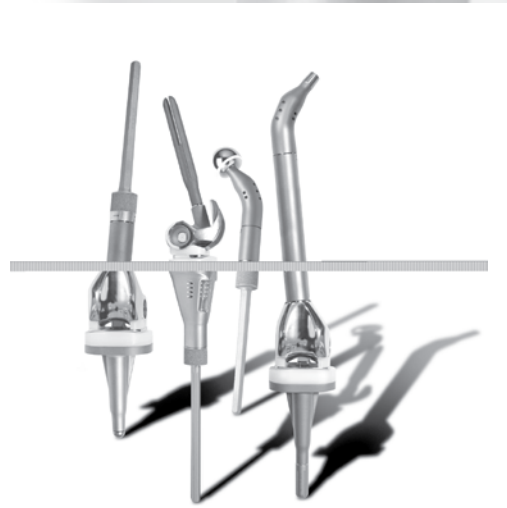




Zimmer® MOST Options® System

Surgical Technique



Modular Options for Severe Bone Loss and Trauma

MOST Options® System Surgical Technique

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Introduction

As total knee and hip arthroplasty have evolved, so has the need for a constrained system to meet the special requirements for arthroplasty in cases of severe bone loss such as tumor resections, trauma, ligamentous laxity or severe deformity.

The Zimmer® MOST Options® System is designed to facilitate intraoperative decisions with a variety of options for femoral and tibial components, implant connections and fixation of the implants. These options include the basic and soft tissue attachment femoral hip components, hinged femoral, distal femoral, hinged tibial and proximal tibial knee components. The knee components are based on a rotating hinge. The knee components can be adapted to replace bone loss of the femur or tibia.

The hinged femoral component can be fitted with distal spacers singularly or in combination to match the patient's needs. The hinge has the advantage of a long post and slight taper angle to significantly reduce the probability of dislocating from the tibial insert. In addition, the hinge position is centralized to reduce the forces on the patellar tendon during flexion. The hinged tibial baseplate has an anterior offset cone for improved placement in the tibial canal. The hinged tibial component can be fitted with spacers singularly or in combination to match the patient's needs. Porous and nonporous tibial revision stem adapters connect with a variety of segments and smooth and fluted stems based on the patient's requirements.

The basic proximal femur and proximal femur with soft tissue attachments provide flexibility in addressing severe bone loss of the proximal femur. The segments provide numerous options to make up for lost bone. One advantage of the system is the ability to easily mix and match components to address patients' individual needs.



Preoperative Planning

Implants and instruments are designed to provide precise anatomical alignment by using intramedullary guides for the femur. The tibia has the option of intramedullary or extramedullary instrumentation. Tibial alignment is achieved by creating a horizontal plane that is 90 degrees to the anatomic axis of the tibia and the distal femur at 6 degrees of valgus. These angles restore the correct overall anatomic valgus alignment of the leg.

In severe bone loss, preoperative planning is important to assist in estimating the proper placement of the implants and their sizes.

Preoperative templating is also helpful in determining the maximum size and length of the femoral or tibial stems. On the tibial side, preoperative measurements using the fibular head as a reference point will show if tibial bone loss is present and which type of tibial component, stem, augmentations or bone grafts will be necessary.

Fig. 1 illustrates one possible combination for each category of the *MOST Options System*.

The possible combinations of proximal femoral components are illustrated in Fig. 2 and the possible combinations of distal femoral, proximal tibial and total femoral components are illustrated in Fig. 3.



Fig. 1

- a Distal Femoral Replacement
- b Proximal Tibial Replacement
- c Proximal Femoral Replacement
- d Total Femoral Replacement

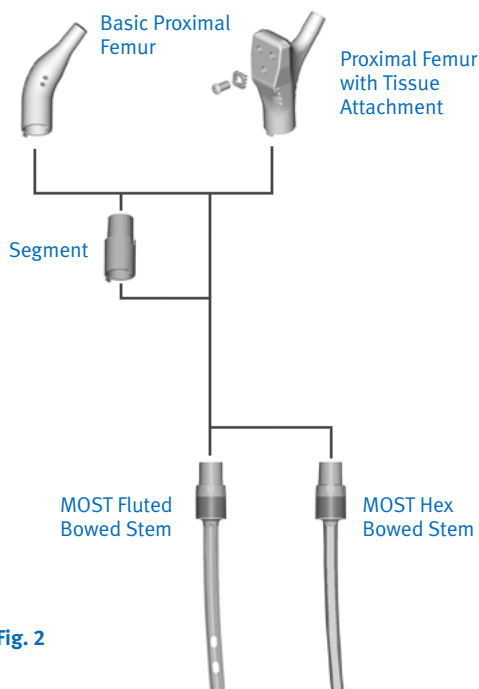
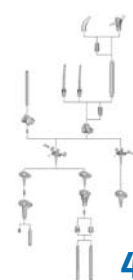


Fig. 2



System Overview

4



Distal Femoral Replacement

5



Proximal Tibial Replacement

21



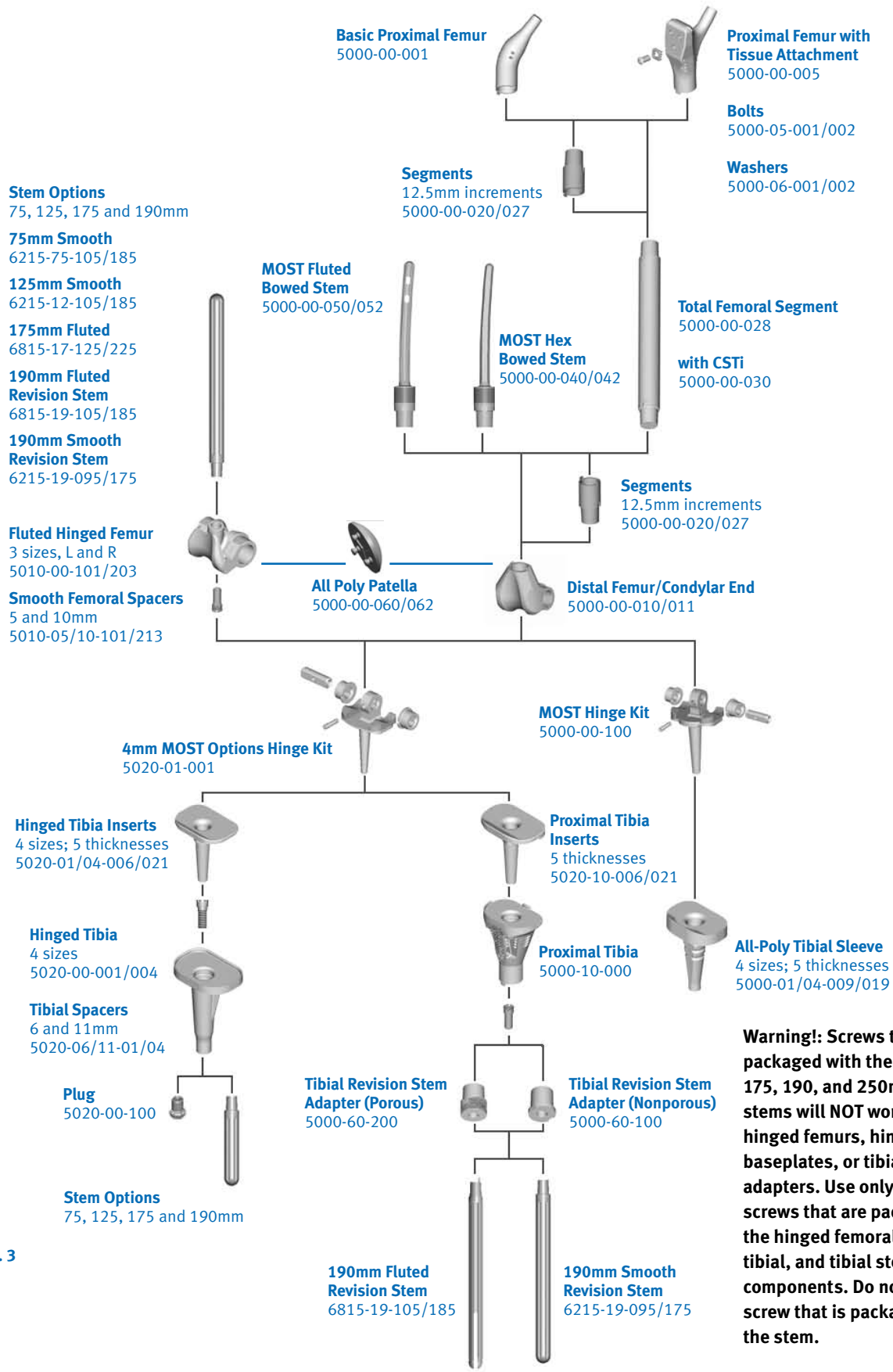
Proximal Femoral Replacement

37



Total Femoral Replacement

47



Warning!: Screws that are packaged with the 75, 125, 175, 190, and 250mm revision stems will NOT work with the hinged femurs, hinged tibial baseplates, or tibial stem adapters. Use only the collet screws that are packaged with the hinged femoral, hinged tibial, and tibial stem adapter components. Do not use the screw that is packaged with the stem.

Fig. 3

Distal Femoral Replacement



Distal Femoral Replacement

Leg Length Measurement

After exposure of the distal femur and proximal tibia has been achieved, the proposed resection levels are marked with the extremity extended in a reproducible position.

Determine the resection level based on the articular surface of the distal femur. Set the resection guide to the resection level and mark a horizontal line with an osteotome, bovie or marker (Fig. 4).

Implant Selection

Determine the implant configuration to finalize the resection level. Select the stem/segment combination from Table 1 to determine the final resection level.

Note: Each large taper connection adds 1mm to the total length.

The intramedullary length of the bowed stems is 152mm.

Distal Femoral Resection

Resect the distal femur at or slightly distal (i.e., 0.5mm to 1mm) to the marked resection level. The additional amount is to account for slightly oblique cuts and femoral resection planing.

Note: To improve the swing phase of the patient's gait, some surgeons choose to slightly shorten the limb.

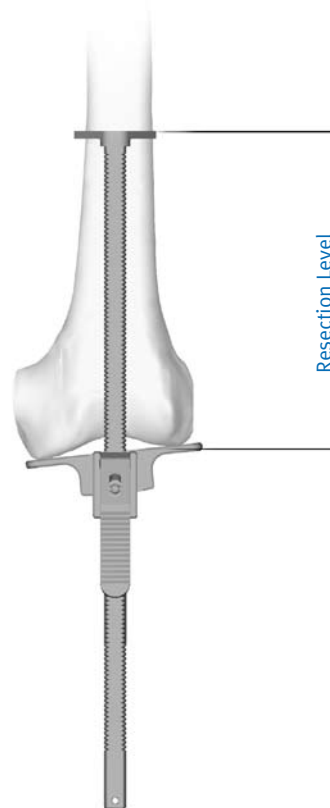


Fig. 4

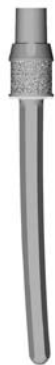


Table 1 Distal Femoral Resection with Hex and Fluted Bowed Stems with Segments

Distal Femur (condylar end)	Bowed Stem	Segments	Total Length†
65mm	30mm	0mm	96mm
65mm	30mm	30mm	127mm
65mm	30mm	42.5mm	139.5mm
65mm	30mm	55mm	152mm
65mm	30mm	67.5mm	164.5mm
65mm	30mm	80mm	177mm
65mm	30mm	55+30mm	183mm
65mm	30mm	55+42.5mm	195.5mm
65mm	30mm	105mm	202mm
65mm	30mm	80+30mm	208mm
65mm	30mm	80+42.5mm	220.5mm
65mm	30mm	130mm	227mm
65mm	30mm	105+30mm	233mm
65mm	30mm	105+42.5mm	245.5mm
65mm	30mm	155mm	252mm
65mm	30mm	130+30mm	258mm
65mm	30mm	130+42.5mm	270.5mm
65mm	30mm	155+30mm	283mm

† Note: Each taper junction adds 1mm

Bowed Femoral Stem Preparation

Flexible ream the femoral canal until cortical bone through the isthmus is reached. (The flexible reamers are not part of the *MOST Options* instrument system but are usually available through the hospital.) The intramedullary length of stems is 152mm. Ream to a depth greater than 152mm to allow proper seating of the stem shoulder on cortical bone and placement of a cement restrictor if desired.

Recommended reamer diameters are as follows:

Stem Size	Hex Bowed Stem Ream Diameter	Fluted Bowed Stem Ream Diameter
12mm	13mm to 14mm	12mm
14mm	15mm to 16mm	14mm
16mm	17mm to 18mm	16mm

Note: The *MOST* hex bowed stems are tapered 2mm distally. The fluted bowed stems are sized 0.5mm larger than the reamed hole diameter to enhance the fit within the canal.

Planing the Femoral Bone

Screw the appropriate-sized pilot for the stem diameter selected (12mm, 14mm or 16mm) to the planer (Fig. 5). Plane the resection using a power tool with a *Zimmer*[®] adapter until the cortical bone is smooth and even. A Tommy Bar or pin may be inserted in the cross hole to aid in pilot removal after planing.

Tibial Preparation

Direct vertical exposure of the tibial plateau is necessary. This is facilitated by soft tissue releases around the tibial metaphysis, medial and lateral soft tissue retraction with small angled knee retractors and subluxation of the tibia anteriorly with a large angled knee retractor.

There are four surgical options for tibial preparation:

- 1 Extramedullary Tibial Option, which uses a metal-backed hinged tibia without a long stem (See page 7, below),
- 2 Extramedullary Tibial Option, which uses an all-poly tibial sleeve (See Appendix A, page 56),
- 3 Intramedullary Tibial Option, which uses the metal-backed tibia without a stem (See Appendix B, page 60), and
- 4 Intramedullary Tibial Option, which uses a metal-backed tibia with a long stem (See Appendix C, page 67).

Extramedullary Tibial Option (Using the metal-backed hinged tibia without a long stem)

The Extramedullary Tibial Alignment Guide assembly consists of the extramedullary guide, Tibial Saw Guide and a 2mm, 10mm or 15mm Tibial Stylus. Select the appropriate Tibial Stylus based on the amount of required bone resected on the tibia. Adjust the extramedullary guide assembly to the approximate tibial length.

Tap the longest pin of the guide into the central portion of the proximal tibia (Fig. 6). This fixes the guide to the tibia but allows for rotation until the second pin is impacted.

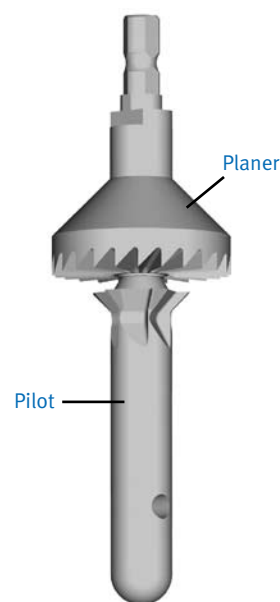


Fig. 5

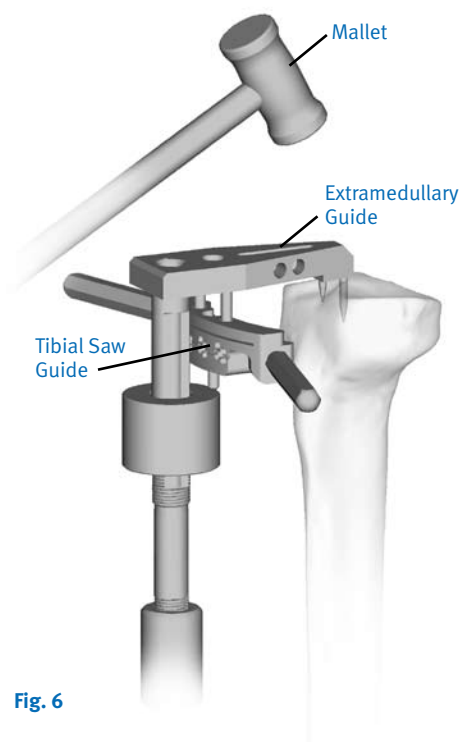


Fig. 6

Rotational Alignment

Rotation is selected based on the anterior crest of the tibia and the bimalleolar axis. Make sure the guide is parallel to the crest of the tibia in the anterior/posterior and medial/lateral view.

The bottom nut on the ankle cradle should be positioned to maintain a 0 degree tibial slope (Fig. 7). The anterior tibial plateau should be aligned parallel with the cutting block (Fig. 8). Rotation is then locked in place by impacting the second pin into the tibia.

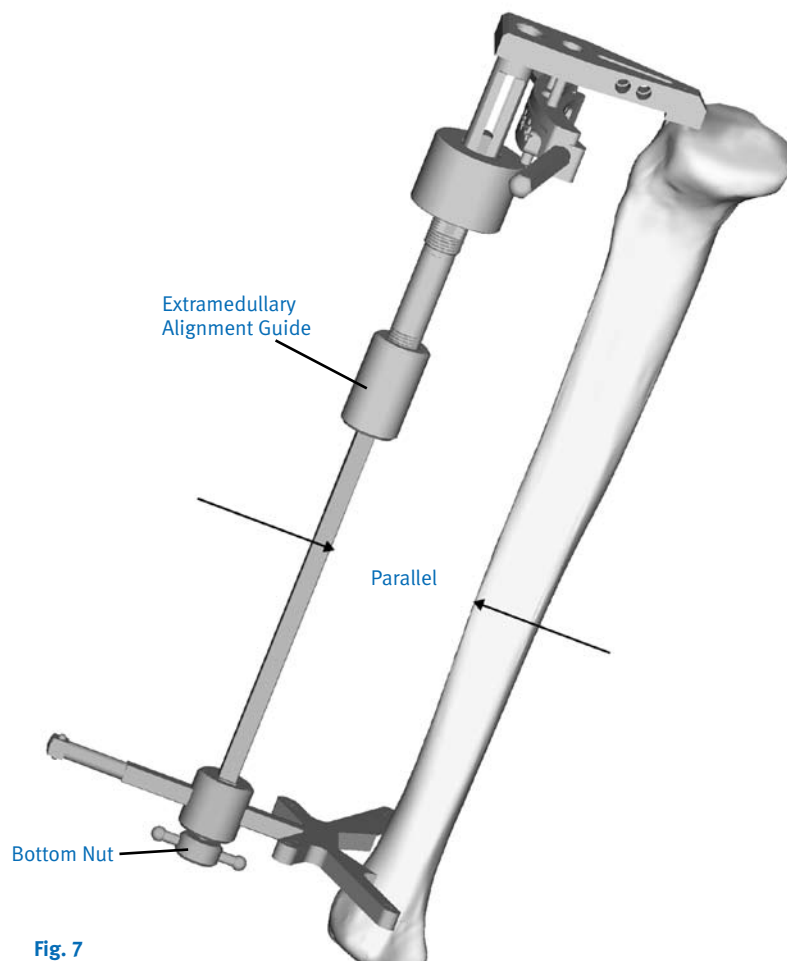


Fig. 7

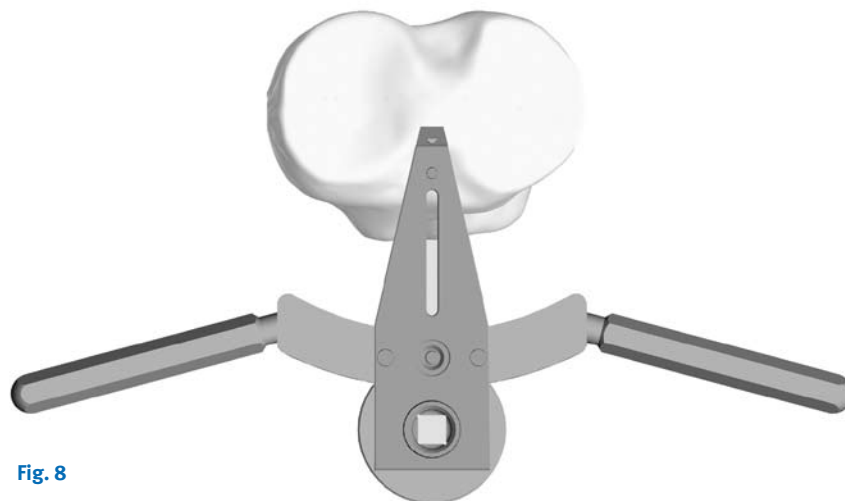


Fig. 8

Zero Degree Tibial Slope

A zero degree tibial cut is recommended to accommodate the cone of the hinged tibial baseplate into the tibia.

Level of Resection

The 10mm tibial stylus is attached to the tibia saw block. It is used to determine the tibial saw guide position for minimal resection of the proximal tibia (Fig. 9). The total thickness of the hinged tibia, hinged tibial insert, 4mm *MOST Options* hinge is 15mm. The stylus will position the tibial saw guide 10mm below the point of reference. If additional bone needs to be resected, the tibial saw block may be moved in 2mm increments (Example: 10mm + 2mm = 12mm).

Note: A 10mm resection will raise the joint line approximately 5mm. Remember to adjust the distal femoral cut to maintain total length measurement. There is a 15mm tibial stylus in the system that may be used to obtain a 15mm tibial resection.

The cutting guide is then stabilized by drilling and pinning through the two outermost holes on the “DRILL ON LINE” (Fig. 10). This allows for 2mm of adjustment proximally and 4mm distally. The lateral drill point is first placed after retracting the patellar tendon, followed by the medial drill point. If the medial drill point appears to “walk,” this can be avoided by marking the entry point through the block, then drilling outside the block to pierce the cortex. Re-drill the hole through the block. Turn the knurled nut counterclockwise until it falls free from the guide to disengage the alignment guide from the tibial saw block.

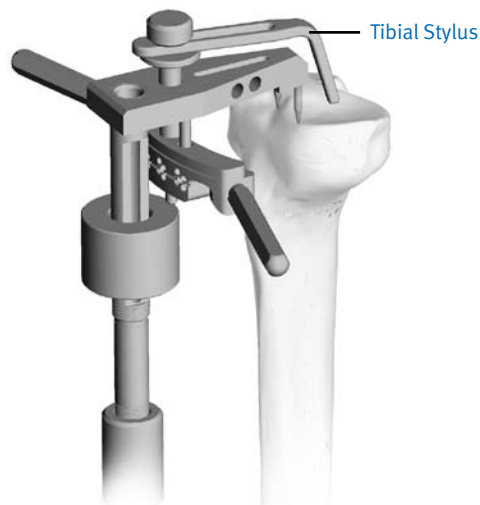


Fig. 9

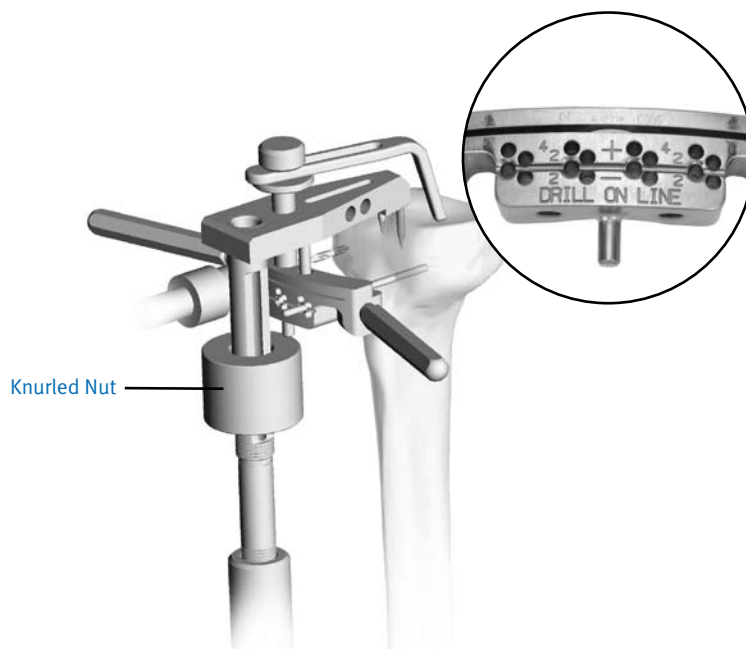


Fig. 10

Disassemble the jig by removing the stylus and extramedullary alignment guide using a saphammer (Fig. 11).

Cutting the Proximal Tibia

A Miller guide (angel wing) can be placed on the tibial saw guide along the medial and lateral edge of the tibia to confirm the level of desired tibial resection. If it appears that an inadequate resection will occur, adjust the tibial saw guide in 2mm increments to a lower level. Use angled retractors to protect soft tissue and ligaments. Cut the proximal tibia with the appropriate saw blade for the saw block (Fig. 12).

