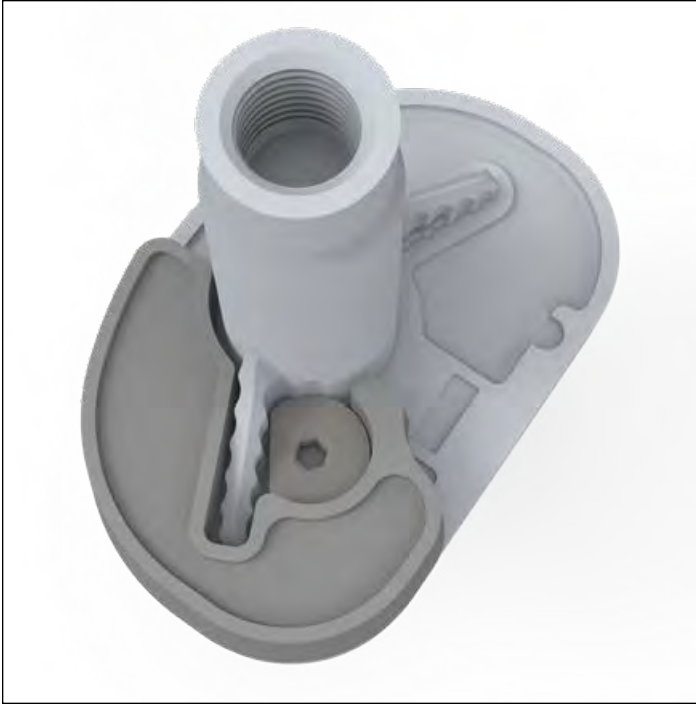


Figure 76

**Tibial Augmentation Revision Baseplate**

Assemble the 1/8" Universal Joint (or Straight) Hex Drive into the Slip Torque Handle.

Place the Tibial Augment on the distal side of the Baseplate. Verify both pins of the Tibial Augment are engaged into the slots on the underside of the Revision Baseplate and that the Tibial Augment is seated flush (**Figure 76**).

Using the 1/8" Universal Joint (or Straight) Hex Drive, torque the helical bolt captured within the tibial augment until the torque driver slips, at that time the driver is designed to emit an audible click (**Figure 77**).

Verify that the helical bolt is engaged into the slot on the keel of the Revision Baseplate. Repeat on a second augment if required on the other side.

**Technical points**

Triathlon Tibial Augments are not intended to be cemented together and stacked to fill voids.



Figure 77



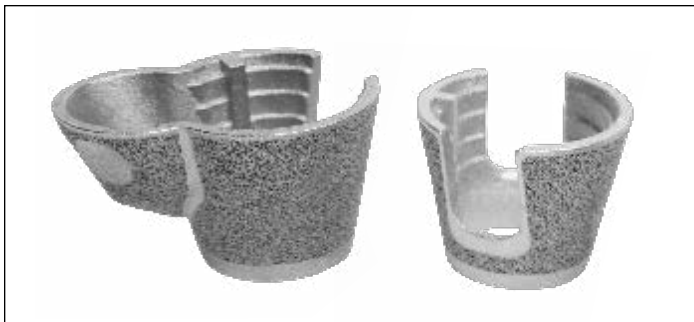


Figure 78



Figure 79

## Implantation

If needed, further prepare resected bone surfaces using an osteotome, oscillating saw blade, or bone file.

If using a cemented stem, it is advised to implant a cement restrictor prior to Cone implantation.

### Tritanium Tibial Cone Augment implantation

- ▶ **Reminder:** The Revision Baseplate is only compatible with Symmetric and Asymmetric Tibial Cones sizes B-E.

Assemble the desired Stem Trial (1mm smaller than reamed for) with the Tibial Cone Introducer, TS Impaction Handle, and the selected Symmetric/Asymmetric Cone Implant (**Figure 78**).

Tibial Cone Introducers are size specific.

Align the orientation key on the implant with the key feature on the Cone Introducer. The orientation key is located posteriorly on the implant.

- ▶ **Note:** There is no positive lock on the Cone Implant and the Cone Introducer. The implant may disconnect from the introducer.
- ▶ **Note:** The Cone can be placed into the prepared bone before the Stem Trial and the Cone Introducer.
- ▶ **Note:** When inserting a Symmetric Cone Implant, ensure that the anterior rotational alignment marking on the implant is aligned with the anterior surface marking previously determined by the Universal Tibial Template (**Figure 79**).

Gently impact the Symmetric/Asymmetric Cone Implant and confirm that it is fully seated at the appropriate depth.

- ▶ **Note:** Stem trials with product code 5560-T-XXX cannot be used with cone augment instrumentation. This includes trials 5560-T-109, 5560-T-112 and 5560-T-115.



Figure 80

## Adjustment of Cone Implant before cementation

### Cone Implants

For Tibial Trial assembly, refer to Symmetric Cone Trialing and Asymmetric Cone Trialing sections of the protocol.

Introduce Tibial Trials.

Perform final trial reduction with the Cone implants and evaluate joint stability.

Remove the trial components.

### Tibial component implantation with Cone Implants

For assembly of Tibial Components refer to Revision Baseplate Tibial Implant Assembly section of the protocol.

Cone implants must be fully seated before cementing the entire construct.

- ▶ **Caution:** Only use the Cone Extractor if the implant is seated in the wrong orientation and must be re-positioned (before cementing).

Insert the extractor into the Cone Implant (jaws closed). Ensure that the flared edges of the jaws are positioned outside of the distal end of the cone. Squeeze the extractor handles to open the jaws.

