Scorpio® TS
Single Axis Revision Knee System
Scorpio® Total Stabilizer Revision Knee System Surgical Protocol

Component Removal .................. 1
Tibial Canal Preparation ............. 1
Proximal Tibial Resection ............. 2
Tibial Augment Preparation
Without Offset ........................ 3
Tibial Sizing ........................... 4
Tibial Augment Preparation
After Offsetting ...................... 5
Femoral Canal Preparation .......... 5
Distal Femoral Resection .......... 6
Distal Femoral Augmentation
Preparation .......................... 7
Flexion and Extension
Gap Assessment ...................... 7
Anterior, Posterior, & Chamfer
Cuts With No Offset ................ 8
Anterior, Posterior, & Chamfer
Cuts With Offset .................... 9
Trial Reduction ....................... 10
Tibial Implant Assembly ............ 12
Femoral Implant Assembly .......... 13
Implant Components ................. 14
Stabilizer Pin ......................... 14
Index: Implant Specifications .... 14
Overview
Scorpio® TS is a unique, comprehensive Revision TKA system with intramedullary based instrumentation for the tibia and femur. The system features cutting guides with a wide array of augment options, offset stem capabilities, and anatomic referencing. Scorpio® TS provides the surgeon with solutions for a broad spectrum of revision scenarios by creating a reproducible means to establish the joint line even in complex cases with bone and ligament deficiencies. The Scorpio® TS instruments are designed to empower the surgeon to accurately restore joint line in cases with severe bone loss and anatomical defects. Based on cadaveric studies, Scorpio® TS utilizes three anatomic landmarks as reference guides: the medial epicondyles of the femur, the top of the tibial tubercle and the inferior pole of the patella. The distal resection guide of the femur was crafted with a scribed line “ME” indicating correct positioning for resection. This line represents the distance from the epicondyles to joint line, thus ensuring joint line is restored. Included in the instrument set is a joint line scale that takes advantage of average distances from the top of the tibial tubercle (32mm) to joint line and the inferior pole of the patella (14mm in full extension) to joint line. This ruler allows a quick and easy check for joint line position.

Acknowledgements
Stryker would like to thank the following orthopaedic surgeons for their help in developing the Scorpio® Knee System:

Peter Bonutti, MD  
Ass’t. Professor  
Effingham Illinois University  
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Ann Arbor Michigan.

Michael Mason, MD  
Ass’t. Professor in Orthopaedic Surgery  
Boston University School of medicine  
Boston, MA  
Clinical Instructor in Orthopaedic Surgery  
Harvard Medical School  
Boston, MA
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. Through the use of small flexible osteotomes, saws, and high-speed burring instruments, bone preservation can usually be achieved.

**Component Removal**

- Ream with 3/8” starter drill if access to canal is not present
- Ream progressively, by hand, until cortical contact is achieved
- Proper reamer depth is achieved with the use of depth gauges (Figure 1)

*Note: If reamed stem diameter is less than 15mm use tibial offset reamer to prepare for implant boss. Ream to depth of bone groove on reamer’s shaft (Figure 1A).*

*Note: Depth gauges account for length of stem, offset adapter, and implant boss.*

*Note: It is strongly recommended that IM Canal reaming be performed manually to avoid bone perforation and/or fracture. Manual reaming should allow for tactile feedback and allow the surgeon to achieve proper fill of the canal without over-reaming. In selected cases, if uncertainty exists, intraoperative X-rays may be considered.*

**Tibial Canal Preparation**

![Figure 1](image1.png)

![Figure 1A](image2.png)
Proximal Tibial Resection

Assemble appropriate stem trial to resection guide tower (Figure 2)

• Attach appropriate size stem (based on ream) to resection guide tower

• Attach reference collar to resection guide tower assembly

• Attach support arm bracket to resection guide tower

• Secure left or right tibial resection guide to support arm bracket by tightening locking screw

Hint: “Consider using the 8mm x 255mm Intramedullary rod for the cutting and aligning portion of the procedure. This will ensure that proper IM alignment is obtained. There is no problem implanting a shorter stem.” Dr. Markel

Hint: “If an offset stem appears necessary, tibial augment resection should be delayed and performed off the tibial template.” Dr. Masini (refer to tibial augment preparation on pages 3 and 5)

Hint: “Stem trial is .5mm smaller than the implant. In poor quality bone it may be necessary to up-size the implant stem.” Drs. Mahoney & Masini.