Note: Saw blades especially designed for this system are recommended. The blades are 1 inch wide with a shank thickness of 0.058" by 90mm long and will best match the saw guide.



Fig. 11



Fig. 12

Proximal Tibial Sizing and Drilling

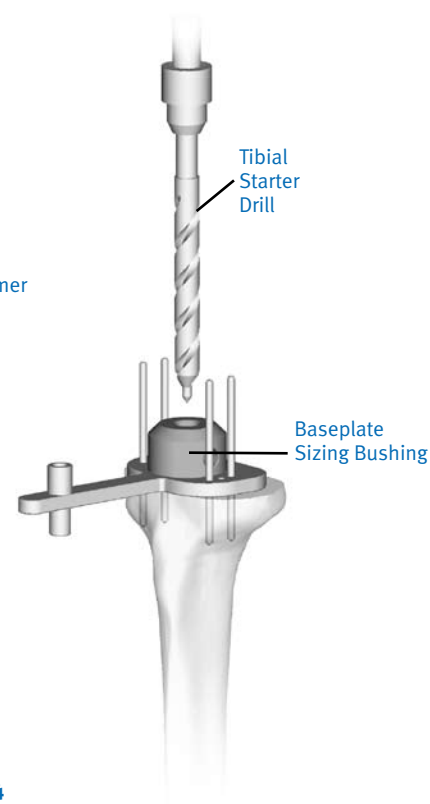
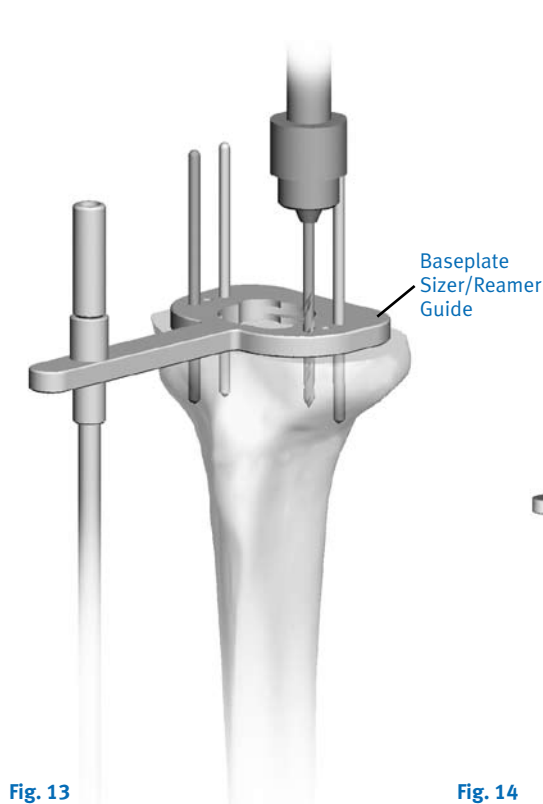
To avoid soft tissue impingement, select the appropriate size Tibial Baseplate Sizer/Reamer Guide that adequately covers but does not overhang the proximal tibia. Adjust the guide as far anteriorly as possible and slightly medial to the midline to avoid lateral perforation. Final rotational alignment is referenced off the tibial tubercle with the handle of the guide in the medial one-third of the tubercle. The Baseplate Sizer/Reamer Guide is then stabilized with four pins as the holes are drilled using the 3.2mm (1/8 inch) by 5 inch drill bit (Fig. 13). Check the alignment of the tibial cut with the Axial Alignment Rod through the handle of the Baseplate Sizer/Reamer Guide.

The tibial profile dimensions correspond to the following A/P and M/L dimensions.

Tibial Size	A/P	M/L
1	46mm	65mm
2	48mm	71mm
3	51mm	77mm
4	54mm	83mm

Proximal Tibial Cone Preparation

Attach the Baseplate Sizing Bushing to the Tibial Baseplate Sizer/Reamer Guide by turning in the direction of the arrow on the tibial baseplate sizer/reamer guide. Attach the 11mm tibial starter drill to a power tool and place it through the baseplate sizing bushing (Fig. 14). If resistance is encountered, remove the drill and inspect the proximal tibia for cortical thinning or perforation. The correct depth is established when the nose of the power tool touches the top of the Baseplate Sizing Bushing. Remove the Baseplate Sizing Bushing by turning it in the opposite direction of the arrow on the Tibial Baseplate Sizer/Reamer Guide.



Assemble the Primary Cone Reamer to the Cone Reamer Guide (Fig. 15). The Cone Reamer Guide assembly is attached to a power tool with a *Zimmer* quick disconnect fitting and then assembled to the Baseplate Sizer/Reamer Guide with a slight turn in the direction of the arrow on the Tibial/Sizing Reamer Guide. The Baseplate Sizer/Reamer Guide must be clear of all bone materials etc. before the Cone Reamer Guide is assembled (Fig. 16).

Ream the tibial cone until the nose of the power tool touches the top of the Cone Reamer Guide (Fig. 16). Remove the reamer guide from the Baseplate Sizer/Reamer Guide by a slight turn in the opposite direction of the arrow on the Tibial/Sizing Reamer Guide.

Note: Care needs to be taken to ensure the correct position of the cone reamer in the proximal tibia. If the cone reamer is angled into the tibia in the A/P or M/L planes, the tibial cone may not fully seat or the tibial cortex may be compromised.

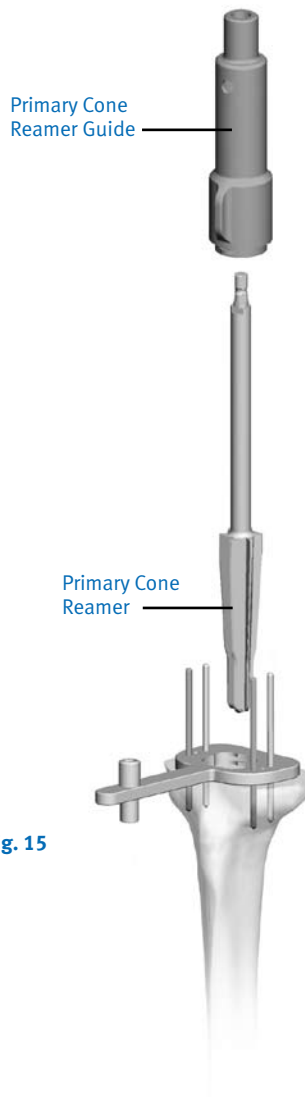


Fig. 15

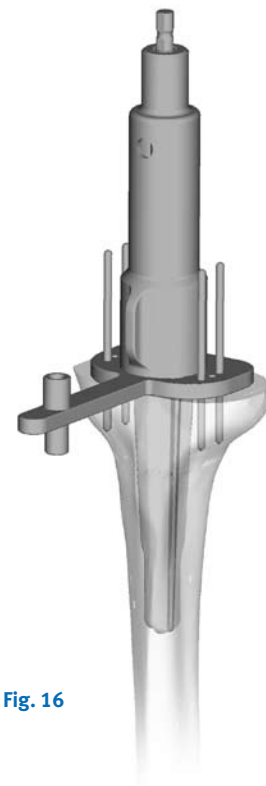


Fig. 16

Tibial Keel Preparation and Tibial Trial Insertion

Once a hole has been reamed, the Hinged Tibial Trial and Trial Stem are assembled and then inserted into the tibia. Rotate the Hinged Tibial Trial to the proper position. The Keel Broach and modular handle are assembled and inserted into the Hinged Tibial Trial. The modular handle of the Keel Broach is gently impacted with a mallet until it is fully seated (Fig. 17a). Remove the modular handle from the Hinged Tibial Trial (Fig. 17b).

Patellar Preparation

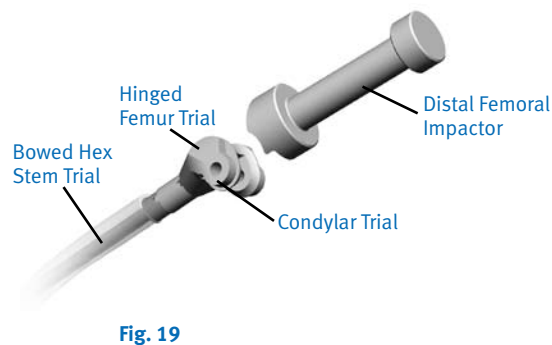
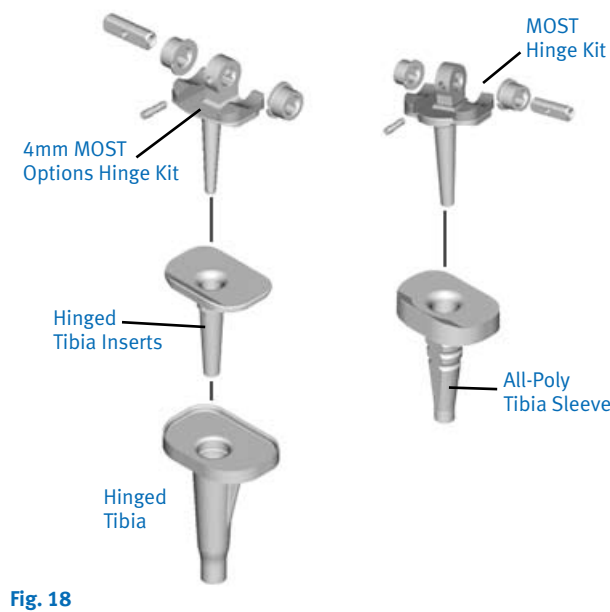
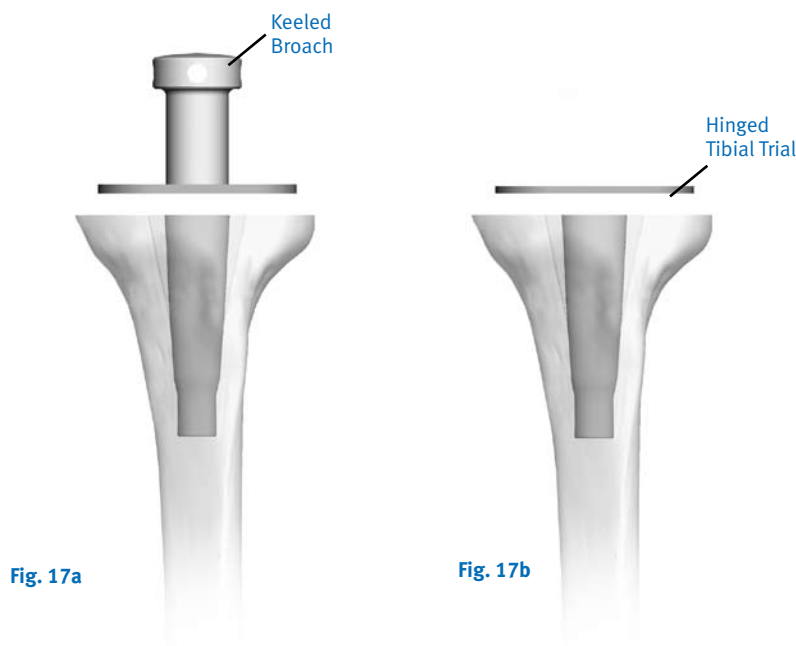
The decision to resurface the patella is an individual surgeon preference. Please refer to Appendix D (page 73).

Trial Assembly

The Metal-Backed Hinged Tibial Trial uses the 4mm trial hinge. The All-Poly Sleeve uses the Standard Trial Hinge. The 4mm Trial Hinge and Standard Trial Hinge are not interchangeable (Fig. 18).

Attach the appropriate Distal Femoral Trial to the Bowed Stem Trial. The Hex Bowed Stem Trial has an anterior mark to ensure proper orientation. The Fluted Bowed Stems use the Hex Trial Stems. Insert the Femoral Trial Assembly into the femoral canal and evaluate for fit. Slightly impact the distal end of the Distal Femoral Trial with the Distal Femoral Impactor and a mallet if needed (Fig. 19). Mark the anterior femoral bone in line with the mark on the Bowed Stem Trial to ensure proper orientation of the implant. The surgeon may slightly externally rotate the femoral component based on the anterior femur and linea aspera to assure proper patellar tracking.

Go to the appropriate section for either a Metal-Backed Hinged Tibia (Page 14) or an All-Poly Sleeve (Page 15) for tibial trialing.



Metal Backed Hinged Tibial Trialing

Install the Tibial Baseplate Trial into the tibia. Then, install the final thickness Hinged Tibial Insert Trial into the Hinged Tibial Trial. Finally, install the 4mm Hinge Trial into the Hinge Tibial Insert. Align the hinged femur or distal femur with the 4mm Hinge Trial. The Trial Hinge Pin is installed from either side of the leg (Fig. 20).

Note: The 4mm Hinge Trial is used with the Metal Backed Hinged Tibia. It is not interchangeable with the Standard Trial Hinge.

The leg should be manipulated through the range of motion. Care must be taken not to pull too hard on the leg due to potential damage incurred to nerve and vascular structures. Attention should be paid to limb rotation. The knee should fully extend, but not hyperextend. The posterior soft tissue should be palpated in full extension to ensure that there is no excessive tension.

Removal of Femoral Trial and Hinged Tibia Trial

Remove the femoral trial by placing a slaphammer in the hinge pin hole (Fig. 21a). Remove the Tibial Insert Trial from the Trial Baseplate by using an osteotome and turning it slightly clockwise or counterclockwise (Fig. 21b). Remove the Trial Baseplate and Keel Broach by threading the broach handle into the posterior hole of the Hinged Tibia Trial and extracting the assembly with the slaphammer (Fig. 21c).

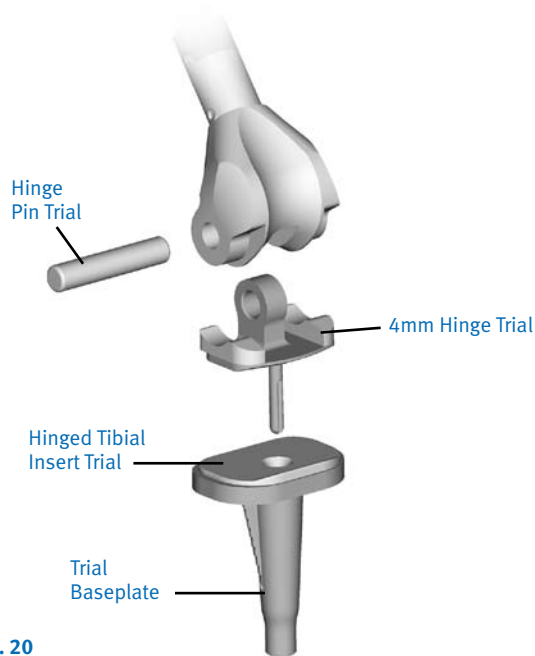


Fig. 20

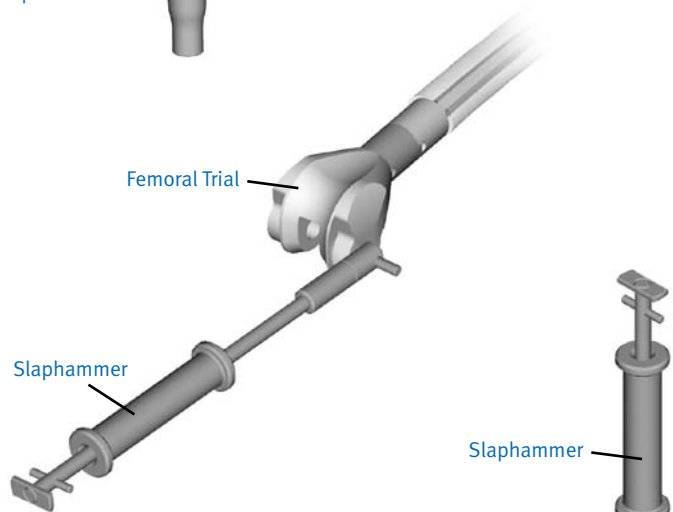


Fig. 21a

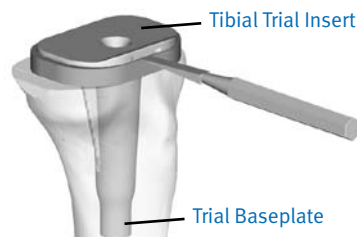


Fig. 21b

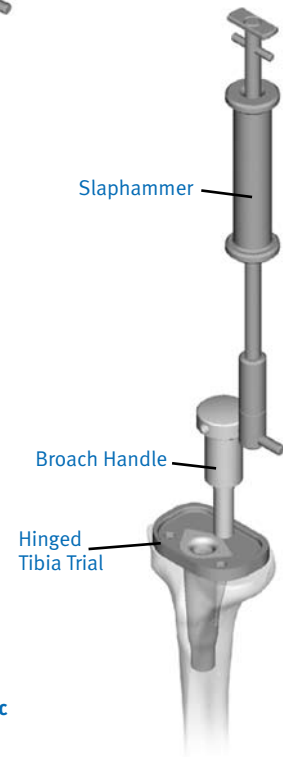


Fig. 21c

All-Poly Tibial Sleeve Trialing

Install the appropriate thickness of the All-Poly Tibial Component Trial into the tibia. Then install the Standard Trial Hinge into the All-Poly Tibial Trial. Align the Distal Femoral Trial or Hinged Femoral Trial with the Standard Trial Hinge. The Trial Hinge Pin is installed from either side of the leg (Fig. 22a). The leg should be manipulated through the range of motion. Care must be taken not to pull too hard on the leg due to potential damage incurred to nerve and vascular structures.

Removal of Femoral Trial

Remove the distal femoral trial by placing a slaphammer in the hinge pin hole (Fig. 22b).

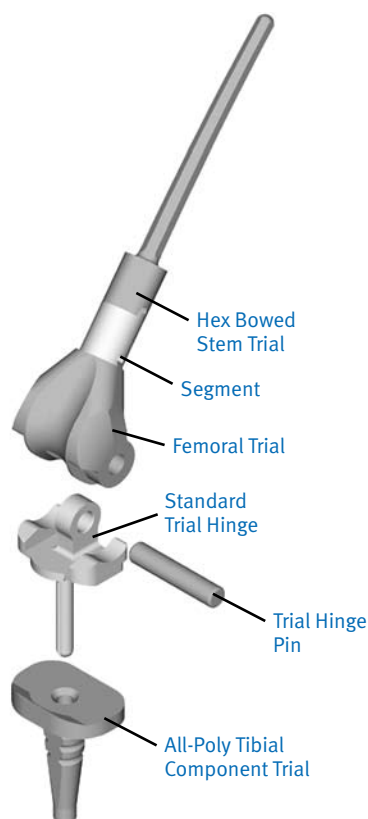


Fig. 22a

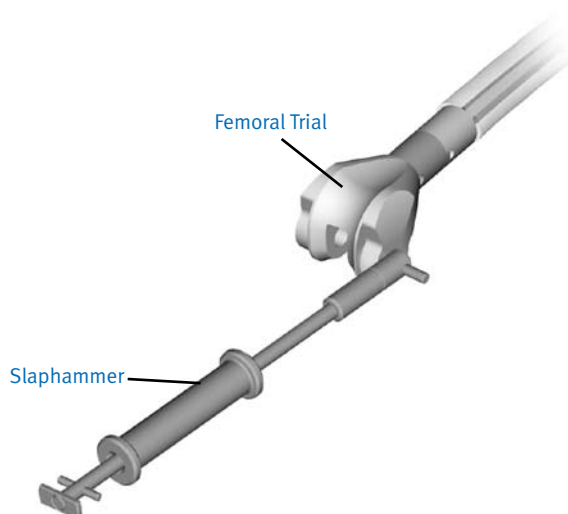


Fig. 22b

Implant Selection and Assembly

The femoral and tibial components are assembled prior to mixing the cement.

Note: If fluted stems are used, cement should not be allowed to contact the fluted portion of the stem.

Distal Femoral Assembly

If segments are needed, rest the femoral-articulating surface on the Femoral Impacting Stand prior to impaction of the segment into the distal femur using the Femoral Impacting Plug and a mallet (Fig. 23).

Bowed Stem Assembly

To impact a bowed stem into a segment or the distal femur, rest the femoral-articulating surface of the distal femur on the Femoral Impacting Stand prior to impaction using the Stem Impacting Sleeve and a mallet (Fig. 24).

Hinged Tibia Assembly

Assemble the Hinged Tibial Plug onto the distal end of the Hinged Tibial Baseplate. Tighten the screw from the proximal side using the hex bit and handle (Fig. 25).

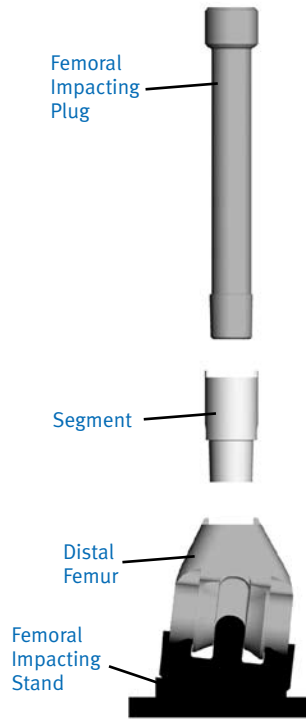


Fig. 23

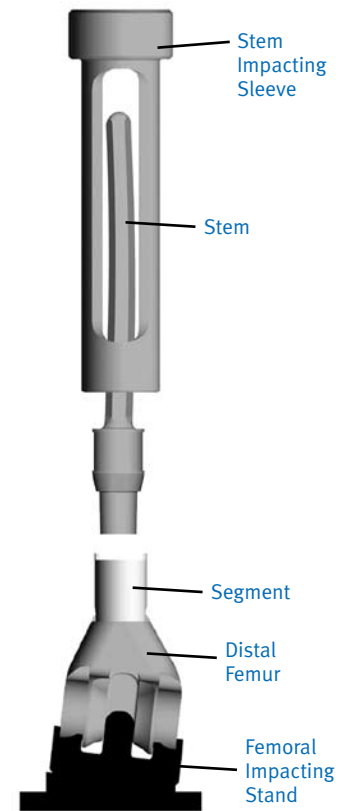


Fig. 24

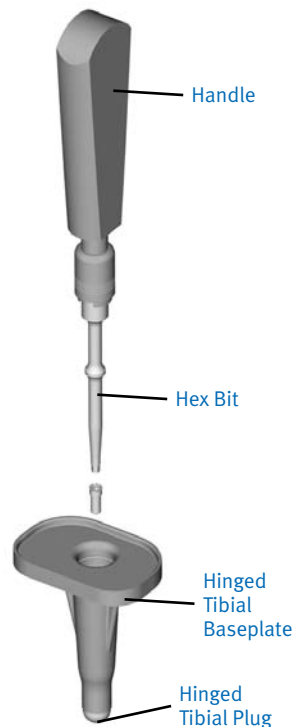


Fig. 25

Warning!: Screws that are packaged with the 75, 125, 175, 190, and 250mm revision stems will NOT work with the hinged femurs, hinged tibial baseplates, or tibial stem adapters. Use only the collet screws that are packaged with the hinged femoral, hinged tibial, and tibial stem adapter components. Do not use the screw that is packaged with the stem.

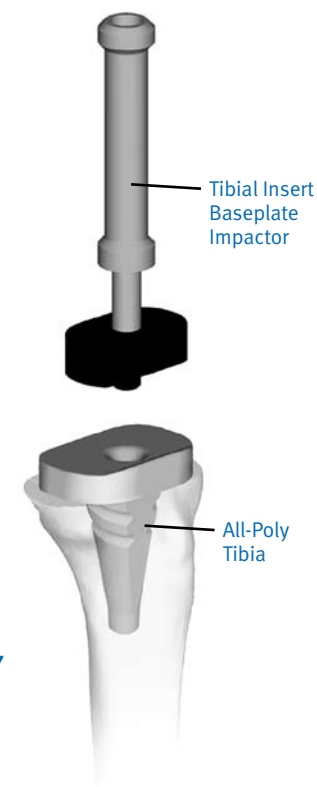
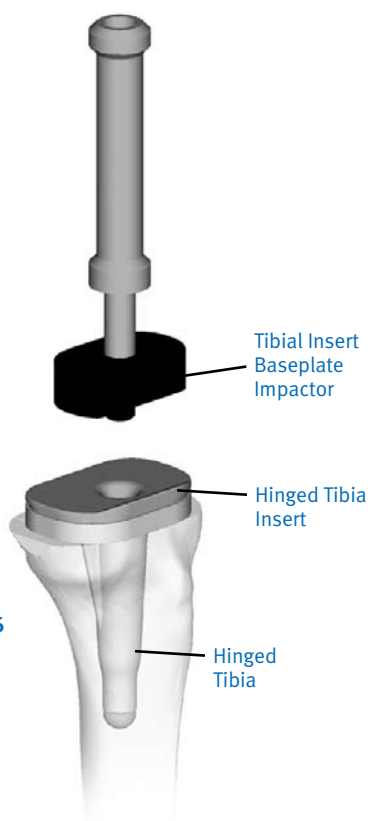
Component Implantation

Implantation of the Metal-Backed Hinged Tibial Component

Cement is applied to the tibial baseplate, keel and stem using a standard cementing technique. A cement restrictor may be used. Impact the tibial component and insert into place using the Tibial Insert/Baseplate Impactor and a mallet (Fig. 26). Remove any excess cement.