- ▶ **Note:** A lamina spreader (with fixed narrow pads) or a curette (reverse angle) may also be used to remove the Cone Implants. Insert the lamina spreader or curette into the Cone ensuring that the ends of either instrument are positioned outside of the distal end of the implant. Apply back pressure.
- ▶ **Caution:** If the Cone Implant is extracted (before cementing), (**Figure 80**) inspect the Cone for damage before reinsertion.

See next section for component and cone cementing techniques.

- ▶ **Note:** All stem implants are compatible with the cone augments. Refer to sizing charts to see maximum stem diameter per cone size.

## Revision Baseplate implantation

### Revision Baseplate with Cemented Stem and Cone Augment

Attach Revision Baseplate Impactor/Extractor to the Impaction Handle.

Assemble the Tibial Implant Assembly to the Revision Baseplate Tibial Impactor/ Extractor by turning the knob.

Ensure the tab of the Impactor/Extractor is engaged under the posterior lip of the baseplate (**Figures 81-83**).

Irrigate the joint and then dry.

Mix cement.

#### Technical points

Tibial Cone Implant used with a cemented stem will require at least two doses without major bone voids. The same is true for bones with IM canals greater than 20mm to fill the cone volume and help facilitate solid fixation to the cone.

Apply a thin layer of wet cement on the underside of the baseplate. Allow the cement to dough.

Use the standard cementing technique with a cement gun to retrograde fill the canal and cone.

Pressurize the cement into the cone, the metaphysis and onto the flat tibial surface.

Impact the tibial implant assembly onto the tibia until fully seated (do so when the cement is in its doughy state) and remove excess cement. Ensure proper rotation and alignment of the baseplate prior and during impaction.



Figure 81



Figure 82



Figure 83

### Revision Baseplate with Cemented Stem without Cone Augment

Assess length of the construct and determine the appropriate depth of cement restrictor.

Insert corresponding restrictor.

Attach Revision Baseplate Impactor/Extractor to the Impaction Handle.

Assemble the Tibial Implant Assembly to the Revision Baseplate Tibial Impactor/ Extractor by turning the knob.

Ensure the tab of the Impactor/Extractor is engaged under the posterior lip of the baseplate (**Figures 84-86**).

Irrigate the joint and then dry.

Mix cement.

Apply cement to the appropriate sections of the tibial implant assembly and the proximal tibia.

- Use the standard cementing technique with a cement gun to retrograde fill the canal.
- Apply doughy cement to the back surface of the baseplate and build the cement up along the stem implant junction proximally.

Pressurize the cement into the metaphysis and onto the flat tibial surface.

Impact the tibial implant assembly onto the tibia until fully seated (do so when the cement is in its doughy state) and remove excess cement. Ensure proper rotation and alignment of the baseplate prior and during impaction.



Figure 84



Figure 85



Figure 86

### Revision Baseplate with Fluted Stem and Cone Augment

Attach Revision Baseplate Impactor/Extractor to the Impaction Handle.

Assemble the Tibial Implant Assembly to the Revision Baseplate Tibial Impactor/ Extractor by turning the knob.

Ensure the tab of the Impactor/Extractor is engaged under the posterior lip of the baseplate (**Figures 87-89**).

Irrigate the joint and then dry.

Mix cement.

#### Technical points

Tibial Cone Implant used with a Fluted stems will require at least one dose of cement for Cone sizes B and C and 2 doses for Cone sizes D and E will be required in the absence of major bone voids.

When using Fluted Stems with Cone implants, wipe the inside surface of the cone with a thin layer of wet cement (avoid cement moving distally beyond the inferior edge of the cone). Apply doughy cement to the back surface of the baseplate and build the cement up along the stem implant junction proximally so that the cement can fill the full depth of the cone.

Make sure the stem tray construct has enough cement coating the implant, with enough volume to fill the Cone and cover the stem tray junction.

Pressurize the cement into the flat tibial surface.

Impact the tibial implant assembly onto the tibia until fully seated (do so when the cement is in its dough-like state) and remove excess cement. Ensure proper rotation and alignment of the baseplate prior and during impaction.



Figure 87



Figure 88



Figure 89

### Revision Baseplate with Fluted Stem without Cone Augment

Assess length of the construct and determine the appropriate depth of cement restrictor.

Insert corresponding restrictor.

Attach Revision Baseplate Impactor/Extractor to the Impaction handle.

Assemble the Tibial Implant Assembly to the Revision Baseplate Tibial Impactor/Extractor by turning the knob.

Ensure the tab of the Impactor/Extractor is engaged under the posterior lip of the baseplate (**Figures 90-92**).

Irrigate the joint and then dry.

Mix cement.

Apply cement to the appropriate sections of the tibial implant assembly and the proximal tibia.

Pressurize the cement into the flat tibial surface.

Impact the tibial implant assembly onto the tibia until fully seated and remove all excess cement. Ensure proper rotation and alignment of the baseplate prior and during impaction.



