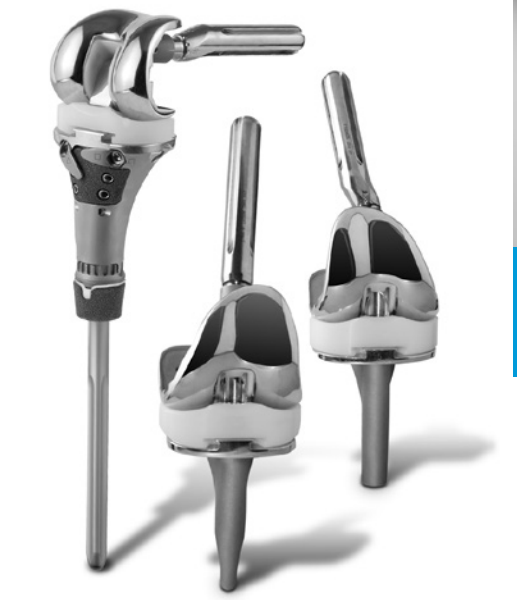
Zimmer® NexGen® RH Knee Primary/Revision

Surgical Technique



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Introduction

The *NexGen*® Rotating Hinge Knee (RH Knee) is designed for revision, difficult primary, and limb salvage surgeries in patients with significant bone loss and/or ligament deficiencies.

Although most RH Knee surgeries involve revision arthroplasty, this document provides options for all procedure types **(Table 1)**.

- Revision: the RH Knee is implanted using the *NexGen* Revision Instrumentation System, an intramedullary referencing system with all femoral and tibial cuts based from a reamer or Stem Extension Provisional located within the medullary canal.
- Difficult Primary: the RH Knee is implanted using either the *NexGen* Revision Instrumentation System or the *Multi-Reference*® 4-in-1 Femoral Instrumentation System.
- Limb Salvage: The RH Knee is also available for use in Proximal Tibial Replacements (PTR) in conjunction with the *Zimmer*® Segmental System *Trabecular Metal*™ Proximal Tibial Component (Refer to the Segmental System *Trabecular Metal* Proximal Tibial Component Surgical Technique (97-5850-006-00)). The *Zimmer* Segmental Distal Femur is also compatible with the RH Knee Tibial Components (Refer to the Segmental System Distal Femoral Component Surgical Technique 97-5850-004-00).

For all procedures, the tibial platform is established first because the tibial articular surface affects both the flexion and extension gaps, whereas the femoral component affects either the flexion or extension gap. The *Zimmer* Revision Knee Arthroplasty Surgical Guidelines booklet 97-5224-003-00 is recommended for a more complete discussion on revision total knee arthroplasty technique.

The RH Knee prosthesis is constrained both mediolaterally and anteroposteriorly, but allows flexion/extension and rotation between the femoral and tibial components. To further accommodate the needs of each patient, the RH Knee system is compatible with a wide variety of *NexGen* Revision implants and the *Zimmer* Segmental System **(Table 2)**.

Procedure	Instrumentation	Reference
Revision	NexGen Revision Instrumentation System	Main Body
Difficult Primary	RH Knee Instrumentation	Appendix B
	LCCK 4-in-1 Instrumentation	Appendix C
Limb Salvage (PTR)	RH Knee / LCCK 4-in-1 & Zimmer Segmental System	Appendix D
Servicing the Hinge	RH Knee & Zimmer Segmental System Instrumentation	Appendix G

Table. 1

Procedure References

Option 1 Option 2 Option 3*

Component	Compatibility	Reference
Tibial Component	RH Knee Modular (Option 1) or non-Modular (Option 2) Tibial Component	Main Body
	Segmental *Trabecular Metal* Proximal Tibial Component (Option 3)	Appendix D
Articular Surface	RH Knee Articular Surface	Main Body
	Segmental Articular Surface (extended sizing options)	
Hinge Post	RH Knee Modular Hinge Post Extension	Main Body
	Segmental One-piece Hinge Post (Back Table Assembly)	Appendix E
	Segmental One-piece Hinge Post (In vivo Assembly)	Appendix F
Bone loss solutions	*NexGen* Augments & Cones	Main Body

Table. 2

RH Knee Compatibility (Segmental Distal Femur Compatibility not shown)

* Refer to the Segmental System *Trabecular Metal* Proximal Tibial Component Surgical Technique (97-5850-006-00)

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Revision Arthroplasty Using RH Knee Instrumentation

Step 1: Establish Tibial Platform

- If necessary, drill a starting hole with the 8mm IM Step Drill centered mediolaterally over the midpoint of the isthmus of the tibial canal.
- Beginning with the 9mm Intramedullary Reamer, progressively ream the tibial canal.
  - Ream until cortical contact is achieved.
  - Ream at least 1cm greater than the overall length of the selected components, burying the cutting flutes beneath the bone surface **(Fig. 1)**.

Warning: Because there is relatively little bone available in the tibia, perforation or fracture can occur with aggressive reaming.

Fig. 1

TECHNIQUE TIP 1.A

Use external tibial landmarks to help ensure that the reamer remains in line with the tibial shaft.

TECHNIQUE TIP 1.B

*To help visualize reaming depth, lay the desired Tibial Provisional assembly next to the reamer and use a pen to mark the depth **(Fig. 2)**.*

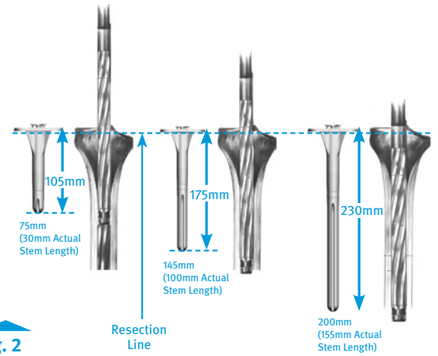


Fig. 2

Notes:

- **If the center of the tibial diaphysis and the center of the medullary canal do not coincide, an Offset Stem Extension is available.**
- **Reamer diameters start at 9mm and increase by 1mm increments up to 24mm. The reamers will ream line-to-line, ie, a 9mm reamer reams to a true 9mm diameter.**
- **When initially reaming the canal, ream based on the center of the canal.**
- **The largest reamer that can be completely buried for tibial preparation may be smaller than the reamer used to prepare for the final diameter and depth of the Stem Extension Provisional and implant.**

Instruments

8mm
IM Step Drill
00-5978-014-00

NexGen Reamer
(See Profiler)
00-5125-010-XX

- The final reamer or the stem provisional adaptor may be used for subsequent steps.
- If all the reamer flutes cannot be buried in the bone, remove the reamer and insert the corresponding size Straight Stem Extension Provisional with the Stem Provisional Adapter attached **(Fig. 3)**.

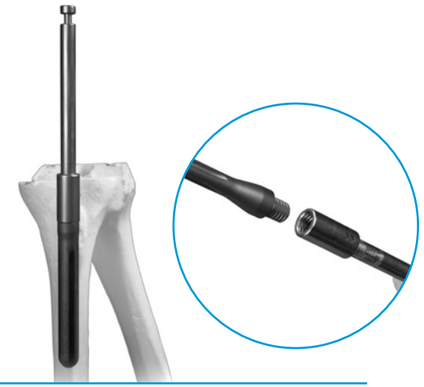


Fig. 3

- If desired, remove the reamer and check alignment by using a Spacer Block with the Extramedullary Alignment Rod **(Fig. 4)**.

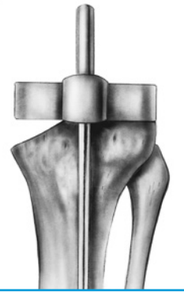


Fig. 4

- Attach the 0˚ Revision Tibial Boom to the reamer shaft **(Fig. 5)** or the Stem Extension Provisional assembly.

Fig. 5

TECHNIQUE TIP 1.C

The standard cutting slot on any of the Tibial Cutting Guides can be used for a flat cut. For a revision case, minimal bone removal is recommended. The purpose of this cut is to create a flat surface only.

Instruments

NexGen Reamer
(See Profiler)
00-5125-010-XX

Spacer Block
(See Profiler)
00-5977-019-XX

Alignment Rod
with Coupler
00-5785-080-00

0° Revision
Tibial Boom
00-5125-060-00

Straight Stem
Extension Provisional
(See Profiler)
00-5989-010-XX

Stem Provisional
Adapter
00-5987-016-00

- Slide the appropriate Tibial Cutting Guide (wedge or block) onto the Tibial Boom until it contacts the anterior tibia, and tighten the thumb screw **(Fig. 6)**.
- Rotate the Tibial Boom so the Cutting Guide is oriented to achieve a direct front-to-back cut.

Fig. 6

- Attach the Extramedullary Alignment Arch to the Tibial Boom, tighten the thumb screw, and insert the Alignment Rod with Coupler through the arch **(Fig. 7)**.
- Confirm that the resented surface will be 90˚ to the tibial mechanical axis by ensuring that the Alignment Rod follows the anterior tibial crest, points about 7mm-10mm medial to the midpoint between the malleoli, and is in line with the tibialis anterior tendon. If the cut is not 90˚, recut.

Fig. 7

Instruments

NexGen Reamer (See Profiler) **00-5125-010-XX**

Straight Stem Extension Provisional (See Profiler) **00-5989-010-XX**

Stem Provisional Adapter **00-5987-016-00**

0° Revision Tibial Boom **00-5125-060-00**

Tibial Cutting Guide (See Profiler) **00-5987-015-00 (Wedge)**

Extramedullary Alignment Arch **00-5125-081-00**

Alignment Rod with Coupler **00-5785-080-00**

Tibial Depth Resection Gauge **00-5987-040-00**

- For a primary case, insert the 10mm tab of the Tibial Depth Resection Gauge into the cutting slot and check the depth with the probe at the lowest point on the condyle **(Fig. 8)**.
- For a revision case, insert the 2mm tab of the Tibial Depth Resection Gauge into the cutting slot and check the depth with the probe as far back as possible on the defective condyle.

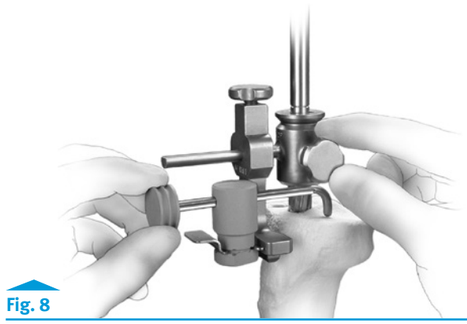


Fig. 8

TECHNIQUE TIP **1.D**

The thinnest available RH Knee Articular Surface is 12mm. For a primary case, the Tibial Depth Resection Gauge will allow only a 10mm resection. Therefore, lower the Tibial Cutting Guide an additional 2mm to remove the additional bone necessary to accommodate the thinnest articular surface.

- Tighten the thumb screw on the Tibial Boom.
- Securely pin the Tibial Cutting Guide to the tibia with two Headless Holding Pins or Hex-head Screws.
- Use a 0.050 in. (1.27mm) oscillating saw blade to make the medial and lateral tibial cuts through the slots **(Fig. 9)**.
- Remove the reamer or provisional assembly, and the Tibial Boom, leaving the Tibial Cutting Guide in place.
- Finish the cut and remove the Cutting Guide.

Note: Using the Hex-head Screws to secure the cutting guide to the bone will improve the stability of the guide.

Fig. 9

Instruments

NexGen Reamer (See Profiler) **00-5125-010-XX**

Straight Stem Extension Provisional (See Profiler) **00-5989-010-XX**

Stem Provisional Adapter **00-5987-016-00**

0° Revision Tibial Boom **00-5125-060-00**

Tibial Cutting Guide (See Profiler) **00-5987-015-00 (Wedge)**

Extramedullary Alignment Arch **00-5125-081-00**

Alignment Rod with Coupler **00-5785-080-00**

Tibial Depth Resection Gauge **00-5987-040-00**

Headless Holding Pins **00-522-039-00, 48mm 00-5997-084-00, 75mm**

Hex-headed Screws **00-5983-040-27, 27mm 00-5983-040-33, 33mm 00-5983-040-48, 48mm**

MIS Screw Inserter/Extractor **00-5983-049-00**

Step 2: Finish Tibia

2.1 Insert Tibial Sizing Plate

- Select the Tibial Sizing Plate and compare the size designation on the plate to that of the preoperatively estimated femoral size to ensure that the components will be kinematically matched **(Table 3)**.
- If there is no match, adjust the size of the Femoral Provisional or the Sizing Plate to yield a match.

Tibial Base Plate	Femoral Size B	C	D	E	F
1	B				
2	B	C			
3	B	C	D		
4	B	C	D	E	
5	B	C	D	E	F
6	B	C	D	E	F

Articulating Surface Size

Table. 3

NexGen RH Knee Size Chart

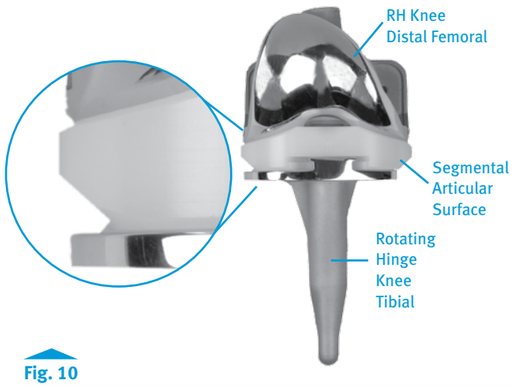


Fig. 10

TECHNIQUE TIP **2.A**

*To enhance sizing options, consider using a Segmental Tibial Articular Surface in place of the RH Knee Tibial Articular Surface (See Appendix D). The tapered edges on the Segmental Articular Surface allow more sizing options **(Fig. 10) (Table 4)**.*

RH Knee Tibial Size	RH Knee Femoral Size B	C	D	E	F
1	B/123456	C/123456	D/123456		
2	B/123456	C/123456	D/123456	E/23456	
3	B/123456	C/123456	D/123456	E/23456	F/3456
4	B/123456	C/123456	D/123456	E/23456	F/3456
5	B/123456	C/123456	D/123456	E/23456	F/3456
6	B/123456	C/123456	D/123456	E/23456	F/3456

Table. 4

NexGen RH Knee Compatibility with Segmental Articular Surface (using RH Knee Tibial Component)

Instruments

RH Knee Tibial Sizing Plate (See Profiler)
00-5881-04X-00

- Reinsert the last Intramedullary Reamer or the stem extension provisional assembly.
- Attach the Sizing Plate Handle to the Sizing Plate **(Fig. 11)**.
- Place the Sizing Plate over the reamer shaft or Stem Provisional Adapter and assess rotation and subsequent coverage.
- Once the final Sizing Plate position is determined, slide the Straight Bushing over the reamer shaft or adapter until it seats into the circular step of the Sizing Plate **(Fig. 12)**.
- If the Straight Bushing allows for optimal Sizing Plate positioning, pin the plate with two Short-head Holding Pins, remove the intramedullary assembly, and proceed to “2.4 Drill Stem Base.”
- If Sizing Plate positioning is satisfactory, but tibial augmentation is necessary, proceed to “2.3 Prepare for Tibial Augmentation.”
- If Sizing Plate positioning is not optimal, proceed to “2.2 Prepare for Offset Stem.”

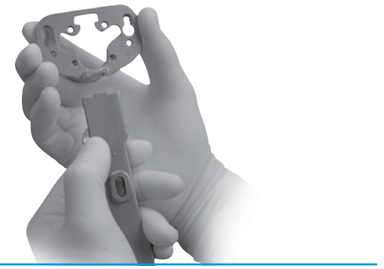


Fig. 11

Fig. 12

2.2 Prepare for Offset Stem

A Straight Stem Extension is typically used with a RH Knee Tibial Component. An Offset Stem Extension can be used only if the diameter of the medullary canal is sufficient to allow for the offset.

- Remove the Straight Bushing and slide the Offset Bushing over the reamer or adapter until it seats into the circular step of the Sizing Plate.
- Rotate the bushing within the Sizing Plate until optimal coverage is achieved.
- Note the position of the etch marks on the bushing relative to the etch mark on the center of the anterior portion of the Sizing Plate **(Fig. 13)**.
- Pin the Sizing Plate with two Short-head Holding Pins.

Warning: Do not use pins on the side of the tibia requiring augmentation.

- If augmentation is required proceed to “2.3 Prepare for Tibial Augmentation.”
- If augmentation is not required, remove the bushing and the reamer or provisional assembly, leaving only the Sizing Plate, and proceed to “2.4 Drill Stem Base.”

Note: If the diameter of the reamer or Stem Extension Provisional exceeds 19mm, the Sizing Plate must be removed first.

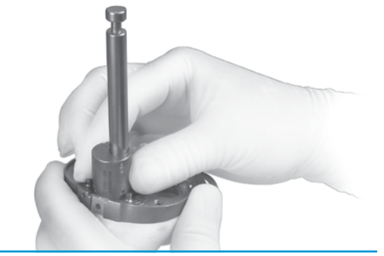


Fig. 13

Instruments

NexGen Reamer (See Profiler)
00-5125-010-XX

Straight Stem Extension Provisional (See Profiler)
00-5989-010-XX

Stem Provisional Adapter
00-5987-016-00

RH Knee Tibial Sizing Plate (See Profiler)
00-5881-04X-00

Sizing Plate Handle
00-5977-096-00

Straight Bushing
00-5987-003

Short-headed Holding Pin
00-5977-056-01

Offset Bushing
00-5987-004-00

2.3 Prepare for Tibial Augmentation

- Slide the 0° Revision Tibial Boom over the reamer or adapter and bushing. Then tighten the thumb screw (Fig. 14).
- Slide the appropriate Tibial Cutting Guide (wedge or block) onto the boom, and tighten the thumb screw on the guide (Fig. 15).
- Secure the Cutting Guide to the bone with two Headless Holding Pins or two Hex-head Screws.
- Use a 0.050 in. (1.27mm) oscillating saw blade to begin the augmentation cut.
- Remove the reamer or Stem Extension Provisional assembly, boom, bushing, and Sizing Plate.
- Finish the cut and remove the Tibial Cutting Guide.
- Attach the Tibial Augment Provisionals to the Sizing Plate and pin the plate to the bone with two Short-head Holding Pins referencing the *NexGen* Tibial Augment Interchangability chart (Table 5).

TECHNIQUE TIP 2.B

Insert one of the pins through the Tibial Augment Provisional.

Notes:

- ***NexGen* Partial Tibial Augments and RH Knee Full Block Augments are used with the RH Knee.**
- **A 7° Full Wedge Augment from the *NexGen* Knee System cannot be used with the RH Knee.**
- **The RH Knee uses different 10mm Full Block Augments from those used with other *NexGen* Knees.**
- **The Sizing Plate must be removed before the reamer or Stem Extension Provisional assembly if their diameter exceeds 19mm.**

Note: Augment options can be found within Appendix I-Augment Compatibility

Fig. 14

Fig. 15

Size	Tibial Plate (mm)	RH Knee Full Augment	*NexGen* Partial Augment
1	56 x 41	Size 1	Size 1
2	62 x 41	Size 2	Size 2
3	67 x 46	Size 3	Size 4
4	70 x 46	Size 4	Size 4
5	74 x 50	Size 5	Size 6
6	77 x 50	Size 6	Size 6

Table. 5

NexGen RH Knee Tibial Augment Interchangeability Chart

Instruments

NexGen Reamer (See Profiler) **00-5125-010-XX**

Straight Stem Extension Provisional (See Profiler) **00-5989-010-XX**

Stem Provisional Adapter **00-5987-016-00**

0° Revision Tibial Boom **00-5881-086-00**

RH Knee Tibial Sizing Plate (See Profiler) **00-5881-04X-00**

Straight Bushing **00-5987-003**

Headless Holding Pins **00-522-039-00, 48mm** **00-5997-084-00, 75mm**

Hex-headed Screws **00-5983-040-27, 27mm** **00-5983-040-33, 33mm** **00-5983-040-48, 48mm**

MIS Screw Inserter/Extractor **00-5983-049-00**

Short-headed Holding Pin **00-5977-056-01**

Offset Bushing **00-5987-004-00**

Tibial Cutting Guide (See Profiler) **00-5987-015-00 (Wedge)**

Tibial Augment Provisional (See Profiler) **00-5989-003-20 (wedge)**

2.4 Drill Stem Base

- Place the RH Knee Tibial Stem Base Drill onto the Sizing Plate (Fig. 16).

Fig. 16

- If using a nonmodular tibial base plate (sizes 1, 2, and 3 only), use the corresponding RH Knee Nonmodular Tapered Tibial Drill in place of the stem base drill (Fig. 17a).

Fig. 17a

- Use the RH Knee Tibial Stem Base Drill to drill until the engraved line labeled “RH Knee” on the drill is in line with the top of the bushing (Fig. 17b).

Fig. 17b

Instruments

RH Knee Tibial Sizing Plate (See Profiler) **00-5881-04X-00**

Short-headed Holding Pin **00-5977-056-01**

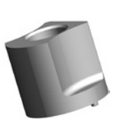
Tibial Augment Provisional (See Profiler) **00-5989-003-20 (wedge)**

Straight Bushing **00-5987-003**

Offset Bushing **00-5987-004-00**

RH Knee Nonmodular Tapered Tibial Drill **00-5881-081-01**

RH Knee Tibial Stem Base Drill **00-5881-081-00**



Tibial Stem Base Drill Bushing **00-5881-082-00**

- Attach the appropriate size Tibial Broach to the RH Knee 0° Broach Impactor **(Fig. 18)**.

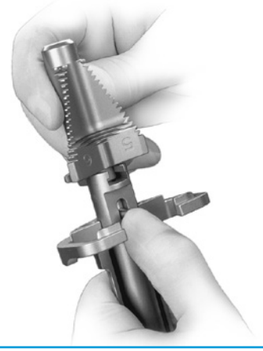


Fig. 18

- Impact the broach to the depth mark on the impactor. The broach has a built in stop to prevent over impaction **(Fig. 19)**.

Fig. 19

- Use the Tibial Provisional Extractor and Sizing Plate Extractor to remove the broach impactor assembly and Sizing Plate **(Fig. 20)**.

Note: Use the arrows on the broach and broach impactor to guide alignment .

Fig. 20

Instruments

RH Knee Tibial Sizing Plate (See Profiler) **00-5881-04X-00**

Short-headed Holding Pin **00-5977-056-01**

Tibial Broach (See Profiler) **00-5977-013-0X**

RH Knee 0° Broach Impactor **00-5881-080-00**

Tibial Provisional Extractor **00-5881-085-00**

Sizing Plate Extractor **00-5881-087-00**

2.5 Insert Trial Tibia Prosthesis

- Assemble the appropriate Tibial Provisional, Stem Extension Provisional, and Tibial Augment Provisional.
- If final reaming has not been completed, return to "Step 1: Establish Tibial Platform."
- In the rare case an offset stem is used, align the appropriate mark on the Offset Stem Extension Provisional with the center of the anterior portion of the tibial component.

TECHNIQUE TIP 2.C

*If using an Offset Stem Extension Provisional, **do not fully tighten** the provisional. This will allow the Tibial Provisional to rotate to an optimal position. See Step 9 on page 19 for offset stem extension Provisional assembly.*

- Insert the final provisional assembly into the tibia, and impact it with the Tibial Provisional Impactor **(Fig. 21)**.

Fig. 21

TECHNIQUE TIP 2.D

If using an Offset Stem Extension, note the alignment mark on the Stem Extension Provisional when removing the Tibial Provisional assembly. The mark on the Offset Stem Extension Provisional should correspond to the mark noted earlier on the Offset Bushing (this mark aligns to the center of the anterior aspect of the tibial component).

TECHNIQUE TIP 2.E

Leave the Tibial Provisional assembly in place for the remainder of the procedure to protect the resected tibial surface.

Instruments

RH Knee Tibial Provisional (See Profiler) **00-5881-00X-00**

Straight Stem Extension Provisional (See Profiler) **00-5989-010-XX**

Tibial Augment Provisional (See Profiler) **00-5989-003-20 (wedge)**

Offset Stem Extension Provisional (See Profiler) **00-5987-020-XX**

Tibial Provisional Impactor **00-5881-084-00**

Mallet **00-0155-002-00**

Step 3: Prepare Femoral Canal

- Use the 8mm IM Step Drill to drill a starting hole in the center of the patellar sulcus **(Fig. 22)**.

Fig. 22

- Beginning with the 9mm Intramedullary Reamer, progressively ream the femoral canal until cortical contact is made at the desired depth and reamer diameter **(Fig. 23)**.
- Note the diameter of the last reamer used.
- Ream at least 1cm deeper than the overall length of the selected components.

Fig. 23

TECHNIQUE TIP 3.A

To help visualize the reaming depth, lay the desired Femoral Provisional assembly next to the reamer and mark the reaming depth on the reamer.

- If the last reamer used is less than 18mm, ream the first 7cm of the canal from the jointline to a diameter of 18mm to accommodate the stem base of the RH Knee Femoral Component and the stem extension shoulder **(Fig. 24)**.

Note: Reamer diameters start at 9mm and increase by 1mm increments up to 24mm. The reamers will ream line-to-line, ie, a 9mm reamer reams to a true 9mm diameter.

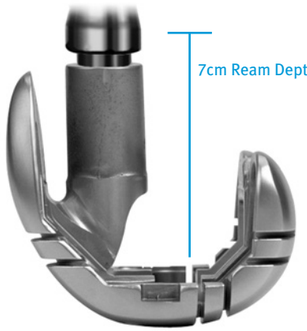


Fig. 24

Instruments

RH Knee Tibial Provisional (See Profiler)
00-5881-00X-00

8mm IM Step Drill
00-5978-014-00

NexGen Reamer (See Profiler)
00-5125-010-XX

RH Knee Femoral Provisional/ Cutting Guide (See Profiler)
00-5881-013-01

Step 4: Determine Femoral Size

Use one of the following methods to determine the femoral size.