Implantation of the All-Poly Tibial Sleeve Component

Cement is applied to the undersurface of the All-Poly Tibial Sleeve and keel. A cement restrictor may be used. Impact the tibial component into place using the Tibial Insert/Baseplate Impactor and a mallet (Fig. 27). Remove any excess cement.



Implantation of the Femoral Component

Cement is injected into the femoral canal. A cement restrictor may be used. Cement is also applied to the radius of the stem to ensure adequate cement coverage at the implant/bone interface. The component is impacted into place using the Femoral Impactor using a mallet (Fig. 28). Excess cement is removed.

Implantation of the Patellar Component

If the patella was selected for resurfacing, apply cement to the patellar bone and/or the All-Polyethylene Patellar Implant. The patellar implant is then pressed into place with the Patellar Inserter (Fig. 29). Remove any excess cement. Remove the inserter after the cement is hard.

For additional information on patellar preparation, please refer to Appendix D (Page 73).

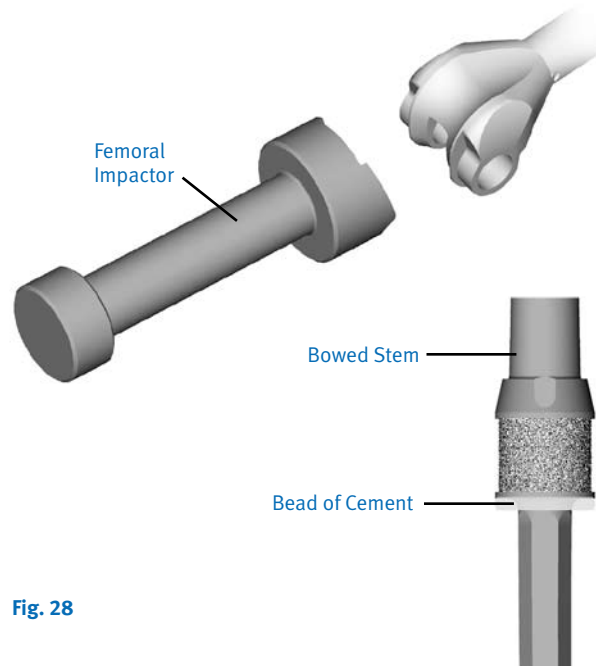


Fig. 28

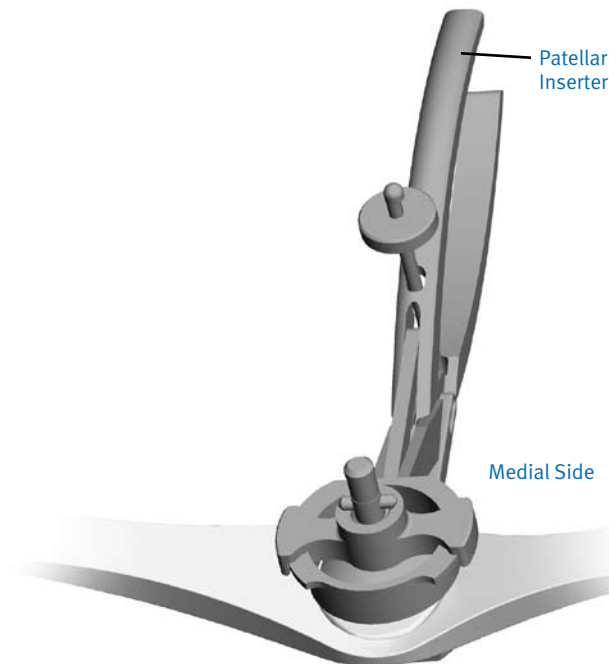


Fig. 29

Hinge Assembly

There are two hinges in the *MOST Options* system. The 4mm hinge is used with the Metal-Backed Hinged Tibia and Proximal Tibia. The standard hinge is used only with the All-Poly Tibial Sleeve.

4mm Hinge Kit

The 4mm Hinge Kit consists of 2 bushings, 1-4mm hinge, 1 hinge pin and 1 poly lock pin (Fig. 30a).

Standard Hinge Kit

The Standard Hinge Kit consists of 2 bushings, 1 hinge, 1 hinge pin and 1 poly lock pin (Fig. 30b).

Note: The 4mm hinge is not compatible with the All Poly Tibial Sleeve and the standard hinge is not compatible with the Metal-Backed Hinged Tibia or Proximal Tibia.

Hinge Components Assembly

Once the appropriate hinge kit is selected and the cemented implants have set, follow the assembly steps below.

Slide the hinge into the hinged tibial insert. Assemble the two hinge bushings into the distal femoral holes via the interarticular slot and align the notches on the bushings anteriorly (Fig. 31).

Use the tapered end of the Hinge Pin Aligner to position the bushings with the notches facing anteriorly (Fig. 32).

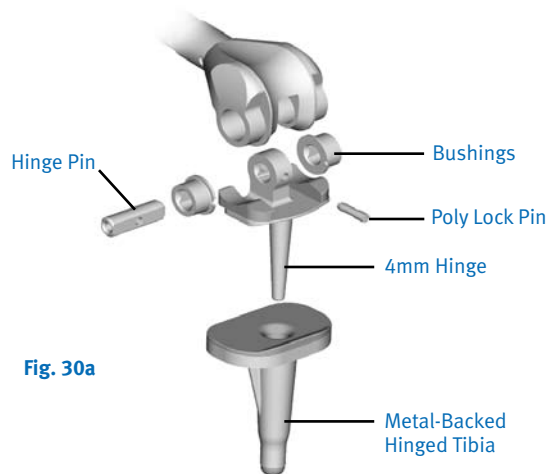


Fig. 30a

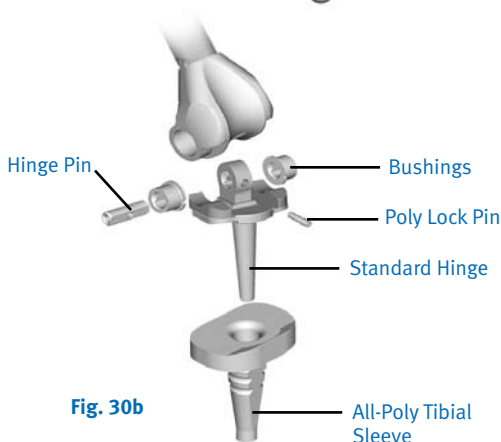


Fig. 30b

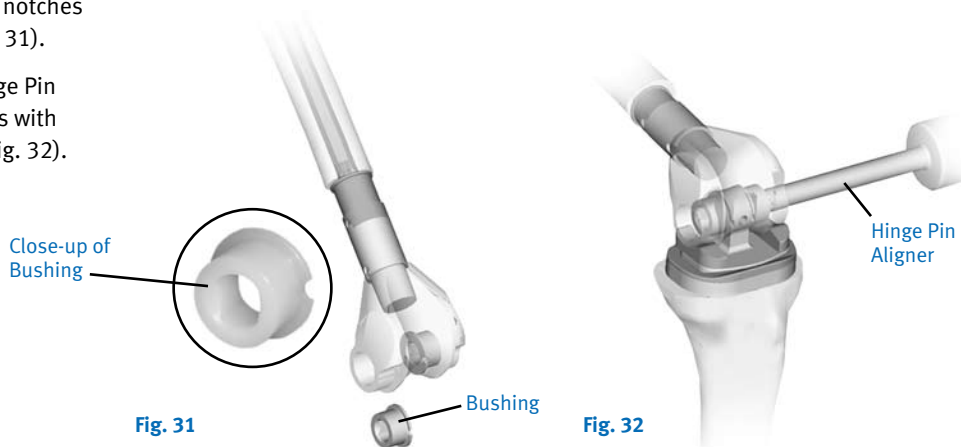


Fig. 31

Fig. 32

Thread the hinge pin to the Hinge Pin Aligner (Fig. 33a) and slide the hinge pin into the distal femur holes and slightly rotate the Hinge Pin Aligner back and forth until the cross pinhole on the hinge pin is visible through the hinge hole (Fig. 33b).

Insert the poly lock pin into the hole on the hinge. Push the poly lock pin with the insert side of the Pin Inserter/Extractor (Fig. 34a) until the poly lock pin is fully seated into the cross pin hole (Fig. 34b).

Note: The poly lock pin can be removed by threading the extractor side of the Pin Inserter/Extractor onto it and pulling it anteriorly. The hinge pin may be removed after the poly lock pin is removed by pushing the hinge pin out with the tapered end of the Hinge Pin Aligner.

Patellar alignment and tracking may be best assessed with the tourniquet down. Perform additional lateral patellar retinacular releases if necessary.

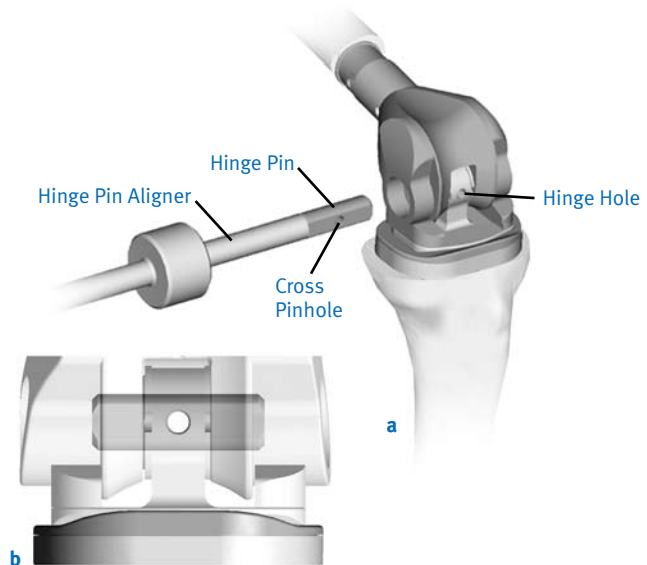


Fig. 33

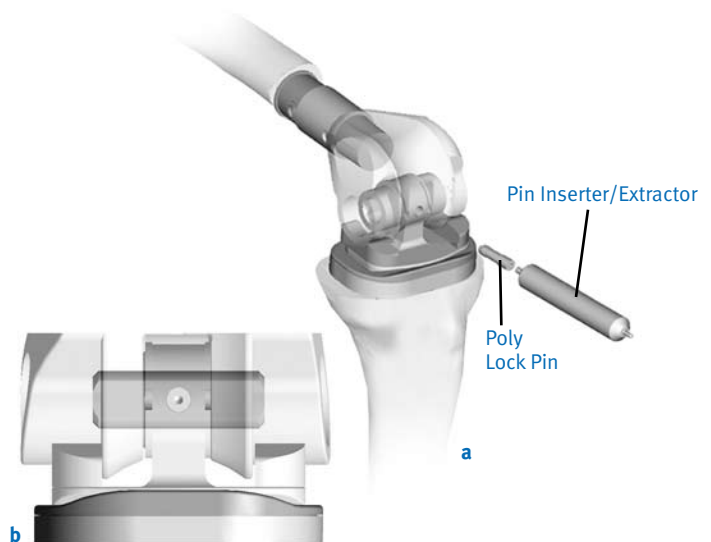


Fig. 34

Proximal Tibial Replacement



Proximal Tibial Replacement

Leg Length Measurement

After exposure of the distal femur and proximal tibia has been achieved, the proposed resection levels are noted with the extremity extended in a reproducible position.

Set the resection guide or scale to the resection level and mark a horizontal line with an osteotome, bovie or marker (Fig. 35).

Implant Selection

Determine the implant configuration to finalize the resection level.

Select the connection/stem segment combination from Table 2 or 3 to determine the final resection level.

Note: Each large taper connection adds one millimeter to the total length. (e.g., The safe margin for proximal tibial tumor removal is 145mm. Using a 30mm segment, porous adapter equals 146mm resection level.)

The intramedullary length of the 190mm straight stems is 155mm.

Proximal Tibial Resection

Resect the proximal tibia at or slightly proximal (i.e., 0.5mm to 1mm) to the marked resection level. The additional amount is to account for slightly oblique cuts and tibial resection planing.

Note: To improve the swing phase of the patient's gait, some surgeons choose to slightly shorten the limb.

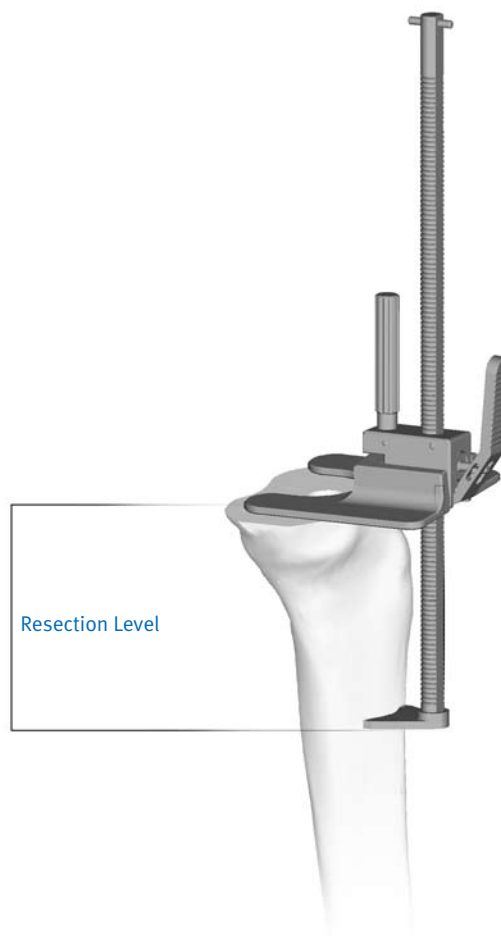


Fig. 35

Table 2 Proximal Tibial Resection with Porous Adapter and Segments

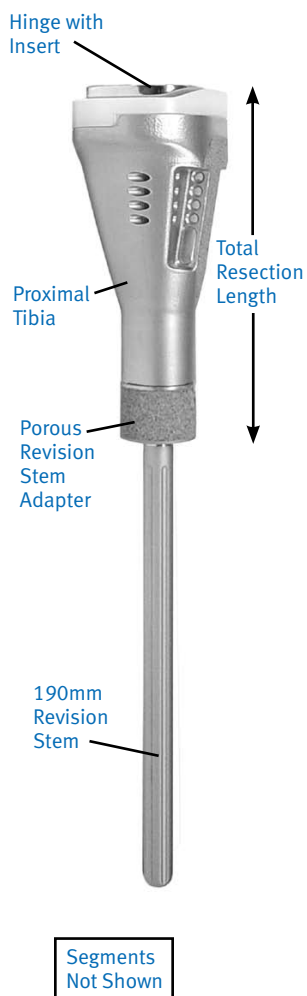
Proximal Tibia	Porous Adapter	Hinge + 6mm Insert	Segments	Total Resection Length
85mm	19mm	10mm	0mm	115mm
85mm	19mm	10mm	30mm	146mm
85mm	19mm	10mm	42.5mm	158.5mm
85mm	19mm	10mm	55mm	171mm
85mm	19mm	10mm	67.5mm	183.5mm
85mm	19mm	10mm	80mm	196mm
85mm	19mm	10mm	55+30mm	202mm
85mm	19mm	10mm	55+42.5mm	214.5mm
85mm	19mm	10mm	105mm	221mm
85mm	19mm	10mm	80+30mm	227mm
85mm	19mm	10mm	80+42.5mm	239.5mm
85mm	19mm	10mm	130mm	246mm
85mm	19mm	10mm	105+30mm	252mm
85mm	19mm	10mm	105+42.5mm	264.5mm

Note: Each large taper connection adds one millimeter to the total length.

Table 3 Proximal Tibial Resection with Nonporous Adapter and Segments

Proximal Tibia	Nonporous Adapter	Hinge + 6mm Insert	Segments	Total Resection Length
85mm	4mm	10mm	0mm	100mm
85mm	4mm	10mm	30mm	131mm
85mm	4mm	10mm	42.5mm	143.5mm
85mm	4mm	10mm	55mm	156mm
85mm	4mm	10mm	67.5mm	168.5mm
85mm	4mm	10mm	80mm	181mm
85mm	4mm	10mm	55+30mm	187mm
85mm	4mm	10mm	55+42.5mm	199.5mm
85mm	4mm	10mm	105mm	206mm
85mm	4mm	10mm	80+30mm	212mm
85mm	4mm	10mm	80+42.5mm	224.5mm
85mm	4mm	10mm	130mm	231mm
85mm	4mm	10mm	105+30mm	237mm
85mm	4mm	10mm	105+42.5mm	249.5mm

Note: Each large taper connection adds one millimeter to the total length.



Tibial Preparation

Straight Stem Preparation

The 190mm straight stem options are shown in Tables 4 and 5. The overall I/M length of 190mm is based on the length of the stem and the tibial component. The intramedullary length of the stems is 155mm.

Table 4 190mm Straight Smooth Stem Options

Size	I/M Length	9.5mm	11.5mm	13.5mm	15.5mm	17.5mm
190mm	155mm	X	X	X	X	X

Table 5 190mm Straight Fluted Stem Options

Size	I/M Length	10.5mm	11.5mm	12.5mm	13.5mm	14.5mm	16.5mm	18.5mm
190mm	155mm	X	X	X	X	X	X	X

The following are the acronyms used on the reamers.

HF = Hinged Femur

DF = Distal Femur

HT = Hinged Tibia

PT = Proximal Tibia

When using a proximal tibial component with a straight stem, ream to the DF/PT mark on the reamer.

Incrementally ream the tibial canal starting with the 9.5mm Femoral/Tibial Reamers using a T-handle with *Zimmer* adapter (Fig. 36). Ream until the DF/PT mark is flush with the resected bone and the reamer diameter contacts cortical bone.

Planing the Tibial Bone

Screw the appropriate 190mm trial stem selected to the planer (Fig. 37). Plane the resection using a power drill with a *Zimmer* adapter until cortical bone is smooth and even. Attaching the trial stem to the planer will ensure the hole depth is deep enough for the implants. A tommy bar or pin may be inserted in the cross hole to aid in trial stem removal after planing.

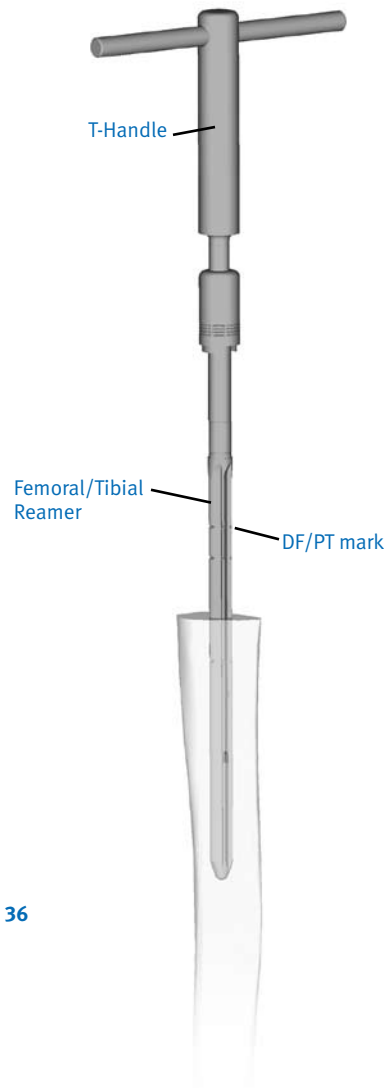


Fig. 36

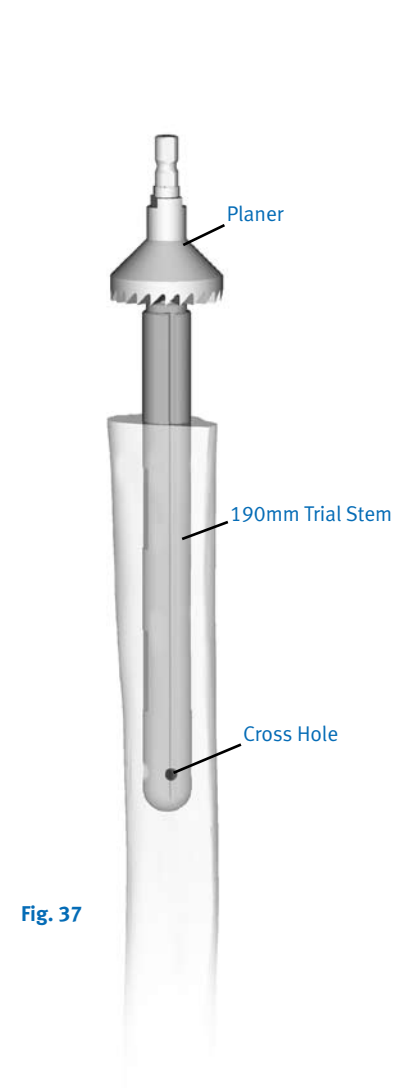


Fig. 37

Femoral Preparation

Femoral Medullary Canal Preparation

The femoral instrumentation of the *MOST Options System* is keyed off the intramedullary stem position. Open the femoral canal with the 8mm (5/16") drill bit just above the superior edge of the intercondylar notch (Fig. 38).

Incrementally ream the femoral canal starting with the 9.5mm Femoral/Tibial Reamers using a T-handle with *Zimmer* adapter (Fig. 39a). The depth of the hole is based on the straight stem selected. The depth marking on the reamer includes the amount of bone being resected (Fig. 39b). The markings on the reamers designate the type of implant being used and the stem length.

Although blunt tips are on the reamers, hand reaming is recommended to prevent notching and perforation of the anterior femoral cortex.

The following are the acronyms used on the reamers.

HF = Hinged Femur

DF = Distal Femur

HT = Hinged Tibia

PT = Proximal Tibia

The reamers are marked as shown below.

HF BOSS (Only on the 16.5mm Reamer to prepare for the Hinged Femoral Boss)

75HF

75HT/125HF

DF/PT

125HT/175HF

190HF

Note: The combined markings on the reamers indicate different overall lengths are equal if used with another component (75HT/125HF, hinged tibia with a 75mm stem = hinged femur with 125mm stem).

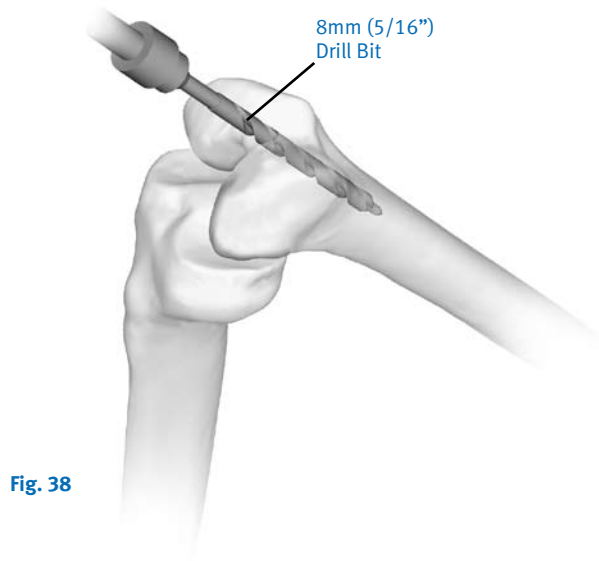


Fig. 38



Fig. 39a



Fig. 39b

Similar to the tibial stem preparation, the diameter of the last reamer size used will correspond to the diameter of the stem trial to be used with the femoral instrumentation. The straight stem options are shown in Tables 6 and 7. For example, if a 14.5mm reamer was last used, then a 14.5mm stem trial will be used. The proper length stem trial is determined by using the length marked on the reamer. For proper seating of the femoral stem, the reamer should be flush with the distal surface of the femur for the length stem desired.

This length should closely correspond to the preoperatively templated length. **(If the femoral stem diameter is smaller than 16.5mm, the femoral canal will need to be reamed distally to accept the Femoral Component Stem Boss (Fig. 39b).** This can be accomplished by reaming with the 16.5mm reamer to the depth marked “HF BOSS.”)