Figure 90



Figure 91



Figure 92

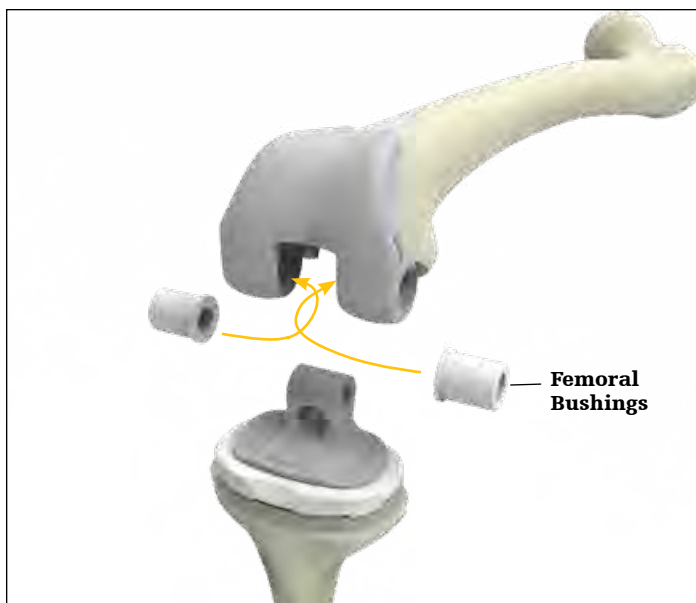


Figure 93

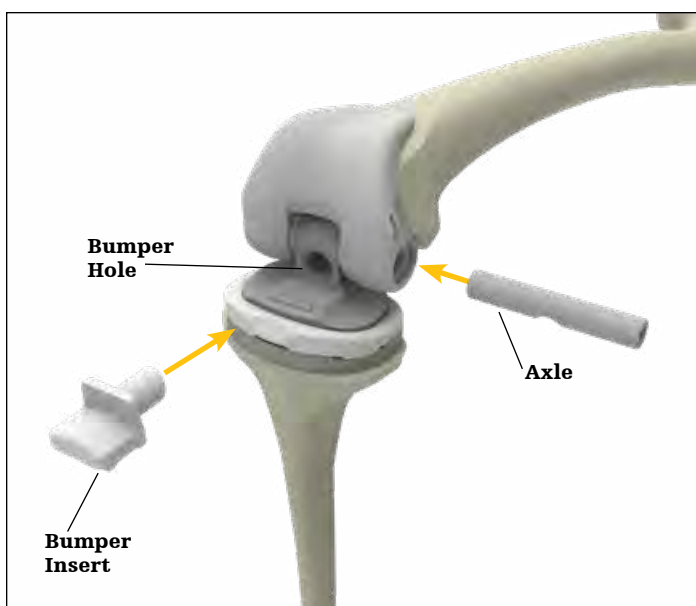


Figure 94

## Final Hinge Mechanism assembly

Refer to the Compatibility section of the protocol for hinge component compatibility.

Flex the knee to 90 degrees, insert the Tibial Sleeve (5612-5-002) into the baseplate until it is flush with the surface.

Ensure that the Baseplate is completely free of debris. Once the definitive Hinge Tibial Insert is selected, attach the Tibial Insert Impactor to the Impaction Handle.

Angle the Hinge Tibial Insert posteriorly into the Revision Baseplate.

Impact the insert to snap it into place anteriorly.

Place the appropriate Triathlon Hinge Tibial Bearing Component into the Revision Baseplate Insert construct.

Place both Bushings into the MRH Femur with the flanges facing the inside of the intercondylar notch (**Figure 93**).

With the knee in 90 degrees of flexion, line up the Tibial Bearing Component with the holes of the Femoral Component Bushings and slide the implant Axle into the assembly until the "recess" in the Axle can be seen through the Tibial Bearing Component from the front (**Figure 94**). Rotate the axle so that the "recess" is inferior. The Axle Guide Rod can be used to align the axle.

With the Axle correctly oriented, the Bumper can now be inserted. This should be impacted into the Tibial Bearing Component until it is flush with the hinge housing and has cleared the "snap-fit" lip on the Tibial Bearing Component.

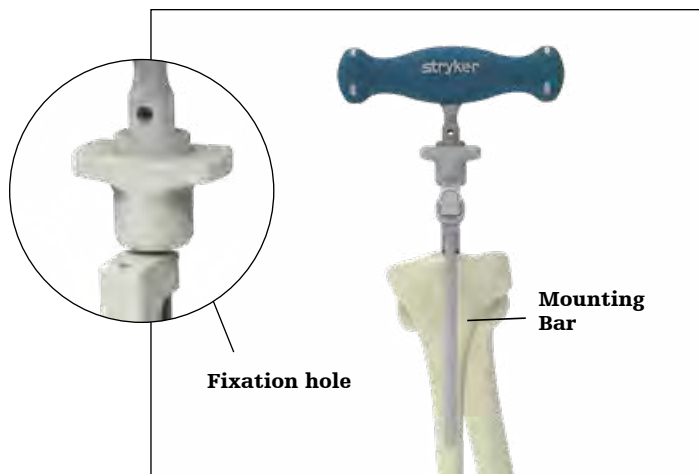
The Bumper implant is available in two options, neutral and 3° flexion.

- ▶ **Note:** With the Bumper inserted, the axle should not be further rotated.
- ▶ **Surgical tip:** Application of cement in a doughy state will allow the implant to fully seat and facilitate interdigitation of cement into bone.

## Closure

After cement polymerization and removal of all residual cement, thoroughly irrigate the joint. Hemostasis is achieved after deflation of the tourniquet.

Close soft tissues in the normal, layered fashion.



**Figure 95**



**Figure 96**



**Figure 97**

## Addendums

### Addendum 1

#### Revision Baseplate Tibial preparation with Primary Tibial instrumentation

With the body of the tibial alignment jig IM resting on the proximal tibia, proper rotational alignment can be achieved by rotating the instrument about the 5/16" IM rod so that the vertical mounting bar is over the medial 1/3 of the tibial tubercle. A headless pin or the 1/8" drill is then inserted into the fixation hole to fix rotation (see inset **Figure 95**).

Assemble the appropriate Tibial Resection Guide (left or right) on the Tibial Adjustment Housing.

Ensure posterior slope is set to 0 degrees.

Attach the assembly onto the mounting bar by pressing the bronze wheel on the Tibial Adjustment Housing. Attach the Universal Alignment Handle to the Tibial Resection Guide and slide a Universal Alignment Rod through the handle for sagittal assessment (**Figure 96**). When alignment is confirmed, the Universal Alignment Handle should be centered over the ankle.