Previous Prosthesis Method

- Measure the size of the previous prosthesis.

Caution: When using the previous prosthesis to determine size, note that the failure of the primary arthroplasty may have been caused by the component being oversized or undersized.

TECHNIQUE TIP 4.A

To help with the final sizing decision, evaluate the preoperative radiograph of the contralateral knee.

Epicondylar Width Method

- Measure the width of the epicondyles and use the table to help determine the maximum possible size **(Table 6)**.

Note: By measuring the epicondyles, the maximum size will be determined.

Size	M/L	A/P	Distal Thickness
B	58	50	9
C	64	54.5	10.5
D	68	58	10.5
E	72	62	10.5
F	76	66	10.5

Table. 6

RH Knee Dimensions. Size Based on Transepicondylar Width

The recommended method for establishing femoral component rotation is to use the epicondyles, the attachment points for the collateral ligaments **(Fig. 25)**.[1]

- Identifying the epicondylar axis may require additional soft tissue dissection.
- The center of the medial epicondyle is located in the sulcus between the proximal and distal origins of the deep MCL.
- The lateral epicondyle is the most prominent lateral point on the distal femur.
- The posterior femoral condyles should be parallel to the transepicondylar axis.

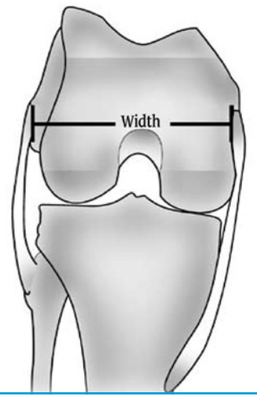


Fig. 25

Step 5: Confirm Femoral Position & Establish Rotation

Inappropriate femoral component rotation may create a flexion imbalance and/or compromise patellofemoral kinematics.[1,2] Therefore, it is important to pay particular attention to femoral rotation. It is especially important to avoid inappropriate internal rotation.[2]

5.1 Insert Femoral Provisional/Cutting Guide

It is required that a Stem Extension always be used with the RH Knee Femoral.

- Insert the appropriate Straight Stem Extension Provisional into the appropriate (size/left/right) RH Knee Femoral Provisional/Cutting Guide **(Fig. 26)**.
- Flex the knee and insert the provisional assembly onto the distal femur, seating it against the existing bone.
- If the provisional assembly cannot be inserted, proceed to Appendix C and revise the femoral bone cuts via the *NexGen* LCCK 4-in-1 Instrumentation.
- If the components will not seat, use a rongeur to carefully remove any anterior or posterior bone that is preventing insertion.

Caution: Be careful not to over-resect.

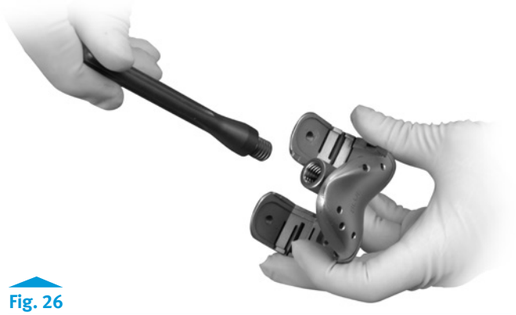


Fig. 26

TECHNIQUE TIP **5.A**

If the Straight Stem Extension Provisional does not allow adequate coverage use an offset stem extension provisional. If using an Offset Stem Extension, note the alignment mark on the Stem Extension Provisional when removing the Offset Stem Extension Provisional assembly. The mark on the Offset Stem Extension Provisional should correspond to the mark noted earlier on the Offset Bushing.

- If the provisional assembly seats properly and provides appropriate coverage, proceed to "5.2 Establish Femoral Rotation."

Instruments

RH Knee Tibial Provisional (See Profiler) **00-5881-00X-00**

Tibial Augment Provisional (See Profiler) **00-5989-003-20 (wedge)**

Straight Stem Extension Provisional (See Profiler) **00-5989-010-XX**

Offset Stem Extension Provisional (See Profiler) **00-5987-020-XX**

RH Knee Femoral Provisional/ Cutting Guide (See Profiler) **00-5881-013-01**

5.2 Establish Femoral Rotation

- Insert the tabs of the Revision Rotational Alignment Guide into the posterior augment resection slots of the Femoral Provisional/Cutting Guide **(Fig. 27)**.

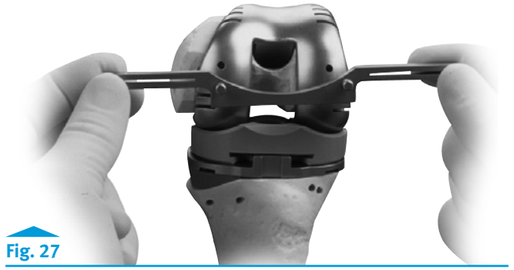


Fig. 27

- If the handles of the alignment guide line up with the transepicondylar axis, insert the Headless Holding Pins to set femoral rotation **(Fig. 28)**.
- If the rotation is incorrect, proceed to Appendix C and revise the femoral bone cuts via the *NexGen* LCCK 4-in-1 Instrumentation.

Note: The Headless Holding Pins can be used later to position the LCCK 4-in-1 or RH Knee Femoral Cutting Block.

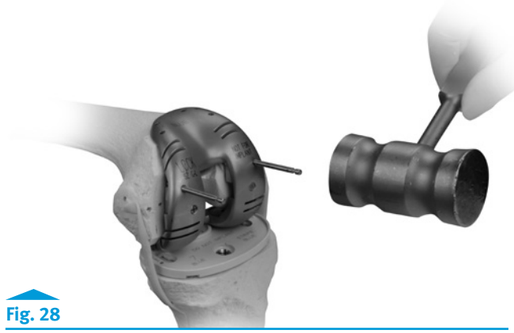


Fig. 28

Instruments

RH Knee Tibial Provisional (See Profiler) **00-5881-00X-00**

Tibial Augment Provisional (See Profiler) **00-5989-003-20 (wedge)**

Straight Stem Extension Provisional (See Profiler) **00-5989-010-XX**

Offset Stem Extension Provisional (See Profiler) **00-5987-020-XX**

RH Knee Femoral Provisional/ Cutting Guide (See Profiler) **00-5881-013-01**

Revision Rotational Alignment Guide **00-5987-051-01**

Headless Holding Pins **00-522-039-00, 48mm** **00-5997-084-00, 75mm**

Step 6: Establish Flexion Gap & Stability

- Insert the thinnest Articular Surface Provisional that matches the Femoral Provisional size and is compatible with the tibial plate size **(Tables 7 and 8)**.

Tibial Base Plate	Femoral Size B	C	D	E	F
1	B				
2	B	C			
3	B	C	D		
4	B	C	D	E	
5	B	C	D	E	F
6	B	C	D	E	F

Articulating Surface Size

Table. 7

NexGen RH Knee Size Chart

RH Knee Tibial Size	RH Knee Femoral Size B	C	D	E	F
1	B/123456	C/123456	D/123456		
2	B/123456	C/123456	D/123456	E/23456	
3	B/123456	C/123456	D/123456	E/23456	F/3456
4	B/123456	C/123456	D/123456	E/23456	F/3456
5	B/123456	C/123456	D/123456	E/23456	F/3456
6	B/123456	C/123456	D/123456	E/23456	F/3456

Table. 8

NexGen RH Knee Compatibility with Segmental Articular Surface (using RH Knee Tibial Component)

TECHNIQUE TIP 6.A

*To enhance sizing options, consider using a Segmental Tibial Articular Surface in place of the RH Knee Tibial Articular Surface (see Appendix D). The tapered edges on the Segmental Articular Surface **(Fig. 29)** allow more sizing options and may be used either with the Segmental One-piece Hinge Post or the RH Knee Modular Hinge Post **(Table 7)**.*

- If the thinnest Articular Surface Provisional cannot be inserted, consider the following:
  - Downsize the Femoral Component (each size is 4mm different in the A/P dimension).
  - Lower the tibial plateau/joint line and repeat Step 2, "Finish Tibia."
- Evaluate the stability in flexion **(Fig. 30)**.
- If the thinnest Articular Surface Provisional does not provide adequate tension, insert progressively thicker provisionals until adequate stability is obtained.
- If the thickest Articular Surface Provisional does not provide adequate tension, consider the following:
  - Augment the Tibial Provisional with a 5mm or 10mm Half Block Augment on both the medial and lateral sides or with a 10mm Full Block Augment.
  - Select the next larger Femoral Provisional/Cutting Guide.

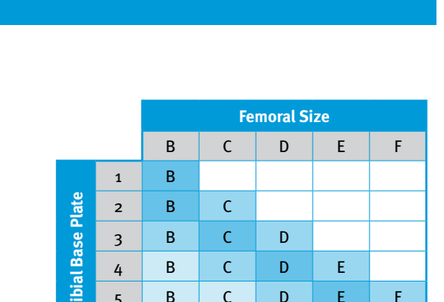


Fig. 29

Fig. 30

Instruments

RH Knee Tibial Provisional (See Profiler) **00-5881-00X-00**

Tibial Augment Provisional (See Profiler) **00-5989-003-20 (wedge)**

Straight Stem Extension Provisional (See Profiler) **00-5989-010-XX**

Offset Stem Extension Provisional (See Profiler) **00-5987-020-XX**

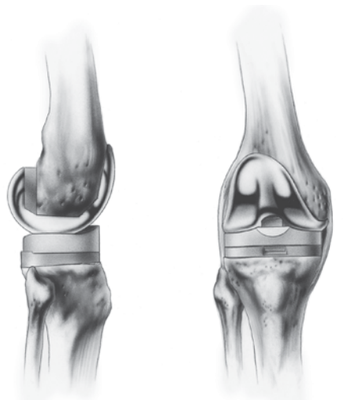
RH Knee Femoral Provisional/ Cutting Guide (See Profiler) **00-5881-013-01**

RH Knee Articular Surface Provisional (See Profiler) **00-5881-0XX-XX**

Step 7: Establish Extension Gap & Stability

7.1 Evaluate Extension Gap

- With the final Articular Surface Provisional in place, fully extend the knee and check for a symmetrical extension gap.
- Ensure that the leg has the desired valgus alignment with adequate varus-valgus stability **(Fig. 31)**.



Full Extension | 6° Valgus & Stability

Fig. 31

TECHNIQUE TIP 7.A

*Use the Distal and Posterior Augment Provisionals as spacers to create added stability in flexion and extension **(Fig. 32)**.*

Fig. 32

- If hyperextension exists, move the Femoral Provisional more distally and evaluate the resulting space between the Femoral Provisional and the distal femur.
- If the gap exceeds 20mm, which is the maximum augment size available, evaluate the next smaller femoral component size, which will allow the use of a thicker articular surface. Then repeat Steps 4, 5, and 6.
- If full extension is not possible, consider the following options:
  - Move the Femoral Provisional more proximally.
  - Use a thinner Articular Surface Provisional.
  - Perform a posterior capsule release.

Note: *NexGen* Anterior Augments are not compatible with the RH Knee Femoral Component.

Note: Augment options can be found within Appendix I-Augment Compatibility

Instruments

RH Knee Tibial Provisional (See Profiler) **00-5881-00X-00**

Tibial Augment Provisional (See Profiler) **00-5989-003-20 (wedge)**

Straight Stem Extension Provisional (See Profiler) **00-5989-010-XX**

Offset Stem Extension Provisional (See Profiler) **00-5987-020-XX**

RH Knee Femoral Provisional/ Cutting Guide (See Profiler) **00-5881-013-01**

RH Knee Articular Surface Provisional (See Profiler) **00-5881-0XX-XX**

Distal Femoral Augment Provisional (See Profiler) **00-5987-0XX-XX**

Posterior Femoral Augment Provisional (See Profiler) **00-5987-0XX-XX**

7.2 Balance Soft Tissues

Unless large deformities are due exclusively to bone loss and component subsidence, conventional soft tissue releases will be necessary.

- With the knee in extension, perform the necessary ligament releases to achieve symmetric and adequate tension in a manner similar to that in a primary arthroplasty.

7.3 Reestablish Joint Line

- If desired, assess the position of the patella by inserting the tabs of the Patella Joint Line Gauge into the two distal slots on the anterior flange of the Femoral Provisional/Cutting Guide, and ensure that the inferior pole of the Patellar Provisional or unresurfaced patella falls between the two “Normal” marks on the gauge **(Fig. 33)**.
- When both the flexion and extension gaps are balanced, and the limb alignment and joint line are accurate, pin the Femoral Provisional/Cutting Guide anteriorly using the Short-head Holding Pins **(Fig. 34)**.
- Perform a trial range of motion and confirm that the soft tissue tension, balance, and joint line are appropriate.

Note: The epicondyles also provide a reference point for distal positioning of the femoral component. The distal joint line averages 25mm from the lateral epicondyle and 30mm from the medial epicondyle (Fig. 35). This is very similar to the average distance to the posterior joint line, and this distance can also be used to check femoral component size.

- Refer to Appendix A for Troubleshooting Flexion/Extension Gaps.

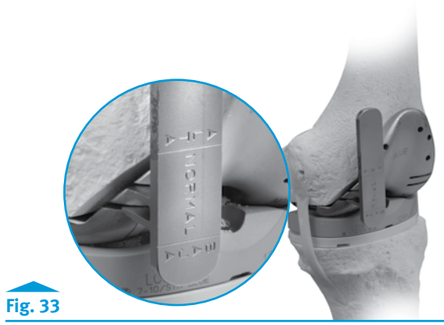


Fig. 33

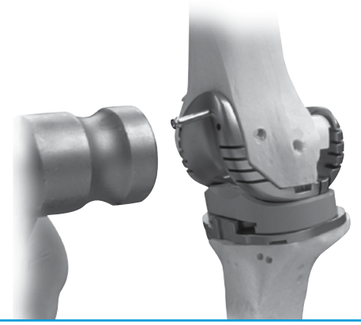


Fig. 34

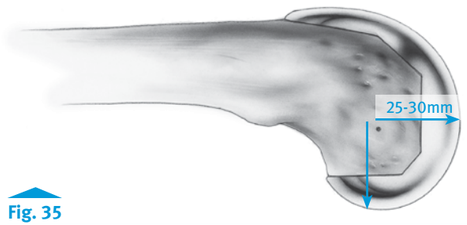


Fig. 35

Instruments

RH Knee Tibial Provisional (See Profiler)
00-5881-00X-00

Tibial Augment Provisional (See Profiler)
00-5989-003-20 (wedge)

Straight Stem Extension Provisional (See Profiler)
00-5989-010-XX

Offset Stem Extension Provisional (See Profiler)
00-5987-020-XX

RH Knee Femoral Provisional/ Cutting Guide (See Profiler)
00-5881-013-01

RH Knee Articular Surface Provisional (See Profiler)
00-5881-0XX-XX

Distal Femoral Augment Provisional (See Profiler)
00-5987-0XX-XX

Posterior Femoral Augment Provisional (See Profiler)
00-5987-0XX-XX

Patella Joint Line Gauge
00-5987-099-00

Short-headed Holding Pin
00-5977-056-01

Step 8: Make Femoral Augment Cuts

- Remove any augment provisionals from the Femoral Provisional/Cutting Guide.

TECHNIQUE TIP 8.A

When removing the Femoral Augment Provisionals from any instrument, use the 3.5mm Hexhead Screwdriver to push the peg of the augment from the opposite side.

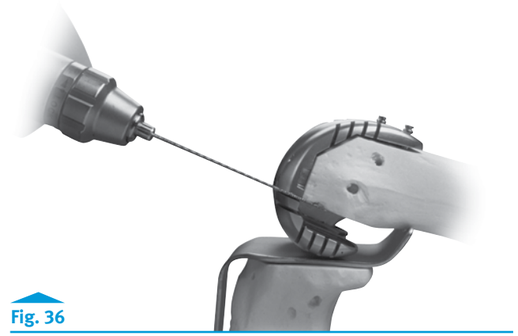


Fig. 36

- Insert a retractor to protect the posterior capsule, and tibial bone or provisional.
- Use a 0.050 in. (1.27mm) reciprocating saw blade to make any necessary posterior or distal augment cuts through the cutting slots in the Femoral Provisional/ Cutting Guide **(Figs. 36 and 37)**. Then remove the retractor.

TECHNIQUE TIP 8.B

Begin the cuts with the cutting guide in place, then remove the guide to complete the cuts.

Fig. 37

Instruments

RH Knee Tibial Provisional (See Profiler)
00-5881-00X-00

Tibial Augment Provisional (See Profiler)
00-5989-003-20 (wedge)

Straight Stem Extension Provisional (See Profiler)
00-5989-010-XX

Offset Stem Extension Provisional (See Profiler)
00-5987-020-XX

RH Knee Femoral Provisional/ Cutting Guide (See Profiler)
00-5881-013-01

Short-headed Holding Pin
00-5977-056-01

Step 9: Prepare for RH Knee Box

9.1 Attach Notch/Chamfer Guide

- Remove the Femoral Provisional assembly from the bone.
- Remove the Stem Extension Provisional from the Femoral Provisional/Cutting Guide, noting the offset setting if using an offset stem. The setting is read at the posterior mark on the femoral stem base.
- For a Straight Stem Extension, thread the Straight Stem Extension Provisional into the Stem Extension Bushing **(Fig. 38)**.

Fig. 38

- For an Offset Stem Extension:
  - Fully thread the Offset Stem Locknut onto the Offset Stem Extension Provisional.
  - Thread the Offset Stem Extension Provisional onto the Stem Extension Bushing.
  - Rotate the Offset Stem Extension Provisional so the appropriate number is lined up to the position noted earlier **(Fig. 39)**.
  - Back thread the locknut against the Stem Extension Bushing and use the Offset Stem Wrench to tighten the locknut against the Stem Extension Bushing

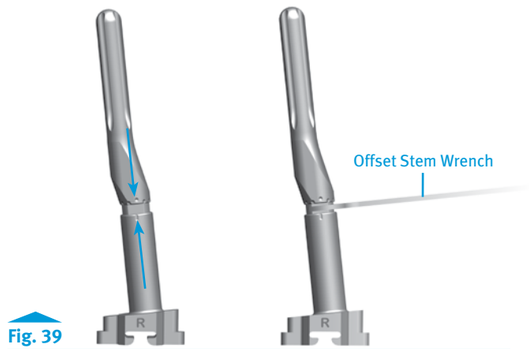


Fig. 39

- Reinsert the Headless Holding Pins **(Fig. 40)**

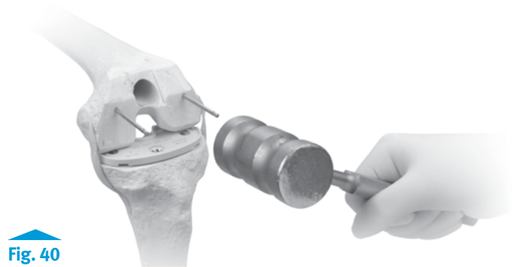
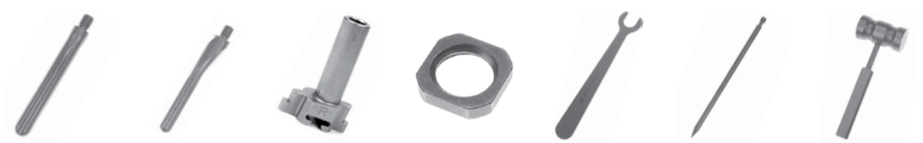


Fig. 40

TECHNIQUE TIP 9.A

One Headless Pin will also provide sufficient rotational alignment along with the central stem base and Stem Extension Provisional.

Instruments



Straight Stem Extension Provisional (See Profiler) **00-5989-010-10**

Offset Stem Extension Provisional (See Profiler) **00-5987-020-11**

Stem Extension Bushing **00-5987-070-00** **00-5987-070-01(Size B)**

Offset Stem locknut **00-5987-080-00**

Offset Stem Wrench **00-5987-079-00**

Headless Holding Pins **00-522-039-00, 48mm** **00-5997-084-00, 75mm**

Mallet **00-0155-002-00**

- If Distal Femoral Augment Provisionals were used on the Femoral Provisional/cutting guide, remove and attach to the RH Knee Notch/Chamfer Guide **(Fig. 41)**.

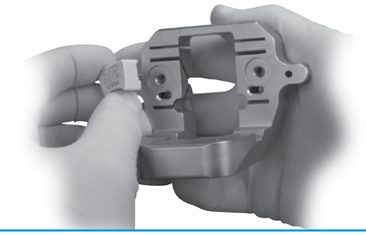


Fig. 41

TECHNIQUE TIP 9.B

*When removing the Femoral Augment Provisionals from any instrument, use the 3.5mm Hex-head Screwdriver to push the peg of the augment from the opposite side **(Fig. 42)**.*

- Insert the stem/bushing assembly into the RH Knee Notch/Chamfer Guide **(Fig. 43)**, ensuring that the proper "R" or "L" (right or left) designation is showing anteriorly.
- Insert the entire assembly into the femoral canal over the headless pins **(Fig. 44)**.

Fig. 42

TECHNIQUE TIP 9.C

Be sure that the Headless Holding Pins protrude beyond the face of the guide so they can be grasped with a Pin Puller for extraction.

TECHNIQUE TIP 9.D

The A/P position of the RH Knee Notch/Chamfer Guide is determined by the orientation of the medullary canal. Therefore, the anterior flange of the guide is not designed to sit flush with the cut surface of the anterior femoral bone.

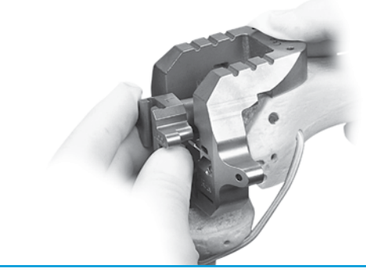


Fig. 43

Notes:

- **Ensure that the augment provisionals correspond to the augment cuts that were made in the previous step**
- **The 15mm and 20mm Distal Femoral Augment Provisionals will block access through the screw fixation holes in the RH Knee Notch/Chamfer Guide; use other available pin holes.**
- **The size B Notch/Chamfer Guide has two sets of pin holes on the distal tabs to help secure the Guide when used with small femurs.**

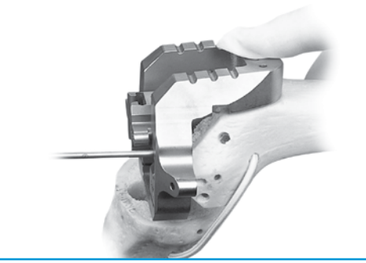


Fig. 44

Instruments

RH Knee Notch/Chamfer Guide (See Profiler) **00-5881-01X-10**

3.5mm Hex Head Screwdriver **00-5987-089-00**

Straight Stem Extension Provisional (See Profiler) **00-5989-010-XX**

Offset Stem Extension Provisional (See Profiler) **00-5987-020-XX**

Stem Extension Bushing **00-5987-070-00** **00-5987-070-01(Size B)**

Offset Stem locknut **00-5987-080-00**

Headless Holding Pins **00-522-039-00, 48mm** **00-5997-084-00, 75mm**

Distal Femoral Augment Provisional (See Profiler) **00-5987-0XX-XX**

- Insert Hex-head Holding Pins through the anterior or distal tab holes in the guide **(Fig. 45)**
- If necessary, use two Hex-headed Screws on the medial/lateral sides of the distal surface to secure the block to the bone.
- Use the Slaphammer Extractor to pull the Stem Extension Bushing/Provisional assembly out of the guide and remove the headless holding pins

Fig. 45

TECHNIQUE TIP **9.E**

If a Straight Stem Extension Provisional larger than 22mm in diameter or an Offset Stem Extension Provisional larger than 17mm in diameter is used, remove the notch guide before pulling out the bushing and stem provisional.

9.2 Make the RH Knee Box Cut

- Use a reciprocating or narrow oscillating saw blade to cut the sides and base for the RH Knee box **(Fig. 46)**.
- Use an oscillating saw to cut the anterior and posterior chamfers, if necessary **(Fig. 47)**.

Caution: For sizes B, C, and D, if snap-in Distal Femoral Augments have been used, care must be taken to avoid the peg if it enters the slot with the saw blade.

- Remove the holding pins and the Notch/Chamfer Guide.

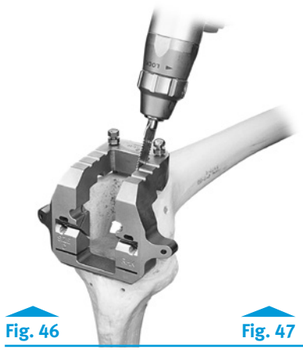


Fig. 46

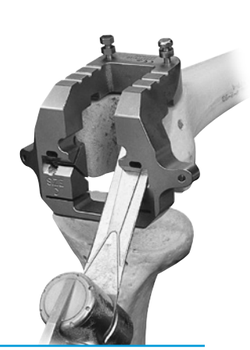


Fig. 47

Instruments

RH Knee Notch/Chamfer Guide (See Profiler)
00-5881-01X-10

3.5mm Hex Head Screwdriver
00-5987-089-00

Straight Stem Extension Provisional (See Profiler)
00-5989-010-XX

Offset Stem Extension Provisional (See Profiler)
00-5987-020-XX

Stem Extension Bushing
00-5987-070-00
00-5987-070-01(Size B)

Offset Stem locknut
00-5987-080-00

Headless Holding Pins
00-522-039-00, 48mm
00-5997-084-00, 75mm

MIS Screw Inserter/Extractor
00-5983-049-00

Slaphammer Extractor
00-5785-097-00

Hex-head Holding Pins
00-5061-063-00

Hex-headed Screws
00-5983-040-27, 27mm
00-5983-040-33, 33mm
00-5983-040-48, 48mm

Step 10: Prepare Patella

The RH Knee is designed to be used with *NexGen* Patellar Components. The *NexGen* Patellar Component requires a minimum of 11mm of remaining bone to allow for the implant pegs **(Fig. 48)**. Sizes 32-41 may be used with either the onlay or inset technique. Smaller diameter patella components must not be used unless using the inset technique. The RH Knee Femoral Component has a wider intercondylar width, so insetting is required on smaller patellar sizes to provide adequate patellar support.