Note: When cementing straight stems, it should be noted that the stem trial diameter should be one size larger than the actual implant.

The 75mm, 125mm, 175mm and 190mm straight stems are used on the system. The length marking on the implant label designates the overall composite length of the stems from the distal femoral cut. This length includes the 35mm length of the femoral boss (Fig. 39c). The actual intramedullary length of the stem is calculated as shown.

75mm stem
 -35mm boss (length of Hinged Femoral Boss)
 40mm intramedullary length of stem*

* This calculation will work on any of the stems used in the system.

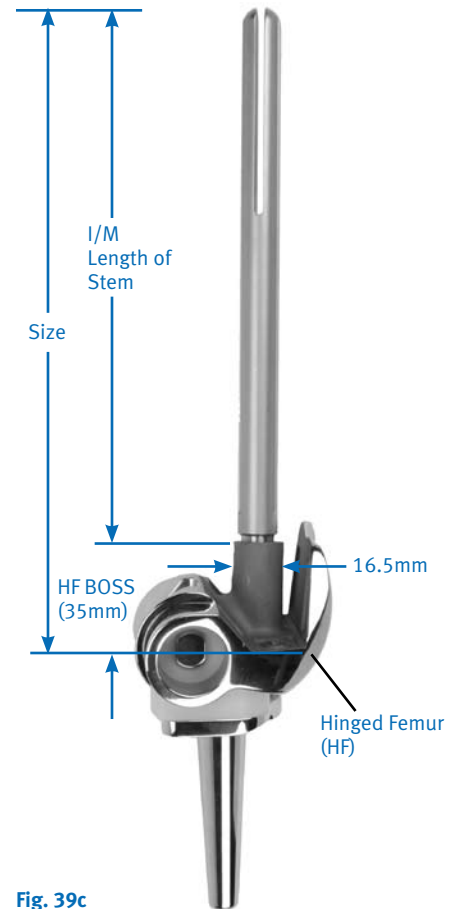


Fig. 39c

Table 6 Straight Smooth Stem Options

Size	I/M Length	9.5mm	10.5mm	11.5mm	12.5mm	13.5mm	14.5mm	15.5mm	16.5mm	17.5mm	18.5mm
75mm	40mm		X		X		X		X		X
125mm	90mm		X		X		X		X		X
190mm	155mm	X		X		X		X		X	

Table 7 Straight Fluted Stem Options

Size	I/M Length	10.5mm	11.5mm	12.5mm	13.5mm	14.5mm	16.5mm	18.5mm	20.5mm	22.5mm
175mm	140mm			X		X	X	X	X	X
190mm	155mm	X	X	X	X	X	X	X		

Note: Fluted 175mm and 190mm stems have an oversized diameter to allow for a 0.5mm press fit above trial size.

Femoral Alignment and Distal Femoral Cut

Thread the proper stem trial onto the 8mm (5/16") trial stem adapter and connect the quick disconnect handle. With the handle in the "Open" position, the 8mm trial stem adapter locks into place by clicking the handle manually to the "Locked" position. Insert the stem trial into the femoral canal until the HF (hinged femur) line on the adapter is flush with the distal femoral bone surface (Fig. 40). Remove the handle by clicking it to the open position and disconnecting it.

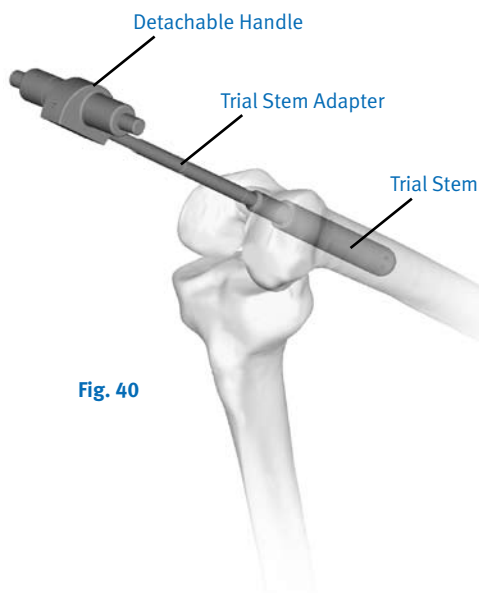


Fig. 40

Assemble the Primary Distal Saw Block onto the Distal Femoral Alignment Guide (Fig. 41). These holes will position the saw block such that a 20mm distal femoral resection will be made. The total distal thickness of the hinged femur is 20mm. The Primary Cut Block has the ability to remove less bone (in 2mm increments) to achieve a change in joint line position by moving the Primary Saw Block (ex. 20mm resection -2mm = 18mm resection).

Make sure that the left/right bushing located on the Distal Femoral Alignment Guide is positioned correctly for the appropriate side.

Attach the alignment guide and saw block assembly onto the stem trial located in the femoral canal. Ensure that the alignment guide is in contact with the distal femoral bone.

Note: The threaded screws on the alignment guide should be dialed out so that they are not in contact with the distal femur surface.

For revision cases where bone has been removed from the distal femur, use the Revision Distal Saw Block (Fig. 41). This assembly is designed to position the saw block for a 2mm distal femoral resection. The total distal thickness of the hinged femur is 20mm. The revision cut block has the ability to remove additional amounts of bone in 2mm increments to achieve the 20mm distal resection for the hinged femur (ex. 20mm resection - primary implant removed distal thickness 10mm - 2mm bone loss = 8mm resection). The guide would be set at the +6mm marks (2mm clean-up cut +6mm of additional bone).

Align the Femoral Alignment Guide handles to approximate the rotation of the femur using the epicondyles as reference points (Fig. 42). This rotation should be as close as possible to the final position as only minor rotational adjustments may be possible in subsequent steps in the technique.

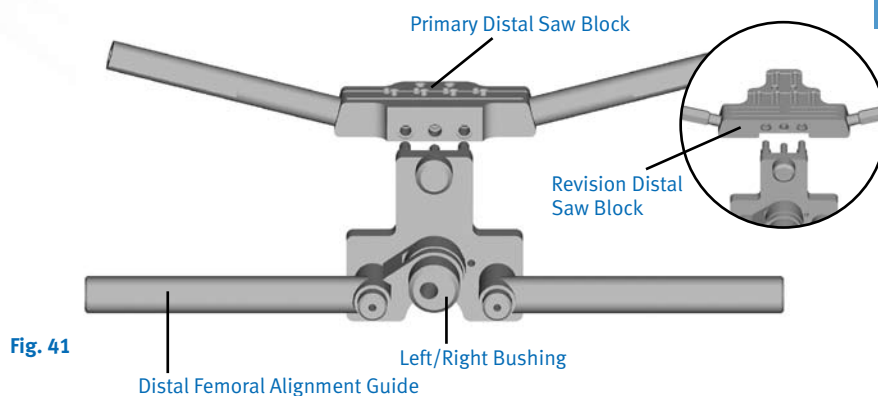


Fig. 41

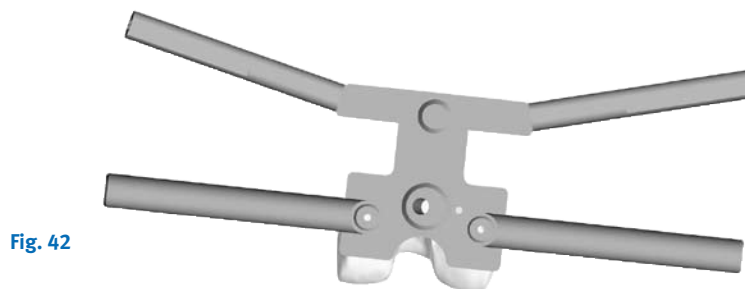


Fig. 42

An optional Extramedullary Alignment Tower and Alignment Rod can be placed on the Distal Primary Saw Block for an extramedullary check of the varus/valgus cut of the distal femur (Fig. 43). For proper alignment, this rod should point two-finger breadths medial to the anterior superior spine. Stabilize the Distal Femoral Alignment Guide by drilling and pinning through the threaded holes located on the medial and lateral side of the guide.

Secure the Slotted Distal Femoral Primary Saw Block to the anterior cortex by drilling and pinning the two holes located on the "Drill On Line" scribed onto the block (Fig. 44).

Once the Primary Saw Block is stabilized, remove the femoral alignment guide, the stem trial and adapter (Fig. 45). The distal cut can now be made using a 1.5mm saw blade along the slots in the Primary Saw Block.

Note: For the *MOST Options System*, cutting blocks use a 1.5mm (.058 inch) thick saw blade.

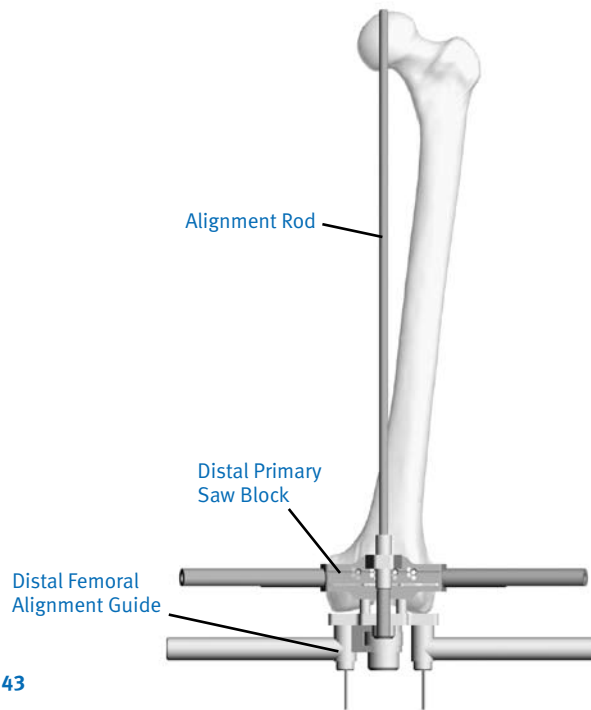


Fig. 43

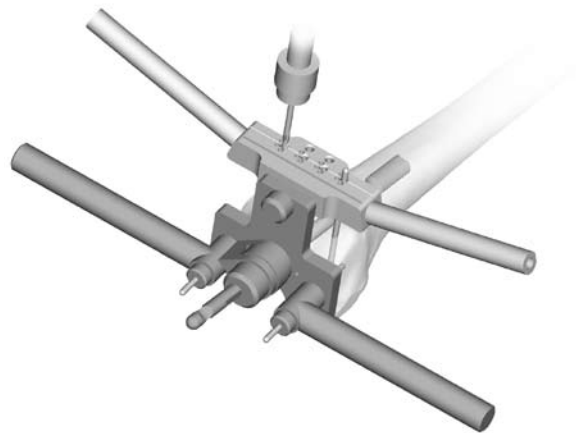


Fig. 44

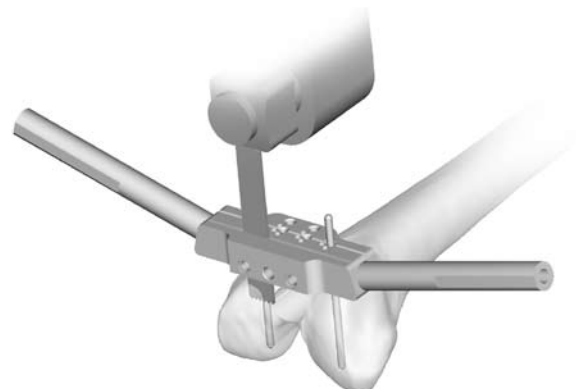


Fig. 45

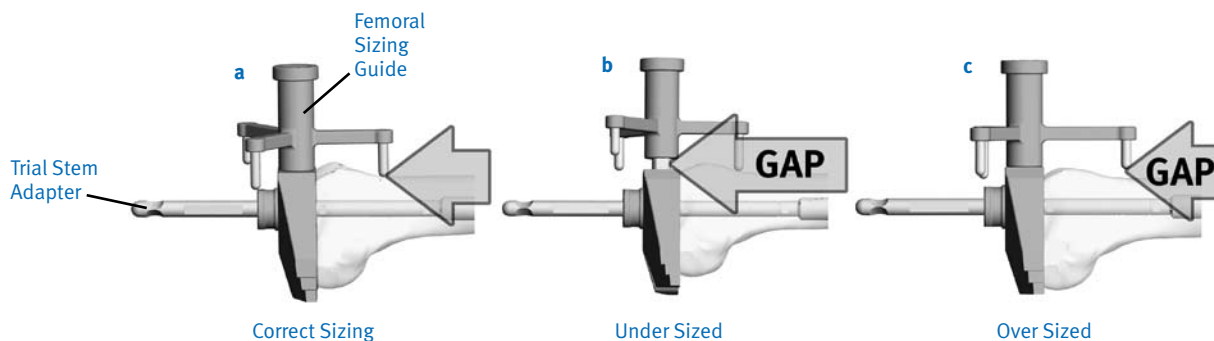


Fig. 46

Femoral Sizing

Reinsert the trial stem and trial stem adapter. Slide the Femoral Sizing Guide over the trial stem adapter. Size the femur by spinning the stylus marked Size 1, 2 or 3 until there is zero-to-minimal gap between the sizing guide and the stylus boss (Fig. 46a).

If there is no gap between the anterior cortex and the stylus but a gap between the housing and the sizing guide, then the femoral implant is under sized (Fig. 46b).

If there is a gap between the anterior cortex and the stylus, and no gap between the housing and sizing guide, then the femoral implant is over sized (Fig. 46c).

There are secondary visual references for the medial/lateral and posterior sizing (Fig. 47).

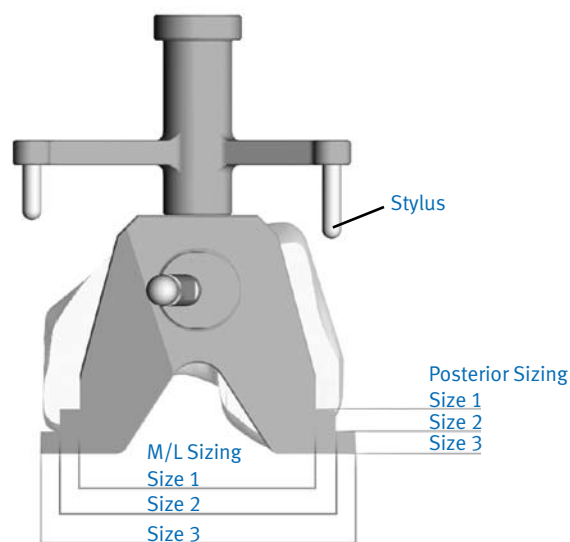


Fig. 47

Slide the A/P Sizing Block over the stem trial adapter. Prior to pinning the Speed Block, verify that the size chosen is not going to significantly undercut the femur by placing a 1.5mm (.060") Miller guide (angel wing) through the anterior cut slot of the A/P Cutting Block (Fig. 48). Once the proper size Speed Block has been chosen, rotation of the Speed Block is established by locating the medial and lateral femoral epicondyles and aligning them so that they are parallel with the medial and lateral oblique pin holes on the Speed Block. This results in slight external rotation. No internal rotation of the Speed Blocks should be allowed.

Note: The posterior condyles should not be the sole reference for orientation.

When rotation has been determined, stabilize the Speed Block by using a 3.2mm (1/8") drill bit and then pinning the two oblique holes with headed pins (Fig. 49). Headed pins are recommended to prevent the pins from being recessed below the oblique holes' upper surface.

The anterior and posterior cuts can now be made using the A/P Cutting Block. The posterior cut is made through the captured posterior angled slot (Fig. 50).

Note: The size 3 A/P Cutting Block requires an anterior chamfer cut.

To remove the A/P Cutting Block, pull both the medial and lateral headed pins. Remove the 8mm trial stem adapter and stem trial by attaching the Quick Disconnect Handle.

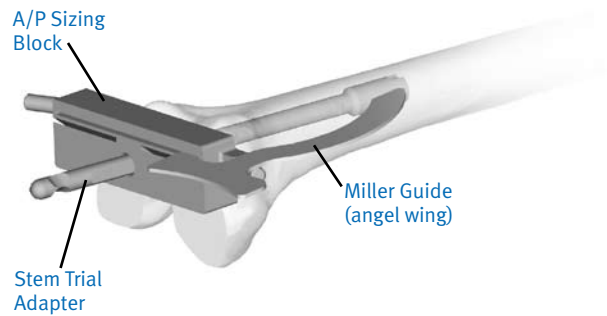


Fig. 48

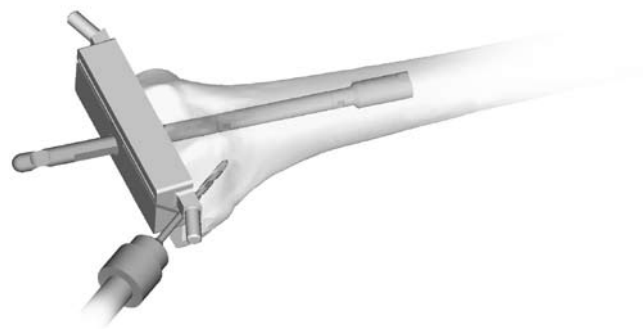


Fig. 49

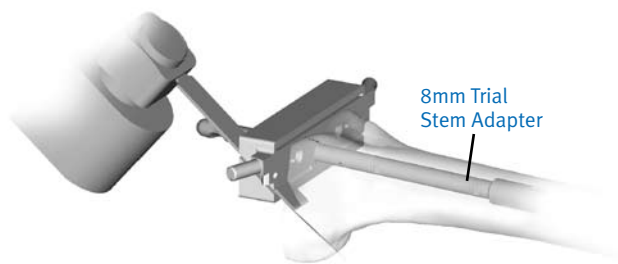


Fig. 50

Patella Preparation

The decision to resurface the patella is a surgeon preference. Please refer to Appendix D (page 73).

Trial Assembly

Femoral Trial Assembly

Attach the appropriate hinged femoral trial to the appropriate length and diameter trial stem. Impact the femoral trial onto the distal femur using the Femoral Impactor and a mallet and evaluate for fit (Fig. 51). Be sure that the posterior condyles engage posterior femoral bone to give rotational stability of the femoral implant.

Adapter, Stem and Proximal Tibia Assembly

Screw the appropriate trial stem to the appropriate trial stem adapter. Assemble any segments to the proximal tibial trial. Assemble the trial stem and adapter to the Proximal Tibial Trial. Insert the Proximal Tibial Trial assembly into the tibia using the Tibial Impactor and a mallet if needed (Fig. 52).

Install the final thickness Proximal Tibial Insert Trial into the Proximal Tibial Trial. Then install the 4mm trial hinge into the tibial insert trial. Align the femoral trial with the hinge. The trial hinge pin is installed from either side on the leg (Fig. 53). The leg should be manipulated through the range of motion.

Trial Removal

Remove the hinged femoral trial by placing the slaphammer into the posterior slot of the hinged femoral trial (Fig. 54a). The porous and nonporous trials are also removed using the stem extractor and slap hammer (Fig. 54b). Remove the Proximal Tibial Insert Trial from the Trial Baseplate by using an osteotome and turning it slightly clockwise or counterclockwise (Fig. 55).

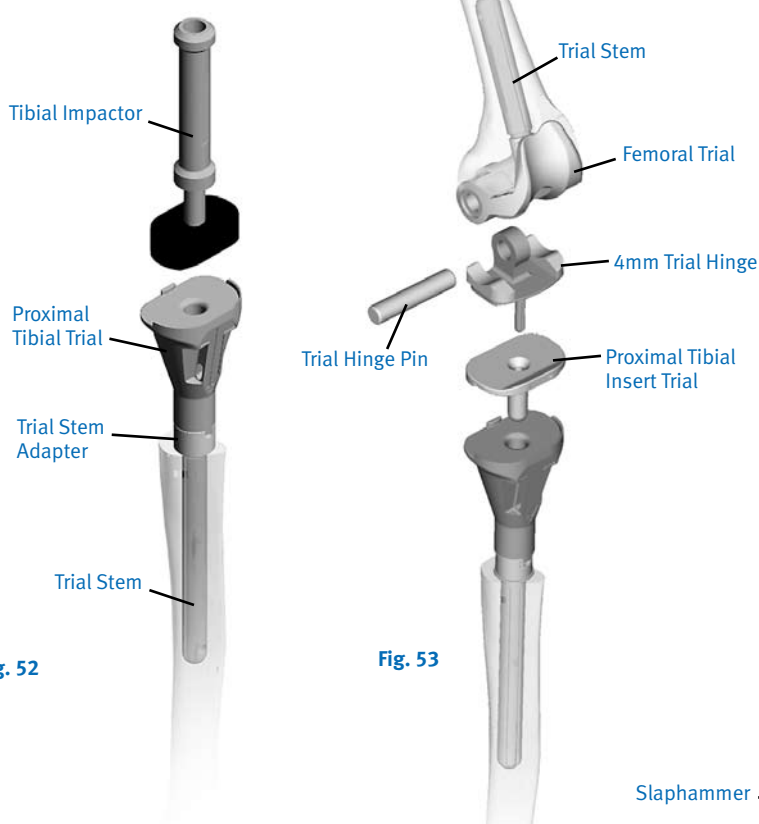
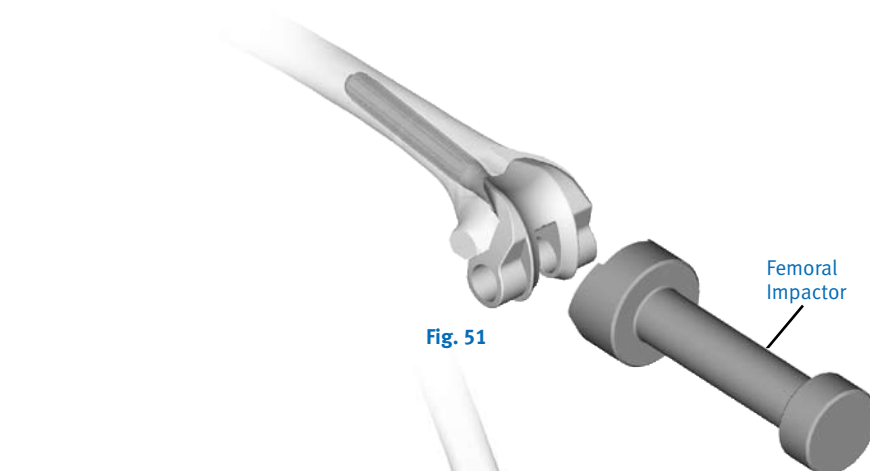


Fig. 52

Fig. 53

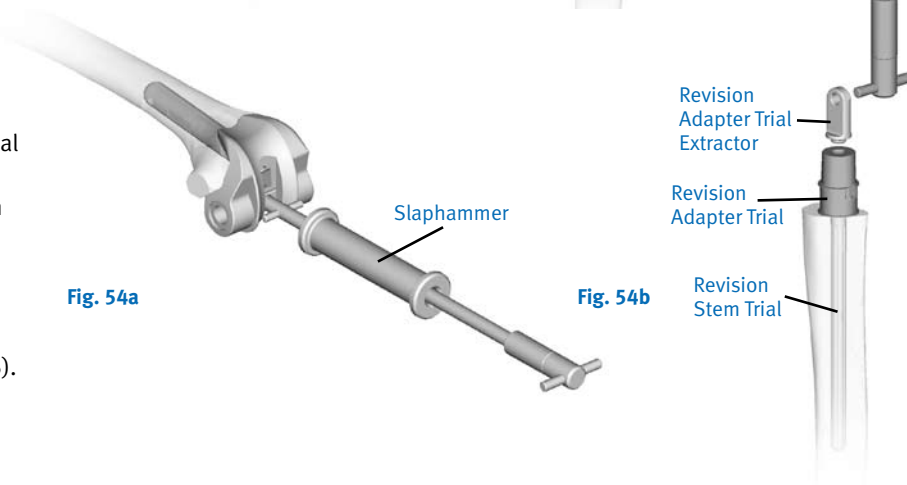


Fig. 54a

Fig. 54b

Component Selection and Assembly

When cementing a femoral stem, downsize at least one stem diameter (2mm) to allow for an adequate cement mantle. For example, if the 14.5mm reamer was the final reamer and the 14.5mm stem trial was used for instrumentation, then use the 12.5mm stem diameter and the proper length smooth stem for cementing. A plastic cement restrictor may be used to permit the cement to be manually pressurized.

Fluted 175mm and 190mm revision stems are sized 0.5mm larger than the reamer/trial to enhance the fit within the canal. Fluted stems are numbered the same as the trials (for a 14.5mm trial, the stem is numbered 14.5mm, but has a true diameter (with fins) of 15mm).