In a revision procedure a 2mm cleanup resection cut can be performed. 2mm of bone will be resected with the initial proximal resection when using the "2" end of the Triathlon Stylus.

The height of the Tibial Resection Guide, Tibial Stylus and Tibial Adjustment Housing can be adjusted using the bronze wheel on the Tibial Adjustment Housing. For coarse adjustment, press the bronze wheel and slide the assembly up or down. For fine adjustment, turn the bronze wheel to the right to move the assembly up the Proximal Rod or turn left to move the assembly down the Proximal Rod (**Figure 97**).



Place two Headless Pins into the “0” [neutral] holes, fixing the level of the Tibial Resection Guide.

If additional stability of the guide is required, utilize the oblique “X” pin-hole.

Remove all alignment instruments leaving only the Tibial Resection Guide in place. Squeeze the bronze tabs on the Tibial Adjustment Housing to disengage the assembly from the Tibial Resection Guide. Slide the Tibial Adjustment Housing anteriorly. Remove the 5/16” IM Rod, the Tibial Alignment Jig IM, the Tibial Adjustment Housing and the Universal Alignment Handle.

Resection of the proximal tibia is now completed. An optional Tibial Resection Guide Modular Capture (Left or Right) may be added.

Remove the Tibial Resection Guide.

For the remaining tibial preparation technique proceed to the Tibial Template sizing section of the desired technique guide.

## Triathlon Revision instruments

For all MRH instrument part numbers see MRH-SP-2

Item number	Description	Quantity in set
6543-6-501	Revision IM Reamers (8-19mm)-- Tray	1
6543-7-527	Boss/Offset Reamer	1
6543-6-019	Revision Boss Reamer	1
6543-7-508	8mm Starter Awl	1
6543-7-509	IM Reamer - 9mm	1
6543-7-510	IM Reamer - 10mm	1
6543-7-511	IM Reamer - 11mm	1
6543-7-512	IM Reamer - 12mm	1
6541-4-800	T-Handle Driver	1
6541-4-538	3/8" IM Drill	1
6543-7-513	IM Reamer - 13mm	1
6543-7-514	IM Reamer - 14mm	1
6543-7-515	IM Reamer - 15mm	1
6543-7-516	IM Reamer - 16mm	1
6543-7-517	IM Reamer - 17mm	1
6543-7-518	IM Reamer - 18mm	1
6543-7-519	IM Reamer - 19mm	1
5560-T-109	Cemented Stem Trial 9 x 50mm	2
5560-T-112	12 x 50mm Stem Trial	2
5560-T-115	15 x 50mm Stem Trial	2
6543-6-502	Revision General-- Tray	1
6541-4-602	Universal Alignment Rod	1
6541-4-806	Universal Alignment Handle	1
6541-4-803	Slap Hammer	1
6541-4-801	Universal Driver	1
6541-4-400	Blade Runner	1
6543-1-603	Size 1-8 Femoral Sizing Templates	1
6541-4-804	Headless Pin Extractor	1
6541-4-518	1/8" Drill	1
6541-4-300	Headed Nail Impactor/Extractor	1
6541-4-003A	Headless Pins - 3"	4
6541-4-515	Headed Nails - 1 1/2"	2
6541-4-575	Headed Nails - 3/4"	2
6541-4-809	Headless Pin Driver	1

## Triathlon Revision instruments (continued)

For all MRH instrument part numbers see MRH-SP-2

Item number	Description	Quantity in set
6543-6-503	Revision Tibial Prep-- Tray	1
5545-T-102	Tibial Augment Trial, Size 1 RM/LL - 5mm	1
5545-T-101	Tibial Augment Trial, Size 1 LM/RL - 5mm	1
5545-T-202	Tibial Augment Trial, Size 2 RM/LL - 5mm	1
5545-T-201	Tibial Augment Trial, Size 2 LM/RL - 5mm	1
5545-T-302	Tibial Augment Trial, Size 3 RM/LL - 5mm	1
5545-T-301	Tibial Augment Trial, Size 3 LM/RL - 5mm	1
5545-T-402	Tibial Augment Trial, Size 4 RM/LL - 5mm	1
5545-T-401	Tibial Augment Trial, Size 4 LM/RL - 5mm	1
5545-T-502	Tibial Augment Trial, Size 5 RM/LL - 5mm	1
5545-T-501	Tibial Augment Trial, Size 5 LM/RL - 5mm	1
5545-T-602	Tibial Augment Trial, Size 6 RM/LL - 5mm	1
5545-T-601	Tibial Augment Trial, Size 6 LM/RL - 5mm	1
5545-T-702	Tibial Augment Trial, Size 7 RM/LL - 5mm	1
5545-T-701	Tibial Augment Trial, Size 7 LM/RL - 5mm	1
5545-T-802	Tibial Augment Trial, Size 8 RM/LL - 5mm	1
5545-T-801	Tibial Augment Trial, Size 8 LM/RL - 5mm	1
5546-T-102	Tibial Augment Trial, Size 1 RM/LL - 10mm	1
5546-T-101	Tibial Augment Trial, Size 1 LM/RL - 10mm	1
5546-T-202	Tibial Augment Trial, Size 2 RM/LL - 10mm	1
5546-T-201	Tibial Augment Trial, Size 2 LM/RL - 10mm	1
5546-T-302	Tibial Augment Trial, Size 3 RM/LL - 10mm	1
5546-T-301	Tibial Augment Trial, Size 3 LM/RL - 10mm	1
5546-T-402	Tibial Augment Trial, Size 4 RM/LL - 10mm	1
5546-T-401	Tibial Augment Trial, Size 4 LM/RL - 10mm	1
5546-T-502	Tibial Augment Trial, Size 5 RM/LL - 10mm	1
5546-T-501	Tibial Augment Trial, Size 5 LM/RL - 10mm	1
5546-T-602	Tibial Augment Trial, Size 6 RM/LL - 10mm	1
5546-T-601	Tibial Augment Trial, Size 6 LM/RL - 10mm	1
5546-T-702	Tibial Augment Trial, Size 7 RM/LL - 10mm	1
5546-T-701	Tibial Augment Trial, Size 7 LM/RL - 10mm	1
5546-T-802	Tibial Augment Trial, Size 8 RM/LL - 10mm	1
5546-T-801	Tibial Augment Trial, Size 8 LM/RL - 10mm	1
6543-7-601	Resection Guide Tower	1
6543-7-600	Support Arm Assembly	1
6543-6-700	Revision Tibial Resection Guides - Slotted -Left	1
6543-6-701	Revision Tibial Resection Guides - Slotted -Right	1
6541-2-807	Alignment Handle	1
6541-2-429Y	Tibial Stylus	1
6541-2-601	Universal Tibial Template Size 1	1
6541-2-602	Universal Tibial Template Size 2	1
6541-2-603	Universal Tibial Template Size 3	1
6541-2-604	Universal Tibial Template Size 4	1
6541-2-605	Universal Tibial Template Size 5	1
6541-2-606	Universal Tibial Template Size 6	1
6541-2-607	Universal Tibial Template Size 7	1
6541-2-608	Universal Tibial Template Size 8	1