- Prepare the patella peg holes by centering the appropriate Patella Drill Guide over the patella, rotating the guide if necessary to find the best location for fixation.
- Holding the Guide firmly in place, drill the three peg holes using the Patella/Femoral Drill Bit.
- If inadequate bone remains, trim the surface and either leave the inadequate bone or consider use of an augmentation patella **(Fig. 49)**.
- To compensate for gross bone deficiency, the *NexGen* Augmentation Patella is available **(Fig. 50)**. The Augmentation Patella provides the additional option of suturing the patella base to the bone remnant or extensor mechanism to provide adjunctive fixation. Refer to the *NexGen* Augmentation Patella Surgical Technique (97-5988-102-00) for additional information.

Fig. 48

Fig. 49

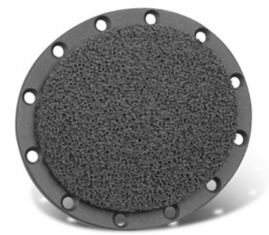


Fig. 50

Instruments

Patella Drill Guide (See Profiler)
00-5979-001-26

Patellar/Femoral Drill Bit
00-5120-052-01

Step 11: Perform Trial Reduction

11.1 Assemble & Insert Provisional Components

- Slide the Modular Box Provisional onto the RH Knee Femoral Provisional/Cutting Guide (Fig. 51) and snap the clip on the box securing it to the femoral provisional/guide.
- Snap the Posterior Augment Provisionals, then the Distal Augment Provisionals onto the Femoral Provisional/Cutting Guide
- Attach the Stem Extension Provisional to the provisional/guide (Fig. 52). If an offset stem will be used, insert the offset Stem Extension Provisional and set it to the orientation noted previously.
- Insert the Femoral Provisional assembly onto the bone to check the fit.
- Attach the Tibial Augment Provisional and Stem Extension Provisional onto the RH Knee Tibial Provisional.
- Insert the Tibial Provisional assembly onto the tibia if not already present.
- Insert the Articular Surface Provisional, ensuring that the size is compatible with the Tibial Provisional (Fig. 53).

11.2 Confirm Flexion/Extension Balance & Stability

- Check the stability of the joint in both flexion and extension.
- If there is any instability or imbalance between flexion and extension, return to Step 6 “Establish Flexion Gap & Stability” or Step 7 “Establish Extension Gap & Stability.”

Note: For additional information about balancing flexion and extension gaps, see Appendix A.

- The RH Knee is not compatible with *NexGen* Anterior Augments.

11.3 Insert Hinge Post Extension Provisional

- Flex the knee to approximately 90˚ and ensure that the tibia is free to move medially and laterally so it can be centered under the femur.
- Insert the Femoral Hinge Post Extension Provisional through the Hinge Post on the Femoral Provisional, through the Tibial Articular Surface Provisional, and then into the Tibial Provisional.

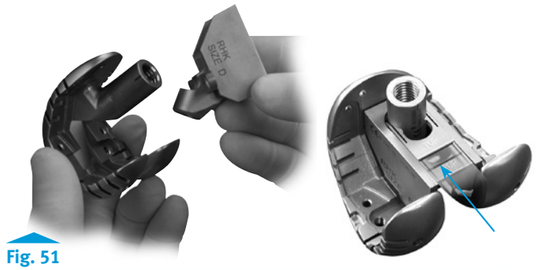


Fig. 51

Fig. 52

Fig. 53

Instruments

RH Knee Modular Box Provisional (See Profiler) **00-5881-01X-00**

RH Knee Femoral Provisional/ Cutting Guide (See Profiler) **00-5881-013-01**

Posterior Femoral Augment Provisional (See Profiler) **00-5987-0XX-XX**

Distal Femoral Augment Provisional (See Profiler) **00-5987-0XX-XX**

Straight Stem Extension Provisional (See Profiler) **00-5989-010-XX**

Offset Stem Extension Provisional (See Profiler) **00-5987-020-XX**

Tibial Augment Provisional (See Profiler) **00-5989-003-20 (wedge)**

RH Knee Tibial Provisional (See Profiler) **00-5881-00X-00**

RH Knee Articular Surface Provisional (See Profiler) **00-5881-0XX-XX**

3.5mm Hex Head Screwdriver **00-5987-089-00**

Offset Stem locknut **00-5987-080-00**

Femoral Hinge Post Extension Provisional **00-5881-011-00**

- If the Hinge Post will not line up with the hole in the Tibial Provisional, reposition the tibia under the femur.
- Use the 4.5mm Hex Head Screwdriver to tighten the Hinge Post Provisional by hand (Figs. 54 and 55).

Notes:

- **The RH Knee is a linked design that will force the tibia to be in alignment directly under the femur (on the mechanical axis) by virtue of the Femoral Hinge Post that links the femoral and tibial components.**
- **To enhance sizing options, consider using a Segmental Tibial Articular Surface in place of the RH Knee Tibial Articular Surface and Modular Hinge Post (see Appendix D). The tapered edges on the Segmental Articular Surface allow more sizing options (refer to page 15).**
- **Use of leg holders during the assembly process is not recommended.**
- **It is not necessary to use the torque wrench to tighten the Hinge Post Provisional.**

11.4 Evaluate Patellar Tracking

- Simulate closure of the capsule with either a single suture or by attaching a towel clip.
- Insert the Patella Provisional and evaluate the tracking against the Femoral Provisional/Cutting Guide to ensure that it tracks centrally.
- If additional pressure is needed to maintain patellar reduction, or if the patella tends to sublux or tilt laterally, perform a lateral retinacular release, being careful not to create a defect in the skin. Extend the release until the patella tracks satisfactorily.
- If a lateral retinacular release fails to correct patellar tracking, reassess the rotation of the femoral and tibial components, and check the orientation of the tibial tubercle.
- Remove all provisional components.

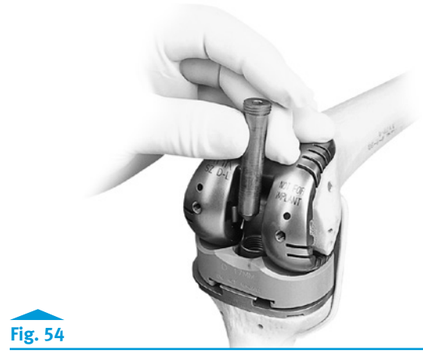


Fig. 54

Fig. 55

Instruments

RH Knee Modular Box Provisional (See Profiler) **00-5881-01X-00**

RH Knee Femoral Provisional/ Cutting Guide (See Profiler) **00-5881-013-01**

Posterior Femoral Augment Provisional (See Profiler) **00-5987-0XX-XX**

Distal Femoral Augment Provisional (See Profiler) **00-5987-0XX-XX**

Straight Stem Extension Provisional (See Profiler) **00-5989-010-XX**

Offset Stem Extension Provisional (See Profiler) **00-5987-020-XX**

Tibial Augment Provisional (See Profiler) **00-5989-003-20 (wedge)**

RH Knee Tibial Provisional (See Profiler) **00-5881-00X-00**

RH Knee Articular Surface Provisional (See Profiler) **00-5881-0XX-XX**

Femoral Hinge Post Extension Provisional **00-5881-011-00**

4.5mm Hex Head Screwdriver **00-5881-026-00**

Patellar Provisional (See Profiler) **00-5971-065-26**

Step 12: Implant Components

- Make a final check to ensure that the femoral, tibial, and articular surface components match (refer to page 15).

12.1 Prepare Tibial Component

Tibial augments are secured to the tibial plate with bone cement.

- Apply cement to the Augment and to the underside of the Tibial Component, and use the Augment Assembly Clamp to stabilize the augment while the cement cures. Allow cement to harden fully before proceeding
- Remove locking screw from stem extension, and set aside for use after Stem Extension impaction.
- Insert the Stem Extension Implant into the base of the Tibial Plate Implant.
- If using an Offset Stem Extension, align the stem location to the position noted earlier.
- Wrap the Tibial Component in a cloth and place it on a surgical cart.
- While protecting the stem extension, strike it solidly **one time** with a two-pound mallet.

Caution: Hitting the stem more than once may loosen the taper connection.

- Insert the Locking Screw into the tibial plate and tighten it with the screwdriver to secure the stem extension **(Fig. 56a)**.

Fig. 56a

12.2 Prepare Femoral Component

Attach Stem Extension

The locking mechanism between the femoral implant and the stem extension implant is a combination of a Morse-type taper and two Set Screws.

- Remove and discard the Stem Extension Locking Screw from the Stem Extension.
- Check to ensure that the Set Screws have not migrated into the femoral stem base taper.
- Insert the Stem Extension into the base of the Femoral Component.
- If using an Offset Stem Extension, line up the stem location number referenced earlier with the etched line on the posterior stem base housing **(see arrow Fig. 56b)**.

Fig. 56b

Instruments

Mallet
00-0155-002-00

3.5mm Hex Head Screwdriver
00-5987-089-00

Femoral Augment Holding Clamp
00-5987-086-00

Augment Assembly Clamp
00-5977-030-00

- Ensure that the stem extension is snug in the femoral component base. If toggle exists, back out one or both of the Set Screws one half turn and ensure snug fit.
- Wrap the Femoral Component in a cloth and place it on a surgical cart.
- While protecting the Stem Extension, seat it by striking it solidly **one time** with a two-pound mallet.

Caution: Hitting the stem more than once may loosen the taper connection.

- Using the Femoral Set Screw Hex Driver, apply moderate torque to tighten each of the two Set Screws located in the base of the Femoral Component **(Fig. 56b)**.

Caution: The Femoral Set Screw Hex Driver is designed to limit the amount of torque that can be applied to the Set Screws. *Torque by hand only*. It is *not* necessary to break the Femoral Set Screw Hex Driver.

Note: The stem extension screw is not used with the stemmed femoral component.

Attach Femoral Augments

Femoral augments can be secured to the femoral implant using either a single fixation screw, which is packaged with the augment, or cement **(Figs. 57 and 58a)**.

- Attach the femoral augments according to the following criteria:
  - For fixation-screw attachment of the distal augments and the posterior medial augment, use either the Femoral Augment Screwdriver or the standard Hex-head Screwdriver
  - For fixation-screw attachment of the posterior lateral augment, initially use the Femoral Augment Starter Screwdriver **(Fig. 58a)**. After the augment is secure, final tightening of the augment screw is done with the 3.5mm Hex Head Screwdriver.

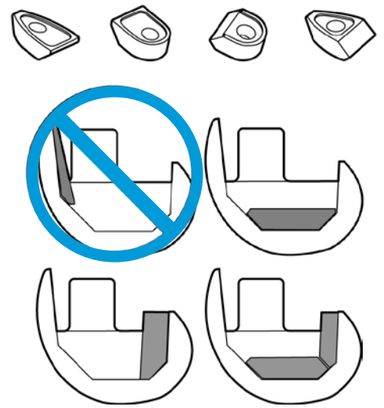


Fig. 57

TECHNIQUE TIP 12.A

To address the limited clearance, use the Posterior Augment Starter Screwdriver for initial tightening of the locking screw for the posterior augments. A final tightening of the augment screw must be done with the 3.5mm Hex Head Screwdriver.

Fig. 58a

Instruments

Femoral Set Screw Hex Driver
00-5987-071-00

Mallet
00-0155-002-00

3.5mm Hex Head Screwdriver
00-5987-089-00

Femoral Augment Starter Screwdriver
00-5987-092-03

- For cement fixation of the augments, apply cement between the augment and femoral component, as well as to the rails of the femoral component **(Fig. 58b)**.
- Use the Femoral Augment Holding Clamp Head with the Augment Assembly Clamp to achieve intimate contact between the augment and the femoral component while the cement cures.

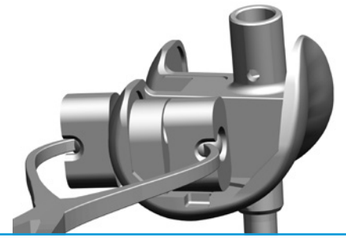


Fig. 58b

TECHNIQUE TIP 12.B

Use of 10mm, 15mm, and 20mm NexGen *Distal Femoral Augments and 10mm Posterior Augments will block access to the* NexGen *RH Knee hinge pin when placed on the medial side. Consider the use of cement only (no locking screw) to affix a medial augment of these sizes to expedite removal in the rare event a revision is required.* ***When implanting a size B femur, all augments on the medial side should be cemented. A 5mm augment will block access to the*** **NexGen** ***RH Knee hinge pin on a size B femur.***

Notes:

- **When using multiple femoral augments, the distal augments must be attached before the posterior augments.**
- **Do not use posterior-only and distal-only augments in combination with other distal or posterior augments.**
- ***NexGen*** **Anterior Augments are not compatible with the RH Knee Femoral.**

TECHNIQUE TIP 12.C

While implanting the femoral component, rotate the Hinge Post anteriorly to gain better visualization of the hinge area.

12.3 Implant/Assemble Components

Implant Tibial & Femoral Components

- Apply cement.
- Implant the tibial base plate, and remove excess cement.
- Implant the femoral component, and remove excess cement.
- Ensure that all cement is removed from the tabs on the femoral component where the Spanner Wrench will be attached **(Fig. 59)**.
- Use a curette to remove all cement from the hinge area.

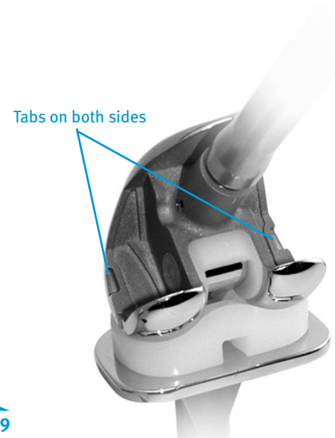


Fig. 59

Instruments

Femoral Augment Holding Clamp
00-5987-086-00

Augment Assembly Clamp
00-5977-030-00

Attach Tibial Articular Surface (RH Knee Articular Surface)

- Cement must be completely cured before inserting Articular Surface. (See Appendix E & F for assembly of a Segmental Articular Surface).
- Perform a final check of the articular surface thickness by using the Articular Surface Provisional to evaluate the flexion and extension gaps. Remove Articular Surface Provisional once the final thickness is selected.
- With the knee flexed, distract the joint so the Femoral Component will not contact the tibial base plate.
- Rotate the Hinge Post anteriorly until it contacts the stop on the Polyethylene Box Insert **(Fig. 60)**.
- Insert the Tibial Articular Surface using one of the following two methods:

Fig. 60

Femoral Condyle Slide Method

- Place the Tibial Articular Surface over the Hinge Post until it contacts the condyles of the Femoral Component **(Fig. 61)**.

Fig. 61

- While maintaining contact with the femoral condyles, slide the articular surface posteriorly until it rests on the Tibial Base Plate **(Fig. 62)**.
- Slide the Articular Surface anteriorly until the tabs on the Tibial Plate are engaged.

Fig. 62

Instruments

RH Knee Articular Surface Provisional (See Profiler)
00-5881-0XX-XX

Distraction Method

- Rotate the Hinge Post anteriorly until it contacts the stop on the Polyethylene Box Insert **(Fig. 63)**.

Fig. 63

- Place the Tibial Articular Surface onto the Tibial Base Plate and slide it anteriorly until it engages the tabs **(Fig. 64)**.

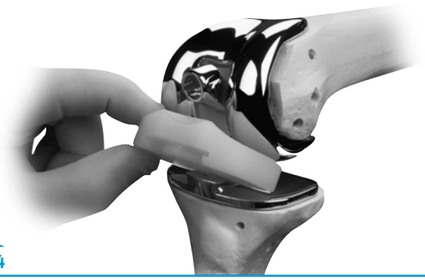


Fig. 64

- While distracting the joint, rotate the Hinge Post posteriorly until it drops into the hole in the middle of the Articular Surface **(Fig. 65)**.

Fig. 65

Insert RH Knee Hinge Post Extension

The modular Hinge Post Extension is designed with a 4˚ Morse-type taper below the threads **(Fig. 66)**. This taper mates with a taper in the Hinge Post to provide a secure lock between the components.

Warning: Tightening of the taper to the level indicated on the torque wrench is *critical* to securing the locking mechanism because it locks the Hinge Post Extension into position. *If the Hinge Post assembly is not properly tightened, postoperative disassembly could potentially occur.*

- Ensure that the Hinge Post and Hinge Post Extension tapers are clean and dry.
- Align the Hinge Post with the hole in the top of the Tibial Base Plate, and insert the Hinge Post Extension into the Hinge Post, through the Articular Surface, and into the hole on the Tibial Base Plate **(Fig. 67)**.
- Ensure that the Hinge Post Extension can freely rotate within the Hinge Post.

TECHNIQUE TIP 12.D

*If difficulty is encountered in assembling the Hinge Post components, reposition the tibia under the femur until the Hinge Post Extension slips easily into place **(Fig. 66)**.*

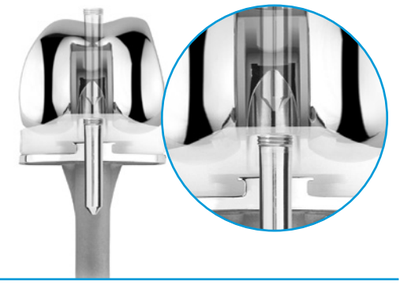


Fig. 66

Fig. 67

Notes:

- **The appropriate length Hinge Post Extension is packaged with each articular surface.**
- **Freedom of the Hinge Post Extension to rotate within the modular Hinge Post may be compromised by binding between the threads of the Hinge Post and Hinge Post Extension. This may occur when the tibial component is not aligned directly under the femoral component (Fig. 68), creating friction between the threads of the Hinge Post and Hinge Post Extension as the extension is inserted and turned. If the malalignment is significant, bending forces may increase to the point where, even though the torque wrench reads to the proper level, only a fraction of tightening force is being exerted to the screw threads and taper. *In this case, the 4˚ taper may not be fully locked. Adequate taper locking is critical to preventing disassembly.***

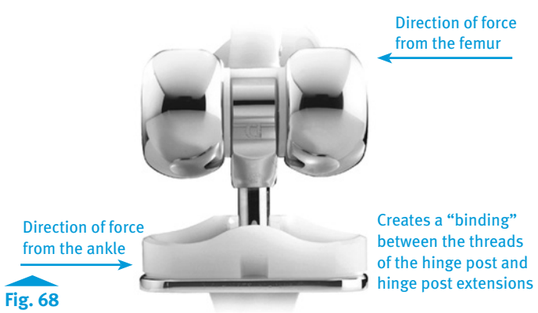


Fig. 68

- Thread the Hinge Post Extension into the Hinge Post, by hand, using the 4.5mm Hex Head Screwdriver **(Fig. 69)**. Then leave the driver in the Hinge Post Extension.
- Attach the Spanner Wrench to the tabs on each side of the femoral component, and thumb tighten the knurled wheel until the wrench is snug to the distal femoral condyles.
- Confirm that the femur and tibia are in alignment by using the 4.5mm Hex Head Screwdriver to finger tighten and loosen the hinge post extension a half turn.
- Attach the RH Knee Deflection Beam Torque Wrench (blue handle) to the driver.

Fig. 69

- While using the Spanner Wrench to apply a counter rotation force, use the torque wrench to apply 130 in-lbs of torque until the needle reaches the appropriate mark **(Figs. 70 and 71)**.

Notes:

— ***Proper alignment must be maintained during the entire assembly process.*** **The Hinge Post Extension should be easy to thread until it is flush with the top of the Hinge Post using only two fingers on the 4.5mm Hex Head Screwdriver.**

— **Using the Spanner Wrench to counteract the opposing forces of the torque wrench ensures that minimal forces are transmitted to the fixation surfaces, and reduces the potential for binding.**

Warning: Do not over- or under-torque. Undertightening of the Hinge Post Extension may allow it to loosen over time. Overtightening is not necessary.

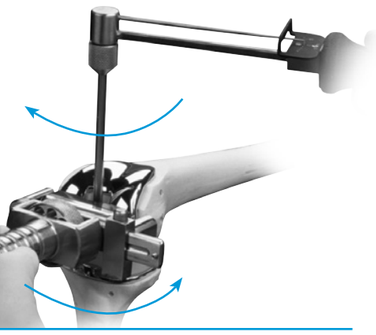


Fig. 70

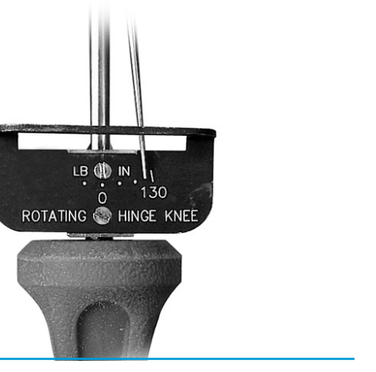


Fig. 71

Instruments

4.5mm Hex Head Screwdriver
00-5881-026-00

Spanner Wrench
00-5881-028-00
00-5881-028-01
(Size B)

RH Knee Deflection Beam Torque Wrench
00-5881-027-00

Appendix A - Troubleshooting Flexion/Extension Gaps

Note: Adjustments to the *femoral* side of the arthroplasty can affect the knee in either flexion *or* extension, while adjustments to the *tibial* side affect both flexion *and* extension.

During a trial reduction, nine scenarios are possible **(Table 9)**.

1. If the knee is too tight in both flexion and extension, two options exist:
   - Use a thinner articular surface.
   - Resect more tibia.

2. If the knee is tight in flexion but acceptable in extension, three options exist:
   - Use an Offset Stem Extension to move the femoral component anteriorly.
   - Use a smaller femoral component.
   - Use a Distal Femoral Augment to move the femoral component distally and use a thinner articular surface.

3. If the joint is loose in extension and tight in flexion, three options exist:
   - Use a Distal Femoral Augment to lower the joint line and allow use of a thinner articular surface.
   - Use a thicker articular surface and a smaller femoral component.
   - Use an Offset Stem Extension to move the femoral component anteriorly and use a thicker articular surface.

4. If the joint is acceptable in flexion but tight in extension, two options exist:
   - Release the posterior capsule from the femur.
   - Resect additional distal femoral bone and move the femoral component proximally.

5. If both components are acceptable, no further modification is necessary.

6. If the joint is acceptable in flexion and loose in extension, two options exist:
   - Use a Distal Femoral Augment with the same articular surface to drop the joint line and tighten the extension gap.
   - Downsize the femoral component and use a thicker articular surface to raise the joint line.

		Extension		
		Tight	OK	Loose
Flexion	Tight	1	2	3
	OK	4	5	6
	Loose	7	8	9

Table. 9

Nine Scenarios

7. If the joint is loose in flexion and tight in extension, three options exist:
   - Resect additional distal femoral bone and use a larger femoral component with Posterior Femoral Augments.
   - Resect additional femoral bone and use a thicker articular surface with a more proximal femoral position.
   - Resect additional distal femoral bone and use Posterior Femoral Augments and an Offset Stem Extension to move the femoral component posteriorly.
8. If the joint is loose in flexion and acceptable in extension, four options exist:
   - Use a larger femoral component with Posterior Femoral Augments to equalize gaps.
   - Resect additional distal femoral bone and use a thicker articular surface with a more proximal femoral position.
   - Use Posterior Femoral Augments and an Offset Stem Extension to move the femoral component posteriorly.
   - Choose to accept the current balance if it is only of a mild degree, particularly in a highly constrained component.
9. If the joint is symmetrically loose in both flexion and extension, use a thicker articular surface.

Notes:

— **Always consider the position of the patella and joint line in the final soft tissue balancing.**

— **After implementing any of these solutions, perform another trial reduction to verify that the solution was successful, or to identify any new problems and/or variation of the initial problem that may still exist.**

Appendix B: Primary Arthroplasty Using RH Knee Instrumentation

Step 1: Prepare Tibia

To prepare the tibia, go to Steps 1 and 2 for revision arthroplasty in the main body of this technique.

Step 2: Prepare Femoral Canal

To prepare the femoral canal, go to Step 3 for revision arthroplasty in the main body of this technique.

Step 3: Resect Distal Femur

- Attach the Plus 1mm Cut Block to the appropriate 6° Distal Femoral Guide **(Fig. 72)**.
- Set the Revision IM Guide to the correct “R” or “L” designation.
- Attach the Straight Stem Extension Provisional to the guide.

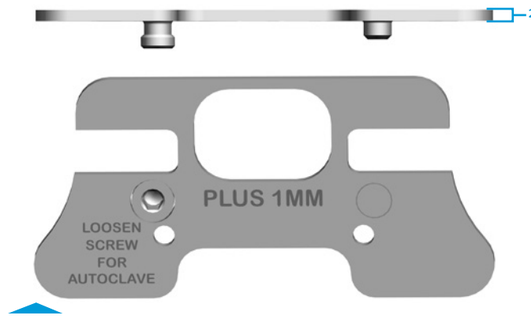


Fig. 72

Notes:

— **The Plus 1mm Cut Block is approximately 2mm in thickness and provides approximately 10mm of bone removal.**

— **Be sure that the correct cutting block is attached before inserting the guide assembly. Using the wrong cutting block may result in excessive bone removal.**

- To check the varus/valgus alignment, insert the Extramedullary Alignment Arch into the 6˚ Distal Femoral Guide. Insert the Alignment Rod with Coupler through the Arch, passing it proximally toward the femoral head to verify proper instrument alignment **(Fig. 73)**.

Fig. 73

- Insert the guide assembly into the femoral canal, and impact it onto the distal femur **(Fig. 74)**.