Note: If fluted stems are used, cement should not be allowed to contact the fluted portion of the stem.

The femoral and tibial components are assembled prior to mixing the cement. The stem can be attached to the hinged femur by resting the femoral articulating surface on the Femoral Impacting Stand prior to impaction of the stem to the femur. Impact the femoral stem onto the Hinged Femur Boss Taper using the Revision Stem Impactor and a mallet (Fig. 56).

The stem collet screw that is packaged with the hinged femur should be used to secure the stem to the Femoral Boss Taper. Tighten the screw from the articular side of the femoral intercondylar housing using the hex bit and handle (Fig. 57). When the screw tightens snugly, the stem has been properly retained. The self-capture feature may be tested by loosening the screw and backing out until a hard stop is detected. If the screw comes out without force, it has not engaged the self-capturing interface. Reinstall until the hard stop is detected when loosening the screw.



Fig. 55

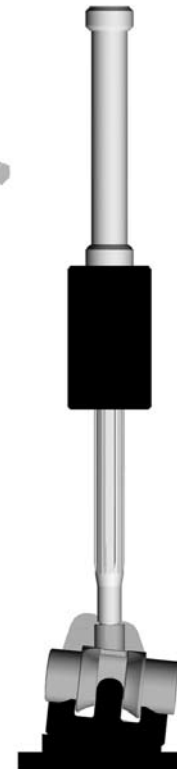


Fig. 56

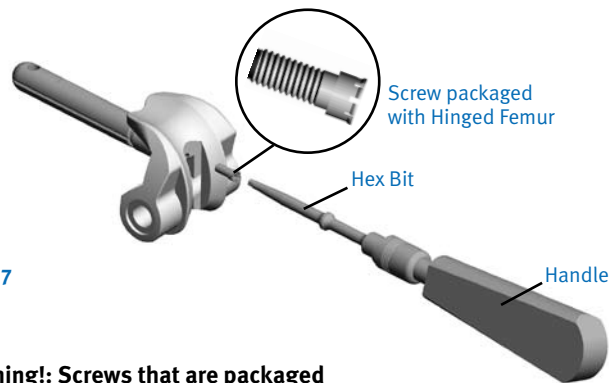


Fig. 57

Warning!: Screws that are packaged with the 75, 125, 175, 190, and 250mm revision stems will NOT work with the hinged femurs, hinged tibial baseplates, or tibial stem adapters. Use only the collet screws that are packaged with the hinged femoral, hinged tibial, and tibial stem adapter components. Do not use the screw that is packaged with the stem.

Warning!: Screws that are packaged with the 75, 125, 175, 190, and 250mm revision stems will NOT work with the hinged femurs, hinged tibial baseplates, or tibial stem adapters. Use only the screws that are packaged with the hinged femoral, hinged tibial, and tibial stem adapter components. Do not use the screw that is packaged with the stem.

Place the appropriate tibial stem adapter into the Adapter Impaction Stand. Impact the tibial stem onto the appropriate adapter using the same revision stem impactor as used with the femoral stem using a mallet (Fig. 58). Insert the collet screw that is provided with the tibial stem adapter into the adapter and tighten it using the hex bit and handle (Fig. 59).

Note: The screw must be inserted before the adapter/stem is assembled to the proximal tibia because there is no access to install it afterwards.

When the screw tightens snugly, the stem has been properly retained. If a segment is used, place the proximal tibia into the Tibial Stand. Impact the segment into the proximal tibia using the impacting plug (Fig. 60).

Next, place the adapter/stem assembly into either the segment or proximal tibia and impact the adapter/stem using the Femoral Stem Impacting Sleeve and a mallet (Fig. 61).

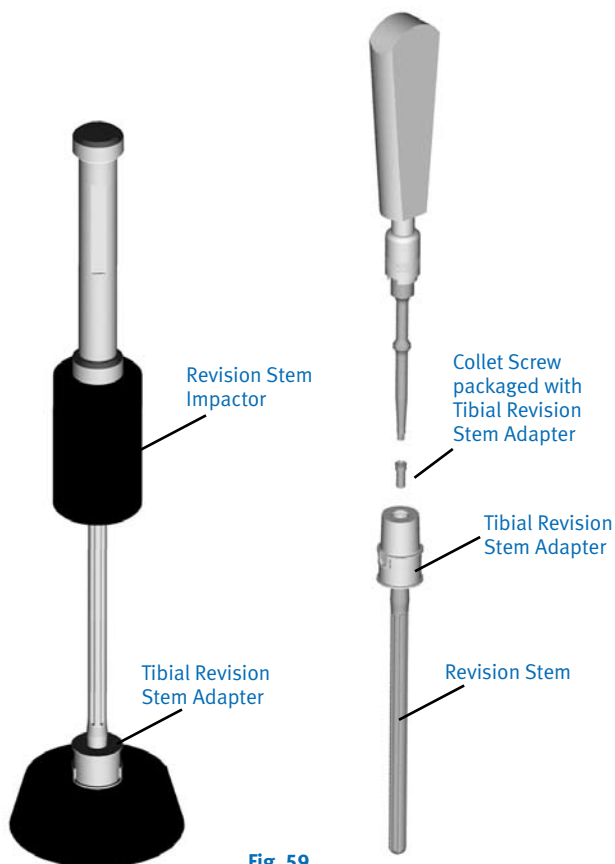


Fig. 58

Fig. 59

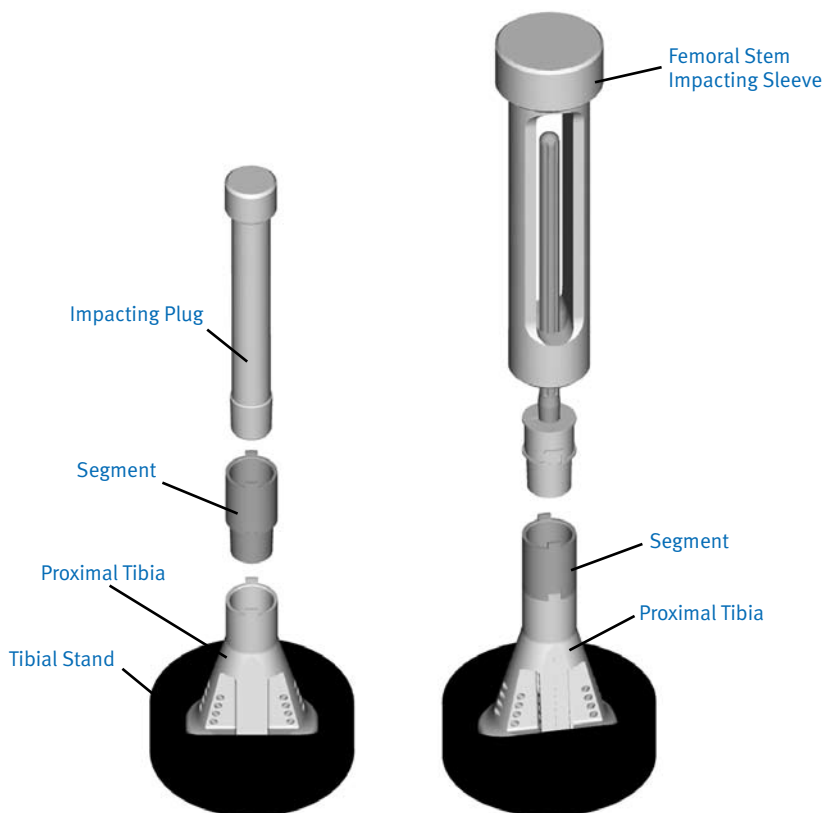


Fig. 60

Fig. 61

Component Implantation

Implantation of the Distal Femoral Component

Cement is applied to the hinged femur, femoral stem and canal. If fluted stems are used, cement should not be allowed to contact the fluted portion of the stem. The distal femur is impacted into place using the femoral impactor and a mallet (Fig. 62). Excess cement is removed.

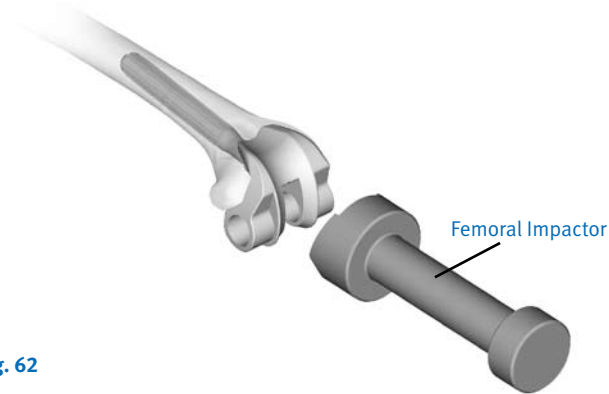


Fig. 62

Implantation of the Tibial Component

Cement is applied to the undersurface of the Tibial Revision Stem Adapter and tibial canal. Impact the proximal tibial component into place using the Tibial Insert/Baseplate Impactor and a mallet (Fig. 63a). Remove any excess cement. The polyethylene liner is inserted with the Tibial Insert/Baseplate Impactor and a mallet (Fig. 63b).

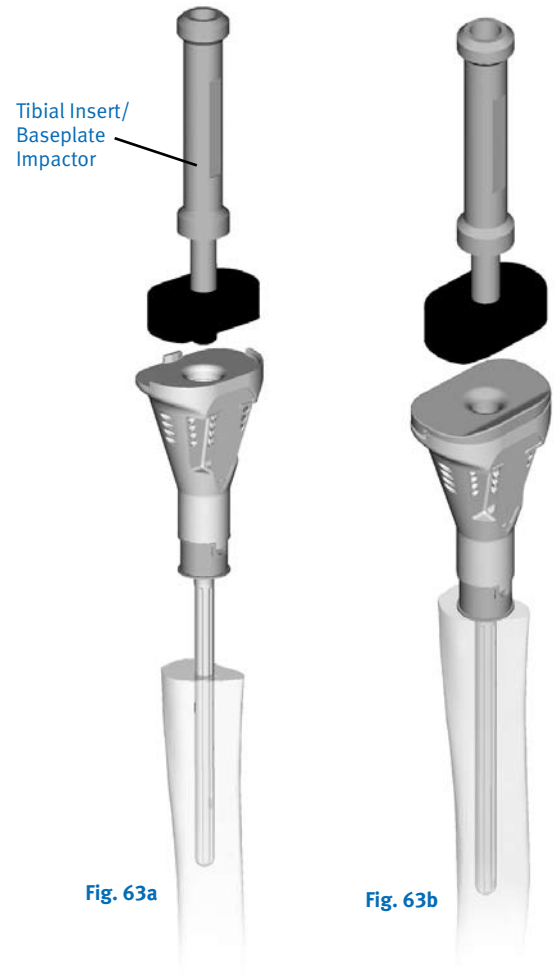


Fig. 63a

Fig. 63b

Implant Extraction

The hinged femur and distal femur are removed using the femur distractor and slap hammer (Fig. 64). The porous and nonporous adapters are removed using the Revision Stem Extractor and slap hammer.

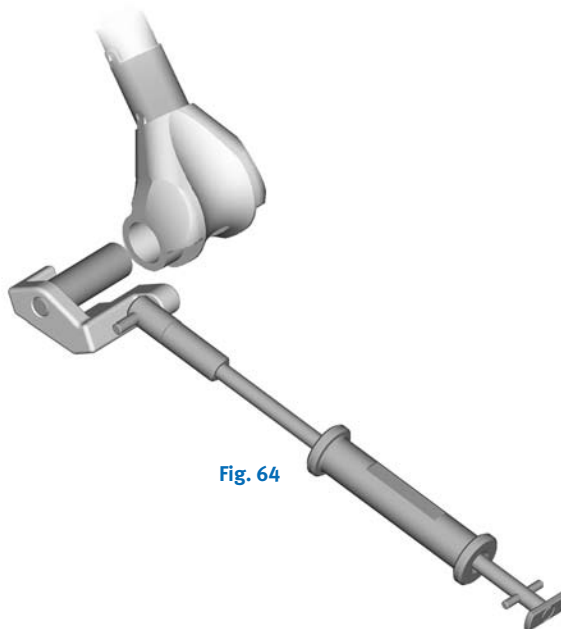


Fig. 64

Implantation of the Patellar Component

If the patella was selected for resurfacing, apply cement to the patellar bone and/or the All Polyethylene Patellar Implant. The patellar implant is then pressed into place with the Patellar Inserter (Fig. 65). Remove any excess cement. Remove the inserter after the cement is hard.

Please refer to Appendix D for additional information on patellar preparation.

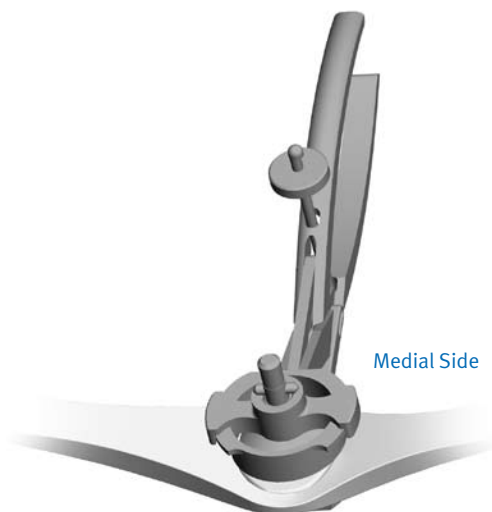


Fig. 65

Hinge Assembly

Hinge Components

There are two hinges in the *MOST Options* system. The 4mm hinge is used with the Metal-Backed Hinge Tibia and the Proximal Tibia. The standard hinge is used only with the All-Poly Tibia Sleeve. The 4mm hinge is not compatible with the All-Poly Sleeve and the standard hinge is not compatible with the Metal Backed Hinged Tibia. The Proximal Tibia shown in Fig. 66 will only accept the 4mm hinge.

4mm Hinge Kit

The 4mm hinge kit consists of 2 bushings, 1-4mm hinge, 1 hinge pin and 1 poly lock pin (Fig. 66).



Fig. 66

Once the cemented implants have set, slide the 4mm hinge into the proximal tibial insert. Assemble the two bushings into the hinged femoral holes via the interarticular slot and align the notches on the bushings anteriorly. Use the tapered end of the Hinge Pin aligner to position the bushings (Fig. 67).

Thread the hinge pin to the Hinge Pin Aligner (Fig. 68) and slide the hinge pin into the hinged femoral holes until the cross pinhole on the hinge pin is visible through the hinge hole (Fig. 68 inset). The Hinge Pin Aligner may need to be rotated back and forth to fully seat the hinge pin.

Insert the poly lock pin into the hole on the hinge and push the poly lock pin with the insert (smooth) side of the pin insert/extractor (Fig. 69) until the poly lock pin is fully seated into the cross pinhole (Fig. 69 inset).

Note: The poly lock pin can be removed by threading the extractor side of the Pin Inserter/Extractor onto it and pulling it anteriorly. The hinge pin may be removed after the poly lock pin is removed by pushing the hinge pin out with the tapered end of the Hinge Pin Aligner.

Patellar alignment and tracking may be best assessed with the tourniquet down.

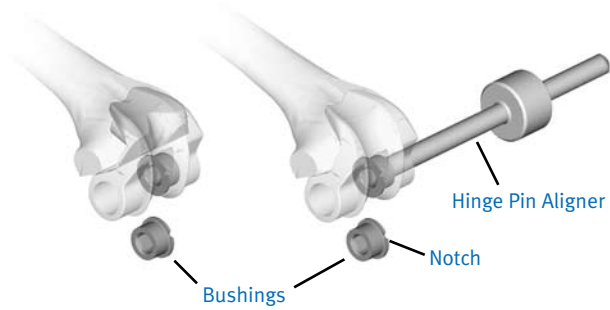


Fig. 67

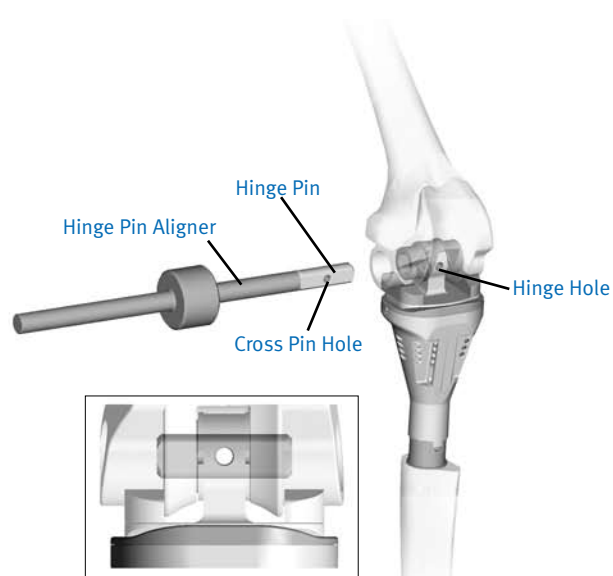


Fig. 68

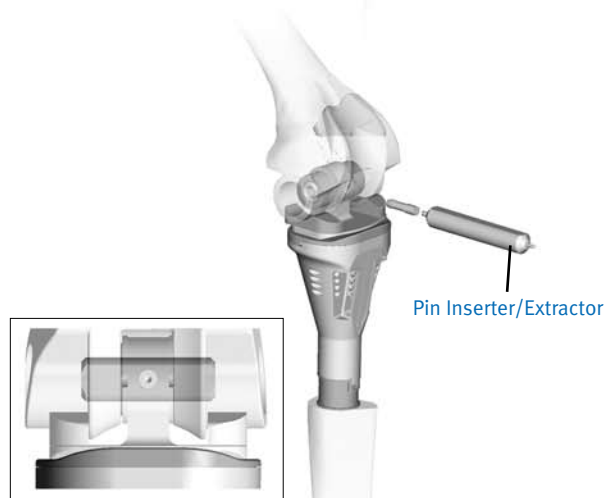


Fig. 69

Proximal Femoral Replacement



Proximal Femoral Replacement

Proximal Femoral Options

There are two proximal femoral options available: the Basic Proximal Femur (Fig. 70) and the Proximal Femur with Tissue Attachments (Fig. 71).

The Basic Proximal Femur is used for attachment of soft tissue when the trochanteric bone cannot be salvaged. The soft tissues are sutured through the holes of the proximal femur for temporary fixation during the healing process.

The Basic Femur is preferred because of its smooth profile which may reduce the chance of developing trochanteric bursitis. If trochanteric bone can be salvaged, use of the Proximal Femur with Tissue Attachments may be considered. For possible improved function of the abductors, attach them by the strongest possible means to the remaining lateral soft tissues, i.e., iliotibial band.

Optimal candidates for this method of fixation are those in whom a resection can be performed with sacrifice of not more than 1cm of native abductor tendon. Sacrifice of more than this amount of abductor tendon may leave the abductor mechanism with insufficient tendon for fixation using the pronged washers.

Restriction of post operative rehabilitation activity and or bracing should be individualized for each case to prevent dislocation.

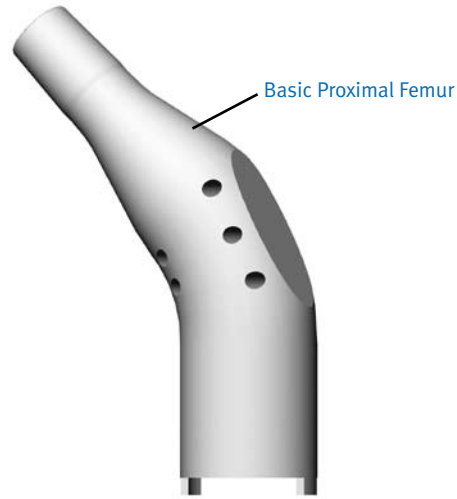


Fig. 70

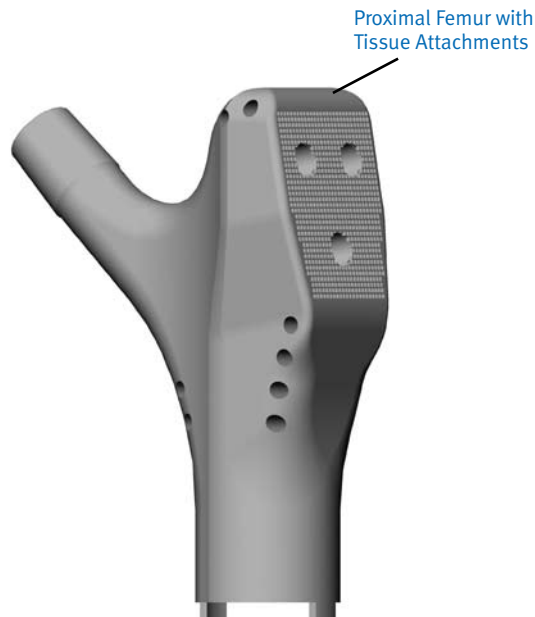


Fig. 71

Femoral Measurement and Resection

Use the Proximal Femoral Ruler (Fig. 72) and the 50cm scale to mark the appropriate segment length distal to the preoperatively determined femoral resection level as well as rotational alignment (Fig. 73).

The minimum resection required to implant either type of proximal femur component is 111mm.

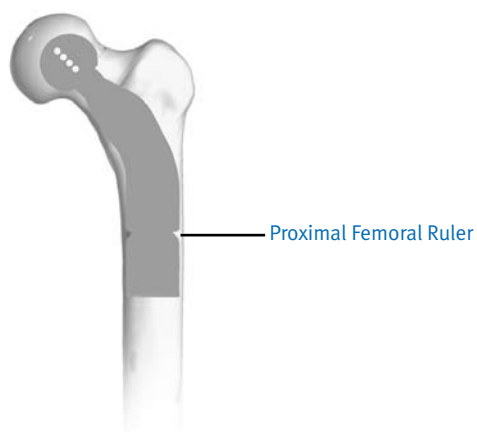


Fig. 72

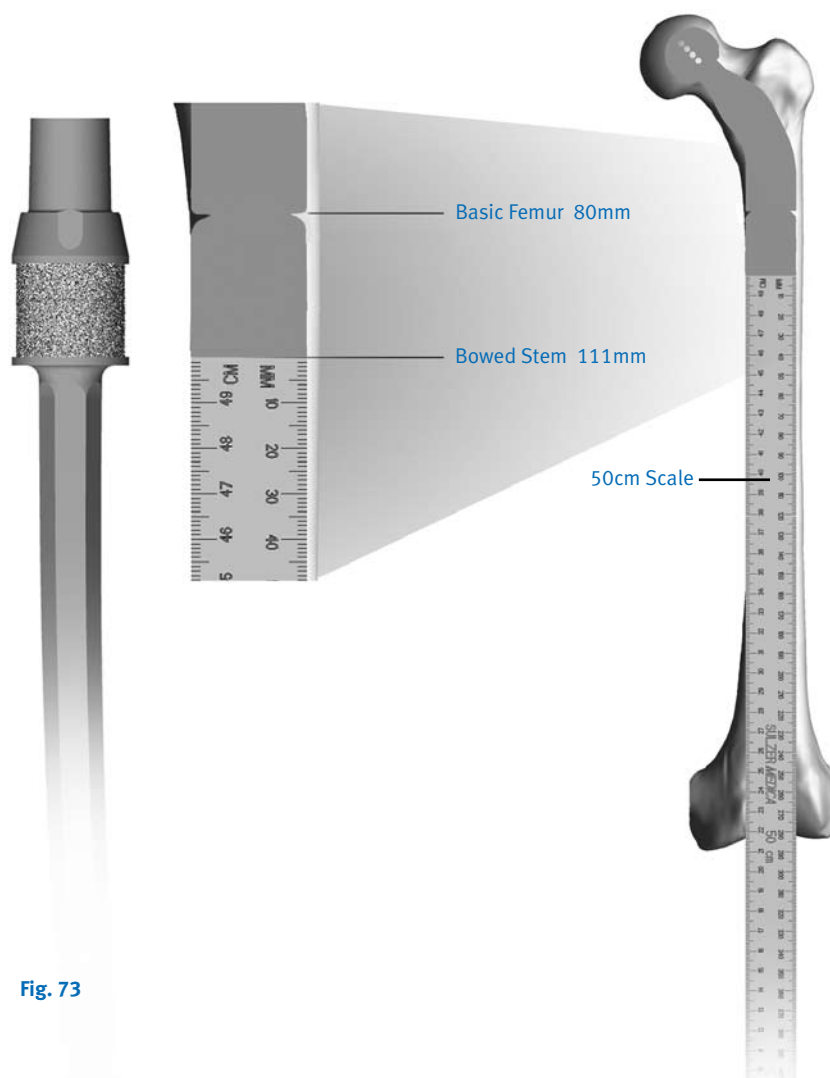


Fig. 73

Implant Selection

Determine the implant configuration to finalize the resection level. Select the proper segment from Table 8 to determine the final resection level. (Example: If the safe margin for proximal femoral tumor removal is 140mm, use a 30mm segment and a bowed stem to obtain a 142mm resection level.)