**Triathlon Revision instruments** (continued)

For all MRH instrument part numbers see MRH-SP-2

Item number	Description	Quantity in set
6543-6-504	Revision 100mm Stem Trial (9-25mm)-- Tray	1
5565-T-009A	9 x 100mm Stem Trial	1
5565-T-010A	10 x 100mm Stem Trial	2
5565-T-011A	11 x 100mm Stem Trial	2
5565-T-012A	12 x 100mm Stem Trial	2
5565-T-013A	13 x 100mm Stem Trial	2
5565-T-014A	14 x 100mm Stem Trial	2
5565-T-015A	15 x 100mm Stem Trial	2
5565-T-016A	16 x 100mm Stem Trial	2
5565-T-017A	17 x 100mm Stem Trial	2
5565-T-018A	18 x 100mm Stem Trial	2
5565-T-019A	19 x 100mm Stem Trial	2
5565-T-020A	20 x 100mm Stem Trial	2
5565-T-021A	21 x 100mm Stem Trial	1
5565-T-022A	22 x 100mm Stem Trial	1
5565-T-023A	23 x 100mm Stem Trial	1
5565-T-024A	24 x 100mm Stem Trial	1
5565-T-025A	25 x 100mm Stem Trial	1
6543-6-505	Revision Finishing-- Tray	1
6541-4-810	Impaction Handle	2
6541-4-813	Tibial Insert Impactor	1
6543-4-818	Universal Torque Wrench	1
6543-6-801	Universal Counter Wrench	1
6541-4-807	Femoral Impactor/Extractor	1
6541-4-811	Femoral Impactor	1
6541-4-812	Baseplate Impactor	1
6543-6-850	Revision Baseplate Impactor/Extractor	1
6543-6-030	Hinge Femoral Counter Wrench	1
6541-4-825	Slip Torque Handle	1
6541-4-805	Tibial Baseplate Impactor/Extractor	1
6541-4-802	1/8" Hex Drive	1
6543-4-802	Universal 1/8" Hex Driver	1
6543-4-600	Stabilizer Post Impactor	1

## Triathlon Revision instruments (continued)

For all MRH instrument part numbers see MRH-SP-2

Item number	Description	Quantity in set
6543-6-512	Revision Baseplate Finishing-- TRAY	1
6543-6-038	IM Reamer Neutral Bushing Guide	1
5612-T-100	Revision Baseplate Trial, Size 1	1
5612-T-200	Revision Baseplate Trial, Size 2	1
5612-T-300	Revision Baseplate Trial, Size 3	1
5612-T-400	Revision Baseplate Trial, Size 4	1
5612-T-500	Revision Baseplate Trial, Size 5	1
5612-T-600	Revision Baseplate Trial, Size 6	1
5612-T-700	Revision Baseplate Trial, Size 7	1
6543-6-313	Revision Baseplate Keel Punch, Size 1-3	1
6543-6-346	Revision Baseplate Keel Punch, Size 4-6	1
6543-6-347	Revision Baseplate Keel Punch, Size 7	1
6543-6-413	Revision Baseplate Keel Punch Guide, Size 1-3	1
6543-6-447	Revision Baseplate Keel Punch Guide, Size 4-7	1
6543-6-039	Hinge Tibial Stylus	1
6543-6-513	Hinge Insert Trials-- TRAY	1
6543-6-018	Femoral Bushing Trial	2
6543-6-020	Hinge Trial Axle	1
6543-6-049	Filler Bushing Removal Tool	1
6543-6-050	Alignment Guide	1
6543-6-058	Hinge Tibial Bearing Post Trial, Size 1-2	1
6543-6-059	Hinge Tibial Bearing Post Trial, Size 3-4	1
6543-6-060	Hinge Tibial Bearing Post Trial, Size 5-6	1
6543-6-061	Hinge Bearing Insert Trial, Size 1	1
6543-6-062	Hinge Bearing Insert Trial, Size 2	1
6543-6-063	Hinge Bearing Insert Trial, Size 3	1
6543-6-064	Hinge Bearing Insert Trial, Size 4	1
6543-6-065	Hinge Bearing Insert Trial, Size 5	1
6543-6-066	Hinge Bearing Insert Trial, Size 6	1
6543-6-067	Hinge Bearing Insert Trial, Size 7	1
6543-6-071	Hinge Trial Bearing Plate, Size 1-2	1
6543-6-073	Hinge Trial Bearing Plate, Size 3-4	1
6543-6-075	Hinge Trial Bearing Plate, Size 5-6	1
6543-6-101	Triathlon Hinge Trial Bumper 0°	1
6543-6-103	Triathlon Hinge Trial Bumper 3°	1
6481-1-008	Axle Guide Rod	2
6543-6-070	Triathlon Hinge Insertion/Removal Handle	1