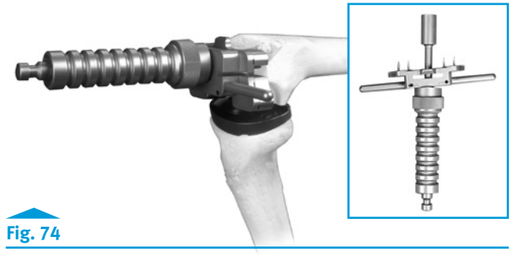


Fig. 74

Instruments

RH Knee Tibial Provisional (See Profiler)
00-5881-00X-00

Mini Handle
00-5967-046-00

LCCK 6° Distal Femoral Guide
00-5987-061-01, Lt
00-5987-061-02, Rt

Plus 1mm Cut Block
00-5964-004-01

Revision IM Guide
00-5987-060-00

Straight Stem Extension Provisional (See Profiler)
00-5989-010-10

Extramedullary Alignment Arch
00-5125-081-00

Alignment Rod with Coupler
00-5785-080-00

- Confirm that the guide has remained on the correct “R” or “L” designation.
- Attach the Distal Femoral Cutting Guide to the 0° Distal Placement Guide **(Fig. 75a)**.

Fig. 75a

- Attach the cutting guide assembly onto the Revision IM Guide, and turn the thumb screw on the cutting guide until it contacts the anterior femoral cortex **(Fig. 75b)**.
- Insert two screws through the holes marked “0” on the top of the Distal Femoral Cutting Guide.
- Fully loosen the thumb screw of the 0˚ Distal Placement Guide, and use the Slaphammer Extractor to remove the Revision IM Guide and the Stem Extension Provisional, leaving the Cutting Guide in place.

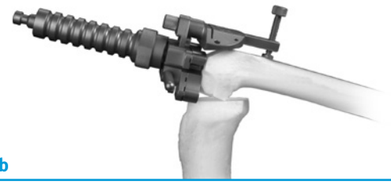


Fig. 75b

- Use a 0.050 in. (1.27mm) oscillating saw blade to make a minimal resection of the distal femur through the slot on the cutting guide **(Fig. 76)**.
- Remove the Distal Femoral Cutting Guide.

Notes:

— **Because the stem location of the RH Knee Femoral Component is oriented in 6˚ of valgus, the IM guide is designed to yield a 6˚ valgus cut.**

— **The thumb screw on the Distal Femoral Cutting Guide is designed to stabilize the guide. After contacting bone, do not turn the screw further.**

— **Additional 2mm adjustments may be made to the resection by using the sets of holes marked -4, -2, +2, and +4 on the cutting guide.**

Fig. 76

Instruments

RH Knee Tibial Provisional (See Profiler)
00-5881-00X-00

Mini Handle
00-5967-046-00

LCCK 6° Distal Femoral Guide
00-5987-061-01, Lt
00-5987-061-02, Rt

Plus 1mm Cut Block
00-5967-045-00

Revision IM Guide
00-5987-060-00

Straight Stem Extension Provisional (See Profiler)
00-5989-010-10

Mini Distal Femoral Cutting Guide
00-5967-036-00

0° Distal Placement Guide
00-5967-031-00

Slaphammer Extractor
00-5785-097-00

Hex-headed Screws
00-5983-040-27, 27mm
00-5983-040-33, 33mm
00-5983-040-48, 48mm

MIS Screw Inserter/Extractor
00-5983-049-00

Step 4: Determine Femoral Size

- Use one of the following methods to determine the femoral size.

Sizing Guide Method

- Remove the last reamer used, if still in the IM canal.
- Place the Mini A/P Sizing Guide flat on the resected distal femur with the feet flush against the posterior condyles.
- Check the position by looking through both windows of the Mini A/P Sizing Guide, ensuring that the medullary canal is not visible through either.
- Insert Hex-head Screws to fix the Mini A/P Sizing Guide to the distal femur.
- Attach the MIS Locking Boom to the Mini A/P Sizing Guide.
- Position the boom and lock it by turning the thumb screw **(Fig. 77)**.
- Read the femoral size between the engraved lines on the sizing tower **(Fig. 78)**.

Fig. 77

Notes:

— **Do not overtighten the Hex-head Screws or the anterior portion of the Mini A/P Sizing Guide will not slide on the distal femur.**

— **If the indicator on the sizing guide is between two sizes, the smaller size is typically chosen to help prevent excessive ligament tightness in flexion.**

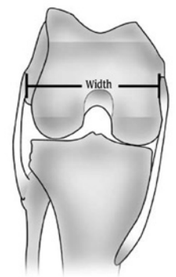
— **Although the Mini A/P Sizing Guide has eight engraved sizes, the RH Knee is available only in sizes B-F.**

Fig. 78

Epicondylar Width Method

- Measure the width of the epicondyles and use the table to help determine the appropriate size **(Table 10)**.

Note: By measuring the epicondyles, the maximum size has been determined.



Size	M/L	A/P	Distal Thickness
B	58	50	9
C	64	54.5	10.5
D	68	58	10.5
E	72	62	10.5
F	76	66	10.5

Table. 10
RH Knee

Instruments

RH Knee Tibial Provisional (See Profiler)
00-5881-00X-00

Mini A/P Sizing Guide
00-5967-055-00

Hex-headed Screws
00-5983-040-27, 27mm
00-5983-040-33, 33mm
00-5983-040-48, 48mm

MIS Locking Boom
00-5983-028-00

Step 5: Confirm Femoral Position & Establish Rotation

- Reinsert the last reamer used or the corresponding size Straight Stem Extension Provisional with the Stem Provisional Adapter attached.
- If re-establishing femoral rotation and refreshing anterior cuts during a revision, attach the Femoral Base Guide Flange to the Femoral Stem Base/Cutting Block that corresponds to the femoral component size chosen.

Note: In a primary knee procedure, the flange cannot be used since the anterior femoral condyles have not been resected.

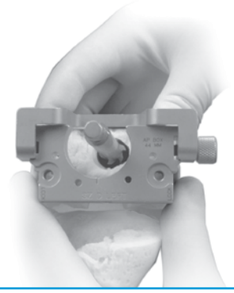


Fig. 79

- Insert the Femoral Stem Base/Cutting Block over the reamer or Stem Provisional Adapter so the cutting block is flush against the distal femur **(Fig. 79)**. Be sure that the proper "Right" or "Left" indication is facing toward you on the cutting block.
- Slide the 9-10mm Femoral Guide Bushing over the reamer shaft or Stem Provisional Adapter until it seats into the circular step of the Femoral Stem Base/Cutting Block **(Fig. 80)**.
- Insert the tabs of the Revision Rotational Alignment Guide into the posterior holes on the face of the Femoral Stem Base/ Cutting Block.

Fig. 80

- Rotate the assembly until the handles of the alignment guide are in line with the epicondylar axis **(Fig. 81)**.
- Lay the Resection Guide on the distal most surface of the anterior face of the Femoral Stem Base/Cutting Block, and check the medial and lateral sides to be sure the cut will not notch the anterior cortex
- If the Femoral Stem Base/Cutting Block is in proper alignment and rotation, insert two Headless Holding Pins into the upper two holes **(Fig 82)**. Then proceed to "Step 6: Finish Femur."
- If the Femoral Stem Base/Cutting Block indicates a less than optimal position for the femoral component, continue with "Offset Stem Technique."

Fig. 81

Instruments

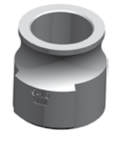
NexGen Reamer (See Profiler) **00-5125-010-XX**

Straight Stem Extension Provisional (See Profiler) **00-5989-010-XX**

Stem Provisional Adapter **00-5987-016-00**

Femoral Base Guide Flange **00-5987-012-00**

Femoral Stem Base/Cutting Block (See Profiler) **00-5987-011-0X**


9-10mm Femoral Guide Bushing **00-5987-013-01**

Headless Holding Pins **00-522-039-00, 48mm** **00-5997-084-00, 75mm**

Offset Stem Technique

- Remove Headless Holding Pins, if used.
- Remove the 9-10mm Femoral Guide Bushing and insert the Femoral Offset Bushing with the numbers facing outward.
- Rotate the bushing within the block until an optimal position is determined.
- Place the Resection Guide on the anterior surface of the Femoral Stem Base/Cutting Block to check the anterior cut location to prevent notching of the anterior cortex.
- Note the reading on the Femoral Offset Bushing that lines up with the engraved line on the posterior face of the Femoral Stem Base/Cutting Block.
- Confirm appropriate external rotation, and insert two Headless Holding Pins in the upper two holes of the block **(Fig. 82)**.

Note: This reading will be used to set the Provisional and the Offset stem rotations (Fig. 83).

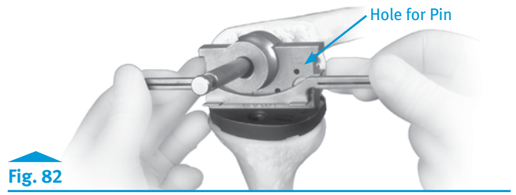


Fig. 82

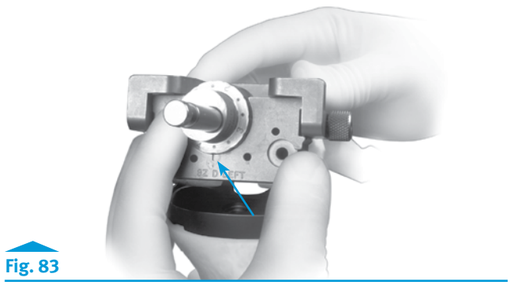


Fig. 83

Step 6: Finish Femur

6.1 Drill for Femoral Stem Base

- Remove the femoral bushing, and the reamer or provisional assembly.
- Attach any augments to the posterior surface of the Femoral Stem Base/Cutting Block.
- Insert the 16mm-18mm Femoral Guide Bushing into the cutting block.
- Attach the Femoral Stem Drill to a drill/driver and drill through the bushing to the third engraved line marked "RH Knee" on the drill bit **(Fig. 84)**.

Caution: In patients with a small medullary canal, do not use the Femoral Stem Drill, as it is an end-cutting instrument. Instead, use the 18mm Intramedullary Reamer, which is a less aggressive side-cutting instrument, to ream to a depth of 7cm to allow the Femoral Provisional/Cutting Guide and Stem Extension Provisional to be inserted.

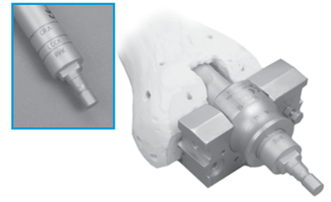


Fig. 84

Instruments

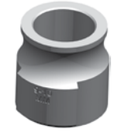
NexGen Reamer (See Profiler) **00-5125-010-XX**

Straight Stem Extension Provisional (See Profiler) **00-5989-010-XX**

Stem Provisional Adapter **00-5987-016-00**

Femoral Base Guide Flange **00-5987-012-00**

Femoral Stem Base/Cutting Block (See Profiler) **00-5987-011-0X**


9-10mm Femoral Guide Bushing **00-5987-013-01**

Headless Holding Pins **00-522-039-00, 48mm** **00-5997-084-00, 75mm**

Distal Femoral Augment Provisional (See Profiler) **00-5987-0XX-XX**

Posterior Femoral Augment Provisional (See Profiler) **00-5987-0XX-XX**

16-18mm Femoral Guide Bushing **00-5987-013-04**

Femoral Stem Base Drill **00-5881-010-01**

6.2 Cut Anterior & Posterior Condyles

- Attach the Posterior Saw Guide Attachment to the posterior surface of the Femoral Stem Base/Cutting Block, ensuring that it is flush with the distal surface of the block, and fully tighten the thumb screw **(Fig. 85)**.

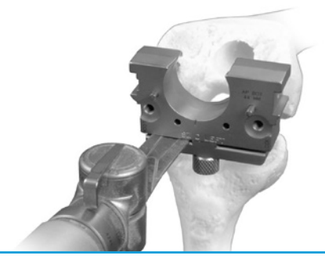


Fig. 85

- Use an oscillating saw to cut the anterior and posterior condyles **(Figs. 86a, 86b and 86c)**. Cut off the most distal top surface when making the anterior cut.
- Remove the Femoral Stem Base/Cutting Block, leaving the headless pins in place.

Notes:

— **The Posterior Saw Guide Attachment is marked to indicate the side that must face the bone.**

— **The headless pins will serve to provide rotational alignment for the RH Knee Notch/Chamfer Guide.**

— **One headless pin will also provide sufficient rotational alignment.**

— **The chamfer cuts will be made in the next step using the RH Knee Notch/Chamfer Guide.**

Fig. 86a

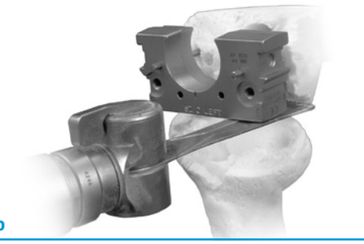


Fig. 86b

6.3 Make Femoral Augment Cuts

If femoral augmentation is necessary, remove the headless pins and refer to Step 8 for revision arthroplasty in the main body of this technique.

Final Steps

To complete the procedure, refer to Steps 9, 10, 11, and 12 for revision arthroplasty in the main body of this technique.

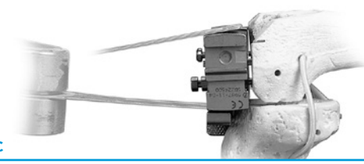


Fig. 86c

Instruments

Headless Holding Pins
00-522-039-00, 48mm
00-5997-084-00, 75mm

Posterior Saw Guide Attachment
00-5987-019-00

Appendix C: Primary Arthroplasty for RH Knee Using NexGen LCCK 4-in-1 Instrumentation

On a size-for-size basis, the anterior, posterior, and chamfer cuts are identical for all implants in the *NexGen* Complete Knee Solution family, this section describes using the LCCK 4-in-1 Femoral Cutting Blocks to prepare these cuts, followed by an additional step to cut the notch using the RH Knee Femoral Provisional/Cutting Guide assembly.

Note: The LCCK 4-in-1 Cutting blocks are not available in size B. When implanting a size B RH Knee, use the steps described in Appendix B.

Step 1: Prepare the Tibia

To prepare the tibia, go to Steps 1 and 2 for revision arthroplasty in the main body of this technique.

Step 2: Prepare Femoral Canal

To prepare the femoral canal, go to Step 3 for revision arthroplasty in the main body of this technique.

Note: After preparing the canal, leave the last reamer in place, or remove the reamer and insert the corresponding size Straight Stem Extension Provisional with the Stem Provisional Adapter attached.

Instruments

RH Knee Tibial Provisional (See Profiler)
00-5881-00X-00

NexGen Reamer (See Profiler)
00-5125-010-XX

Straight Stem Extension Provisional (See Profiler)
00-5989-010-XX

Stem Provisional Adapter
00-5987-016-00

Step 3: Resect Distal Femur

- Screw the Mini Handles into the side of the appropriate (left or right) LCCK 6° Distal Femoral Guide **(Fig. 87)**.

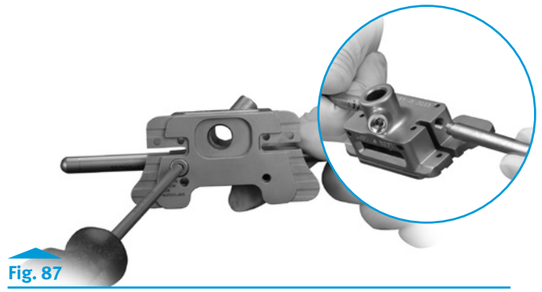


Fig. 87

- Attach the Plus 1mm Cut Block to the femoral guide **(Figs. 87 and 88)**.
- Ensure that the locking screw is backed out to allow insertion over the reamer or Stem Extension Provisional

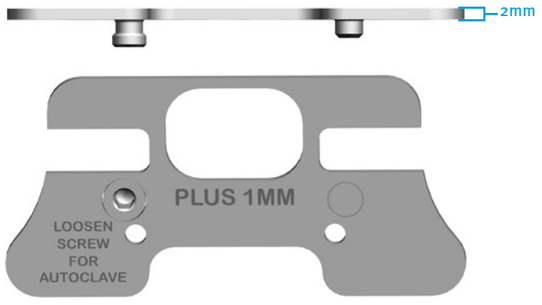


Fig. 88

- Slide the femoral guide assembly over the reamer or Stem Extension Provisional assembly and rotate the guide until the Mini Handles are aligned with the epicondylar axis **(Fig. 89)**.

Fig. 89

Notes:

- **The Plus 1mm Cut Block is approximately 2mm in thickness and provides approximately 10mm of bone removal.**
- **Be sure that the correct cutting block is attached before inserting the guide assembly. Using the wrong cutting block may result in excessive bone removal.**
- **Because the stem location of the RH Knee Femoral Component is oriented in 6˚ of valgus, the IM guide is designed to yield a 6˚ valgus cut.**

Instruments

RH Knee Tibial Provisional (See Profiler)
00-5881-00X-00

NexGen Reamer (See Profiler)
00-5125-010-XX

Straight Stem Extension Provisional (See Profiler)
00-5989-010-XX

Stem Provisional Adapter
00-5987-016-00

Plus 1mm Cut Block
00-5964-004-01

Mini Handle
00-5967-046-00

LCCK 6° Distal Femoral Guide
00-5987-061-01, Lt
00-5987-061-02, Rt

- Check to ensure the proper "Left" or "Right" LCCK 6° Distal Femoral Guide is contacting the distal femur, and use the 3.5mm Hex-head Screwdriver to secure the femoral guide to the reamer or provisional assembly **(Fig. 90)**.

TECHNIQUE TIP C.1

*For additional stability, insert 27mm Hex-head Screws through the femoral guide **(Fig. 90)**.*

Fig. 90

- Insert the Extramedullary Alignment Arch into the femoral guide.
- Insert the Alignment Rod with Coupler through the arch, passing it proximally toward the femoral head to check varus/valgus alignment **(Fig. 91)**.

Fig. 91

- Attach the Mini Distal Femoral Cutting Guide to the 0˚ Distal Placement Guide **(Fig. 92)**, and slide the assembly onto the femoral guide.

Fig. 92

Instruments

RH Knee Tibial Provisional (See Profiler)
00-5881-00X-00

NexGen Reamer (See Profiler)
00-5125-010-XX

Straight Stem Extension Provisional (See Profiler)
00-5989-010-XX

Stem Provisional Adapter
00-5987-016-00

Plus 1mm Cut Block
00-5964-004-01

Mini Handle
00-5967-046-00

LCCK 6° Distal Femoral Guide
00-5987-061-01, Lt
00-5987-061-02, Rt

Extramedullary Alignment Arch
00-5125-081-00

Alignment Rod with Coupler
00-5785-080-00

Mini Distal Femoral Cutting Guide
00-5967-036-00

0° Distal Placement Guide
00-5967-031-00

- Ensure the guides contacting the distal femur and insert two 33mm Hex-head Screws through the holes marked “0” on the top of the cutting guide **(Fig. 93)**.

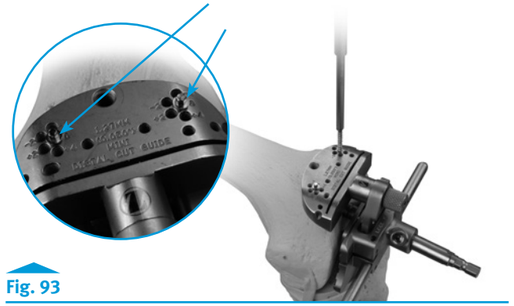


Fig. 93

TECHNIQUE TIP C.2

For increased stability, use additional Hex-head Screws or Headless Holding Pins.

TECHNIQUE TIP C.3

To improve fixation, leave the instrumentation in place during most of the distal resection.

- Use a 0.050 in. (1.27mm) oscillating saw blade to start the resection of the distal femur through the slot on the cutting guide **(Fig. 94)**.
- Loosen the thumb screw on the 0˚ Distal Placement Guide, and remove the 6° Distal Femoral Guide and 0° Distal Placement Guide, leaving the Cutting Guide in place.
- Finish the resection **(Fig. 94)**. If necessary, remove the reamer to complete the cut.
- Remove the Mini Distal Femoral Cutting Guide, leaving the Reamer or Stem Extension Provisional assembly in place.

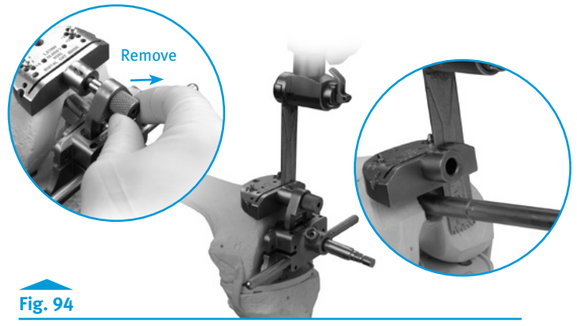


Fig. 94

Instruments

RH Knee Tibial Provisional (See Profiler)
00-5881-00X-00

NexGen Reamer (See Profiler)
00-5125-010-XX

Straight Stem Extension Provisional (See Profiler)
00-5989-010-XX

Stem Provisional Adapter
00-5987-016-00

Plus 1mm Cut Block
00-5964-004-01

Mini Handle
00-5967-046-00

LCCK 6° Distal Femoral Guide
00-5987-061-01, Lt
00-5987-061-02, Rt

Mini Distal Femoral Cutting Guide
00-5967-036-00

0° Distal Placement Guide
00-5967-031-00

Headless Holding Pins
00-522-039-00, 48mm
00-5997-084-00, 75mm

Hex-headed Screws
00-5983-040-27, 27mm
00-5983-040-33, 33mm
00-5983-040-48, 48mm

MIS Screw Inserter/Extractor
00-5983-049-00

Step 4: Determine Femoral Size

- Use one of the following methods to determine the femoral size.

Note: There are no LCCK 4-in-1 instruments for a size B. When using a size B RH Knee, use steps in Appendix B.

Sizing Guide Method

- Remove the last reamer used, if still in the IM canal.
- Place the Mini A/P Sizing Guide flat on the resected distal femur with the feet flush against the posterior condyles.
- Check the position by looking through both windows of the Mini A/P Sizing Guide, ensuring that the medullary canal is not visible through either.
- Insert Hex-head Screws to fix the Mini A/P Sizing Guide to the distal femur.
- Attach the MIS Locking Boom to the Mini A/P Sizing Guide.
- Position the boom and lock it by turning the thumb screw **(Fig. 95)**.
- Read the femoral size between the engraved lines on the sizing tower **(Fig. 96)**.

Notes:

- **Do not overtighten the Hex-head Screws or the anterior portion of the Mini A/P Sizing Guide will not slide on the distal femur.**
- **If the indicator on the sizing guide is between two sizes, the smaller size is typically chosen to help prevent excessive ligament tightness in flexion.**
- **Although the Mini A/P Sizing Guide has eight engraved sizes, the RH Knee is available only in sizes B-F.**

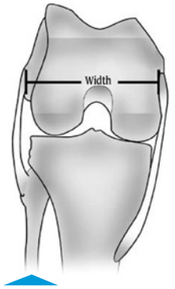
Fig. 95

Fig. 96

Epicondylar Width Method

- Measure the width of the epicondyles and use the table to help determine the appropriate size **(Table 11)**.

Note: By measuring the epicondyles, the maximum size has been determined.



Size	M/L	A/P	Distal Thickness
B	58	50	9
C	64	54.5	10.5
D	68	58	10.5
E	72	62	10.5
F	76	66	10.5

Table. 11
RH Knee

Instruments

RH Knee Tibial Provisional (See Profiler)
00-5881-00X-00

Mini A/P Sizing Guide
00-5967-055-00

Hex-headed Screws
00-5983-040-27, 27mm
00-5983-040-33, 33mm
00-5983-040-48, 48mm

MIS Screw Inserter/Extractor
00-5983-049-00

MIS Locking Boom
00-5983-028-00

Step 5: Confirm Femoral Position & Establish Rotation

- Reinsert the Reamer or stem provisional assembly if not already present

TECHNIQUE TIP C.4

The Reamer or Stem Provisional Adapter should have minimal distal protrusion.

- Insert the 4-in-1 9-10mm Bushing into the 4-in-1 Femoral Cutting Block.
- Ensure that the proper “Right” or “Left” designation is showing anteriorly.
- Use the engraved mark on the bushing to ensure proper alignment relative to the medullary canal.
- Slide the cutting block/bushing assembly over the reamer shaft or Stem Extension Provisional assembly until the cutting block is flush against the distal femur **(Fig. 97)**.

Fig. 97

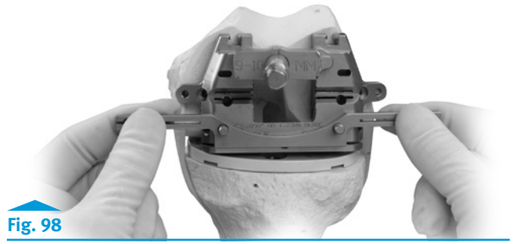


Fig. 98

TECHNIQUE TIP C.5

If the cutting block does not sit flush due to missing or poor quality bone on the condyles, consider using a Distal Femoral Augment. The 15mm and 20mm Distal Femoral Augment Provisionals will block access through the screw fixation holes in the 4-in-1 Femoral Cutting Block; use other available holes if necessary.

- Insert the tabs of the Revision Rotational Alignment Guide into the posterior cutting slot, and rotate the guide until the handles are aligned with the transepicondylar axis **(Fig. 98)**.
- Ensure the construct is contacting the distal femur, and the 3.5mm Hex-head Screwdriver to tighten the bushing to the reamer or Stem Extension Provisional assembly **(Fig. 99)**.