Note: Each large taper connection between components adds 1mm to the total length.

The intramedullary length of the bowed stems is 152mm.

Using a neutral offset head, segment lengths correspond to resection lengths in the table shown.

Set the resection guide to the final resection level and mark the proximal femur.

Resect the proximal femur slightly proximal (i.e., 0.5mm to 1mm) to the marked level. The additional amount is to account for slightly oblique cuts and femoral resection planing.

Note: To improve the swing phase of the patient's gait, some surgeons choose to slightly shorten the limb.



Table 8 Proximal Femoral Resection with Bowed Stems with Segments

Proximal Femur	Bowed Stem	Segments	Total Length
80mm	30mm	0mm	111mm
80mm	30mm	30mm	142mm
80mm	30mm	42.5mm	154.5mm
80mm	30mm	55mm	167mm
80mm	30mm	67.5mm	179.5mm
80mm	30mm	80mm	192mm
80mm	30mm	55+30mm	198mm
80mm	30mm	55+42.5mm	210.5mm
80mm	30mm	105mm	217mm
80mm	30mm	80+30mm	223mm
80mm	30mm	80+42.5mm	235.5mm
80mm	30mm	130mm	242mm
80mm	30mm	105+30mm	248mm
80mm	30mm	105+42.5mm	260.5mm
80mm	30mm	155mm	267mm
80mm	30mm	130+30mm	273mm
80mm	30mm	130+42.5mm	285.5mm
80mm	30mm	155+30mm	298mm

Note: Each large taper connection adds one millimeter to the total length.

Femoral Canal Preparation

Flexibly ream the femoral canal until cortical bone through the isthmus is reached. (The flexible reamers are not part of the *MOST Options* instrument system but are usually available through the hospital). The intermedullary length of stems is 152mm. Ream to a depth greater than 152mm to allow proper seating of stem shoulder on cortical bone. Recommended reamer diameters are as follows:

Stem Size	Cemented Hex Stem Ream Diameter	Fluted Stem Ream Diameter
12mm	13mm to 14mm	12mm
14mm	15mm to 16mm	14mm
16mm	17mm to 18mm	16mm

Note: The hex bowed stems are tapered 2mm distally. The fluted bowed stems are sized 0.5mm larger than the reamed hole diameter to enhance the fit within the canal.

Planing the Femoral Bone

Screw the appropriate-sized pilot for the stem diameter selected (12mm, 14mm or 16mm) to the planer (Fig. 74). Plane the resection using a power drill with a *Zimmer* adapter until cortical bone is smooth and even. A pin may be inserted in the cross hole to aid in pilot removal after planing.

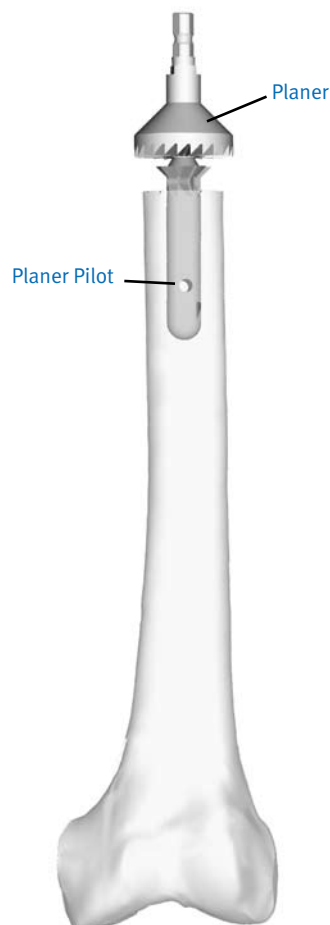


Fig. 74

Trial Assembly

Attach the appropriate proximal femur to the bowed stem. The bowed stem trial has an anterior mark to insure proper orientation. The fluted bowed stems use the hex trial stems. Insert the femoral trial assembly into the femoral canal and evaluate for fit (Fig. 75). When using a bowed stem, mark the anterior femoral bone in line with the mark on the bowed stem trial to ensure proper orientation of the implant.

Trial Reduction

Firmly assemble the appropriate trials together by hand. It is not necessary to impact the trials together.

The trial heads are selected as follows; 26mm, 28mm and 32mm options (-4mm, neutral, +4mm and +8mm necks).

Prepare the acetabulum as needed for a *Converge*®, Bipolar or Unipolar acetabular component. If the acetabulum is normal, a bipolar head is suggested for stability.

Perform the trial reduction. If leg length, alignment, range of motion and stability are acceptable, proceed with the next step. If the joint is tight at full extension or during push-pull, try a shorter offset head trial or recheck the cuts and remove bone from the femur as necessary. If the joint is loose at full extension or during push-pull, try the longer offset head trial or recheck cuts and try the next length segment trial. An option of a shorter neck but longer stem (medialize) may decrease apparent abduction weakness.

Place the femoral component in approximately 0-20 degrees of anteversion. Check stability while externally rotating the limb. Support the reconstruction with nonabsorbable suture if needed.

Note: Consider decreasing the amount of anteversion to reduce risk of anterior dislocation.

Use caution not to over-lengthen the reconstruction in order to achieve longitudinal stability.



Fig. 75

Bowed Stem Implant Assembly

Assemble the selected segment to the Basic Proximal Femur using the Impacting Stand (or the Proximal Femur with Tissue Attachments using the Proximal Femur with Attachment Impacting Stand) and the Impactor Plug (Fig. 76). Use a mallet to firmly tap the tapers to the seated position. Using the impaction sleeve, assemble the hex I/M stem or the I/M fluted stem to the proximal components, while still in the Proximal Femur Impacting Stand (Fig. 77).

Ensure that the stem tip extends anatomically posteriorly with respect to the proximal femur. Then, firmly tap the taper to the seated position with a mallet and the Stem Impacting Sleeve.

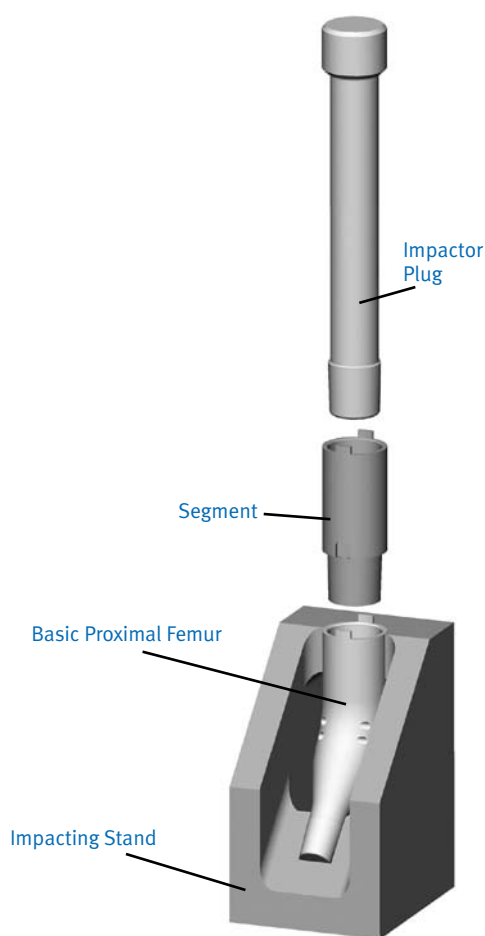


Fig. 76

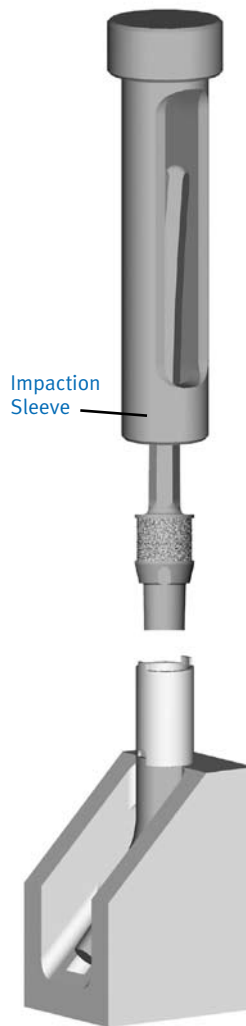


Fig. 77

Implantation of the Femoral Component

Cement the femoral assembly into the femur using a standard cementing technique (Fig. 78). A cement restrictor may be used. Cement is injected into the femoral canal. Cement is also applied to the radius of the stem to ensure adequate cement coverage at the implant/bone interface. The component is impacted into place using the femoral impactor and a mallet. Excess cement is removed. Implantation of hex stems should be guided by the anterior bow.

A trial head is assembled to the proximal femur and a mallet is used to lightly tap the implant in using the head impaction instrument if needed.

Assemble the chosen head using a femoral head impactor.

The surgeon will choose a standard closure technique. Secure all remaining abductors to the lateral fascia to help restore hip abduction.

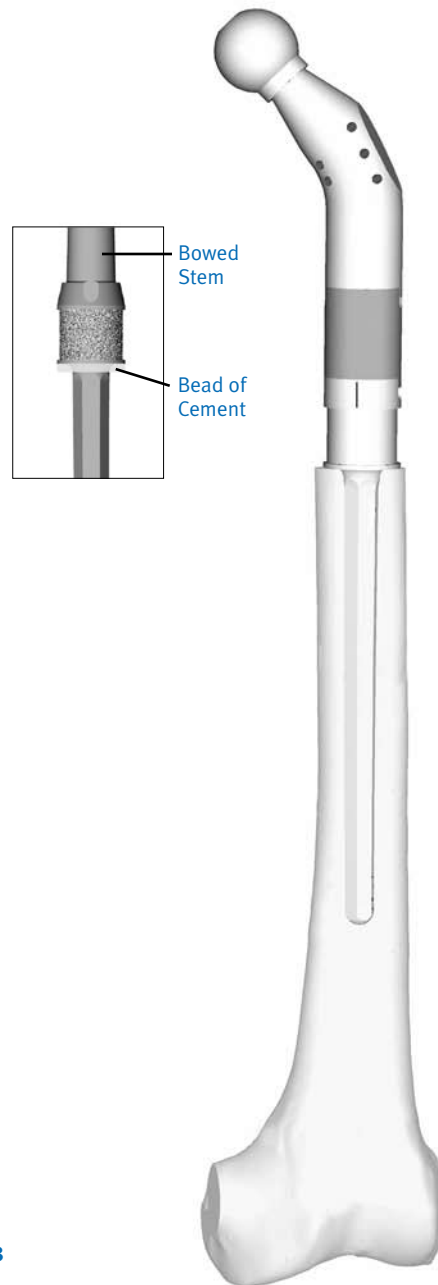


Fig. 78

Reattachment of the Greater Trochanter

First, advance the bone over the lateral surface of the Proximal Femoral Implant with Tissue Attachment with the limb positioned in 30 degrees of abduction to optimize the resting tension in the abductor mechanism. The bone is over the distal hole and the muscle tissue is over the two proximal holes. Mark the approximate position of the distal hole on the bone and drill with a 1/4 inch drill from the inside (implant side) out (tissue side).

The first bolt/washer combination, generally a short (5mm) washer and a long bolt (20mm), can now be placed against the bone and into the distal hole under direct vision. The hex driver is used to advance the washer until the tips of the prongs are firmly embedded in the bone. This limits the prominence of the fixation to 2mm to 3mm above the native cortex.

Once the first bolt/washer couple has been placed, the square hole of the Proximal Femur Attachment Template can be placed over the square washer to guide the next two bolt/washer couple placement (Fig. 79).

After making a longitudinal incision through the middle of one of the square holes, a Kelly Hemostat can be used to spread the tissue so that the next combination can be placed under direct vision. The hex driver is used to advance the washer until the tips of the prongs are firmly compressed into the textured surface.

The final bolt/washer (if required) can be placed in a similar fashion. This placement through the soft tissue provides a shear stop for the combination placed through the greater trochanter and prevents weakening of the trochanter with multiple holes.



Fig. 79

Reattachment of the Abductor Tendon (Optional Technique)

Fixation of soft tissue is performed using short (13.5mm) or long (20mm) bolts and either short-prong (5mm) or long-prong (9mm) washers, depending on the thickness of the soft tissue. Advance the abductor tendon and available gluteus medius over the lateral surface of the proximal femoral component using sutures in the provided suture holes or a towel clip. The limb should be positioned in 30 degrees of abduction to optimize the resting tension in the abductor mechanism. Make a longitudinal incision over the distal hole and spread the tissue using a Kelly Hemostat so that the first bolt/washer combination can be placed under direct vision. The hex driver is used to advance the washer until the tips of the prongs are firmly compressed into the textured surface.

Once the first bolt/washer couple has been placed, the square hole of the proximal femoral attachment template can be placed over the square washer to guide the next bolt-washer couple placement. The next bolt/washer combination can be placed in a similar fashion to the first.

If the bolts/washers are unable to advance fully (i.e., the washer prongs are not firmly compressed or the bolt is not snug in the washer) the combination should be removed, even if it feels tight. The thread sights should be cleaned and extra care should be taken to avoid clogging the threads with tissue in advancing the bolt on the next try. Backout may occur if the combination is not advanced properly.

Use the standard closure technique.

Note: This design traps soft tissue securely against the textured surface while preventing the crushing and limiting associated devascularization of tissue. Secure fixation of the washer tips into the textured surface enhances fixation by broadening the bending moment on the bolt. This also serves to limit motion of metallic components against one another and should limit generation of debris at this site. Notches between the spikes of the bolts are widened and smoothed to allow the maximum tissue volume to be trapped and to limit the risk of shearing soft tissue on sharp metal edges.

Total Femoral Replacement



Total Femoral Replacement

Implant Configuration

In the event that a Total Femur is required, the procedure for doing a Proximal Femur and a Distal Femur is essentially combined. The suggested procedures take place after a routine approach has been performed for opening and exposing the acetabulum, femur and proximal tibia. **It is critical that leg length be checked and noted prior to any bone resection.** Care should be taken during the reconstruction to avoid stretch injury to the neurovascular structures.

Determine the implant configuration based on the bone replacement requirements. Refer to Table 9.

Note: Each large taper connection adds one millimeter to total length.

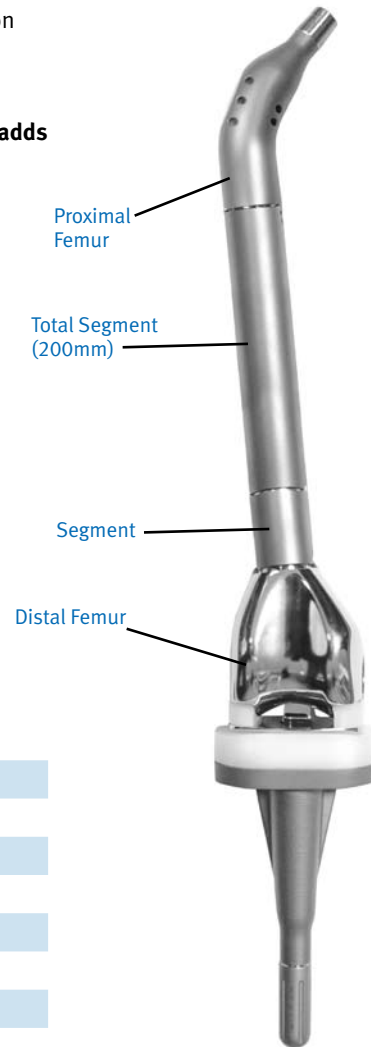


Table 9 Total Femur with Segments

Proximal Femur	Distal Femur	Segments	Total Length
80mm	65mm	200mm	347mm
80mm	65mm	200+30mm	378mm
80mm	65mm	200+42.5mm	390.5mm
80mm	65mm	200+55mm	403mm
80mm	65mm	200+67.5mm	415.5mm
80mm	65mm	200+80mm	428mm
80mm	65mm	200+55+30mm	434mm
80mm	65mm	200+55+42.5mm	446.5mm
80mm	65mm	200+105mm	453mm
80mm	65mm	200+80+30mm	459mm
80mm	65mm	200+80+42.5mm	471.5mm
80mm	65mm	200+130mm	478mm
80mm	65mm	200+105+30mm	484mm
80mm	65mm	200+105+42.5mm	496.5mm
80mm	65mm	200+155mm	503mm
80mm	65mm	200+130+30mm	509mm
80mm	65mm	200+130+42.5mm	521.5mm
80mm	65mm	200+155+30mm	534mm
80mm	65mm	200+155+42.5mm	546.5mm

Note: Each large taper connection adds one millimeter to the total length.

Tibial Preparation

There are four surgical options for tibial preparation:

- 1 Extramedullary Tibial Option, which uses a metal-backed hinged tibia without a long stem (Page 7),
- 2 Extramedullary Tibial Option, which uses an all-poly tibial sleeve (See Appendix A, page 56),
- 3 Intramedullary Tibial Option, which uses the metal-backed tibia without a stem (See Appendix B, page 60), and
- 4 Intramedullary Tibial Option, which uses a metal-backed tibia with a long stem (See Appendix C, page 67).

Trial Reduction

The Metal-Backed Hinged Tibial Trial uses the 4mm trial hinge. The All-Poly Tibia Sleeve uses the standard trial hinge. The 4mm trial hinge and the standard trial hinge are not interchangeable.

The total femoral segment has two tab orientations at the proximal portion. These are left/right specific and provide 15° of anteversion for the proximal femur.

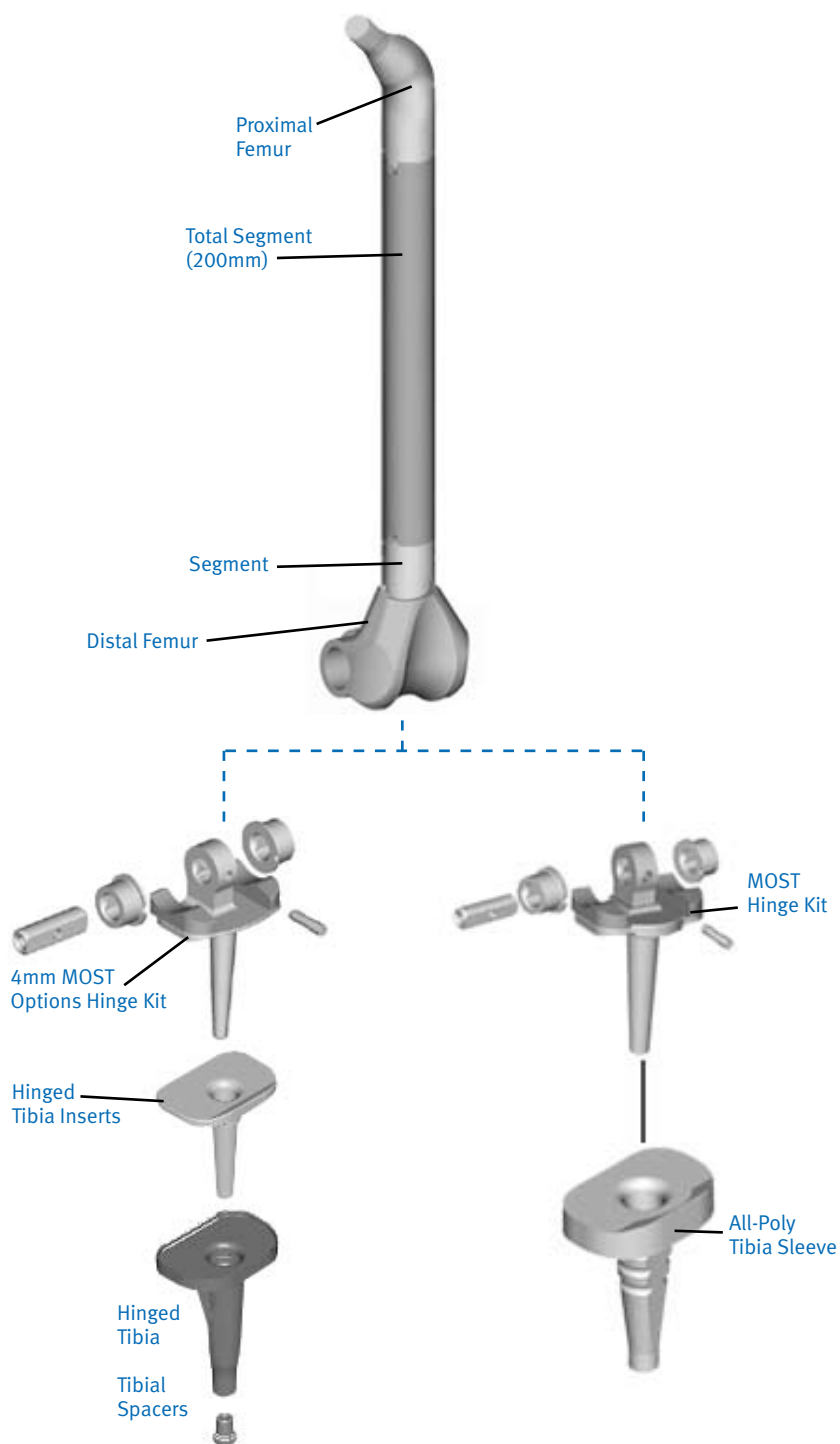


Fig. 80

Component Implantation

Implantation of the Metal-Backed Hinged Tibial Component

Cement is applied to the undersurface of the tibial baseplate, keel and stem. Impact the tibial component and insert into place using the Tibial Insert/Baseplate Impactor and a mallet (Fig. 81). Remove any excess cement.

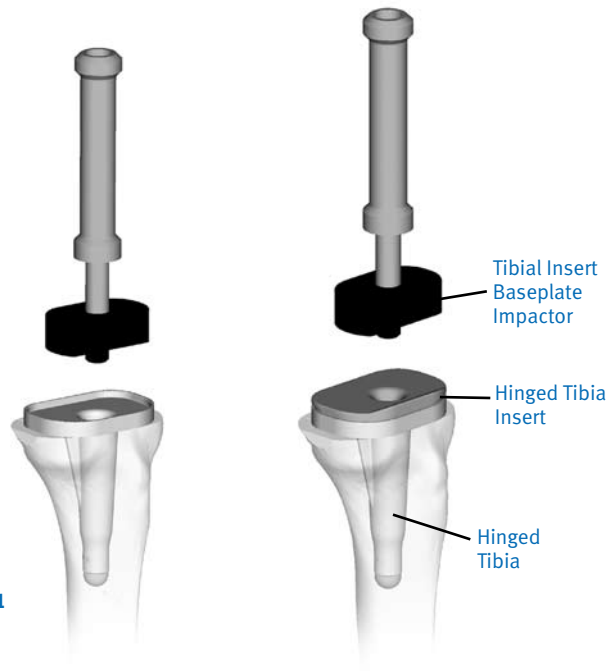


Fig. 81

Implantation of the All-Poly Tibial Sleeve Component

Cement is applied to the undersurface of the All-Poly Tibial Sleeve and stem. Impact the tibial component into place using the Tibial Insert/Baseplate Impactor and a mallet (Fig. 82). Remove any excess cement.

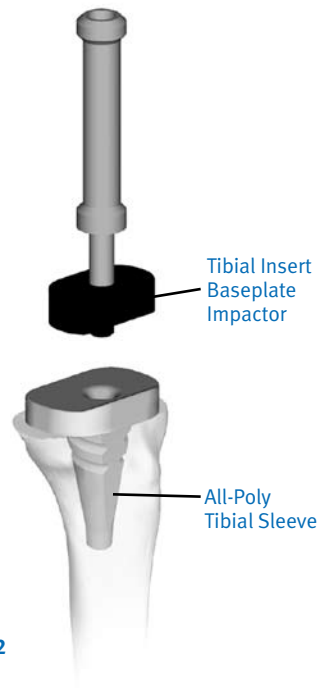


Fig. 82

Implant Assembly

Assemble the porous or nonporous Total Femoral Segment to the Basic Proximal Femur using the Basic Proximal Femoral Impacting Stand (or the Proximal Femur with Tissue Attachments using the Proximal Femur with Attachment Impacting Stand), and impacting plug (Fig. 83). The Proximal Femur should be assembled and anteverted appropriately for a left or right in accordance with the patient's affected side. Use a mallet to firmly tap the tapers to the seated position.