**Triathlon Revision instruments** (continued)

For all MRH instrument part numbers see MRH-SP-2

Item number	Description	Quantity in set
6543-6-517	Revision IM Reamers (20-25mm)-- TRAY	1
6543-7-520	IM Reamer - 20mm	1
6543-7-521	IM Reamer - 21mm	1
6543-7-522	IM Reamer - 22mm	1
6543-7-523	IM Reamer - 23mm	1
6543-7-524	IM Reamer - 24mm	1
6543-7-525	IM Reamer - 25mm	1
5571-T-025	Triathlon Stem Extender Trial - 25mm	2
5571-T-050	Triathlon Stem Extender Trial - 50mm	2
6543-6-518	Revision 150mm Stem Trial (9-25mm)	1
5566-T-009A	9 x 150mm Stem Trial	1
5566-T-010A	10 x 150mm Stem Trial	1
5566-T-011A	11 x 150mm Stem Trial	2
5566-T-012A	12 x 150mm Stem Trial	2
5566-T-013A	13 x 150mm Stem Trial	2
5566-T-014A	14 x 150mm Stem Trial	2
5566-T-015A	15 x 150mm Stem Trial	2
5566-T-016A	16 x 150mm Stem Trial	1
5566-T-017A	17 x 150mm Stem Trial	1
5566-T-018A	18 x 150mm Stem Trial	1
5566-T-019A	19 x 150mm Stem Trial	1
5566-T-020A	20 x 150mm Stem Trial	1
5566-T-021A	21 x 150mm Stem Trial	1
5566-T-022A	22 x 150mm Stem Trial	1
5566-T-023A	23 x 150mm Stem Trial	1
5566-T-024A	24 x 150mm Stem Trial	1
5566-T-025A	25 x 150mm Stem Trial	1

**Triathlon Revision instruments** (continued)

For all MRH instrument part numbers see MRH-SP-2

Item number	Description	Quantity in set
6543-5-200	Tibial Symmetric Cone Reamer	1
6543-5-220	Tibial Asymmetric Cone Reamer Size B	1
6543-5-230	Tibial Asymmetric Cone Reamer Size C	1
6543-5-240	Tibial Asymmetric Cone Reamer Size D	1
6543-5-250	Tibial Asymmetric Cone Reamer Size E	1
6543-5-201	Tibial Cone Reamer Guide LM/RL	1
6543-5-202	Tibial Cone Reamer Guide RM/LL	1
6543-5-203	Tibial Cone Alignment Guide	1
6543-8-017	Tibial Cone Upper Tray	1
6543-5-211	Tibial Cone Introducer Size A	1
6543-5-221	Tibial Cone Introducer Size B	1
6543-5-231	Tibial Cone Introducer Size C	1
6543-5-241	Tibial Cone Introducer Size D	1
6543-5-251	Tibial Cone Introducer Size E	1
6541-5-100	Cone Extractor	1
5549-T-110	Tibial Symmetric Cone Augment Trial Size A	1
5549-T-120	Tibial Symmetric Cone Augment Trial Size B	1
5549-T-130	Tibial Symmetric Cone Augment Trial Size C	1
5549-T-140	Tibial Symmetric Cone Augment Trial Size D	1
5549-T-150	Tibial Symmetric Cone Augment Trial Size E	1
5549-T-221	Tibial Asymmetric Cone Augment Trial Size B LM/RL	1
5549-T-222	Tibial Asymmetric Cone Augment Trial Size B RM/LL	1
5549-T-231	Tibial Asymmetric Cone Augment Trial Size C LM/RL	1
5549-T-232	Tibial Asymmetric Cone Augment Trial Size C RM/LL	1
5549-T-241	Tibial Asymmetric Cone Augment Trial Size D LM/RL	1
5549-T-242	Tibial Asymmetric Cone Augment Trial Size D RM/LL	1
5549-T-251	Tibial Asymmetric Cone Augment Trial Size E LM/RL	1
5549-T-252	Tibial Asymmetric Cone Augment Trial Size E RM/LL	1
6543-8-117	Tibial Cone Lower Tray	1
5900-8114	Stryker Case	1

## Triathlon Revision implants

For all MRH implant part numbers see MRH-SP-2

### Triathlon Hinge accessory implant part numbers

Item number	Description
5612-0-003	Triathlon Hinge Tibial Bearing Component Size 3-4
5612-0-005	Triathlon Hinge Tibial Bearing Component Size 5-6
6481-2-110	MRH Femoral bushings
6481-2-120	MRH Axle
6481-2-150	MRH bushings, Sleeve, Neutral Bumper Package *Optional package used for sleeve and bushings and bumper
5612-3-000	Triathlon Bushings and Axle Standard Assembly Pack
6481-2-130	MRH Neutral bumper
6481-2-133	MRH 3 degree bumper