Fig. 99

Instruments

RH Knee Tibial Provisional (See Profiler)
00-5881-00X-00

NexGen Reamer (See Profiler)
00-5125-010-XX

Straight Stem Extension Provisional (See Profiler)
00-5989-010-XX

Stem Provisional Adapter
00-5987-016-00

LCCK 4-in-1 9-10mm Bushing
00-5987-026-00

LCCK 4-in-1 Femoral Cut Block (See Profiler)
00-5987-021-03

Revision Rotational Alignment Guide
00-5987-051-01

Distal Femoral Augment Provisional (See Profiler)
00-5987-0XX-XX

3.5mm Hex Head Screwdriver
00-5987-089-00

- If the position is satisfactory, insert two Hex-head Screws to secure the 4-in-1 Femoral Cutting Block to the distal femur **(Fig. 100)**. Then proceed to “Step 6: Finish Femur.”
- If the cutting block indicates a less than optimal position for the femoral component, continue with “Offset Stem Technique.”

Fig. 100

Offset Stem Technique

- Remove the 4-in-1 9mm-10mm Bushing, and insert the Femoral Offset Bushing into the LCCK Straight/Offset Bushing Adapter.
- Remove the Headless Holding Pins, if used.
- Insert the adapter and bushing into the appropriate size 4-in-1 Femoral Cutting Block.
- Ensure that the proper “Right” or “Left” designation is showing anteriorly.
- Use the engraved mark on the bushing to ensure proper alignment relative to the IM canal.
- Slide the adapter/cutting block assembly over the reamer or Stem Extension Provisional assembly.
- Rotate the bushing within the adapter until an optimal position is determined **(Fig. 101)**.
- Insert the tabs of the Revision Rotational Alignment Guide into the posterior cutting slot, and rotate the guide until the handles are aligned with the transepicondylar axis **(Fig. 101)**.

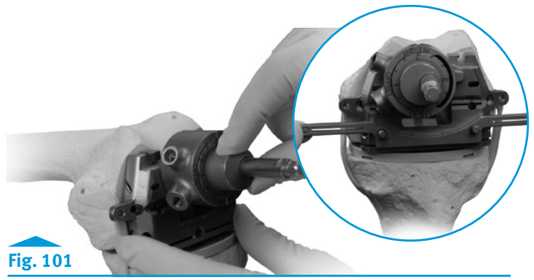


Fig. 101

Instruments

RH Knee Tibial Provisional (See Profiler)
00-5881-00X-00

NexGen Reamer (See Profiler)
00-5125-010-XX

Straight Stem Extension Provisional (See Profiler)
00-5989-010-XX

Stem Provisional Adapter
00-5987-016-00

LCCK 4-in-1 9-10mm Bushing
00-5987-026-00

LCCK 4-in-1 Femoral Cut Block (See Profiler)
00-5987-021-03

Distal Femoral Augment Provisional (See Profiler)
00-5987-0XX-XX

3.5mm Hex Head Screwdriver
00-5987-089-00

Hex-headed Screws
00-5983-040-27, 27mm
00-5983-040-33, 33mm
00-5983-040-48, 48mm

MIS Screw Inserter/Extractor
00-5983-049-00

Femoral Offset Bushing
00-5987-014-00

Straight/Offset Bushing Adapter
00-5987-025-00

Revision Rotational Alignment Guide
00-5987-051-01

- Use the 3.5mm Hex-head Screwdriver to tighten the adapter to the bushing **(Fig. 102)**. This locks in the offset setting for future reference.

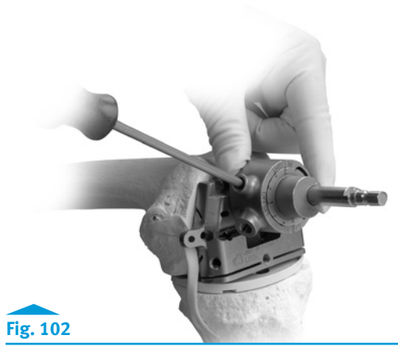


Fig. 102

- Note the orientation of the bushing by observing the numbers and marks on the bushing relative to the etched line on the posterior face of the adapter **(Fig. 103)**.

Note: This reading will be used to set the provisional and the offset stem rotations (Fig. 103).

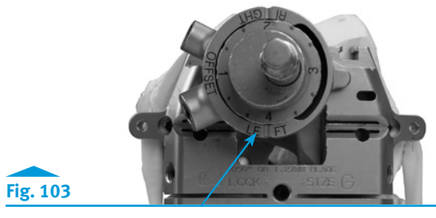


Fig. 103

- Secure the cutting block to the femur with two Hex-head Screws **(Fig. 104)**.

Note: Use the inside screw holes for all primary cases that do not require Distal Femoral Augments. Use the outside screw holes if 5mm or 10mm Distal Femoral Augment Provisionals are used (Fig. 104).

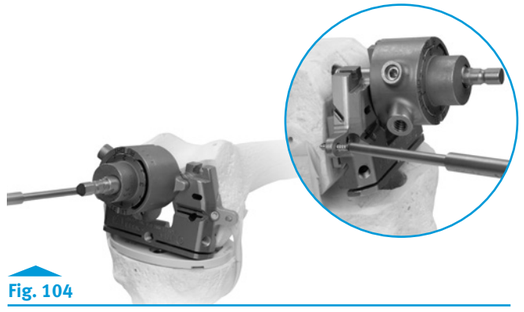


Fig. 104

Instruments

RH Knee Tibial Provisional (See Profiler)
00-5881-00X-00

NexGen Reamer (See Profiler)
00-5125-010-XX

Straight Stem Extension Provisional (See Profiler)
00-5989-010-XX

Stem Provisional Adapter
00-5987-016-00

LCCK 4-in-1 9-10mm Bushing
00-5987-026-00

LCCK 4-in-1 Femoral Cut Block (See Profiler)
00-5987-021-03

Distal Femoral Augment Provisional (See Profiler)
00-5987-0XX-XX

3.5mm Hex Head Screwdriver
00-5987-089-00

Femoral Offset Bushing
00-5987-014-00

Straight/Offset Bushing Adapter
00-5987-025-00

Hex-headed Screws
00-5983-040-27, 27mm
00-5983-040-33, 33mm
00-5983-040-48, 48mm

MIS Screw Inserter/Extractor
00-5983-049-00

Step 6: Finish Femur

6.1 Make Anterior Cut

- Remove the 4-in-1 9-10mm Bushing or the Straight/Offset Bushing Adapter and femoral Offset Bushing.
- Remove the Reamer or Stem Extension Provisional assembly.
- Place the Resection Guide on the anterior surface of the 4-in-1 Femoral Cutting Block, and check the medial and lateral sides to be sure the cut will not notch the anterior cortex **(Fig. 105)**.

Fig. 105

- Attach the Mini Handles to the LCCK Anterior Cutting Guide **(Fig. 106)**.
- Slide the LCCK Anterior Cutting Guide into the keyed slots in the 4-in-1 Femoral Cutting Block **(Fig. 106)**.
- Use a 0.050 in. (1.27mm) oscillating saw blade to make the anterior bone cut **(Fig. 106)**.

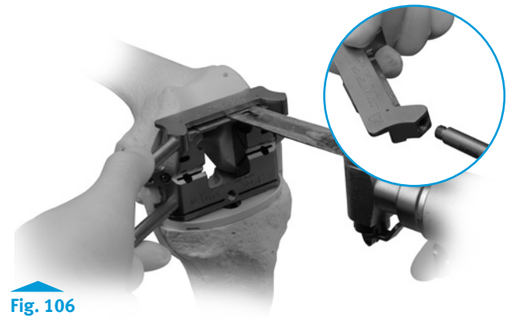


Fig. 106

TECHNIQUE TIP C.6

For added stability while cutting, hold the Mini Handles on the Anterior Cutting Guide and the 4-in-1 Femoral Cutting Block.

Instruments

RH Knee Tibial Provisional (See Profiler)
00-5881-00X-00

Resection Guide
00-5977-084-00

LCCK 4-in-1 Femoral Cut Block (See Profiler)
00-5987-021-03

Distal Femoral Augment Provisional (See Profiler)
00-5987-0XX-XX

Hex-headed Screws
00-5983-040-27, 27mm
00-5983-040-33, 33mm
00-5983-040-48, 48mm

MIS Screw Inserter/Extractor
00-5983-049-00

Mini Handle
00-5967-046-00

LCCK Anterior Cutting Guide
00-5987-023-00

6.2 Make Posterior & Chamfer Cuts

Posterior Cut

- Remove the LCCK Anterior Cutting Guide.
- Insert the appropriate size LCCK Notch Cut Guide until fully seated in the 4-in-1 Femoral Cutting Block.
- Insert two 33mm Hex-head Screws through the top of the notch guide **(Fig. 107)**.

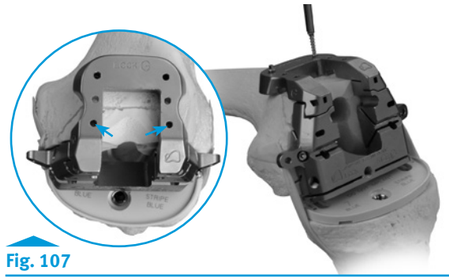


Fig. 107

- Use the oscillating saw to cut the posterior condyles **(Fig. 108)**.

Chamfer Cuts

- If screws were used in the first two sets of holes on the LCCK Notch Cut Guide, remove them before making the anterior chamfer cut **(Fig. 108)**.
- Use a reciprocating saw or an oscillating saw to cut the anterior and posterior chamfers **(Fig. 109)**.

Fig. 108

Notes:

- **There are no LCCK 4-in-1 instruments for a size B. If implanting a size B RH Knee, use steps in Appendix B.**
- **The A/P position of the LCCK Notch Cut Guide/4-in-1 Femoral Cut Block Assembly is determined by the orientation of the medullary canal. Therefore, the anterior flange of the guide is *not designed to sit flush* with the cut surface of the anterior femoral bone.**
- **The first set of holes on the notch guide should not be used if any augmentation is used on the 4-in-1 Femoral Cutting Block (Fig. 107).**
- **If snap-in distal augments have been used for sizes B, C, and D, be careful to avoid the peg if it enters the slot with the saw blade (Fig. 109).**

Fig. 109

Instruments

RH Knee Tibial Provisional (See Profiler)
00-5881-00X-00

LCCK 4-in-1 Femoral Cut Block (See Profiler)
00-5987-021-03

Distal Femoral Augment Provisional (See Profiler)
00-5987-0XX-XX

Hex-headed Screws
00-5983-040-27, 27mm
00-5983-040-33, 33mm
00-5983-040-48, 48mm

MIS Screw Inserter/Extractor
00-5983-049-00

LCCK Notch Cut Guide (See Profiler)
00-5987-022-01

6.3 Drill for Femoral Stem Base

- Attach the MIS Threaded Handle to the LCCK 18mm Femoral Drill Bushing **(Fig. 110)**.
- Ensure that the proper “Right” or “Left” designation is showing anteriorly.
- Use the engraved mark on the bushing to ensure proper alignment relative to the IM canal.
- Insert the RH Knee 18mm Femoral Drill Bushing into the 4-in-1 Femoral Cutting Block.
- Drill the canal to the second engraved line, marked “RH Knee” **(Fig. 110)**.

Fig. 110

Caution: In patients with a small medullary canal, do not use the Femoral Stem Drill. Instead, use the 18mm Intramedullary Reamer to ream to a depth of 7cm to allow the Femoral Provisional/Cutting Guide and Stem Extension Provisional to be inserted.

6.4 Make Femoral Augment Cuts

If femoral augmentation is necessary, remove the headless pins and refer to Step 8 for revision arthroplasty in the main body of this technique.

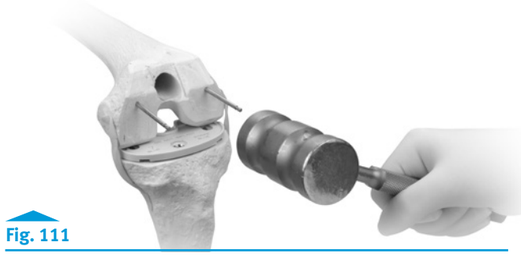


Fig. 111

Step 7: Prepare for RH Knee Box

7.1 Attach Notch/Chamfer Guide

- Insert one or two Headless Holding Pins into the face of the LCCK 4-in-1 Femoral Cutting Block **(Fig. 111)**
- Remove the Hex-head Screws and the cutting block.
- If Distal Femoral Augment Provisionals were used on the cutting block, remove and install them on the RH Knee Notch/Chamfer Guide **(Fig. 112)**.

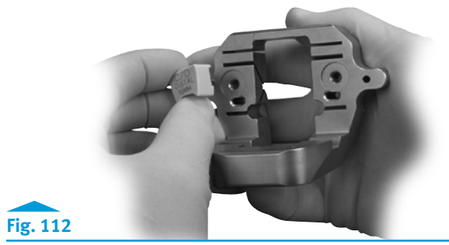


Fig. 112

Instruments

RH Knee Tibial Provisional (See Profiler)
00-5881-00X-00

LCCK 4-in-1 Femoral Cut Block (See Profiler)
00-5987-021-03

Distal Femoral Augment Provisional (See Profiler)
00-5987-0XX-XX

Hex-headed Screws
00-5983-040-27, 27mm
00-5983-040-33, 33mm
00-5983-040-48, 48mm

LCCK Anterior Cutting Guide
00-5987-023-00

LCCK Notch Cut Guide (See Profiler)
00-5987-022-01

MIS Threaded Handle
00-5983-002-01

LCCK 18mm Femoral Drill Bushing
00-5987-04-00

Headless Holding Pins
00-522-039-00, 48mm
00-5997-084-00, 75mm

RH Knee Notch/ Chamfer Guide (See Profiler)
00-5881-01X-10

Condylar Trephine Guide
00-5853-028-00

Femoral Stem Base Drill
00-5881-010-01

TECHNIQUE TIP C.7

When removing the Femoral Augment Provisionals from any instrument, use the 3.5mm Hex-head Screwdriver to push the peg of the augment from the opposite side (Fig. 113).

- For a straight stem extension, thread the Straight Stem Extension Provisional into the Stem Extension Bushing (Fig. 114).
- For an offset stem extension, fully thread the Offset Stem Locknut onto the Offset Stem Extension Provisional.
- Thread the Offset Stem Extension Provisional onto the Stem Extension Bushing.
- Rotate the Offset Stem Extension Provisional so the appropriate number is lined up to the position noted earlier on the bushing adapter (Fig. 114).
- Back thread the locknut against the Stem Extension Bushing and use the Offset Stem Wrench to tighten the locknut against the Stem Extension Bushing.
- Insert the stem/bushing assembly into the RH Knee Notch/Chamfer Guide, ensuring that the proper "R" or "L" (right or left) designation is showing anteriorly (Fig. 115).
- Insert the entire assembly into the femoral canal over the headless pins (Fig. 116).

TECHNIQUE TIP C.8

Be sure that the Headless Holding Pins protrude beyond the face of the guide so they can be grasped with a pin puller for extraction.

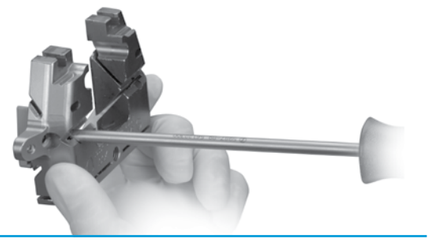


Fig. 113

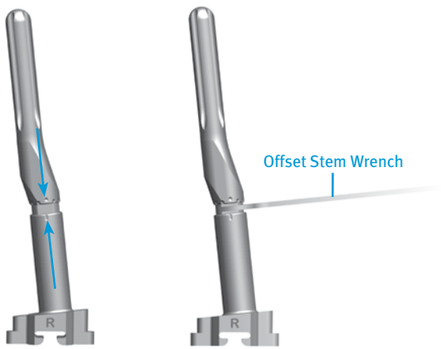


Fig. 114

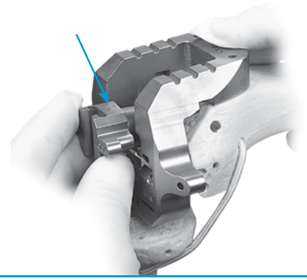


Fig. 115

Instruments

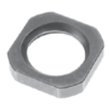
RH Knee Tibial Provisional (See Profiler)
00-5881-00X-00

3.5mm Hex Head Screwdriver
00-5987-089-00

Straight Stem Extension Provisional (See Profiler)
00-5989-010-XX

Stem Extension Bushing
00-5987-070-00
00-5987-070-01
(Size B)

Offset Stem Extension Provisional (See Profiler)
00-5987-020-XX



Offset Stem locknut
00-5987-080-00

Offset Stem Wrench
00-5987-079-00

Headless Holding Pins
00-522-039-00, 48mm
00-5997-084-00, 75mm

RH Knee Notch/ Chamfer Guide (See Profiler)
00-5881-01X-10

- Insert Hexhead Holding Pins through the anterior or distal tab holes in the guide .
- Use the Slaphammer Extractor to pull the Stem Extension Bushing and the Stem Extension Provisional out of the guide.

TECHNIQUE TIP C.9

If a Straight Stem Extension Provisional larger than 22mm in diameter or an Offset Stem Extension Provisional larger than 17mm in diameter is used, remove the entire assembly as a unit.

Notes:

- **The Headless Holding Pins will serve to provide rotational alignment for the RH Knee Notch/Chamfer Guide.**
- **The 15mm and 20mm Distal Femoral Augment Provisionals will block access through the screw fixation holes in the RH Knee Notch/Chamfer Guide; use other available pin holes.**
- **The Size B has two sets of pin holes on the distal tabs to help secure the Notch/Chamfer Guide when used with small femurs.**
- **This Notch/Chamfer Guide is designed to key from the medullary canal. There is typically a space between the anterior bone and the bottom of the guide (see Fig. 117).**

7.2 Make the RH Knee Box Cut

- Use a reciprocating or narrow oscillating saw blade to cut the sides and base of the RH Knee box (Fig. 118).
- Remove the holding pins and the Notch/Chamfer Guide.

Final Steps

To complete the procedure, refer to Steps 10, 11, and 12 for revision arthroplasty in the main body of this technique.

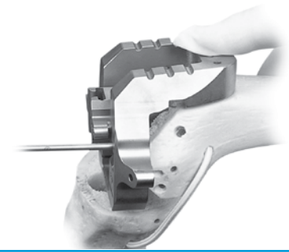


Fig. 116

Fig. 117

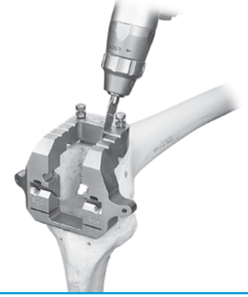


Fig. 118

Instruments

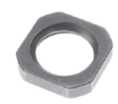
RH Knee Tibial Provisional (See Profiler)
00-5881-00X-00

3.5mm Hex Head Screwdriver
00-5987-089-00

Straight Stem Extension Provisional (See Profiler)
00-5989-010-XX

Stem Extension Bushing
00-5987-070-00
00-5987-070-01
(Size B)

Offset Stem Extension Provisional (See Profiler)
00-5987-020-XX



Offset Stem locknut
00-5987-080-00

Offset Stem Wrench
00-5987-079-00

Headless Holding Pins
00-522-039-00, 48mm
00-5997-084-00, 75mm

RH Knee Notch/ Chamfer Guide (See Profiler)
00-5881-01X-10

Hex-head Holding Pins
00-5061-063-00

Slaphammer Extractor
00-5785-097-00

Appendix D: Using the RH Knee Femoral Component with the Segmental Proximal Tibial Component

This section is used when implanting a *Trabecular Metal* Proximal Tibial Component. The Tibial instructions are provided in the *Zimmer* Segmental System *Trabecular Metal* Proximal Tibial Component Surgical Technique (97-5850-006-00)

Step 1: Tibial Preparation

Refer to the *Zimmer* Segmental System *Trabecular Metal* Proximal Tibial Component Surgical Technique (97-5850-006-00) for tibial preparation.

Step 2: Initial Femoral Preparation

If using the RH Knee in a primary arthroplasty refer to Appendix B for the femoral preparation.

If using the RH Knee in a revision arthroplasty refer to the main *NexGen* RH Knee technique:

- Step 3: Prepare Femoral Canal (p.11)
- Step 4: Determine Femoral Size (p. 12)
- Step 5: Confirm Femoral Position & Establish Rotation (p. 13)

Caution: The Segmental one-piece hinge post must be used with the Segmental Proximal Tibial Component (The *NexGen* RH Knee modular hinge post and hinge post extension are not compatible with the *Trabecular Metal* Proximal Tibial Component).

Step 3: Provisional Preparation

3.1 Prepare the Stem Provisional

3.2 Prepare the Proximal Tibial Provisional

Refer to the *Zimmer* Segmental System *Trabecular Metal* Proximal Tibial Component Surgical Technique (97-5850-006-00) for preparation of the Segmental Stem Provisional and Tibial Provisional.

3.3 Prepare the Distal Femoral Provisional

- Insert the thinnest Articular Surface Provisional that matches the Femoral Provisional size and is compatible with the tibial plate size. **(Fig. 119 & Table 12)**

Fig. 119

		NexGen RH Knee Femoral Size				
		B	C	D	E	F
Segmental Proximal Tibial Size	1	B/123	C/123	D/123		
	2	B/123	C/123	D/123	E/23	
	3	B/123	C/123	D/123	E/23	F/3

Table. 12

Segmental Knee System Compatibility Chart (using RH Knee Femoral and Tibial Components)

Instruments

NexGen Reamer (See Profiler) **00-5125-010-XX**

Straight Stem Extension Provisional (See Profiler) **00-5989-010-XX**

Stem Provisional Adapter **00-5987-016-00**

RH Knee Articular Surface Provisional (See Profiler) **00-5881-0XX-XX**

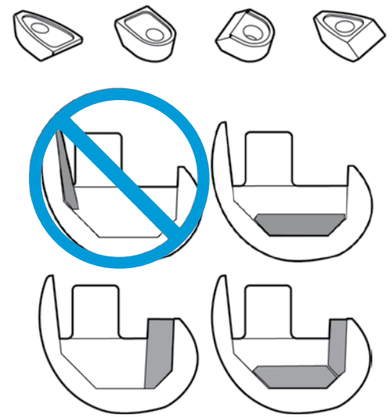
RH Knee Femoral Provisional/ Cutting Guide (See Profiler) **00-5881-01X-XX**

3.4 Establish Flexion/Extension Gap & Stability

- Refer to Appendix A for more detail regarding flexion/ extension balancing.
- If the thinnest Articular Surface Provisional cannot be inserted or the joint is too tight, consider the following:
  - Downsize the Femoral Component (each size is 4mm different in the A/P dimension).
  - Lower the tibial plateau/joint line by resection additional bone from the tibia (Refer to the *Zimmer* Segmental System *Trabecular Metal* Proximal Tibial Component Surgical Technique (97-5850-006-00) Step 1 Tibial Preparation.)
- If the thinnest Articular Surface Provisional does not provide adequate tension, insert progressively thicker provisionals until adequate stability is obtained.
- If the thickest Articular Surface Provisional does not provide adequate tension, consider the following:
  - Select the next larger Femoral Provisional/Cutting Guide. Re-evaluate the tibial resection and use of Segmental Segments (Refer to the *Zimmer* Segmental System *Trabecular Metal* Proximal Tibial Component Surgical Technique (97-5850-006-00) Step 1 Tibial Preparation.)
- With the final Articular Surface Provisional in place, fully extend the knee and check for a symmetrical extension gap and adequate stability.

TECHNIQUE TIP **D.1**

*Use the Distal and Posterior Augment Provisionals as spacers to create added stability in flexion and extension **(Fig. 120)**.*



- If hyperextension exists, move the Femoral Provisional more distally and evaluate the resulting space between the Femoral Provisional and the distal femur.
- If the gap exceeds 20mm, which is the maximum augment size available, evaluate the next smaller femoral component size, which will allow the use of a thicker articular surface. Then repeat Steps 2 “Femoral Preparation” and 3 “Trial Reduction” above as necessary.
- If full extension is not possible, consider the following options:
  - Move the Femoral Provisional more proximally.
  - Use a thinner Articular Surface Provisional.

Fig. 120

Instruments

NexGen Reamer (See Profiler) **00-5125-010-XX**

Straight Stem Extension Provisional (See Profiler) **00-5989-010-XX**

Stem Provisional Adapter **00-5987-016-00**

RH Knee Articular Surface Provisional (See Profiler) **00-5881-0XX-XX**

RH Knee Femoral Provisional/ Cutting Guide (See Profiler) **00-5881-01X-XX**

Distal Femoral Augment Provisional (See Profiler) **00-5987-0XX-XX**

Posterior Femoral Augment Provisional (See Profiler) **00-5987-0XX-XX**

3.5 Reestablish the Joint Line

Refer to Step 7.3 in the main *NexGen* RH Knee technique above "Reestablish the Joint Line" (p.17).

- After selecting the final articular surface, use the mark made earlier on the tibia to verify the rotation of the Proximal Tibial Provisional.
- If the desired position is different than the initial mark made on the tibia, make a new mark.
- Measure soft tissue distraction available for back-table assembly with the Femoral Caliper by simulating the total height required to assemble the Segmental One-Piece Hinge Pin over and into the Segmental Articular Surface **(Fig. 121 & Table 13)**.

Caution: The Hinge Post Provisional used for trial reduction is available only in the shortest length (corresponding to a 12mm Segmental Articular Surface), which may be shorter than the final Hinge Post being implanted. Thus, more distraction may be necessary to assemble the final implant.