Insert assembly into canal

• Secure resection guide with two 1/8” pins, using the “0” drill holes (Figure 3)

• Loosen locking screw of tibial resection guide, remove resection guide tower assembly from canal

Hint: Tibial resection can be done with the entire guide tower in place when bone stock is poor

Note: Slap hammer can be inserted into the hole on the resection guide tower to aid in extraction

• Slide cutting guide to contact the tibia

• Stabilize by inserting a pin into the “X” hole

• Resect tibia (a cut in the neutral slot will be 2mm below the reference collar if the resection guide is up against the stop on the support arm assembly) (Figure 4)

Note: This is a 0° (A/P) cut. 4° slope is built into the insert

Figure 2

Figure 3

Figure 4
Tibial Augment Preparation without Offset

• 5mm and 10mm augment cuts can be made with the tibial resection guide (Figure 5)

• Tibial wedge cuts are made by assembling the tibial wedge cutting guide to support arm bracket (Figure 5A)

Hint: “If you recognize that a full wedge is necessary it is best not to pin the regular cutting guide as the pins are in a different location.” Dr. Masini
Tibial Sizing

- Assemble stem trial to trial stem extender shaft and insert into canal until top of large diameter is level with resection (Figure 6)

- Position the appropriate sized tibial template for optimal coverage of the tibial plateau

- Visually assess the position of the trial stem extender shaft and the center of the tibial template

- If offsetting is needed select the appropriate offset bushing (4mm, 6mm or 8mm) to maximize proximal tibial coverage

Note: Available options for instrumented offsetting are 4mm, 6mm, and 8mm

Slide the offset bushing over the trial stem extender shaft and seat in the offset positioning guide (Figure 6A)

- Rotate the bushing, moving the tibial template relative to the stem to determine optimal coverage (Figure 7)

- Record reading

- Pin tibial template

- Remove stem trial with trial stem extender shaft, and offset bushing

Hint: Shaft on slap hammer can be inserted into the hole on the trial stem extender shaft to aid in extraction
• Seat Boss reamer guide in the proximal tibial baseplate

• Insert the tibial offset reamer into the boss reamer guide and ream to the appropriate depth (reference tibial size as indicated by markings on reamer) (Figure 8)

**Hint:** *It is common for the offset reamer to not make bone contact in severe revision scenarios.*

• Remove the boss reamer guide and tibial offset reamer

• Assemble the appropriate tibial keel punch with punch tower and handles

**Hint:** *Allow for augmentation prior to doing keel punch (see below)*

**Note:** *Punch needs to be back loaded through the exit port of the punch tower*

**Hint:** "If sclerotic bone is present, consider using 1/8” drill bit, osteotome, or sagittal saw as preliminary prep for punching.”

*Dr. Mahoney & Masini*

• Assemble punch tower assembly to the tibial template and punch to the final depth, employing progressive punching if required (Figure 9)

**Hint:** *It is very important to ensure all cement is removed prior to punching*

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**Tibial Augment Prep After Offsetting**

• Prior to keel punching, assess the need for augmentation

• Assemble 5 & 10 mm cutting guide to tibial template and make necessary resections or assemble 5 degree tibial wedge cutting guide to tibial template and make necessary resection

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**Femoral Canal Preparation**

• See Tibial Canal Preparation on Page 1
Distal Femoral Resection

• Assemble appropriate stem trial to resection guide tower

• Assemble distal femoral resection guide to support arm bracket by tightening locking screw

• Assemble bracket assembly to resection guide tower assembly (Figure 11)

• Insert assembly into canal and align M/E scribe line on distal resection guide to medial epicondyle (Figure 12)

• Secure resection guide with two 1/8” pins, using the “0” drill holes

• Loosen locking screw of femoral resection guide, remove resection guide tower assembly from canal

• Slide cutting guide on pins to contact the anterior femur

• Stabilize by inserting a pin into the “X” hole

• Resect distal femur (Neutral slot is a 2mm clean up cut)

• Size femur with either femoral sizing templates, or femoral cutting guide (Scribe lines on medial & lateral sides of cutting guide indicates M/L width of implant. Scribe line on anterior tab indicates anterior flange location on the implant.) (Figure 13)

Note: Markings on sizing template help to predetermine if offset will be required

Hint: “Implant removed can be helpful in sizing in cases of severe bone loss.” Dr. Masini
Flexion and Extension Gap Assessment

• After completing the distal femoral resection, the balance and alignment of the flexion and extension gaps can be evaluated through the use of Gap spacer blocks. (Figure 15)

• Spacer blocks are available in multiple thicknesses that correspond to the combined thicknesses of the tibial baseplate, polyethylene insert, and the femoral condyles.