### Triathlon Revision Tibial Baseplate part numbers

Item number	Description
5612-B-100	Triathlon Revision Tibial Baseplate Size 1
5612-B-200	Triathlon Revision Tibial Baseplate Size 2
5612-B-300	Triathlon Revision Tibial Baseplate Size 3
5612-B-400	Triathlon Revision Tibial Baseplate Size 4
5612-B-500	Triathlon Revision Tibial Baseplate Size 5
5612-B-600	Triathlon Revision Tibial Baseplate Size 6
5612-B-700	Triathlon Revision Tibial Baseplate Size 7



## Triathlon Revision implants (continued)

For all MRH implant part numbers see MRH-SP-2

### Triathlon Revision Tibial Augment part numbers

Item number	Description
5612-A-110	Triathlon Revision Tibial Augment Size 1, RM/LL, 10mm
5612-A-111	Triathlon Revision Tibial Augment Size 1, LM/RL, 10mm
5612-A-150	Triathlon Revision Tibial Augment Size 1, RM/LL, 5mm
5612-A-151	Triathlon Revision Tibial Augment Size 1, LM/RL, 5mm
5612-A-210	Triathlon Revision Tibial Augment Size 2, RM/LL, 10mm
5612-A-211	Triathlon Revision Tibial Augment Size 2, LM/RL, 10mm
5612-A-250	Triathlon Revision Tibial Augment Size 2, RM/LL, 5mm
5612-A-251	Triathlon Revision Tibial Augment Size 2, LM/RL, 5mm
5612-A-310	Triathlon Revision Tibial Augment Size 3, RM/LL, 10mm
5612-A-311	Triathlon Revision Tibial Augment Size 3, LM/RL, 10mm
5612-A-350	Triathlon Revision Tibial Augment Size 3, RM/LL, 5mm
5612-A-351	Triathlon Revision Tibial Augment Size 3, LM/RL, 5mm
5612-A-410	Triathlon Revision Tibial Augment Size 4, RM/LL, 10mm
5612-A-411	Triathlon Revision Tibial Augment Size 4, LM/RL, 10mm
5612-A-450	Triathlon Revision Tibial Augment Size 4, RM/LL, 5mm
5612-A-451	Triathlon Revision Tibial Augment Size 4, LM/RL, 5mm
5612-A-510	Triathlon Revision Tibial Augment Size 5, RM/LL, 10mm
5612-A-511	Triathlon Revision Tibial Augment Size 5, LM/RL, 10mm
5612-A-550	Triathlon Revision Tibial Augment Size 5, RM/LL, 5mm
5612-A-551	Triathlon Revision Tibial Augment Size 5, LM/RL, 5mm
5612-A-610	Triathlon Revision Tibial Augment Size 6, RM/LL, 10mm
5612-A-611	Triathlon Revision Tibial Augment Size 6, LM/RL, 10mm
5612-A-650	Triathlon Revision Tibial Augment Size 6, RM/LL, 5mm
5612-A-651	Triathlon Revision Tibial Augment Size 6, LM/RL, 5mm
5612-A-710	Triathlon Revision Tibial Augment Size 7, RM/LL, 10mm
5612-A-711	Triathlon Revision Tibial Augment Size 7, LM/RL, 10mm
5612-A-750	Triathlon Revision Tibial Augment Size 7, RM/LL, 5mm
5612-A-751	Triathlon Revision Tibial Augment Size 7, LM/RL, 5mm
5612-A-810	Triathlon Revision Tibial Augment Size 8, RM/LL, 10mm
5612-A-811	Triathlon Revision Tibial Augment Size 8, LM/RL, 10mm
5612-A-850	Triathlon Revision Tibial Augment Size 8, RM/LL, 5mm
5612-A-851	Triathlon Revision Tibial Augment Size 8, LM/RL, 5mm

**Triathlon Revision implants** (continued)

For all MRH implant part numbers see MRH-SP-2

**Triathlon Hinge Inserts**

Item number	Description
5612-P-111	Triathlon Hinge Insert Size 1, 11mm
5612-P-113	Triathlon Hinge Insert Size 1, 13mm
5612-P-116	Triathlon Hinge Insert Size 1, 16mm
5612-P-119	Triathlon Hinge Insert Size 1, 19mm
5612-P-122	Triathlon Hinge Insert Size 1, 22mm
5612-P-211	Triathlon Hinge Insert Size 2, 11mm
5612-P-213	Triathlon Hinge Insert Size 2, 13mm
5612-P-216	Triathlon Hinge Insert Size 2, 16mm
5612-P-219	Triathlon Hinge Insert Size 2, 19mm
5612-P-222	Triathlon Hinge Insert Size 2, 22mm
5612-P-311	Triathlon Hinge Insert Size 3, 11mm
5612-P-313	Triathlon Hinge Insert Size 3, 13mm
5612-P-316	Triathlon Hinge Insert Size 3, 16mm
5612-P-319	Triathlon Hinge Insert Size 3, 19mm
5612-P-322	Triathlon Hinge Insert Size 3, 22mm
5612-P-411	Triathlon Hinge Insert Size 4, 11mm
5612-P-413	Triathlon Hinge Insert Size 4, 13mm
5612-P-416	Triathlon Hinge Insert Size 4, 16mm
5612-P-419	Triathlon Hinge Insert Size 4, 19mm
5612-P-422	Triathlon Hinge Insert Size 4, 22mm
5612-P-511	Triathlon Hinge Insert Size 5, 11mm
5612-P-513	Triathlon Hinge Insert Size 5, 13mm
5612-P-516	Triathlon Hinge Insert Size 5, 16mm
5612-P-519	Triathlon Hinge Insert Size 5, 19mm
5612-P-522	Triathlon Hinge Insert Size 5, 22mm
5612-P-611	Triathlon Hinge Insert Size 6, 11mm
5612-P-613	Triathlon Hinge Insert Size 6, 13mm
5612-P-616	Triathlon Hinge Insert Size 6, 16mm
5612-P-619	Triathlon Hinge Insert Size 6, 19mm
5612-P-622	Triathlon Hinge Insert Size 6, 22mm
5612-P-711	Triathlon Hinge Insert Size 7, 11mm
5612-P-713	Triathlon Hinge Insert Size 7, 13mm
5612-P-716	Triathlon Hinge Insert Size 7, 16mm
5612-P-719	Triathlon Hinge Insert Size 7, 19mm
5612-P-722	Triathlon Hinge Insert Size 7, 22mm