TECHNIQUE TIP **D.2**

If there may not be enough distraction consider in vivo *assembly as described in Appendix F.*

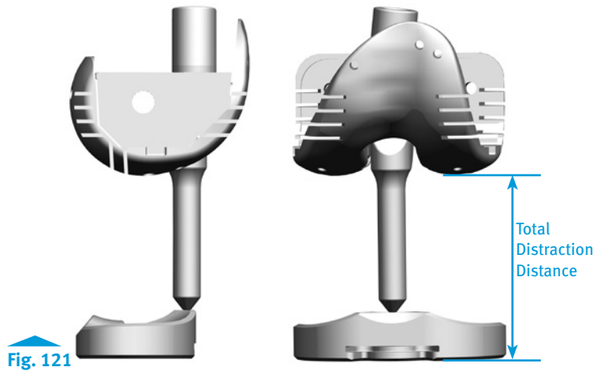


Fig. 121

Provisional Articular Surface	Total Distraction Distance Required
00-5881-0XX-12	67mm
00-5881-0XX-14	71mm
00-5881-0XX-17	77mm
00-5881-0XX-20	83mm
00-5881-0XX-23	89mm
00-5881-0XX-26	95mm

Table. 13

Step 4: Tissue Attachment Assessment

4.1 Assess Tissue Attachment

4.2 Perform Trialing

Refer to the *Zimmer* Segmental System *Trabecular Metal* Proximal Tibial Component Surgical Technique (97-5850-006-00) for the steps listed above.

Step 5: Final Distal Femoral Preparation & Final Trialing

5.1 Final Femoral Preparation

Refer to the femoral preparations per the main *NexGen* RH Knee technique above:

- Step 8: Make Femoral Augment Cuts (p.18)
- Step 9: Prepare for RH Knee Box (p.19)
- Step 10: Prepare Patella (p.22)

Instruments

NexGen Reamer (See Profiler) **00-5125-010-XX**

Straight Stem Extension Provisional (See Profiler) **00-5989-010-XX**

Stem Provisional Adapter **00-5987-016-00**

RH Knee Articular Surface Provisional (See Profiler) **00-5881-0XX-XX**

RH Knee Femoral Provisional/ Cutting Guide (See Profiler) **00-5881-01X-XX**

Distal Femoral Augment Provisional (See Profiler) **00-5987-0XX-XX**

Posterior Femoral Augment Provisional (See Profiler) **00-5987-0XX-XX**

Femoral Caliper **00-5903-030-00**

5.2 Assemble & Insert Femoral Provisional Components

Refer to the femoral provisional assembly instructions in the main *NexGen* RH Knee technique above:

- Step 11.1: Assemble & Insert Provisional Components (p.22)
- To secure the Segmental/RH Knee Hinge Post Provisional to the *NexGen* RH Knee Femoral Provisional/Cutting Guide, cross-pin with the Segmental RH Knee Hinge Pin Provisional **(Fig. 122)**

Note: Do not use the Segmental Hinge Post (gold color on its superior end) on the RH Knee Femoral Provisional/ Cutting Guide. It will not provide an accurate assessment of hyperextension during trial reduction.

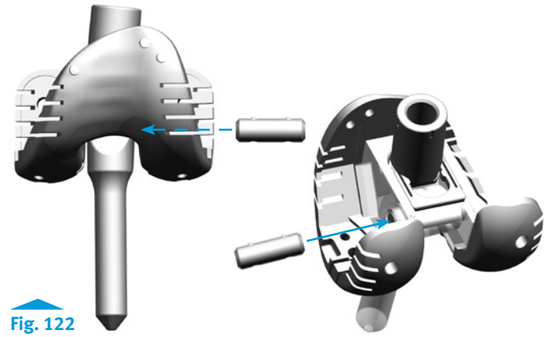


Fig. 122

5.3 Insert Hinge Post Provisional

- Place the Articular Surface Provisional onto the tibia provisional assembly.
- Hyperflex the knee and slide the Segmental/RH Knee Segmental Hinge Post Provisional through the Articular Surface Provisional into the Tibial Provisional assembly **(Fig. 123)**.

Caution: The Segmental One-piece Hinge Post must be used with the Segmental Proximal Tibial Component (not compatible with the *NexGen* RH Knee modular hinge post and hinge post extension with the Segmental *Trabecular Metal* Proximal Tibia).

Note: Use of leg holders during the assembly process is not recommended.

5.4 Evaluate Patellar Tracking

Refer to the patellar tracking evaluation in the main *NexGen* RH Knee technique above:

- Step 11.4: Evaluate Patellar Tracking (p.24)

Fig. 123

Instruments

NexGen Reamer (See Profiler) **00-5125-010-XX**

Straight Stem Extension Provisional (See Profiler) **00-5989-010-XX**

Stem Provisional Adapter **00-5987-016-00**

RH Knee Articular Surface Provisional (See Profiler) **00-5881-0XX-XX**

RH Knee Femoral Provisional/ Cutting Guide (See Profiler) **00-5881-01X-XX**

Distal Femoral Augment Provisional (See Profiler) **00-5987-0XX-XX**

Posterior Femoral Augment Provisional (See Profiler) **00-5987-0XX-XX**

Segmental/RH Knee Hinge Post Provisional (See Profiler) **00-5851-01X-04**

Segmental RH Knee Hinge Pin Provisional **00-5851-085-05**

Step 6: Provisional Disassembly

- Consider initiating disassembly at the proximal tibia/stem or segment interface. Use the Taper Separator if necessary.
- If necessary, place the Femoral Extractor into the extraction slots on the Distal Femoral Provisional to remove the component and/or Hinge Post assembly.
- Refer to the *Zimmer* Segmental System *Trabecular Metal* Proximal Tibial Component Surgical Technique (97-5850-006-00) for disassembly of the tibial construct.

Step 7: Gastrocnemius Transfer Preparation

Refer to the *Zimmer* Segmental System *Trabecular Metal* Proximal Tibial Component Surgical Technique (97-5850-006-00) to prepare the gastrocnemius transfer.

Step 8: Final Assembly & Implantation

It is important to implant the tibial construct before the distal femoral construct to provide a platform for the articular surface and subsequent pressure for the distal femoral component while the cement is curing.

8.1 Assemble the Tibial Construct

Refer to the *Zimmer* Segmental System *Trabecular Metal* Proximal Tibial Component Surgical Technique (97-5850-006-00) for the tibial construct assembly.

8.2 Assemble Distal Femoral Construct

- Make a final check to ensure that the femoral, tibial, and articular surface components match **(Fig. 124 and Table 14)**.
- Assemble the Stem Extension and Augment(s) per the main *NexGen* RH Knee technique above:
  - Step 12: “Implant Components” 12.2 “Prepare Femoral Component” (p.24)

Fig. 124

		NexGen RH Knee Femoral Size				
		B	C	D	E	F
Segmental Proximal Tibial Size	1	B/123	C/123	D/123		
	2	B/123	C/123	D/123	E/23	
	3	B/123	C/123	D/123	E/23	F/3

Table. 14

RH Knee Compatibility Chart. Interchangeability Chart 2 - Segmental Knee System (using RH Knee distal femoral and Segmental tibial components)

Instruments

Segmental Taper Separator
00-5851-020-00

Femoral Extractor
00-5978-020-00

8.3 Implant Distal Femoral Construct & Articular Surface

See Appendix E: Using the One-piece Segmental Hinge Post with the RH Knee Femoral Component (Back Table Assembly)

Caution: If there is concern regarding insufficient tissue distraction, assemble the components via the *in vivo* Assembly Technique (Appendix F).

Warning: Do not use the Segmental Polyethylene Insert with the *NexGen* RH Knee Distal Femoral Component. Only use the items included in the appropriate size Segmental Articular Surface and *NexGen* RH Knee Cement Shield Service Kit (Appendix H).

9 Tissue Attachment

10 Final Gastrocnemius Transfer & Closure

Refer to the *Zimmer* Segmental System *Trabecular Metal* Proximal Tibial Component Surgical Technique (97-5850-006-00) for final gastrocnemius transfer and closure.

Appendix E: Appendix E: Using the One-piece Segmental Hinge Post with the RH Knee Femoral Component (Back Table Assembly)

This is the recommended method for the One-piece Segmental Hinge Post with the RH Knee Femoral Component Assembly. If there is concern over sufficient distraction distance, proceed to Appendix F (*in vivo* Assembly).

In back-table assembly, the hinge post is attached to the femoral component on the back table before the femoral component is implanted. The distal femoral implant assembly (with One-piece Hinge Post) is inserted into the femoral canal as a complete construct. Then, after sufficient distraction has been achieved across the joint space, the cylindrical portion of the Hinge Post is inserted through the articular surface and into the tibia.

- Complete Steps 1-10 in the main body of this technique.

Step 1: Assemble and Insert Provisionals

1.1 Prepare the Tibial Provisional Assembly

- Insert the tibial provisional assembly onto the tibia if not already present.

1.2 Prepare the Femoral Provisional Assembly

- Slide the Segmental/RH Knee Modular Box Provisional onto the Femoral Provisional/Cutting Guide and push the clip until it snaps into place **(Fig. 125)**.
- Snap the appropriate Posterior and Distal Femoral Augment Provisionals onto the lateral side of the Femoral Provisional/ Cutting Guide **(Fig. 126)**.
- Attach the Stem Extension Provisional to the Femoral Provisional/Cutting Guide **(Fig. 127)**.
- For an offset stem extension, set the rotational alignment mark to the setting noted earlier, fully thread the Offset Stem Locknut onto the Offset Stem Extension Provisional and tighten the locknut against the Stem Extension Bushing to lock the orientation.

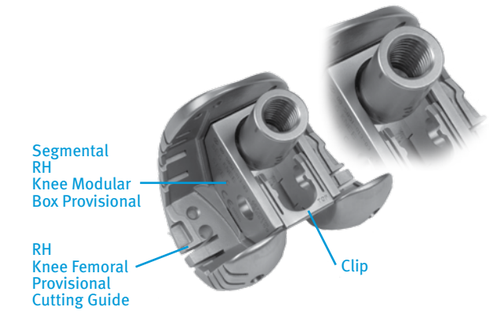


Fig. 125

Fig. 126

Fig. 127

Instruments

RH Knee Tibial Provisional (See Profiler) **00-5881-00X-00**

Straight Stem Extension Provisional (See Profiler) **00-5989-010-XX**

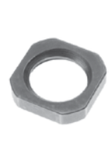
Offset Stem Extension Provisional (See Profiler) **00-5987-020-XX**

Segmental RH/ Knee Modular Box Provisional (See Profiler) **00-5851-01X-03**

RH Knee Femoral Provisional/ Cutting Guide (See Profiler) **00-5881-013-01**

Distal Femoral Augment Provisional (See Profiler) **00-5987-0XX-XX**

Posterior Femoral Augment Provisional (See Profiler) **00-5987-0XX-XX**


Offset Stem locknut **00-5987-080-00**

- To secure the Segmental/RH Knee Hinge Post Provisional to the *NexGen* RH Knee Femoral Provisional/Cutting Guide, cross-pin with the Segmental RH Knee Hinge Pin Provisional **(Figs. 128 and 129)**.
- Place the Articular Surface Provisional onto the Tibial Provisional Assembly (refer to page 61 for compatibility chart).

1.3 Insert Femoral Provisional Assembly

- Insert the provisional stem extension into the canal and begin to advance the femoral component.
- As the Hinge Post approaches the tibial component, distract the joint and simultaneously engage the cylindrical portion of the Hinge Post through the Articular Surface and into the tibial component **(Fig. 130)**.
- Continue to advance the femoral construct until it is flush against the bone surface.

Note: Do not use the Segmental Hinge Post (gold color on its superior end) on the RH Knee Femoral Provisional/ Cutting Guide. It will not provide an accurate assessment of hyperextension during trial reduction.

Caution: The Hinge Post Provisional used for trial reduction is available only in the shortest length (corresponding to a 12mm Segmental Articular Surface), which may be shorter than the final Hinge Post being implanted. Thus, more distraction may be necessary to assemble the final implant. If there is concern over sufficient distraction distance, proceed to Appendix F.

Fig. 128

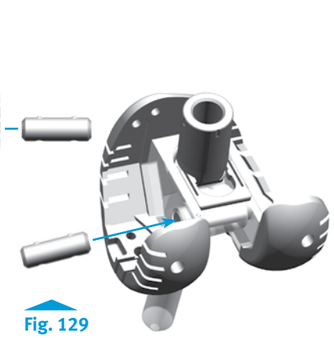


Fig. 129

Step 2: Perform Trial Reduction

- Place the knee through a full range of motion to evaluate soft tissue tension and knee stability.
- If necessary, use a thicker Articular Surface Provisional to balance the knee. For additional information about balancing flexion and extension gaps, refer to Appendix A.
- Refer to the Patellar Tracking Evaluation in the main RH Knee technique above (page 23).
- Once satisfied with the balance of the knee, remove all provisional components.

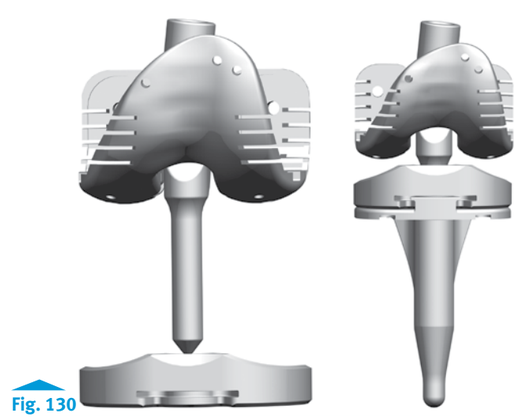


Fig. 130

Instruments

RH Knee Tibial Provisional (See Profiler) **00-5881-00X-00**

Straight Stem Extension Provisional (See Profiler) **00-5989-010-XX**

Segmental RH/ Knee Modular Box Provisional (See Profiler) **00-5851-01X-03**

RH Knee Femoral Provisional/ Cutting Guide (See Profiler) **00-5881-013-01**

Distal Femoral Augment Provisional (See Profiler) **00-5987-0XX-XX**

Posterior Femoral Augment Provisional (See Profiler) **00-5987-0XX-XX**

Segmental RH Knee Hinge Pin Provisional **00-5851-085-05**

RH Knee Articular Surface Provisional (See Profiler) **00-5881-0XX-XX**

Step 3: Prepare Implants

3.1 Prepare Tibial Component

Refer to the Tibial Component Preparation instructions in the main *NexGen* RH Knee technique above (p. 25)

3.2 Prepare Femoral Component

- Check all component sizes to ensure that the Distal Femoral Component, Tibial Articular Surface, Tibial Component, and Hinge Post match **(Table 15)**.
- Remove the Modular Hinge Post assembly that is pre-attached to and packaged with the RH Knee Femoral Component.
  - Use the Hinge Pin Polyethylene Plug Removal Tool to remove the hinge pin plug.
  - Use the 4.5mm Hex Driver and LCCK Torque Wrench (black handle) to remove the hinge pin.
  - Remove and discard the Hinge Post and Polyethylene Box Insert **(Fig. 131)**.

3.3 Assemble One-Piece Segmental Hinge Post

- Verify that the appropriate size Segmental Articular Surface and *NexGen* RH Knee Cement Shield Service Kit **(Fig. 132)** is used (Appendix H).
- Attach the proper size RH Knee Polyethylene Box Insert with Shield to the Segmental Hinge Post by spreading out the sides of the insert slightly and pressing it over the Hinge Post so the holes in the insert engage the bosses of the Segmental Hinge Pin Busing.

Warning: When implanting an RH Knee Femoral Component with the Segmental One-piece Hinge Post, use only the RH Knee Cement Shield Polyethylene Insert (Fig. 132). Do not use the Segmental Polyethylene Insert as this is only used on the Segmental System Distal Femoral Component (refer to Appendix H).

- If the post/insert assembly does not fit easily within the intercondylar notch, pull the assembly out, spread the sides of the insert to remove it from the Hinge Post, reverse the polyethylene insert orientation, and re-attach it.

RH Knee Tibial Size	RH Knee Femoral Size				
	B	C	D	E	F
1	B/123456	C/123456	D/123456		
2	B/123456	C/123456	D/123456	E/23456	
3	B/123456	C/123456	D/123456	E/23456	F/3456
4	B/123456	C/123456	D/123456	E/23456	F/3456
5	B/123456	C/123456	D/123456	E/23456	F/3456
6	B/123456	C/123456	D/123456	E/23456	F/3456

Table. 15

Segmental Knee System Compatibility Chart (using RH Knee Femoral and Tibial Components)

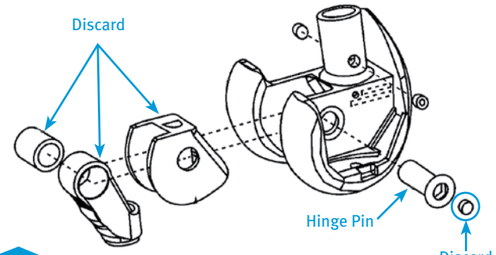


Fig. 131

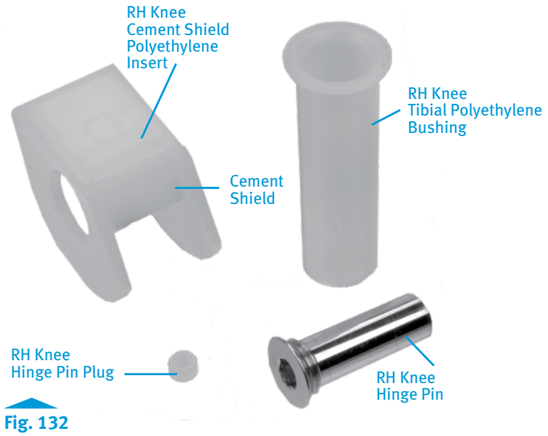


Fig. 132

Instruments

Hex Cap Removal Tool
00-5881-053-00

4.5mm Hex Head Screwdriver
00-5881-026-00

LCCK Deflection Beam Torque Wrench
00-5987-035-00

Notes:

- **At least two *NexGen* RH Knee Cement Shield Hinge Servicing Kits must be available in the operating room in case a component is dropped or otherwise rendered nonsterile.**
- **The RH Knee Cement Shield Hinge Servicing Kit is not the same as the *NexGen* RH Knee Hinge Servicing Kit or the Segmental Knee Hinge Servicing Kit (Appendix H).**
- **Use only the Segmental Hinge Post packaged with the Segmental Articular Surface. Its length accounts for the thickness of the Segmental Articular Surface and includes an additional 40mm of jump height to resist subluxation.**
- **The Hinge Pin Bushing that is pre-assembled to the Hinge Post prevents the polyethylene insert from being assembled backwards. This bushing should never be replaced with a modular *NexGen* RH Knee Hinge Post Bushing.**
- **The holes in the polyethylene insert must match the bosses on the hinge pin bushing to ensure proper orientation (Fig. 133). If assembled backwards, the insert will not sit flush against the lateral side of the Hinge Post due to a "no-fit" condition with the hinge pin bushing. This will cause the post/insert assembly to not properly fit within the intercondylar notch of the *NexGen* RH Knee Distal Femoral Component upon assembly.**
- Place the distal femoral component on a padded surgical table.
- Insert the Segmental post/insert assembly into the distal femoral component.
- Insert the Segmental/RH Knee Hinge Pin Aligner through the medial hole of the femoral component and through the hole in the post/insert assembly to align the components.
- Remove the aligner and insert the hinge pin.
- Confirm that the hinge pin has engaged the hole on the hinge post bushing and on the opposite side of the intercondylar notch visually or by pulling distally on the Hinge Post by hand.
- Use the LCCK Torque Wrench (black handle) and 4.5mm Hex Driver to torque the hinge pin to 95 in-lbs.
- Cover the hex of the hinge pin with bone wax or press the Hinge Pin Plug from the *NexGen* RH Knee Cement Shield Hinge Servicing Kit into place with a fingertip or blunt tool to protect the hex of the hinge pin during cementing.

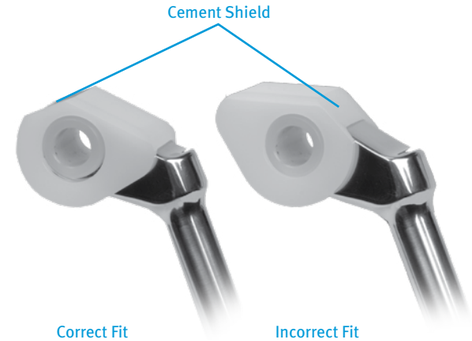


Fig. 133

Instruments

Segmental/ RH Knee Hinge Pin Aligner
00-5851-085-00

4.5mm Hex Head Screwdriver
00-5881-026-00

LCCK Deflection Beam Torque Wrench
00-5987-035-00

3.3 Stem Extension Assembly

Refer to the Stem Extension Assembly in the main *NexGen* RH Knee technique above (p. 25).

Step 4: Implant Components

- Implant the tibial component.
  - If using a RH Knee Tibial Component, refer to the main *NexGen* RH Knee technique above (p. 25).
  - If using a Segmental Proximal Tibial Component, refer to Appendix D.
- Insert the Segmental Articular Surface (packaged with the Segmental One-piece Hinge Post) onto the implanted tibial component.
- Apply augments per the main *NexGen* RH Knee technique above (p. 26). If using medial augments, apply with cement in order to facilitate its removal if future hinge servicing needed.
- Apply cement to the fixation surfaces of the distal femoral component, and to the stem extension.
- Insert the stem extension into the canal and begin to advance the femoral component.
- As the Hinge Post approaches the tibial component, distract the joint and simultaneously engage the cylindrical portion of the Hinge Post through the Articular Surface and into the tibial component **(Fig. 134)**.
- Continue to advance the femoral construct until it is flush against the bone surface.

Note: Be careful to protect the articular surface from cement when implanting the Femoral/Hinge Post assembly.

Fig. 134

Appendix F: Using the One-piece Segmental Hinge Post with the RH Knee Femoral Component (in vivo Assembly)

In vivo assembly is recommended when there is concern over sufficient distraction distance.

For *in vivo* assembly, the Hinge Post is attached to the femoral component after all other components (the femoral component, Segmental Articular Surface, and tibial component) have been implanted and a medial trephine hole is drilled. The cylindrical portion of the Hinge Post is first inserted through the Segmental Articular Surface and into the implanted tibial component. Then the proximal portion of the Hinge Post is attached to the implanted femoral component.

- Complete Steps 1-10 in the main body of this technique.

Step One: Assemble Provisionals

1.1 Prepare the Tibial Provisional Assembly

- Insert the tibial provisional assembly onto the tibia if not already present.

1.2 Prepare the Femoral Provisional Assembly

- Slide the Segmental Trephine Guide Bushing into the slot of the Segmental/RH Knee Drill Guide Body **(Fig. 135)**.
- Thread the Universal Impactor Handle into the hole on the distal face of the drill guide body and tighten it to secure the guide bushing to the drill guide body.
- If using a Distal Femoral Augment on the lateral side, attach the Distal Augment Provisional to the underside of the drill guide body.

- Confirm that the drill guide body is flush against the distal and anterior chamfer cuts on the lateral side **(Fig. 136)**.

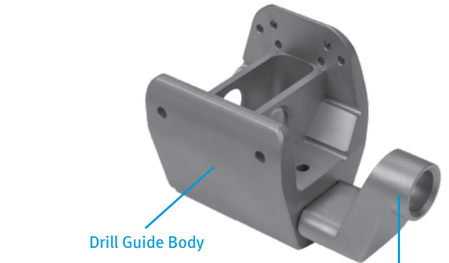


Fig. 135

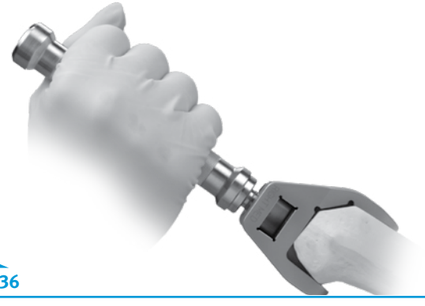


Fig. 136

Instruments

RH Knee Tibial Provisional (See Profiler) **00-5881-00X-00**

Straight Stem Extension Provisional (See Profiler) **00-5989-010-XX**

Segmental Trephine Guide Bushing **00-5851-012-06**

Segmental/ RH Knee Drill Guide Body (See Profiler) **00-5851-01X-05**

Universal Impactor Handle **6216-01-125**

Distal Femoral Augment Provisional (See Profiler) **00-5987-0XX-XX**

- Insert the drill guide assembly onto the distal femur, and impact it lightly with a mallet until it is flush with the resected distal surface.
- Attach the Trephine to a drill/driver, and drill an access hole through the guide bushing and into the medial side of the femur **(Fig. 137)**.

Notes:

— **The Segmental/RH Knee Drill Guide Body is intended to be used when implanting an RH Knee either during a revision or primary procedure. To service the hinge on a well fixed, implanted RH Knee, see Appendix G.**

— **Use the Segmental/RH Knee Drill Guide Body that is the same size as the femoral component being implanted.**

— **Do not attach Distal Femoral Augment Provisionals to the medial side of the drill guide body as this could block the Trephine when drilling the access hole.**

— **The Trephine has a built-in stop to limit the depth of drilling.**

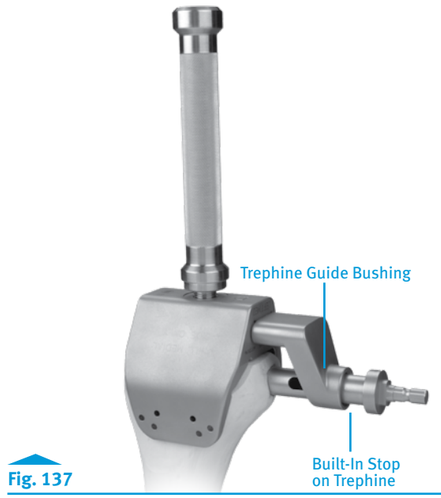


Fig. 137

Step 2: Perform Trial Reduction

- Slide the Segmental/RH Knee Modular Box Provisional onto the Femoral Provisional/Cutting Guide and push the clip until it snaps into place **(Fig. 138)**.
- Snap the appropriate Posterior and Distal Femoral Augment Provisionals onto the lateral side of the Femoral Provisional/Cutting Guide **(Fig. 139)**.
- Attach the Stem Extension Provisional to the Femoral Provisional/Cutting Guide **(Fig. 140)**.