If segments are needed, the segment can be attached to the distal femur by resting the femur-articulating surface on the Femoral Impacting Stand prior to impaction of the segment into the distal femur using the Femoral Impacting Plug and a mallet (Fig. 84).

Note: The femoral and tibial components are assembled prior to mixing the cement.

The distal femur and selected segments are placed in the Femoral Impacting Stand and then the selected Total Femoral Segment and the Basic Proximal Femoral Component are placed into the segment and impacted together using the Proximal Femoral Stand (Fig. 85).

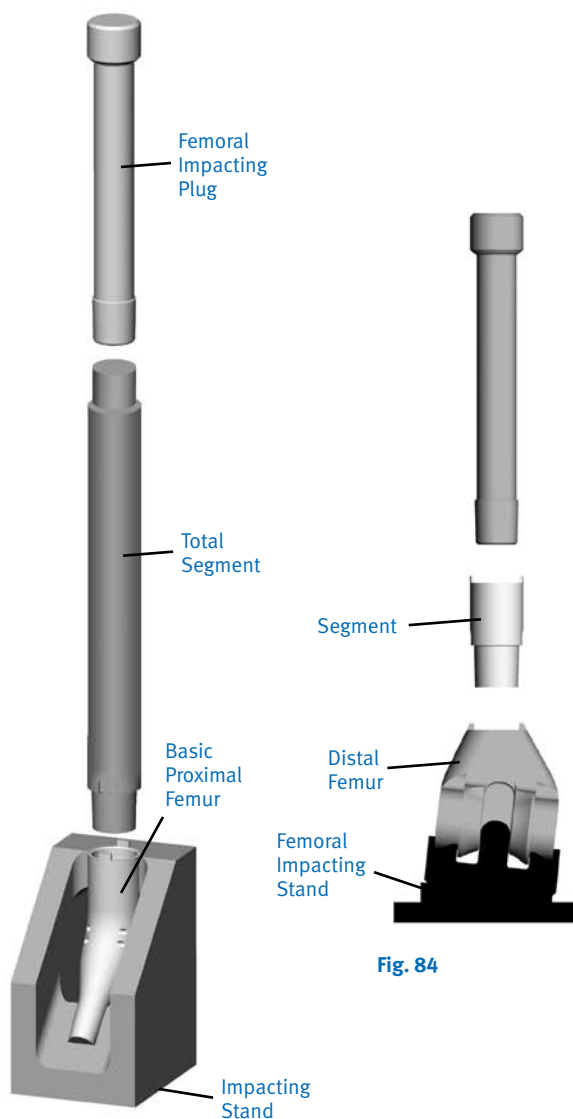


Fig. 83

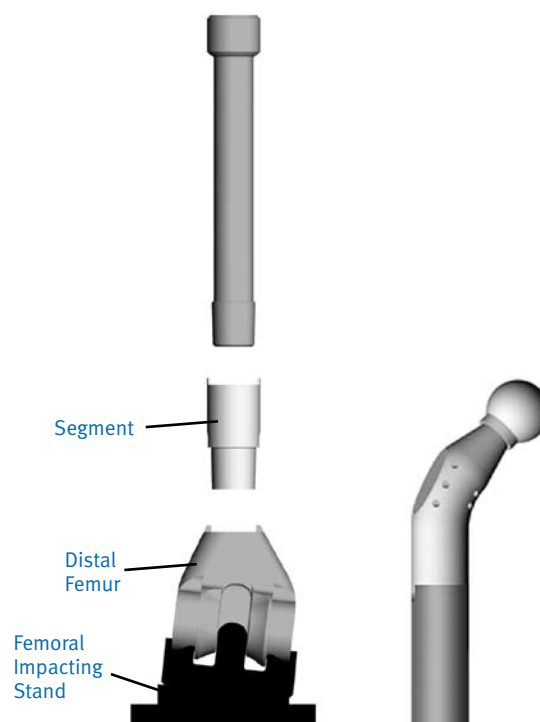


Fig. 84



Fig. 85

Hinge Assembly

There are two hinges in the *MOST Options* system. The 4mm hinge is used only with the Metal-Backed Hinged Tibia and Proximal Tibia. The standard hinge is used only with the All-Poly Tibial Sleeve.

4mm Hinge Kit

The 4mm hinge kit consists of 2 bushings, 1-4mm hinge, 1 hinge pin and 1 poly lock pin (Fig. 86a).

Standard Hinge Kit

The standard hinge kit consists of 2 bushings, 1 hinge, 1 hinge pin and 1 poly lock pin (Fig. 86b).

Note: The 4mm hinge is not compatible with the All-Poly Tibial Sleeve and the standard hinge is not compatible with the metal-backed hinged tibia.

Hinge Components Assembly

Once the appropriate hinge kit is selected and the cemented implants have cured, follow the assembly steps below.

Slide the hinge into the hinged tibial insert. Assemble the two hinge bushings into the distal femoral holes via the interarticular slot and align the notches on the bushings anteriorly (Fig. 87).

Use the tapered end of the Hinge Pin Aligner to position the bushings with the notches facing anteriorly (Fig. 88).

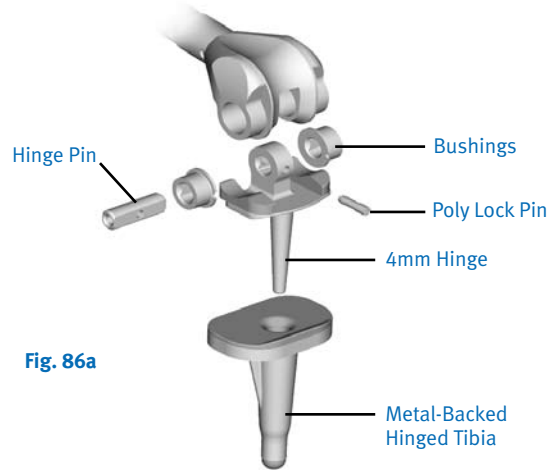


Fig. 86a

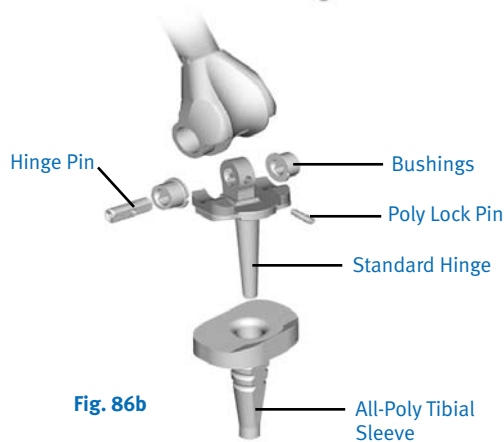


Fig. 86b

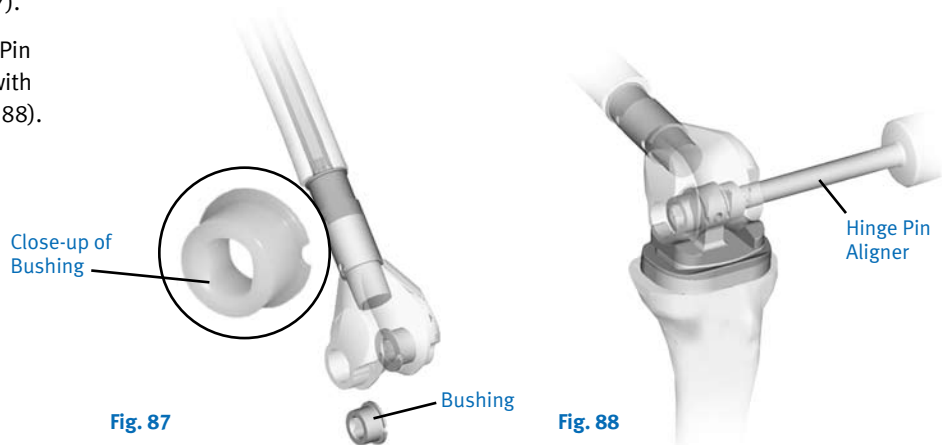


Fig. 87

Fig. 88

Thread the hinge pin to the Hinge Pin Aligner (Fig. 89a) and slide the hinge pin into the distal femur holes and slightly rotate the Hinge Pin Aligner back and forth until the cross pinhole on the hinge pin is visible through the hinge hole (Fig. 89b).

Insert the poly lock pin into the hole on the hinge. Push the poly lock pin with the insert side of the Pin Inserter/Extractor (Fig. 90a) until the poly lock pin is fully seated into the cross pin hole (Fig. 90b).

Note: The poly lock pin can be removed by threading the extractor side of the Pin Inserter/Extractor onto it and pulling it anteriorly. The hinge pin may be removed after the poly lock pin is removed by pushing the hinge pin out with the tapered end of the Hinge Pin Aligner.

Patellar alignment and tracking may be best assessed with the tourniquet down. Perform additional lateral patellar retinacular releases if necessary.

Concentrate on a complete closure of the fascia, especially over the proximal tibia. If elevation of the proximal tibial crest and tubercle has been done, this is reattached with wires or a #5 nonabsorbable suture through drill holes into the tibia and fragment.

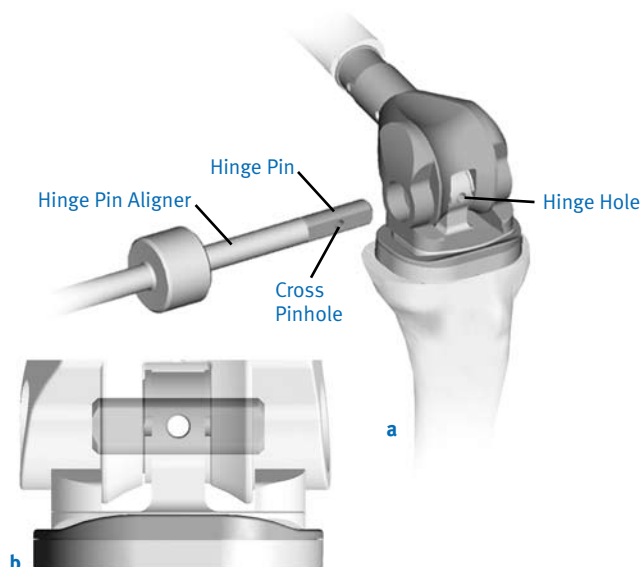


Fig. 89

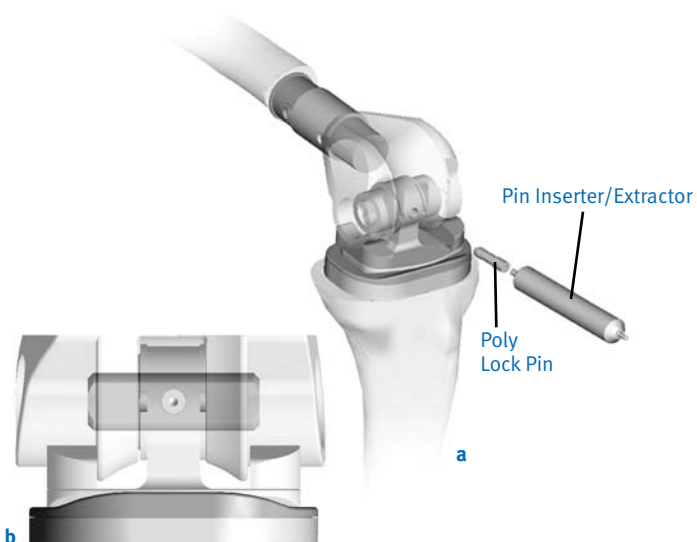


Fig. 90

Component Disassembly

In the event that the components need to be disassembled, two taper distractors have been provided. Either distractor may be used to disassemble the components. Place the Taper Distractor Jaws between the tab and slot of the mating components with the curvature of the jaws facing the curved slot and the flat of the jaws facing the tab; firmly rotate (Fig. 91). Alternatively, the Wedge Stem Distractor may also be used on any of the *MOST Options* components connected by taper interfaces (Fig. 92).

Note: A surgical implant should not be reused under any circumstances. Once implanted and subsequently removed, an implant should be discarded. Even though the implant appears undamaged, it may have small defects and internal stresses that may lead to failure.

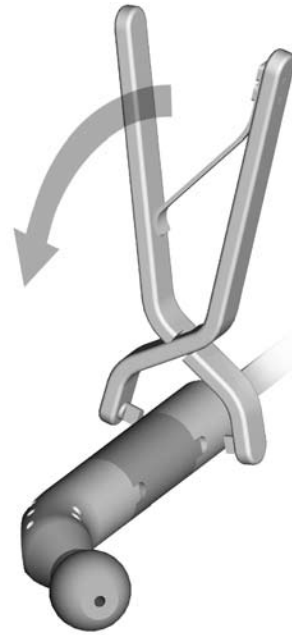


Fig. 91

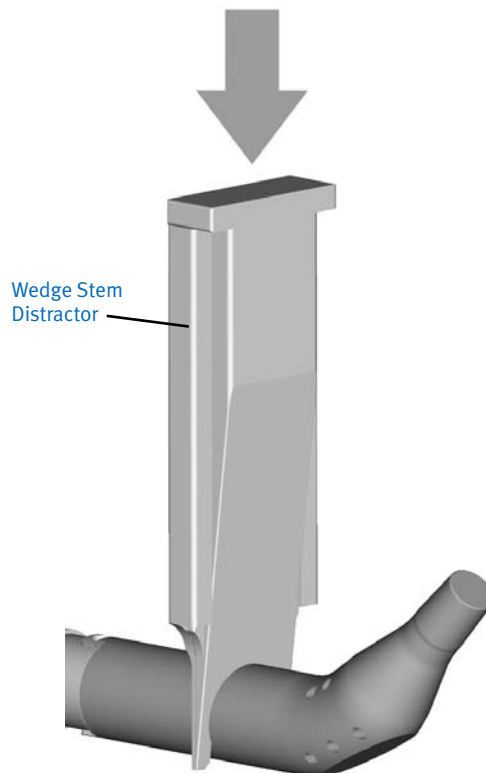


Fig. 92

Limb Lengthening

If a patient requires limb lengthening, the surgeon may choose to remove a femoral segment by use of the distraction instrument and replace it with the next size larger femoral segment.

Note: Attention must be given to soft tissue release at the time of limb lengthening.



Fig. 94

Appendix A

Extramedullary Tibial Option – All-poly tibial sleeve

The Extramedullary Tibial Alignment Guide assembly consists of the extramedullary guide, Tibial Saw Guide and 2mm, 10mm or 15mm Tibial Stylus. Select the appropriate Tibial Stylus based on the amount of bone requiring resection on the tibia. Adjust the extramedullary guide assembly to the approximate tibial length.

Tap the longest pin of the guide into the central portion of the proximal tibia (Fig. 95). This fixes the guide to the tibia but allows for rotation until the second pin is impacted.

Rotational Alignment

Rotation is selected based on the anterior crest of the tibia and the bimalleolar axis. Make sure the guide is parallel to the crest of the tibia in the anterior/posterior and medial/lateral planes.

The bottom nut on the ankle cradle should be positioned to maintain a zero degree tibial slope (Fig. 96). The anterior tibial plateau should be aligned parallel with the cutting block (Fig. 97).

Rotation is then locked in place by impacting the second pin into the tibia.

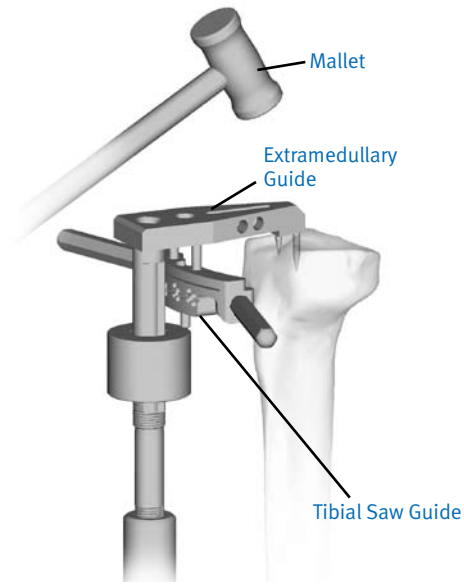


Fig. 95

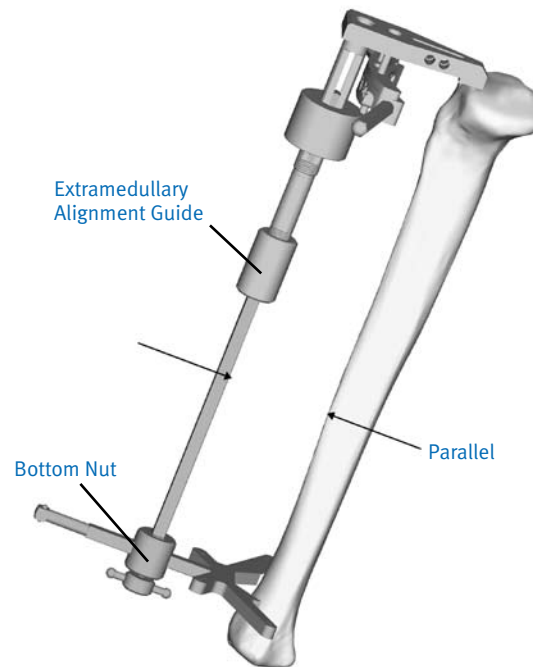


Fig. 96



Fig. 97

Zero Degree Tibial Slope

A zero degree tibial cut is recommended to accommodate the cone of the hinged tibial baseplate into the tibia. The instruments are preset to provide a zero degree tibial cut. No adjustment is needed.

Level of Resection

Use the 10mm Tibial Stylus to determine the Tibial Saw Guide position for minimal resection of the proximal tibia (Fig. 98). The tip of the stylus is placed on the lower side. The total thickness of the 9mm All-Poly Tibial Sleeve and standard hinge (6mm) is 15mm. The stylus will position the tibial saw guide 10mm below the point of reference. If additional bone needs to be resected, the Tibia Saw Guide could be moved in 2mm increments (Ex. 10mm + 2mm =12mm).

Note: A 10mm resection will raise the joint line approximately 5mm. There is a 15mm tibial stylus in the system that may be used to obtain a 15mm tibial resection if raising the joint line is not desired.

The cutting guide is then stabilized by drilling and pinning through the two outer most holes on the “DRILL ON LINE” (Fig. 99). This allows for 2mm of adjustment proximally and 4mm distally. The lateral drill point is first placed after retracting the patellar tendon, followed by the medial drill point. If the medial drill point appears to “walk,” this can be easily avoided by marking the entry point through the block, then drilling outside the block to pierce the cortex. Redrill the hole through the block.

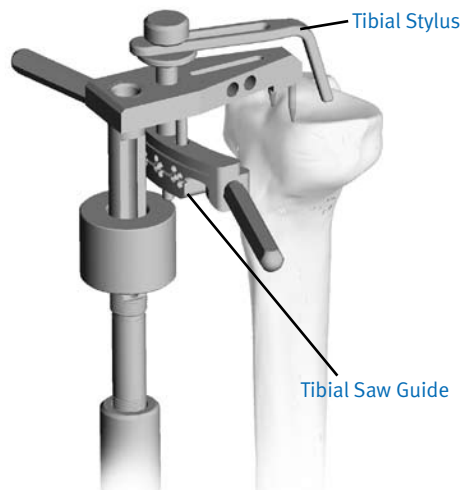


Fig. 98

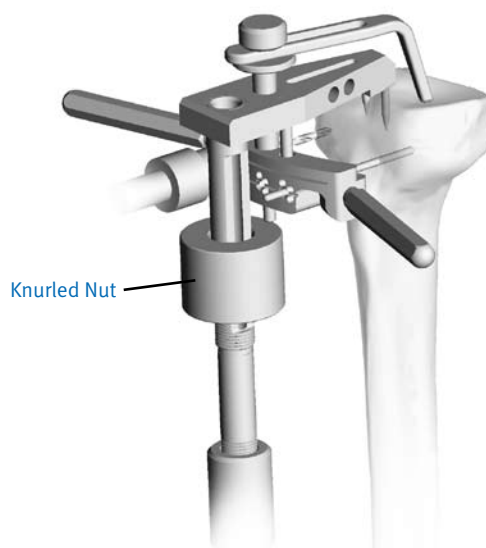


Fig. 99

Disassemble the jig by removing the stylus and extramedullary alignment guide using a slaphammer (Fig. 100). Place the alignment rod on the zero degree tibial alignment guide. The rod should pass through the center to no more than a few millimeters lateral to the center of the ankle.

Cutting the Proximal Tibia

A Miller guide (angel wing) can be placed on the tibial saw guide along the medial and lateral edge of the tibia to confirm the level of desired tibial resection. Place the saw capture on the tibial saw guide. If it appears that an inadequate resection will occur, adjust the tibial saw guide in 2mm increments to a lower level. Angled retractors are used to protect soft tissue and ligaments. Cut the proximal tibia with the appropriate saw blade for the saw guide (Fig. 101).

Note: Saw blades especially designed for this system are recommended. The blades are 1 inch wide with a shank thickness of 0.058" and will best match the saw guide.

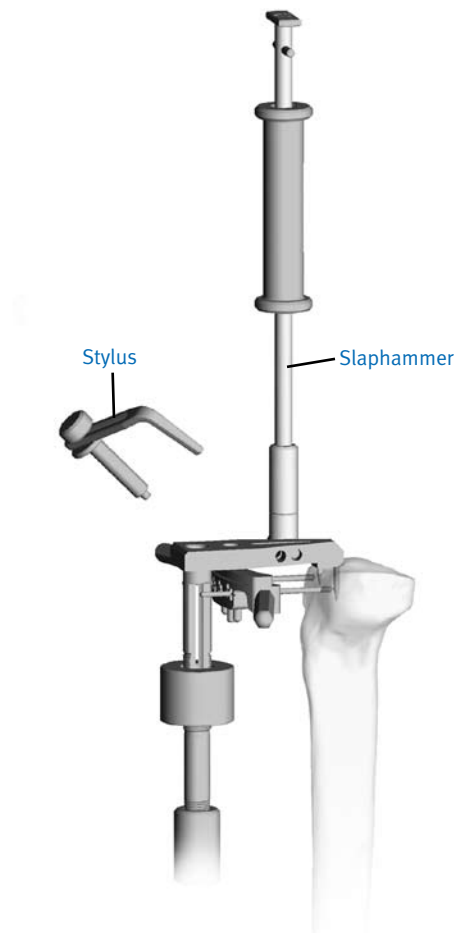


Fig. 100



Fig. 101

Proximal Tibial Sizing and Drilling

To avoid soft tissue impingement, select the appropriate size Tibial Baseplate Sizer/Reamer Guide that best fills but does not overhang the proximal tibia. The medial/central hole is drilled and filled. Final rotational alignment is referenced off the tibial tubercle with the handle of the guide in the medial one-third of the tubercle. It is then stabilized with four pins as the holes are drilled using the 3.2mm (1/8 inch) by 5 inch drill bit. Check the alignment of the tibial cut with the Axial Alignment Rod through the handle of the Baseplate Sizer/Reamer Guide (Fig. 102). The tibial profile dimensions correspond to the following A/P and M/L dimensions.

Tibial Size	A/P	M/L
1	46mm	65mm
2	48mm	71mm
3	51mm	77mm
4	54mm	83mm

Tibial Stem Preparation and Tibial Trial Insertion

Using the appropriate tibial sizing template, ream with the tibial reamer and guide assembly using a power drill with *Zimmer* adapter (Fig. 103); broach the proximal tibial canal with the tibial broach and cage assembly (Fig. 104).

Note: Both reamer and broach need to be fully seated for correct tibial preparation. If resistance is met, remove and inspect for cortical thinning or perforation.

For hinge selection and trial assembly, please refer to page 13.