## Triathlon Revision implants (continued)

For all MRH implant part numbers see MRH-SP-2

### Triathlon Tritanium Cone Augments part numbers

Item number	Description
5549-A-120	Triathlon Tritanium Symmetric Cone Augment Size B
5549-A-130	Triathlon Tritanium Symmetric Cone Augment Size C
5549-A-140	Triathlon Tritanium Symmetric Cone Augment Size D
5549-A-150	Triathlon Tritanium Symmetric Cone Augment Size E
5549-A-221	Triathlon Tritanium Asymmetric Cone Augment Size B LM/RL
5549-A-222	Triathlon Tritanium Asymmetric Cone Augment Size B RM/LL
5549-A-231	Triathlon Tritanium Asymmetric Cone Augment Size C LM/RL
5549-A-232	Triathlon Tritanium Asymmetric Cone Augment Size C RM/LL
5549-A-241	Triathlon Tritanium Asymmetric Cone Augment Size D LM/RL
5549-A-242	Triathlon Tritanium Asymmetric Cone Augment Size D RM/LL
5549-A-251	Triathlon Tritanium Asymmetric Cone Augment Size E LM/RL
5549-A-252	Triathlon Tritanium Asymmetric Cone Augment Size E RM/LL

### Triathlon TS Stems - Cemented - part numbers

Item number	Description
5560-S-109	Triathlon Cemented Stem 9mm x 50mm
5560-S-112	Triathlon Cemented Stem 12mm x 50mm
5560-S-115	Triathlon Cemented Stem 15mm x 50mm
5560-S-209	Triathlon Cemented Stem 9mm x 100mm
5560-S-212	Triathlon Cemented Stem 12mm x 100mm
5560-S-215	Triathlon Cemented Stem 15mm x 100mm
5560-S-309	Triathlon Cemented Stem 9mm x 150mm
5560-S-312	Triathlon Cemented Stem 12mm x 150mm
5560-S-315	Triathlon Cemented Stem 15mm x 150mm

## Triathlon Revision implants (continued)

For all MRH implant part numbers see MRH-SP-2

### Triathlon TS Stems – Fluted – part numbers

Item number	Description
5565-S-010	Triathlon Fluted Stem, Titanium 10mm x 100mm
5565-S-011	Triathlon Fluted Stem, Titanium 11mm x 100mm
5565-S-012	Triathlon Fluted Stem, Titanium 12mm x 100mm
5565-S-013	Triathlon Fluted Stem, Titanium 13mm x 100mm
5565-S-014	Triathlon Fluted Stem, Titanium 14mm x 100mm
5565-S-015	Triathlon Fluted Stem, Titanium 15mm x 100mm
5565-S-016	Triathlon Fluted Stem, Titanium 16mm x 100mm
5565-S-017	Triathlon Fluted Stem, Titanium 17mm x 100mm
5565-S-018	Triathlon Fluted Stem, Titanium 18mm x 100mm
5565-S-019	Triathlon Fluted Stem, Titanium 19mm x 100mm
5565-S-020	Triathlon Fluted Stem, Titanium 20mm x 100mm
5565-S-021	Triathlon Fluted Stem, Titanium 21mm x 100mm
5565-S-022	Triathlon Fluted Stem, Titanium 22mm x 100mm
5565-S-023	Triathlon Fluted Stem, Titanium 23mm x 100mm
5565-S-024	Triathlon Fluted Stem, Titanium 24mm x 100mm
5565-S-025	Triathlon Fluted Stem, Titanium 25mm x 100mm
5566-S-010	Triathlon Fluted Stem, Titanium 10mm x 150mm
5566-S-011	Triathlon Fluted Stem, Titanium 11mm x 150mm
5566-S-012	Triathlon Fluted Stem, Titanium 12mm x 150mm
5566-S-013	Triathlon Fluted Stem, Titanium 13mm x 150mm
5566-S-014	Triathlon Fluted Stem, Titanium 14mm x 150mm
5566-S-015	Triathlon Fluted Stem, Titanium 15mm x 150mm
5566-S-016	Triathlon Fluted Stem, Titanium 16mm x 150mm
5566-S-017	Triathlon Fluted Stem, Titanium 17mm x 150mm
5566-S-018	Triathlon Fluted Stem, Titanium 18mm x 150mm
5566-S-019	Triathlon Fluted Stem, Titanium 19mm x 150mm
5566-S-020	Triathlon Fluted Stem, Titanium 20mm x 150mm
5566-S-021	Triathlon Fluted Stem, Titanium 21mm x 150mm
5566-S-022	Triathlon Fluted Stem, Titanium 22mm x 150mm
5566-S-023	Triathlon Fluted Stem, Titanium 23mm x 150mm
5566-S-024	Triathlon Fluted Stem, Titanium 24mm x 150mm
5566-S-025	Triathlon Fluted Stem, Titanium 25mm x 150mm

### Triathlon TS Stem Extender part numbers

Item number	Description
5571-S-025	Triathlon Stem Extender 25mm
5571-S-050	Triathlon Stem Extender 50mm

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