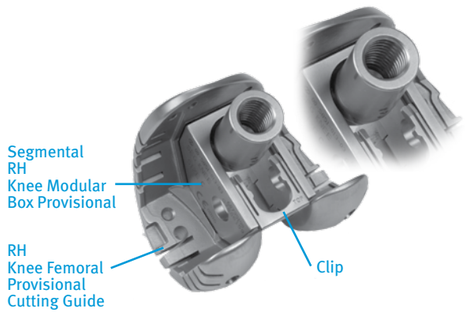


Fig. 138

Instruments

RH Knee Tibial Provisional (See Profiler) **00-5881-00X-00**

Straight Stem Extension Provisional (See Profiler) **00-5989-010-10**

Segmental Trephine Guide Bushing **00-5851-012-06**

Segmental/ RH Knee Drill Guide Body (See Profiler) **00-5851-01X-05**

Universal Impactor Handle **6216-01-125**

Distal Femoral Augment Provisional (See Profiler) **00-5987-0XX-XX**

Trephine **00-5881-050-00**

Segmental RH/ Knee Modular Box Provisional (See Profiler) **00-5851-01X-03**

RH Knee Femoral Provisional/ Cutting Guide (See Profiler) **00-5881-013-01**

- For an offset stem extension, set the rotational alignment mark to the setting noted earlier, fully thread the Offset Stem Locknut onto the Offset Stem Extension Provisional and tighten the locknut against the Stem Extension Bushing to lock the orientation
- Insert the provisional assembly onto the bone.
- Ensure that the hole in the medial side of the box provisional lines up with the access hole drilled into the medial side of the femur.
- If the hole is not aligned, re-drill the access hole or use a burr to remove additional bone.
- Assemble and insert the Tibial Provisional construct.
- Insert the Articular Surface Provisional.
- Look through the drilled medial hole and ensure it is aligned to the hole in the provisional assembly.
- Insert the Segmental/RH Knee Hinge Pin Aligner through the access hole drilled on the medial side of the femur, and through the holes in the Insert Provisional and Hinge Post Provisional.
- Insert the Segmental/RH Knee Hinge Post Provisional into the post hole in the tibial provisional assembly.

TECHNIQUE TIP **F.1**

To facilitate assembly, flex the knee to approximately 90° and ensure that the tibia is free to move medially and laterally so it can be centered under the femur. Movement of the knee from 90° of flexion to full extension may also facilitate assembly.

- Place the knee through a full range of motion to evaluate soft tissue tension and knee stability.
- If necessary, use a thicker Articular Surface Provisional to balance the knee.

Fig. 139

Fig. 140

Instruments

RH Knee Tibial Provisional (See Profiler) **00-5881-00X-00**

Straight Stem Extension Provisional (See Profiler) **00-5989-010-XX**

Offset Stem Extension Provisional (See Profiler) **00-5987-020-XX**

Segmental RH/ Knee Modular Box Provisional (See Profiler) **00-5851-01X-03**

RH Knee Femoral Provisional/ Cutting Guide (See Profiler) **00-5881-013-01**

Distal Femoral Augment Provisional (See Profiler) **00-5987-0XX-XX**

Offset Stem locknut **00-5987-080-00**

Offset Stem Wrench **00-5987-079-00**

Segmental/RH Knee Hinge Post Provisional (See Profiler) **00-5851-01X-04**

Segmental/ RH Knee Hinge Pin Aligner **00-5851-085-00**

Posterior Femoral Augment Provisional (See Profiler) **00-5987-0XX-XX**

RH Knee Articular Surface Provisional (See Profiler) **00-5881-0XX-XX**

- If the Hinge Post Provisional does not line up with the box provisional, reposition the tibia under the femur.
- Perform any necessary soft tissue releases.
- Assess the patellar tracking per the Patellar Tracking Evaluation section in the main RH Knee technique above (p. 23).
- Once satisfied with the balance of the knee, remove all provisional components.

Notes:

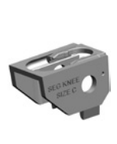
- **Do not attach Distal Femoral Augment Provisionals thicker than 5mm to the medial side of the Femoral Provisional/ Cutting Guide as this could block access for cross-pinning with the Segmental/RH Knee Hinge Pin Aligner.**
- **Use the *NexGen* RH Knee Articular Surface Provisionals from the *NexGen* RH Knee Articular Surface Provisional Instrument Set.**
- **The size of the articular surface provisional must match the size of the femoral provisional, and the size of the tibial provisional must be compatible with the size on the femoral provisional. Refer to the sizing chart (refer to page 68 Table 16).**
- **Do not use the Segmental Hinge Post (gold color on its superior end) on the RH Knee Femoral Provisional/Cutting Guide. It will not provide an accurate assessment of hyperextension during trial reduction.**
- **The provisional hinge post used for trial reduction is available in only one length, which may be shorter than the final hinge post implanted. The main purpose of the provisional hinge post is to bring the tibia into alignment with the mechanical axis directly under the femur. The Segmental/RH Knee Hinge Post Implant plays a similar role; however, its length also accounts for the thickness of the Segmental Articular Surface and provides 40mm of jump height to resist subluxation.**

Instruments

RH Knee Tibial Provisional (See Profiler)
00-5881-00X-00

Straight Stem Extension Provisional (See Profiler)
00-5989-010-XX

Offset Stem Extension Provisional (See Profiler)
00-5987-020-XX


Segmental RH/ Knee Modular Box Provisional (See Profiler)
00-5851-01X-03

RH Knee Femoral Provisional/ Cutting Guide (See Profiler)
00-5881-01X-XX

Distal Femoral Augment Provisional (See Profiler)
00-5987-0XX-XX

Offset Stem locknut
00-5987-080-00

Segmental/RH Knee Hinge Post Provisional (See Profiler)
00-5851-01X-04

Step 3: Assemble and Insert Implants

3.1 Prepare Tibial Component

Refer to the Tibial Component Preparation instructions in the main *NexGen* RH Knee technique above (p. 25)

3.2 Prepare Femoral Component

- Check all component sizes to ensure that the Distal Femoral Component, Tibial Articular Surface, Tibial Component, and Hinge Post match **(Table 16)**.

RH Knee Tibial Size	RH Knee Femoral Size				
	B	C	D	E	F
1	B/123456	C/123456	D/123456		
2	B/123456	C/123456	D/123456	E/23456	
3	B/123456	C/123456	D/123456	E/23456	F/3456
4	B/123456	C/123456	D/123456	E/23456	F/3456
5	B/123456	C/123456	D/123456	E/23456	F/3456
6	B/123456	C/123456	D/123456	E/23456	F/3456

Table. 16

Segmental Knee System Compatibility Chart (using RH Knee Femoral and Tibial Components)

- Remove the Modular Hinge Post assembly that is pre-attached to and packaged with the RH Knee Femoral Component.
  - Use the Hex Cap Removal Tool to remove the Hinge Pin Plug.
  - Use the 4.5mm Hex Driver and LCCK Torque Wrench (black handle) to remove the hinge pin.
  - Remove and discard the Hinge Post and Polyethylene Box Insert **(Fig. 141)**.
  - Re-insert and manually tighten the Hinge Pin to protect the thread in the femoral component during the cementing process.
- Assemble the femoral and tibial components as indicated in the main body of this technique; however, do no attach femoral augments on the medial side greater than 5 mm.

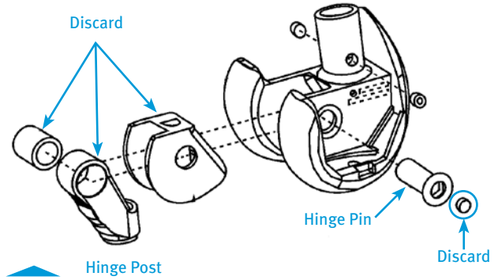


Fig. 141

TECHNIQUE TIP **F.2**

Use of 10mm, 15mm, and 20mm NexGen *Distal Femoral Augments and 10mm Posterior Augments will block access to the RH Knee hinge pin when placed on the medial side. Consider the use of cement only (no locking screw) to affix a medial augment of these sizes to expedite removal in the rare event a revision is required.*

Instruments

Hex Cap Removal Tool
00-5881-053-00

4.5mm Hex Head Screwdriver
00-5881-026-00

LCCK Deflection Beam Torque Wrench
00-5987-035-00

3.3 Cement Implants

- Insert the tibial base plate component.
- Insert the femoral component, clearing any excess cement from the medial access hole prior to cement cure.
- Insert the Articular Surface Provisional and place the knee in extension until the cement cures
- Use the 4.5mm Hex Driver or Expandable Hinge Pin Driver through the medial access hole to remove the hinge pin.
- Discard the hinge pin.

Step 4: Assemble Segmental Hinge Post

- Verify that the appropriate size Segmental Articular Surface and *NexGen* RH Knee Cement Shield Service Kit **(Fig. 142)** is used (Appendix H).
- Attach the proper size RH Knee Polyethylene Box Insert with Shield to the Segmental Hinge Post by spreading out the sides of the insert slightly and pressing it over the Hinge Post so the holes in the insert engage the bosses of the Segmental Hinge Pin Busing.
- If the post/insert assembly does not fit easily within the intercondylar notch, pull the assembly out, spread the sides of the insert to remove it from the Hinge Post, reverse the polyethylene insert orientation, and re-attach it.

Warning: Do not use the Segmental Polyethylene Insert with the *NexGen* RH Knee Distal Femoral Component. Only the items shown in Fig. 142 are to be used with the Segmental Hinge Post when it is being implanted with a *NexGen* RH Knee Distal Femoral Component (refer to Appendix H).

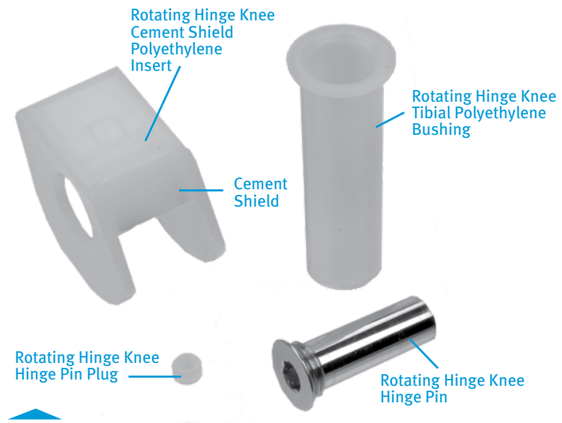


Fig. 142

Instruments

4.5mm Hex Head Screwdriver
00-5881-026-00

RH Knee Articular Surface Provisional (See Profiler)
00-5881-0XX-XX

Expandable Hinge Pin Driver
00-5881-052-00

Notes:

- **At least two *NexGen* RH Knee Cement Shield Hinge Servicing Kits must be available in the operating room in case a component is dropped or otherwise rendered non-sterile.**
- **The RH Knee Cement Shield Hinge Servicing Kit is not the same as the *NexGen* RH Knee Hinge Servicing Kit or the Segmental Knee Hinge Servicing Kit (Appendix H).**
- **Use only the Segmental Hinge Post packaged with the Segmental Articular Surface. Its length accounts for the thickness of the Segmental Articular Surface and includes an additional 40mm of jump height to resist subluxation.**
- **The Hinge Pin Bushing that is pre-assembled to the Hinge Post prevents the polyethylene insert from being assembled backwards. This bushing should never be replaced with a modular *NexGen* RH Knee Hinge Post Bushing.**
- **The holes in the polyethylene insert must match the bosses on the hinge pin bushing to ensure proper orientation (Fig. 143).**
- **If the polyethylene insert with shield is assembled backwards onto the Hinge Post, the insert will not sit flush against the lateral side of the Hinge Post due to a "no-fit" condition with the hinge pin bushing. This will cause the post/insert assembly to not fit without interference within the intercondylar notch of the *NexGen* RH Knee Distal Femoral Component upon assembly.**

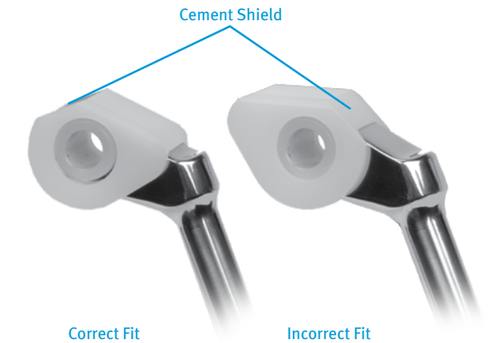


Fig. 143

Step 5: Assemble and Insert Implants

Implant Assembly

- Attach the new hinge pin from the *NexGen* RH Knee Cement Shield Servicing Kit to the Expandable Hinge Pin Driver **(Fig. 144)**.
- Insert the proximal end of the post/insert assembly into the intercondylar notch of the distal femur.

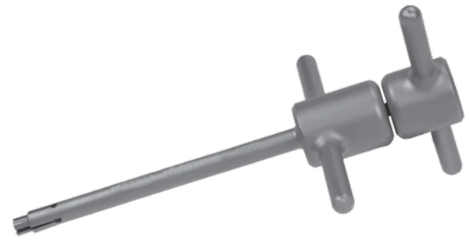


Fig. 144

TECHNIQUE TIP **F.3**

To facilitate seating of the assembly into the intercondylar notch, rotate the post/insert assembly anteroposteriorly and move the knee from 90° of flexion into extension.

Instruments

4.5mm Hex Head Screwdriver
00-5881-026-00

Expandable Hinge Pin Driver
00-5881-052-00

- Visually confirm that the holes are aligned by looking through the medial access hole.
- Insert the Segmental/RH Knee Hinge Pin Aligner through the holes.
- Confirm that the aligner has engaged the hole on the opposite side of the intercondylar notch by pulling distally on the Hinge Post by hand.
- While holding the knee steady, remove the Segmental/RH Knee Hinge Pin Aligner.
- Insert and thread the new hinge pin through the medial access hole and into the aligned holes of the femoral component and Hinge Post, ensuring that the hinge pin passes through the hinge pin bushing of the Hinge Post.
- Confirm that the hinge pin has engaged the hole in the hinge post bushing and on the opposite side of the intercondylar notch by pulling distally on the Hinge Post by hand.
- Use the LCCK Torque Wrench (black handle) and 4.5mm Hex Driver to torque the hinge pin to 95 in-lbs **(Fig. 145)**.
- Cover the hex with bone wax through the medial access hole.
- If using medial augments, pack cement into the medial pockets of the distal femoral component, and onto the resected distal and posterior medial femoral condyle.
- Insert the medial augments from the side, and fill any gaps with additional cement.

Notes:

— **Do not use the hinge pin that was in place during the cementing process.**

— **The Expandable Hinge Pin Driver can be used to hold the hinge pin during insertion. Do not use this instrument to torque the hinge pin after it is fully inserted.**

— **If femoral augments are being used on the medial side of the *NexGen* RH Knee Distal Femoral Component, the augments will need to be removed to remove the hinge pin in a future revision. Consider cementing these augments to facilitate further removal if necessary.**

Fig. 145

Instruments

Segmental/ RH Knee Hinge Pin Aligner
00-5851-085-00

LCCK Deflection Beam Torque Wrench
00-5987-035-00

Expandable Hinge Pin Driver
00-5881-052-00

Appendix G: Servicing the Hinge of a Well Fixed RH Knee

This is typically used when there is an existing well fixed RH Knee Femoral and Tibial Component.

The hinge mechanism of the RH Knee implant can be replaced or serviced without disrupting the fixation of the femoral and tibial components. A sterile kit (RH Knee Cement Shield Hinge Servicing Kit for replacement with the Segmental Articular Surface and the One-Piece Hinge Post, or the RH Knee Hinge Servicing Kit for replacement with the RH Knee Articular Surface or Segmental Articular Surface and the modular hinge post) is available for each femur size that contains the hinge components required to facilitate the exchange **(Figs. 146 and 147)**.

Note: If the RH Knee Hinge Servicing Kit (Table 17 top) is used to service the RH Knee implant, the RH Knee Modular Hinge Post can be used with either the RH Knee Articular Surface or the Segmental Articular Surface. If the RH Knee Cement Shield Hinge Servicing Kit (Table 17, bottom) is used to service the RH Knee implant, the Segmental One-Piece Hinge Post must be used with the Segmental Articular Surface. See Table 17 for an illustration of the compatibility of the servicing kits.

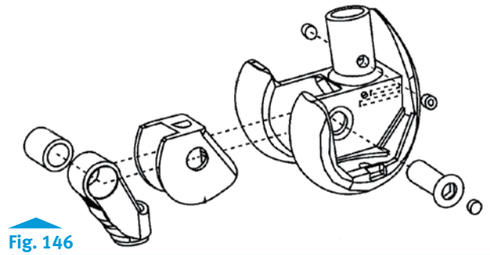


Fig. 146

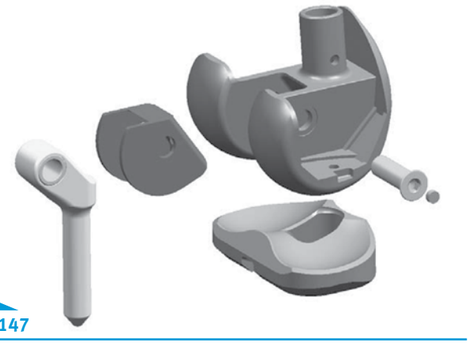


Fig. 147

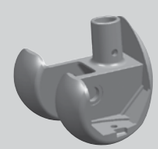
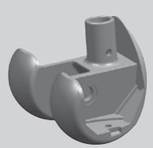
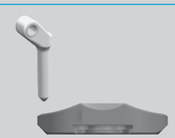
RH Knee	Hinge Servicing Kit Used	Compatible Articular Surfaces and Hinge Components		
			Segmental Articular Surface (with the Hinge Post)	
 Base Component System	*NexGen* RH Knee Hinge Servicing Kit	*NexGen* RH Knee Articular Surface (with the Hinge Post Extension)	DISCARD OR Segmental Articular Surface with the Segmental One-Piece Hinge Post	DISCARD *NexGen* RH Knee Articular Surface (with the Hinge Post Extension)
 Base Component System	*NexGen* RH Knee Cement Shield Servicing Kit	 Segmental Articular Surface with the Segmental One-Piece Hinge Post		

Table. 17

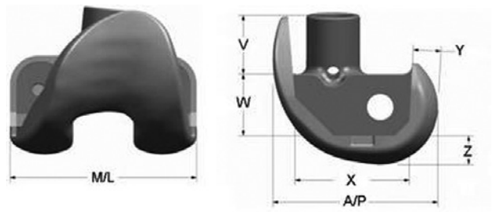
Servicing Kit Compatibility Chart

- Determine the femur size that has been implanted into the patient. Markings on the articular surface, top of the polyethylene box insert and on the back of the hinge post can assist in this identification.

Notes:

- **The Segmental Articular Surface may be used to increase the Tibial/Femoral compatibility options (refer to Table 17, page 72). If used with the RH Knee Hinge Servicing Kit, discard the Segmental One-piece Hinge Post from the Segmental Articular Surface package. An RH Knee Articular Surface package must also be opened to retrieve the hinge-post extension to be used with the RH Knee Hinge Servicing Kit and the Segmental Articular Surface.**
- **If a distal and/or posterior augment larger than 5mm has been used on the medial side, the augment will need to be removed to provide access to the hinge pin.**
- **Make sure the femur size is identified correctly (by reading markings or measuring M/L and/or A/P dimension of femoral implant) and that the correct Trephine Guide Bushing is chosen. Otherwise, the Hinge Pin may not be accessed and additional bone loss could occur. See Table 18 and Table 19 for M/L, A/P, and other important dimensions of the RH Knee Distal Femoral Implant.**

- If there is not sufficient clearance on the distal end of the RH Knee Femoral Component for the Condylar Trephine Guide instrumentation **(Fig. 148)** to be used properly due to biological obstructions, an alternate freehand technique may be used to locate the hinge pin as follows.



	RH Knee Key Dimensions						
	M/L	A/P	V	W	X	Y	Z
Size B	58mm	50mm	18mm	19mm	35mm	8.4mm	9mm
Size C	64mm	54.4mm	23.4mm	22.4mm	37mm	10mm	10.5mm
Size D	68mm	58mm	23.4mm	24mm	41mm	10mm	10.5mm
Size E	72mm	62mm	23.4mm	25.4mm	45mm	10mm	10.5mm
Size F	76mm	66mm	23.4mm	27.4mm	48.6mm	10mm	10.5mm

Table. 18

RH Knee Distal Femoral Implant Dimensions

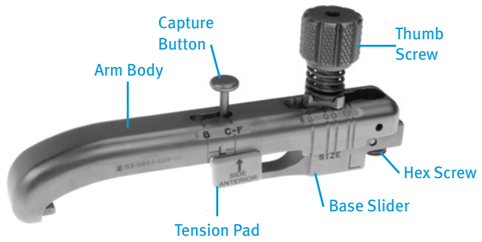


Fig. 148

Instruments

Condylar Trephine Guide
00-5853-028-00

Freehand Drilling using Trephine or 18mm Femoral Stem Drill:

- Locate and mark the drilling center point on the medial side of the bone at a distance of 'X' from the anterior flange and a distance of 'Y' from the distal condyle surface **(Fig. 149)**.

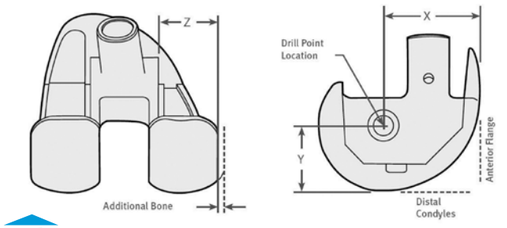


Fig. 149

- Measure the additional bone on the medial side (not covered by the implant) and add to 'Z' depth **(Table 19)**. This is the 'total depth' to be drilled.
- Mark the total depth on Trephine or 18mm Femoral Stem Drill with a marking pen and drill through the bone to the required depth (taking care not to drill into the actual component) to access the hinge pin.
- Follow the steps as shown for servicing the hinge mechanism for a RH Knee Distal Femur with a Segmental One-Piece Hinge Post or servicing the hinge mechanism for a RH Knee Distal Femur with a RH Knee Modular Hinge Post, whichever applies.

Note: For size B RH Knee Femurs, if a distal and/or posterior augment has been used on the medial side, the augment will need to be removed to provide access to the hinge pin.

For size C-F RH Knee Femurs, if a distal and/or posterior augment larger than 5mm has been used on the medial side, the augment will need to be removed to provide access to the hinge pin.

RH Knee Hinge Pin Location Dimensions			
Femoral Size	X	Y	Z
B	32.5mm	17.5mm	16mm
C	32.5mm	22mm	19mm
D	35mm	23.5mm	21mm
E	37mm	25mm	23mm
F	38.5mm	27mm	25mm

Table. 19

Instruments

Trephine
00-5881-050-00

Femoral Stem Base Drill
00-5881-010-01

Step 1: Preparing the Condylar Trephine Guide

- Adjust the orientation of the tension pad on the Condylar Trephine Guide by pressing the capture button so that the tension pad is disengaged and slide the capture button so that it is in the hole that corresponds to the size of the femoral component **(Fig. 150)**.

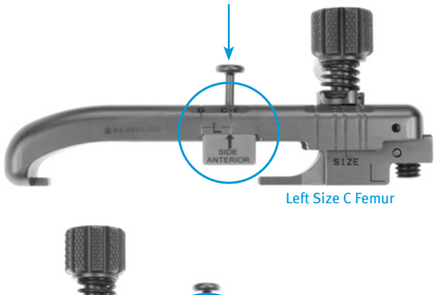


Fig. 150

- The etching on the tension pad must match up with the etching on the arm body indicating which side femoral component ('L' for left or 'R' for right) is being serviced **(Fig. 151)**.

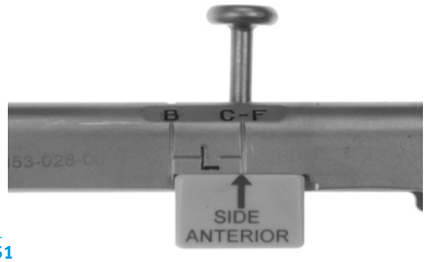


Fig. 151

- Adjust the base slider by loosening the thumb screw of the Condylar Trephine Guide so that the recessed hex screw is accessible for attachment of the Trephine Guide Bushing **(Fig. 152)**.

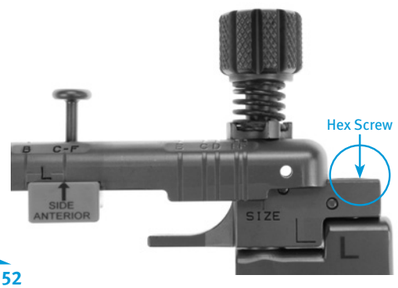


Fig. 152

Instruments

Condylar Trephine Guide
00-5853-028-00

Trephine Guide Bushing
See ZSS Profiler
00-5853-01X-51

3.5mm Hex Head Screwdriver
00-5987-089-00

- Secure the appropriate size Trephine Guide Bushing, corresponding to the size femoral component implanted in the patient, to the Condylar Trephine Guide by tightening the recessed hex screw with the 3.5mm Hex Head Screwdriver **(Fig. 153)**.