Note: If any augment cuts were made on the distal femur or proximal tibia, Modular half spacers must be attached to the Gap Spacer Blocks (Figure 16)
• Assemble appropriate stem trial to the left or right 0mm-offset valgus adapter and assemble to appropriate size femoral all-in-one cutting guide (Figure 17)

Note: Options available for instrumented offsetting are 2mm and 4mm

• If distal augment cuts were made, assemble the corresponding spacer blocks to femoral cutting guide (Figure 18)

Hint: “If the augment blocks are not positioned correctly the pins will not pass through.” Dr. Kolisek

• If reamed stem diameter is less than 15mm use tibial offset reamer to prepare for implant boss

• Ream with tibial offset reamer to the depth of the “Bone” groove on the reamer shaft

• Determine external rotation by using the medial & lateral epicondyles as a reference to the medial & lateral tabs on the all-in-one cutting guide

• Pin femoral cutting guide using holes on the M/L tabs and the appropriate hole on the anterior tab (Figure 19)

• Perform femoral cuts

Note: Posterior resection is an uncaptured cut made on the exposed posterior surface of the cutting guide. 5mm & 10mm are augment cuts and are captured

• Using a narrow saw blade, make medial & lateral cuts for the stabilizer box (cut should go through posterior femur)

Hint: “Slotted cuts are easier with a double-edged (“Insall”) reciprocating blade.” Dr. Barnes

• The proximal box cut is stopped by stem trial (score bone with saw for marking purpose then remove femoral cutting guide and complete cut) (Figure 19A)
Anterior, Posterior, & Chamfer Cuts with Offset

• Assemble stem trial to femoral offset reamer (Figure 20)

• Ream to “Bone” mark on femoral offset reamer (Figure 21)

• Assemble appropriate stem trial to the left or right appropriate offset valgus adapter and assemble to appropriate femoral cutting guide

Note: Options available for instrumented offsetting are 2mm and 4mm

• If distal augment cuts were made, assemble the corresponding spacer blocks to femoral cutting guide

• Insert blade runner into anterior slot (to prevent notching)

• Using 4mm ball hex driver position femoral cutting guide for optimal placement of the femur with respect to the canal (Figure 22)

• Record offset value from offset adapter

• Determine external rotation by using the medial & lateral epicondyles

• Pin femoral cutting guide using holes on sides and anterior tab

• Perform femoral cuts

Note: Posterior resection is a un-captured cut and is made on the exposed posterior surface of the cutting guide. 5mm & 10mm posterior augment cuts are captured

• Using a narrow saw blade, make side cuts for the stabilizer box (see Figure 19A opposite)

• The top cut is stopped by stem trial

• Remove femoral cutting guide and complete top cut
**Trial Reduction**

**Femoral Component (Figure 23)**

The trial femoral component is assembled with required augments and stems, corresponding to the completed femoral bone preparation. The options include:

- Medial and/or lateral distal spacers (5mm, 10mm, 15mm)
- Medial and/or lateral posterior spacers (5mm, 10mm)
- Intramedullary Stem Extenders in various lengths, diameters, and offsets.

*Note: Options available for instrumented offsetting are 2mm and 4mm (refer to implant assembly)*

Trial augments snap into trial component

**Tibial Component (Figure 24)**

Assemble the trial component corresponding to the tibial preparation. The implant options are:

- Half 5mm, or 10mm blocks
- Full 10mm Block
- 5 degree full wedge

Trial augments snap into trial component
Insert Trials

• Trial inserts snap on to tibial trial baseplate

Note: When mixing a size #7 femur and #5 tibia or a #11 femur and a #9 tibia, the “bridging inserts” should be used (see Compatibility Chart below)

Note: If varus/valgus constraint is not desired the Scorpio® PS insert will articulate with the Scorpio® TS Femur

### Scorpio® TS Implant Compatibility Chart

(“XX” Denotes insert thickness)

<table>
<thead>
<tr>
<th>Femoral Components</th>
<th>Tibial Baseplates*</th>
</tr>
</thead>
<tbody>
<tr>
<td>76-4103</td>
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</tr>
<tr>
<td>76-4113</td>
<td>72-4-07XX</td>
</tr>
</tbody>
</table>

*C Scorpio® PS Inserts may be used.
**Tibial Implant Assembly**

*Note: The full wedge is the only augment that requires cementing*

- Assemble tibial augments necessary with the 2.5mm hex driver to the tibial baseplate implant. Hand tighten only

*Note: If tibial stem/offset is to be used remove keel end-cap with 5mm hex wrench*

Assemble stem to offset adapter if needed. Torque to 120-180lbs (not required for trialing). Use offset counter wrench and appropriate adapter to the torque wrench