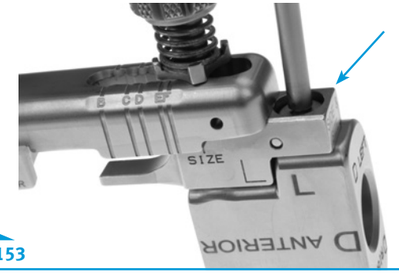
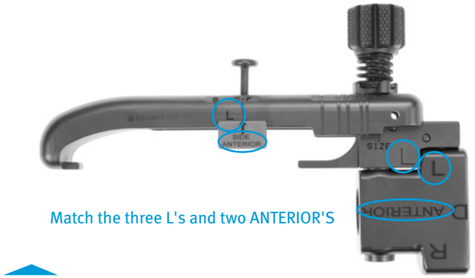


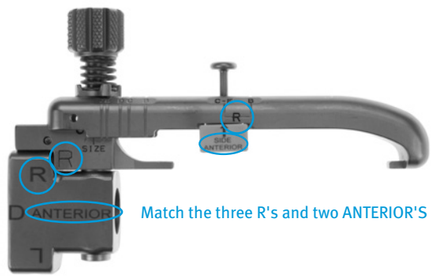
Fig. 153



Match the three L's and two ANTERIOR'S

Fig. 154

Note: For a left femur, the 'L' on the Trephine Guide Bushing should be oriented the same as both 'L's on the Condylar Trephine Guide (Fig. 154). For a right femur, the 'R' on the Trephine Guide Bushing should be oriented the same as the 'R' on the Condylar Trephine Guide (Fig. 155). In both cases the bushing and guide should read 'ANTERIOR'.



Match the three R's and two ANTERIOR'S

Fig. 155

Instruments

Condylar Trephine Guide
00-5853-028-00

Trephine Guide Bushing
See ZSS Profiler
00-5853-01X-51

3.5mm Hex Head Screwdriver
00-5987-089-00

- Attach the Condylar Trephine Guide to the notches on each side of the femoral component by sliding the base slider towards the femoral component **(Figs. 156 and 157)**.

Note: The etching on the Trephine Guide Bushing 'ANTERIOR' as well as the etching on the tension pad 'ANTERIOR' should be facing the ANTERIOR side of the femoral component.

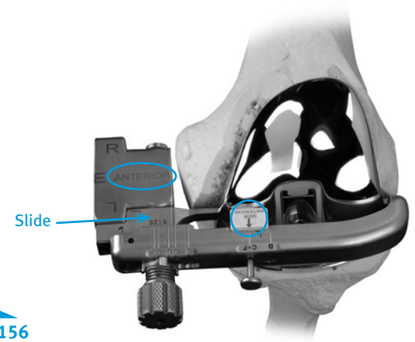


Fig. 156

Fig. 157

- Tighten the thumb screw in the location on the arm body such that the appropriate size femur matches the size indicated by the Condylar Trephine Guide **(Fig. 158)**. This will secure the Condylar Trephine Guide to the notches of the femoral component.

Note: Make sure the femur size implanted in the patient matches the femoral size marking on the Condylar Trephine Guide. Otherwise, the hinge pin may not be accessed and additional bone loss could occur.

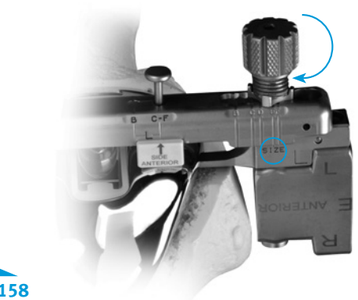


Fig. 158

Instruments

Condylar Trephine Guide
00-5853-028-00

Trephine Guide Bushing
See ZSS Profiler
00-5853-01X-51

Step 2: Accessing the Currently Implanted Hinge Pin

- Use the Trephine to drill an access hole into the medial side of the femur **(Fig. 159)**. The Trephine has a built in stop to limit the depth of drilling. Use the Hand Rasp to remove any remaining bone or cement obstructing access to the hinge pin **(Fig. 160)**.

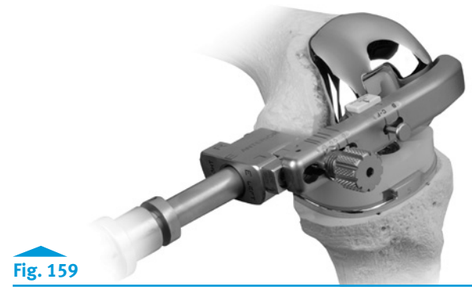


Fig. 159

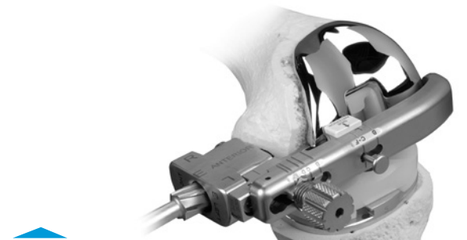


Fig. 160

- Remove the Condylar Trephine Guide from the femoral component by loosening the thumb screw. Use the Hex Cap Removal Tool to remove the polyethylene plug from the hex in the hinge pin by pressing the tip into the center of the hinge pin plug and turning **(Fig. 161)**.

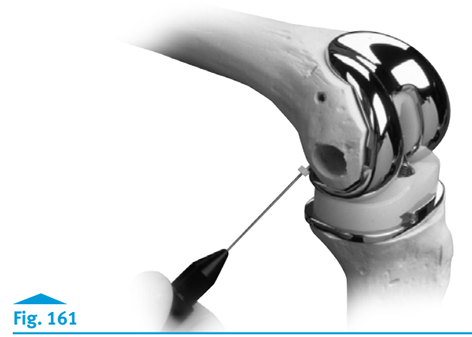


Fig. 161

Instruments

Condylar Trephine Guide
00-5853-028-00

Trephine Guide Bushing
See ZSS Profiler
00-5853-01X-51

Trephine
00-5881-050-00

Hand Rasp
00-5881-051-00

Hex Cap Removal Tool
00-5881-053-00

Tibial Bushing Remover
00-5881-055-00

Step 3: Removing the Currently Implanted Hinge Pin and Components

Note: This document assumes that there is a well-fixed distal femoral component and a well-fixed proximal tibia component.

Removing the Hinge Pin and Components

- Remove the hinge pin using the 4.5mm Hex Head Screwdriver and RH Knee Removal Wrench. Once the hinge pin has been removed, the remaining internal hinge components are also removed **(Figs. 162 and 163)**.

Fig. 162

Fig. 163

- Remove the articular surface. Remove tibial bushing from the tibial plate stem with the Tibial Bushing Remover **(Fig. 164)**. Be careful to avoid scratching the tibial plate surface.

Fig. 164

Instruments

4.5mm Hex Head Screwdriver
00-5881-026-00

RH Knee Removal Wrench
00-5881-054-00

Step 4: Implanting the New Hinge Mechanism and Articular Surface

Implanting the Hinge Mechanism using the RH Knee Hinge Servicing Kit with an RH Knee Modular Hinge Post

- Insert the new tibial bushing from the RH Knee Hinge Servicing Kit for using a RH Knee Modular Hinge Post into the tibial plate stem and press into place **(Fig. 165)** (Appendix H). If using a Segmental One-piece Hinge Post, proceed to page 84.

Fig. 165

- Insert the polyethylene box insert from the RH Knee Hinge Servicing Kit into the femur and slide the RH Knee Hinge Post with bushing into place **(Fig. 166)**.

Fig. 166

- Attach the new hinge pin from the RH Knee Hinge Servicing Kit to the Expandable Hinge Pin Driver **(Fig. 167)**. The Expandable Hinge Pin Driver can be used to hold the hinge pin during insertion.

Note: Do not use this instrument to torque the hinge pin after it is fully inserted.

- Align the holes of the femoral component and of the RH Knee Modular Hinge Post/RH Knee Polyethylene Box Insert assembly to accept the hinge pin by first confirming alignment visually through the medial access hole, then insert the Segmental/RH Knee Hinge Pin Aligner through the medial access hole.
- Hold the knee steady, and remove the Segmental/RH Knee Hinge Pin Aligner. Then insert and thread the new hinge pin (attached to the Expandable Hinge Pin Driver). Remove the Expandable Hinge Pin Driver.
- Torque the hinge pin to 95 in.-lb. using the LCCK Torque Wrench (black handle) and the 4.5mm Hex Driver **(Fig. 168)**. Press the new hinge pin plug from the RH Knee Hinge Servicing Kit into the hex of the hinge pin or cover the hex with bone wax. Replace the bone removed during drilling if desired.

Fig. 167

Fig. 168

Instruments

Segmental RH/ Knee Modular Box Provisional (See Profiler)
00-5851-01X-03

Segmental/ RH Knee Hinge Pin Aligner
00-5851-085-00

Expandable Hinge Pin Driver
00-5881-052-00

LCCK Deflection Beam Torque Wrench
00-5987-035-00

Distraction Method

- Select the appropriate size Articular Surface (refer to page 5).
- Place the tibial articular surface onto the tibial base plate and slide it forward until it engages the tab **(Fig. 169)**. While distracting the joint, rotate the hinge post posteriorly until it drops into the hole in the middle of the articular surface **(Fig. 170)**.

The Locking Mechanism of the RH Knee

- Tightening of the taper on the Hinge Post Extension is critical to achieving security of the locking mechanism of the implant. Use of the Spanner Wrench to counteract the opposing forces of the RH Knee Torque Wrench ensures minimal forces are transmitted to the fixation surfaces, and reduces the potential of binding. Tightening to the level indicated on the Torque Wrench is the most important step in the surgical technique because it "locks" the Hinge Post Extension into position. The Hinge Post Extension is designed with a 4 degree Morse-type taper below the threads **(Fig. 171)**. This 4 degree taper mates with a taper in the hinge post to provide the "lock" between the components. If the hinge post assembly is not properly tightened, **postoperative disassembly could potentially occur.**
- Freedom of the hinge post extension to rotate within the hinge may be compromised (reduced) by binding between the threads of the hinge post and hinge post extension. This binding is created when the tibial is not aligned directly under the femoral component **(Fig. 172)**.
- This malalignment creates friction between the threads of the hinge post and hinge post extension as the extension is inserted and turned. The friction in the hinge post extension can lead to a reduction in the tightening torque being applied to threads just above the 4 degree Morse Taper. As bending forces (binding) increase, the rotational torque that is applied to the hinge post extension decreases. This could directly affect locking of the 4 degree locking taper. In cases where this malalignment is significant, it is possible for bending forces to increase to the point where even though the torque wrench reads to the proper level, only a fraction of tightening force is being exerted to the screw threads and Morse Taper. **In this case, the 4-degree Morse Taper may not be fully locked.** As earlier discussed, **adequate taper locking is critical to maintaining assembly.**

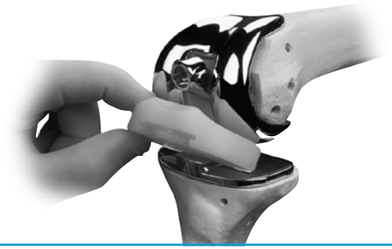


Fig. 169

Fig. 170

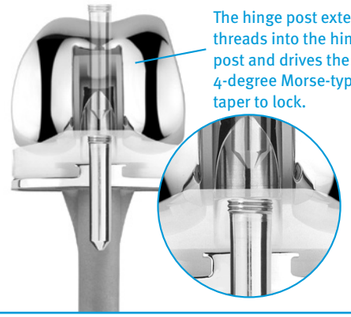


Fig. 171

Fig. 172

Instruments

Spanner Wrench
00-5881-028-00
00-5881-028-01
(Size B)

RH Knee
Deflection Beam
Torque Wrench
00-5881-027-00

- It is possible to address this concern at the time of implant assembly by following these recommendations. If difficulty is encountered in assembling or disassembling the provisional hinge post components, it is necessary to reposition the lower leg (tibia) under the femur until the hinge post extension pin slips easily into place. The same is true for the implant assembly. The hinge post extension should easily slide through the hole in the top of the hinge post and into the tibial base plate **(Fig. 173)**.
- **The surgeon should be able to easily turn (thread) the hinge post extension until it is flush with the top of the hinge using only two fingers on the hex head screwdriver.** If significant resistance to turning is encountered, the tibial/femoral alignment must be altered to remove the binding force.
- **Proper alignment must be maintained during the entire assembly process.** It is critical to continue to maintain this orientation during the time that the spanner wrench is assembled, and the torque wrench is tightened. Remember, if resistance to turning is encountered, a malalignment is creating a bending force (binding) and reducing the locking torque on the 4-degree Morse Taper.
- To confirm that the femur and tibia are in alignment during the tightening process, **use the 4.5mm Hex Head Screwdriver to finger tighten and loosen the hinge post extension a half turn immediately prior to use of the Torque Wrench.** The proper upper/ lower leg alignment position must then be maintained throughout the tightening process.

Hinge Post Extension Insertion

- Make sure that the hinge post and hinge post extension tapers are clean and dry prior to assembly of the components. The appropriate length hinge post extension is packaged with each articular surface. Align the hinge post with the hole in the top of the tibial base plate, and insert the hinge post extension in the hinge post through the articular surface and into the hole on the tibial base plate **(Fig. 174)**. Thread the hinge post extension into the hinge post, by hand, using the driver **(Fig. 175)**.

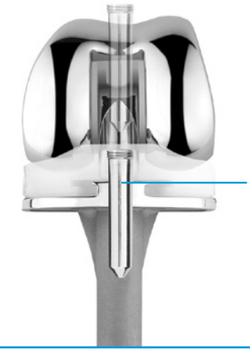


Fig. 173

Fig. 174

Fig. 175

Instruments

Spanner Wrench
00-5881-028-00
00-5881-028-01
(Size B)

RH Knee
Deflection Beam
Torque Wrench
00-5881-027-00

4.5mm Hex Head
Screwdriver
00-5881-026-00

- Leave the driver in the hinge post extension. Attach the Spanner Wrench to the two tabs on the outside of the medial and lateral femoral component. Thumb tighten the knurled wheel to snug the wrench to the distal femoral condyles. Attach the RH Knee Deflection Beam Torque Wrench to the driver, and apply 130 in.-lbs. (15n-m) of torque until the needle on the wrench reaches the appropriate mark on the torque wrench **(Figs. 176, 177 and 178)**. While torque is being applied, counter rotation is applied using the Spanner Wrench.

Note: Do not over- or under-torque. Undertightening of the hinge post extension may allow it to loosen over time. Overtightening is not necessary.

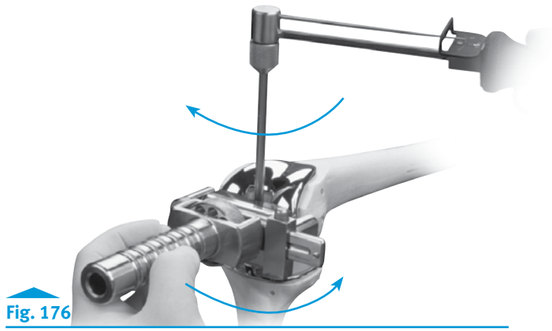


Fig. 176

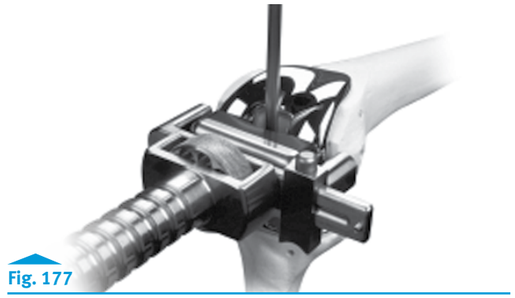


Fig. 177

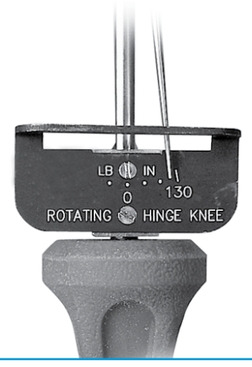


Fig. 178

Instruments

Spanner Wrench
00-5881-028-00
00-5881-028-01
(Size B)

RH Knee
Deflection Beam
Torque Wrench
00-5881-027-00

4.5mm Hex Head
Screwdriver
00-5881-026-00

Implanting the Hinge Mechanism using the RH Knee Cement Shield Servicing Kit with a Segmental One-Piece Hinge Post

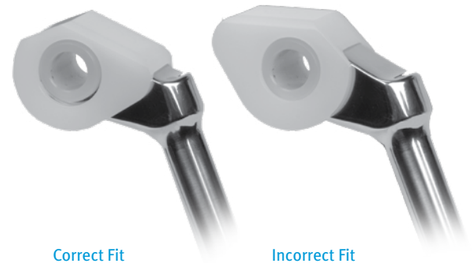
- Insert the new tibial bushing from the RH Knee Cement Shield Hinge Servicing Kit for using a Segmental One-Piece Hinge Post into the tibial plate stem and press into place **(Fig. 179)**.
- Attach the proper size RH Knee Cement Shield Polyethylene Insert to the Segmental Hinge Post by spreading out the sides of the insert slightly and pressing it over the hinge post so the holes in the insert engage the bosses of the Segmental Hinge Pin Bushing. The holes in the polyethylene insert must match the bosses on the hinge pin bushing to assure proper orientation **(Fig. 180)**.

Note: If attached backwards, the insert will not sit flush against the lateral side of the hinge post due to a "no-fit" condition with the hinge pin bushing. This will cause the hinge post/polyethylene insert assembly to not fit without interference within the intercondylar notch of the femoral component upon assembly. Therefore, if the hinge post/ polyethylene insert assembly does not fit easily within the intercondylar notch, pull the assembly out, spread the sides of the polyethylene insert to remove it from the hinge post, reverse the polyethylene insert orientation, and reattach it. The polyethylene insert should then be flush against the lateral sides of the hinge post.

- Place the Segmental Articular Surface onto the Tibial Base Plate and slide it forward until it engages the tab.
- Insert the cylindrical portion of the Segmental One-Piece Hinge Post through the Segmental Articular Surface and into the implanted tibial component
- Attach the new hinge pin from the RH Knee Cement Shield Hinge Servicing Kit to the Expandable Hinge Pin Driver **(Fig. 181)**. The Expandable Hinge Pin Driver can be used to hold the hinge pin during insertion.

Note: Do not use this instrument to torque the hinge pin after it is fully inserted.

Fig. 179



Correct Fit Incorrect Fit

Fig. 180

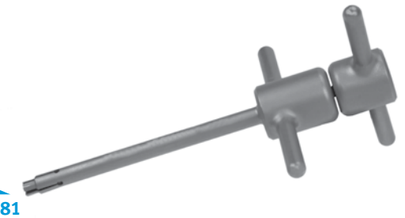


Fig. 181

Instruments

Expandable Hinge
Pin Driver
00-5881-052-00

- Insert the proximal end of the Segmental One-Piece Hinge Post/RH Knee Cement Shield Polyethylene Insert assembly into the intercondylar notch of the distal femur. Anteroposterior rotation of the Segmental One-Piece Hinge Post/RH Knee Cement Shield Polyethylene Insert assembly, from flexion into extension, may facilitate seating of the assembly into the intercondylar notch.
- Align the holes of the femoral component and the Segmental One-Piece Hinge Post/RH Knee Cement Shield Polyethylene Insert assembly to accept the hinge pin by first confirming alignment visually through the medial access hole, then insert the Segmental/ RH Knee Hinge Pin Aligner through the medial access hole.
- Hold the knee steady, and remove the Segmental/RH Knee Hinge Pin Aligner then insert and thread the new hinge pin (attached to the Expandable Hinge Pin Driver). Remove the Expandable Hinge Pin Driver.
- Torque the hinge pin to 95 in.-lb. using the LCCK Torque Wrench (black handle) and the Hex Head Screwdriver **(Fig. 182)**. Press the new hinge pin plug from the RH Knee Hinge Servicing Kit into the hex of the hinge pin or cover the hex with bone wax. Replace the bone removed during drilling if desired.

Fig. 182

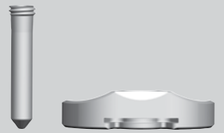
Instruments

Segmental/ RH Knee Hinge Pin Aligner
00-5851-085-00

LCCK Deflection Beam Torque Wrench
00-5987-035-00

4.5mm Hex Head Screwdriver
00-5881-026-00

Appendix H: NexGen RH Knee & Segmental Articular Surface/Hinge Kit Compatibilities

	Item Description	Picture/Item Number	Use On/With	Do Not Use With/Why
1	Segmental Articular Surface • Segmental One-piece Hinge Post • Segmental Articular Surface Piece	 00-5850-020_060-12_26	Segmental Distal Femoral (00-5850-012_013-01/02) Segmental *Trabecular Metal* Proximal Tibial (00-5850-001_003-10) *NexGen* RH Knee Distal Femoral (00-5880-012_016-01/02) *NexGen* RH Knee Tibial Plate (00-5880-001_006-00/02) Segmental Articular Surface can be used with the *NexGen* RH Knee Hinge Post Extension (from Item 2 below) EXCEPT with the *Trabecular Metal* Proximal Tibial (see page 72 for the Servicing Kit Compatibility Chart)	Segmental One-piece Hinge Post with *NexGen* RH Knee Articular Surface Piece • Mating components are not compatible RH Knee Modular Hinge Post Extension + Segmental Articular Surface + Segmental *Trabecular Metal* Proximal Tibial • Only Segmental One-piece Hinge Post is indicated with the Segmental *Trabecular Metal* Proximal Tibial
2	*NexGen* RH Knee Articular Surfaces • *NexGen* RH Knee Hinge Post Extension • *NexGen* RH Knee Articular Surface Piece	 00-5880-020_060-12_26	*NexGen* RH Knee Distal Femoral *NexGen* RH Knee Tibial Plate	Segmental Distal Femoral Segmental *Trabecular Metal* Proximal Tibial Segmental One-piece Hinge Post • Mating components are not compatible
3	*NexGen* RH Knee Cement Shield Hinge Service Kit • Poly Insert with Shield • Shoulder Bolt Hinge Pin • Hinge Pin Plug • Tibial Bushing	 00-5850-075-12_16	*NexGen* RH Knee Distal Femoral with Segmental Articular Surface & Segmental One-Piece Hinge Post (Item 1 above)	*NexGen* RH Knee Distal Femoral with *NexGen* RH Knee Hinge Post Extension • Mating components are not compatible
4	Segmental Hinge Service Kit • Segmental Poly Insert • Segmental Hinge Pin • Segmental Hinge Pin Set Screw • Tibial Bushing	 00-5850-070-12_13	Segmental Distal Femoral Segmental Articular Surface with Segmental One-piece Hinge Post (Item 1 above)	*NexGen* RH Knee Distal Femoral • Mating components are not compatible
5	*NexGen* RH Knee Hinge Service Kit • Poly Box Insert • Hinge Post • Shoulder Bolt Hinge Pin • Hinge Pin Plug • Tibial Bushing	 00-5880-090-12_16	*NexGen* RH Knee Distal Femoral *NexGen* RH Knee Articular Surface and RH Knee Hinge Post Extension (Item 2 above)	Segmental Distal Femoral *NexGen* RH Knee Distal Femoral with Segmental One-piece Hinge Post • Mating components are not compatible

Appendix I: Augment Compatibility
APPENDIX I

Appendix A-Augment Compatibility

NexGen RH Knee Precoat Tibial Augments

			Half Block (5mm)								Half Block (10mm)							
		Size	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
NexGen Tibial Baseplates	RH Knee Tibia (Modular)	2		C								C						
		3				C								C				
		4				C								C				
		5						C								C		
		6						C								C		
	RH Knee Tibia (Non-Modular)	1	C								C							
		2		C								C						
		3				C								C				

			Half Block Tapered (15mm) Right-Lateral/Left-Medial								Half Block Tapered (15mm) Left-Lateral / Right-Medial								Half Block Tapered (20mm) Right-Lateral/Left-Medial								(blank)
		Size	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	
NexGen Tibial Baseplates	RH Knee Tibia (Modular)	2		C								C								C							
		3				C								C								C					
		4				C								C								C					
		5						C								C								C			
		6						C								C								C			
	RH Knee Tibia (Non-Modular)	1	C								C								C								
		2		C								C								C							
		3				C								C								C					

			Half Block Tapered (20mm) Left-Lateral/Right-Medial								Half Wedge (16°)							Half Wedge (26°)							Third Wedge (22°)							RH Knee Full Block (10mm)					
		Size	1	2	3	4	5	6	7	8	2	3	4	5	6	7	8	2	3	4	5	6	7	8	2	3	4	5	6	7	8	1	2	3	4	5	6
NexGen Tibial Baseplates	RH Knee Tibia (Modular)	2		C							C							C							C								C				
		3				C							C							C							C							C			
		4				C							C							C							C								C		
		5						C							C							C							C							C	
		6						C							C							C							C								C
	RH Knee Tibia (Non-Modular)	1	C								C																					C					
		2		C								C						C							C								C				
		3				C								C						C							C							C			

C: Cement Attachment Only

NexGen RH Knee Precoat Femoral Augments

		Posterior (5mm)					Posterior (10mm)				Distal (5mm)					Distal (10mm)				Distal Only (10mm)					Distal Only (15mm)					Distal Only (20mm)				Posterior Only	
	Size	B	C	D	E	F	C	D	E	F	B	C	D	E	F	C	D	E	F	B	C	D	E	F	B	C	D	E	F	C	D	E	F	E	F
NexGen RH Knee Femorals	B Left	CS									CS									CS					CS										
	B Right	CS									CS									CS					CS										
	C Left		CS				CS					CS				CS					CS					CS				CS					
	C Right		CS				CS					CS				CS					CS					CS				CS					
	D Left			CS				CS					CS				CS					CS					CS				CS				
	D Right			CS				CS					CS				CS					CS					CS				CS				
	E Left				CS				CS					CS				CS					CS					CS				CS		CS	
	E Right				CS				CS					CS				CS					CS					CS				CS		CS	
	F Left					CS				CS					CS				CS					CS					CS				CS		CS
	F Right					CS				CS					CS				CS					CS					CS				CS		CS

CS: Cement or Screw Attachment

Establish the Tibial Platform SECTION 1

1. Insall JN. *Surgery of the Knee*. 3rd ed. New York, NY: Churchill Livingston; 2001:1556.
2. Berger RA, Crossett LS, Jacobs JJ, Rubash HE. Malrotation causing patellofemoral complications after total knee arthroplasty. *Clin Orthop*. November 1998;(356):144-153.

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