- Ensure jam nut is up against the offset adapter (Figure 25)

- Assemble stem and offset adapter to tibial baseplate

- Put tibial baseplate on table with stem pointing towards ceiling

- Bring offset fixture over the stem and secure

- With counter wrench in left hand slide pin all the way to “STD” markings on wrench (align scribe line on wrench with scribe line on offset adapter)

- Insert pin into hole determined by instrumentation (see page 4)

- Rotate offset adapter counterclockwise until the hash marks are aligned and offset adapter body fits into wrench

- Hand tighten the jam nut against the tibial baseplate (Not the offset)

- Lock in place with jam nut wrench. (Pull towards you) Torque to 120-180lbs (not required for trialing) (Figure 26)
Femoral Implant Assembly

Note: If femoral stem/offset is to be used remove stem end-cap with 4mm hex wrench Assemble stem to offset adapter if needed.

• Ensure jam nut is up against the offset adapter (Figure 25)

• Thread stem/offset assembly into femoral component completely

• Align hash marks on offset adapter trial to hash marks on the box of the femoral component (Figure 27)

• Hand tighten the jam nut against the femoral component (not the stem) no more than one complete turn

• Insert femoral counter wrench between anterior flange and the femoral boss (Figure 28)

• Lock in place with jam nut wrench. Use femoral counter wrench an jam nut wrench to torque to 120-180lbs (not required for trialing)

• Assemble femoral augments as necessary by utilizing the 4-mm ball hex driver. Hand tighten only (Figure 29)

Implant Components

• Implant tibial component by assembling to the tibial impactor/extractor

• Implant femoral component by assembling the femur to the femoral impactor/extractor

• Implant the tibial insert into the tibial tray by tapping the insert with the tibial impactor and a mallet
**Stabilizer Pin**

- Insert locking pin into insert post “barbed” end up (Figure 30)
- Tap down below anterior surface

*Note: Stabilizer pin is packaged with the insert*

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### Scorpio® TS Revision Knee System Technical Information

#### Baseplate

<table>
<thead>
<tr>
<th>Size</th>
<th>A/P (mm)</th>
<th>M/L (mm)</th>
<th>*Stem Length (mm)</th>
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<tbody>
<tr>
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<td>40</td>
<td>61</td>
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<td>5</td>
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</table>

*With end cap

#### Insert

<table>
<thead>
<tr>
<th>Size</th>
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<tr>
<td>Thickness (mm)</td>
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<tr>
<td>Post Height/Width</td>
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<tr>
<td></td>
<td>7F/5T, 7, 9, 27 mm/18 mm</td>
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<tr>
<td></td>
<td>11F/9T, 11, 13, 29 mm/20 mm</td>
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</table>

*Jump Height 21 mm

| Varus / Valgus Constraint | ± 2º |
| Internal / External Constraint | ± 10º |
| Posterior Slope            | 4º   |
| Cam Engagement             | 60º  |

* The distance the femoral component must travel to clear the post in 90° of flexion
**Femur**

**Stem Extenders Titanium Fluted and Vitallium® Alloy Pressfit**

<table>
<thead>
<tr>
<th>Size</th>
<th>A/P Medial (mm)</th>
<th>A/P Lateral (mm)</th>
<th>M/L (mm)</th>
<th>Resected A/P (mm)</th>
<th>Box Height (mm)</th>
<th>Box Width (mm)</th>
<th>*Stem Height (mm)</th>
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</table>

*With end cap

**Titanium Fluted Stem** (155 mm shown)

**Vitallium® Alloy Press Fit Stem** (80 mm shown)

**80 mm Length**

10 mm Ø, 11 mm Ø, 12 mm Ø, 13 mm Ø, 14 mm Ø, 15 mm Ø, 16 mm Ø, 17 mm Ø, 18 mm Ø, 19 mm Ø, 21 mm Ø, 23 mm Ø

**155 mm Length**

10 mm Ø, 11 mm Ø, 12 mm Ø, 13 mm Ø, 14 mm Ø, 15 mm Ø, 16 mm Ø, 17 mm Ø, 18 mm Ø, 19 mm Ø, 21 mm Ø, 23 mm Ø

• Tri-slots available in Titanium fluted stems only – 14 mm through 23 mm diameters in 155 mm length.

• Offset adapters mate with all stems, Scorpio® TS baseplates, and Scorpio® TS femoral components. Offset adapters are available in 2 mm, 4 mm, 6 mm, and 8 mm configurations.
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Literature Number: LSTS/ST
GC/GS 2.25m 06/04

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