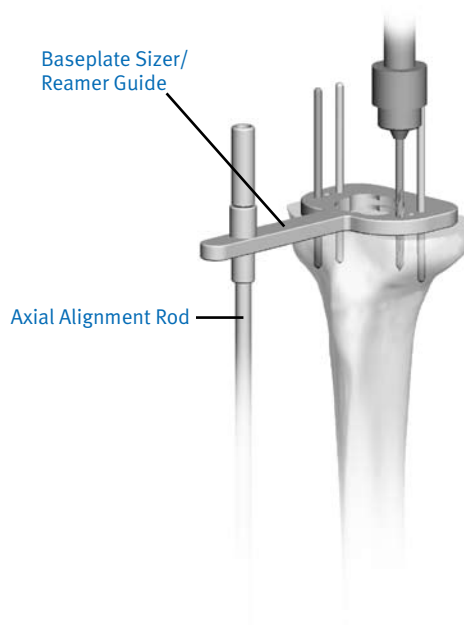


Fig. 102

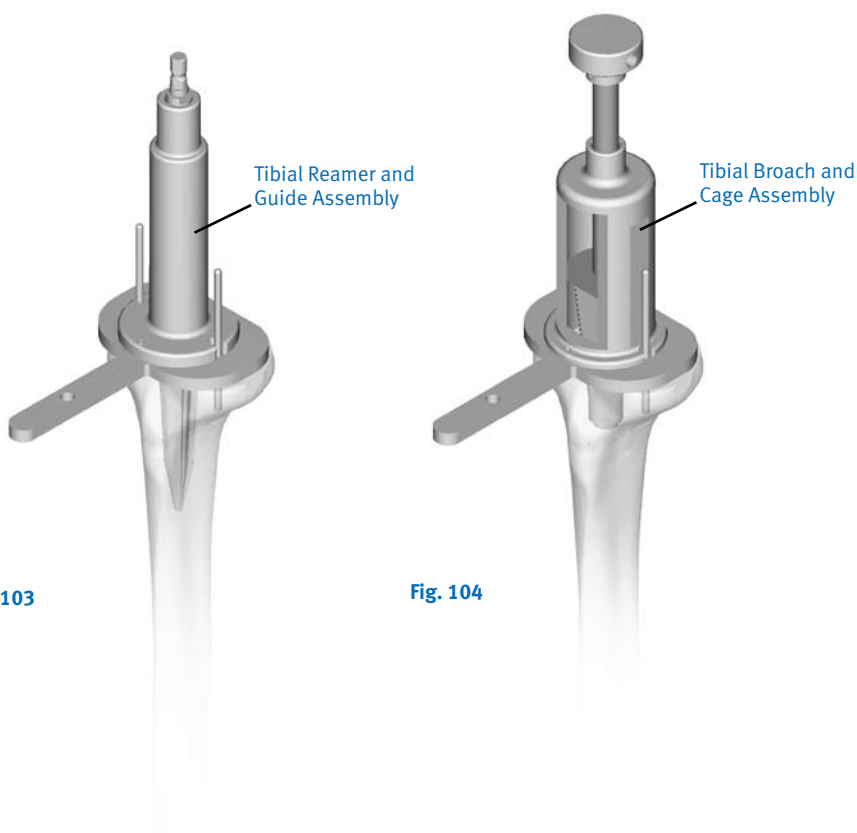


Fig. 103

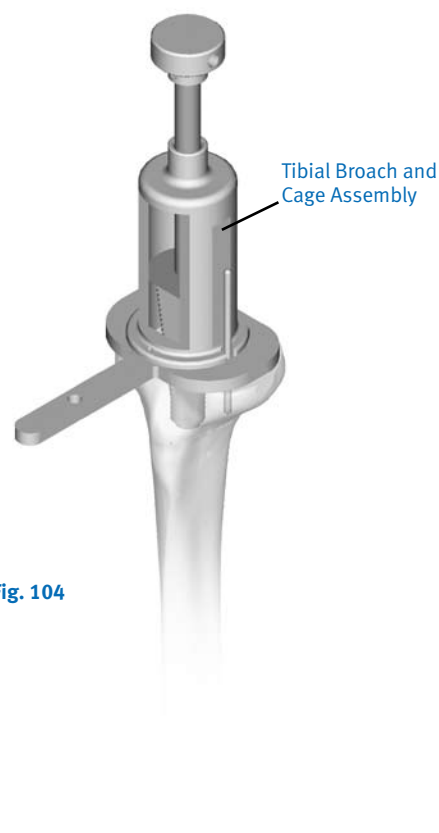


Fig. 104

Appendix B

Intramedullary Tibial Option – Metal backed tibia without a stem

Tibial Medullary Canal Preparation

Direct vertical exposure of the tibial plateau is necessary. This is facilitated by soft tissue releases around the tibial metaphysis, medial and lateral soft tissue retraction with the small angled knee retractors and subluxation of the tibia anteriorly with the large angled knee retractor.

The reference hole should be centered from medial to lateral. Anterior/posterior positioning should fall between the middle and anterior one-third of the tibial plateau (Fig. 105). Placement of the intramedullary guide or I/M rod is accomplished by first drilling a 8mm (5/16") hole in the proximal tibia (Fig. 106).

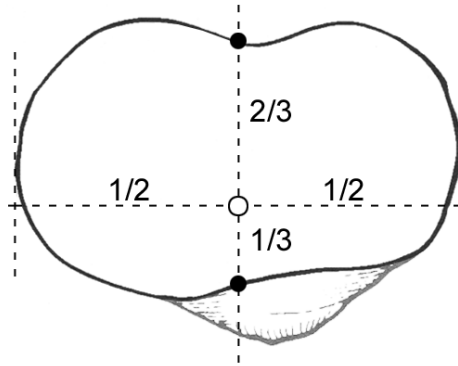


Fig. 105

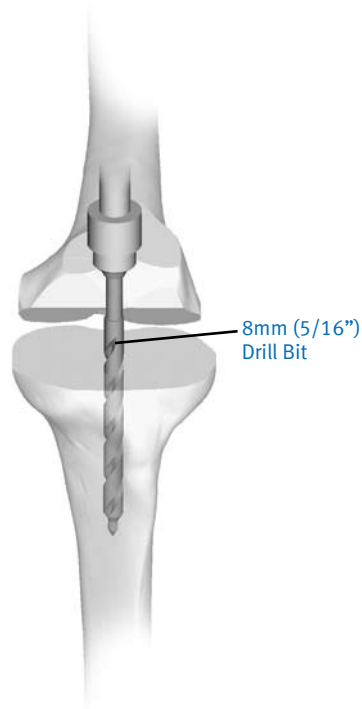


Fig. 106

Intramedullary Tibial Option 2 only – Reference Hole While Using a 8mm I/M Rod

Attach the 8mm (5/16") I/M rod to the Quick Disconnect Handle. With the handle in the "Open" position, the 8mm adapter is locked into place by clicking the handle manually to the "Locked" position.

Slowly insert the I/M rod into the tibial canal (Fig. 107). Remove the handle by clicking it to the open position and disconnecting it.

Tibial Alignment and Proximal Tibia Cuts

Connect the fixed zero degree intramedullary alignment guide to the slotted tibial cut guide with a 10mm single ended stylus (Fig. 108 on the following page). The zero degree guide is then placed onto the 8mm (5/16") trial stem adapter located in the tibial canal. If no bone is present on which to rest the 10mm stylus, the thumbscrew located on the fixed zero degree intramedullary alignment guide is used to secure the stylus tip by touching the least involved portion of the tibial plateau.

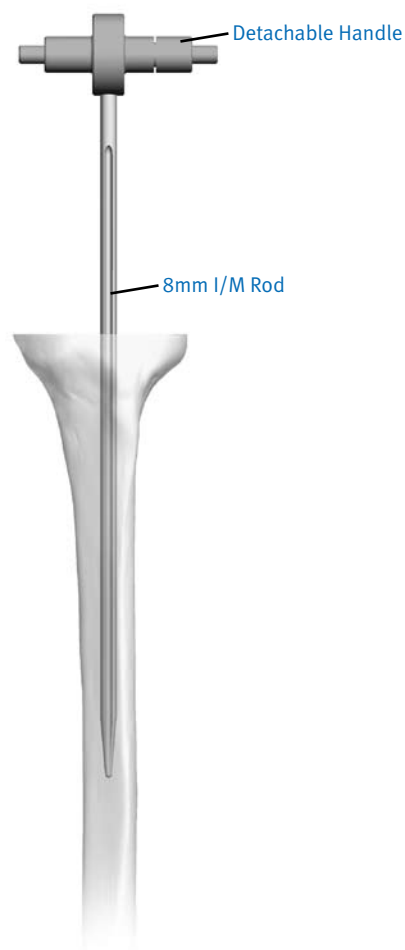


Fig. 107

Rotational Alignment

Rotation is selected based on any remaining landmarks. The most reliable landmark will be the tibial tubercle. For proper internal/external rotation, the center of the saw block should be positioned directly over the medial one-third of the tibial tubercle (not medial to the tubercle). It can be helpful to mark this medial one-third of the tubercle with a longitudinal methylene blue line. Extramedullary confirmation of the internal/external rotation can also be achieved by using an alignment rod placed through the outer hole of the alignment guide. The external guide rod should align with the tibial tubercle or at the ankle over the anterior tibialis tendon (Fig. 108).

Ideally, both references should be used. Rotation is then locked in place by impacting the set pin with a mallet.

Zero Degree Tibia Slope

A zero degree tibial cut is recommended to accommodate the cone of the hinged tibial baseplate into the tibia. The instruments are preset to provide a zero degree tibia cut.

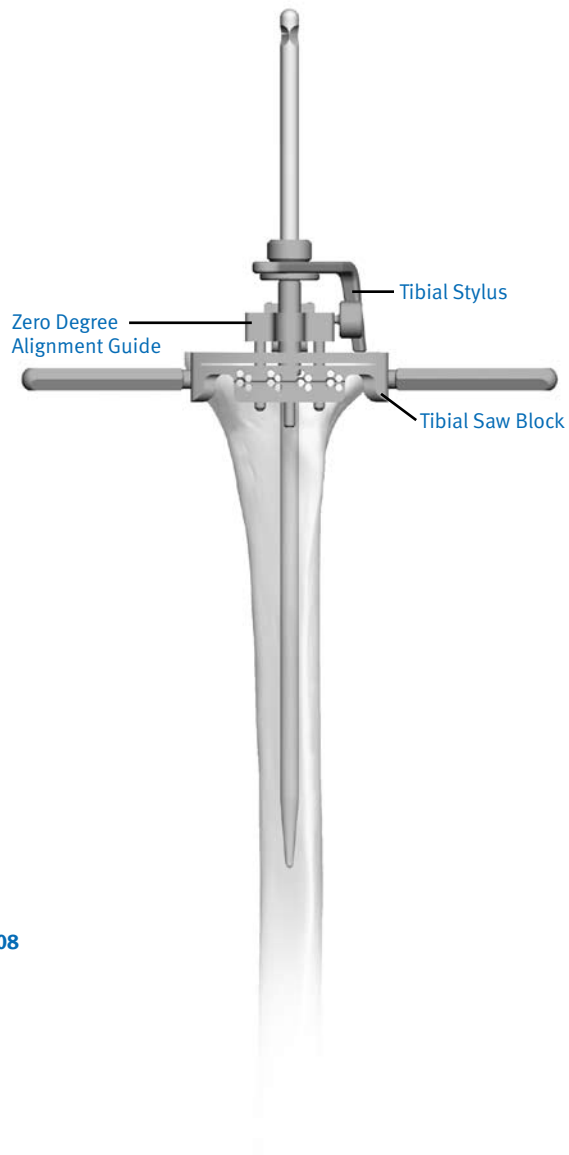


Fig. 108

Level of Resection

The 10mm Tibial Stylus is used to determine the tibial saw guide position for minimal resection of the proximal tibia. The stylus will position the tibial saw guide 10mm below the point of reference. The tip of the stylus is placed on the lower side.

Note: A 10mm resection will raise the joint line approximately 5mm. There is a 15mm Tibial Stylus in the system that may be used to obtain a 15mm tibial resection.

Stabilize the cutting guide by drilling and pinning through the two outer most holes on the “DRILL ON LINE” (Fig. 109). This allows for 2mm adjustment proximally and 4mm distally. The lateral drill point is first placed after retracting the patellar tendon, followed by the medial drill point. If the medial drill point appears to “walk,” this can be easily avoided by marking the entry point through the block, then drilling outside the block to pierce the cortex. Redrill the hole through the block.

To recheck alignment, place the alignment rod on the zero degree tibial alignment guide to confirm the correct rotational position. The rod should pass through the center to no more than a few millimeters lateral to the center of the ankle (Fig. 110). Remove the tibial alignment guide, alignment rod and I/M rod from the tibial canal.

Cutting the Proximal Tibia

A Miller guide (angel wing) can be placed on the tibial saw guide along the medial and lateral edge of the tibia to confirm the level of desired tibial resection. If it appears that an inadequate resection will occur, adjust the tibial saw guide in 2mm increments to a lower level. Angled retractors are used to protect soft tissue and ligaments.

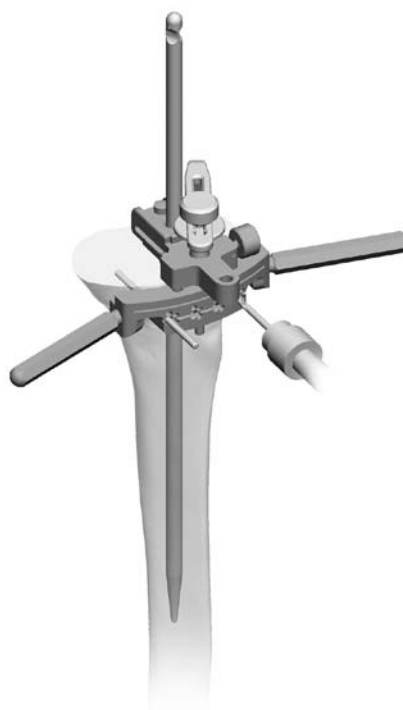


Fig. 109

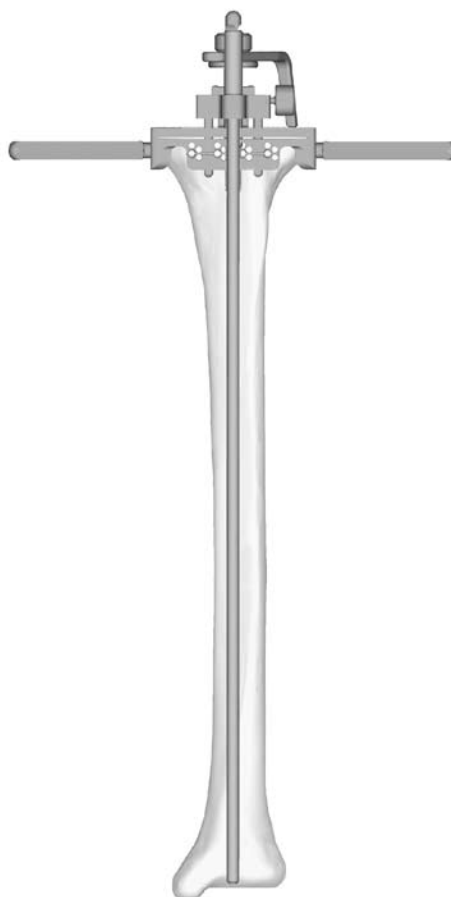


Fig. 110

Cut the proximal tibia with the appropriate saw blade for the saw guide (Fig. 111).

Note: Saw blades especially designed for this system are recommended. The blades are 25mm (1") wide by 90mm (3.5") long with a shank thickness of 1.5mm (0.058") and will best match the saw guide.

Disassemble the jig by removing the stylus and trial stem adapter. A saphammer may be placed under the body of the guide to aid in removal of the trial stem adapter and jig, leaving the saw guide fixed to the anterior face of the tibia.

Proximal Tibial Cone Preparation

Attach the Baseplate Sizing Bushing to the Tibial Baseplate Sizer/Reamer Guide by turning it in the direction of the arrow on the baseplate sizer/reamer guide. Attach the 11mm tibial starter drill to a power tool and place it through the Baseplate Sizing Bushing (Fig. 112). If resistance is encountered, remove the drill and inspect the proximal tibia for cortical thinning or perforation. The correct depth is established when the nose of the power tool touches the top of the baseplate sizing bushing. Remove the bushing by turning it in the opposite direction of the arrow on the Baseplate Sizer/Reamer Guide.



Fig. 111

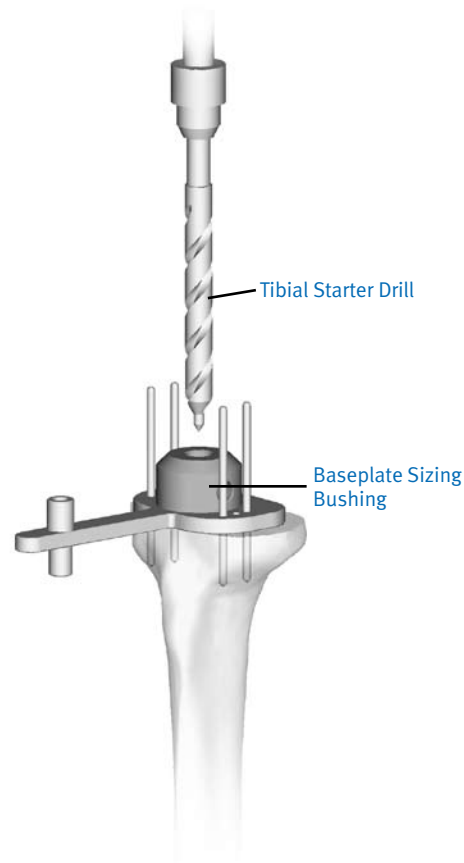


Fig. 112

Assemble the Primary Cone Reamer to the Cone Reamer Guide (Fig. 113). The cone reamer guide assembly is attached to a power tool with a *Zimmer* quick disconnect fitting and then assembled to the Baseplate Sizer/Reamer Guide with a slight turn in the direction of the arrow on the Tibial/Sizing Reamer Guide. The Baseplate Sizer/Reamer Guide must be clear of all bone materials, etc. before the cone reamer guide is assembled.

Ream the tibial cone until the nose of the power tool touches the top of the Cone Reamer Guide (Fig. 114). Remove the reamer guide from the Baseplate Sizer/Reamer Guide by a slight turn in the opposite direction of the arrow on the Tibial/Sizing Reamer Guide.

Note: Care needs to be taken to insure the position of the cone reamer in the proximal tibia. If the cone reamer is angled into the tibia in the A/P or M/L planes, the tibial cone may not fully seat or the tibial cortex may be compromised.

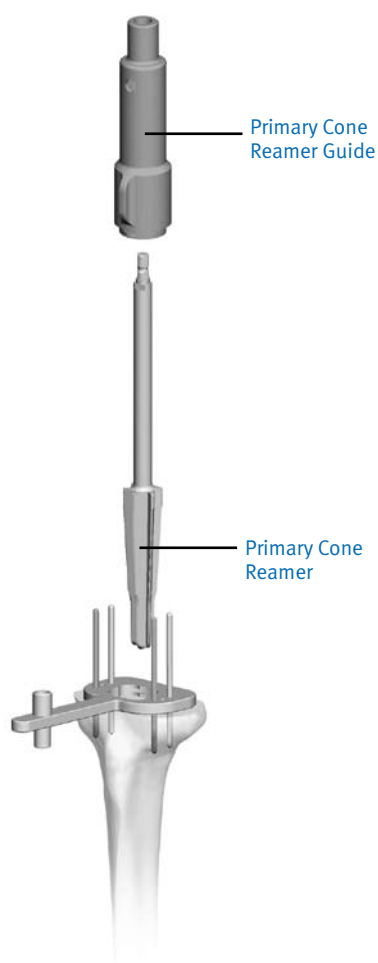


Fig. 113

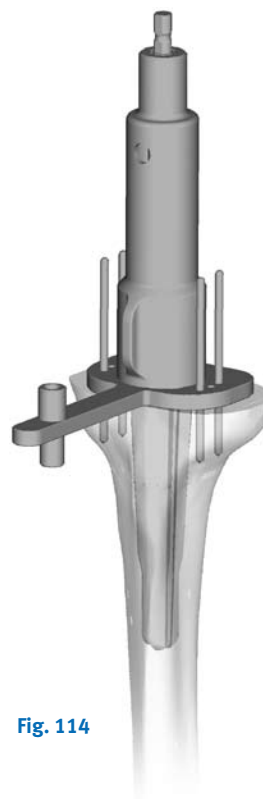


Fig. 114

Tibial Keel Preparation and Tibial Trial Insertion

Once the appropriate size tibia has been selected, the Hinged Tibial Trial and trial stem are assembled and then inserted into the tibia. Rotate the Hinged Tibial Trial to the proper position. The keel broach and modular handle are assembled and inserted into the Hinged Tibial Trial. The modular handle of the keel broach is gently impacted until it is fully seated using a mallet (Fig. 115a). Remove the modular handle from the Hinged Tibial Trial (Fig. 115b). Attention at this point is directed to the femoral preparation.

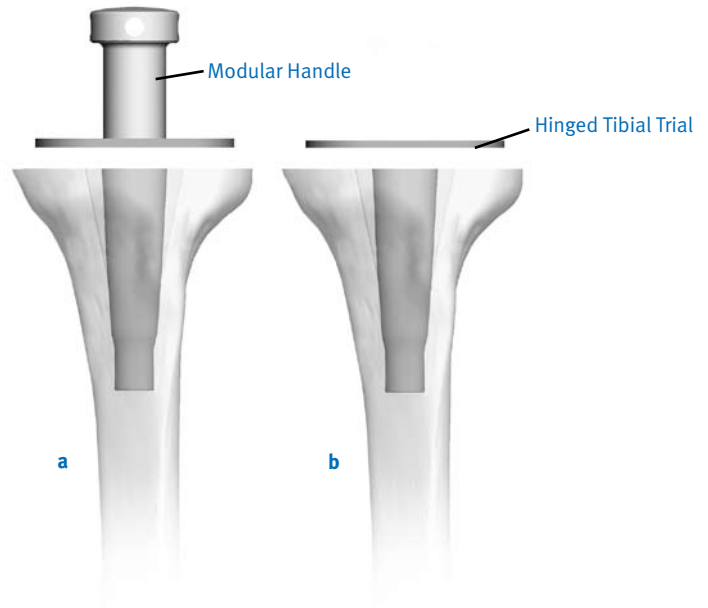


Fig. 115

Appendix C

Intramedullary Tibial Option – Metal-backed tibia with a long stem

Tibial Preparation

Tibial Medullary Canal Preparation

Direct vertical exposure of the tibial plateau is necessary. This is facilitated by soft tissue releases around the tibial metaphysis, medial and lateral soft tissue retraction with the small angled knee retractors and subluxation of the tibia anteriorly with the large angled knee retractor.

The reference hole for the Intramedullary Tibial option should be centered from medial to lateral. Anterior/posterior positioning should fall between the middle and anterior one-third of the tibial plateau (Fig. 116). Placement of the intramedullary guide is accomplished by first drilling a 8mm (5/16") hole in the proximal tibia (Fig. 117).

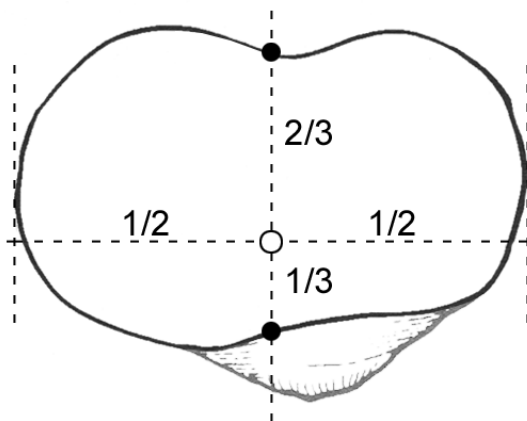


Fig. 116

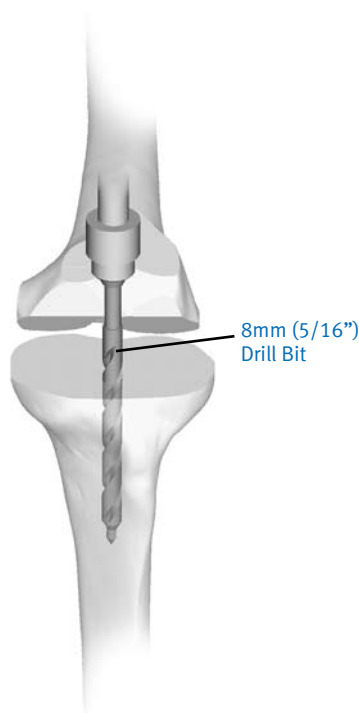


Fig. 117

Table 10 Straight Smooth Stem Options

Size	I/M Length	Total Length	9.5mm	10.5mm	11.5mm	12.5mm	13.5mm	14.5mm	15.5mm	16.5mm	17.5mm	18.5mm
75mm	40mm	122mm		X		X		X		X		X
125mm	90mm	172mm		X		X		X		X		X
190mm	155mm	237mm	X		X		X		X		X	

Table 11 Straight Fluted Stem Options

Size	I/M Length	Total Length	10.5mm	11.5mm	12.5mm	13.5mm	14.5mm	16.5mm	18.5mm	20.5mm	22.5mm
175mm	140mm	222mm			X		X	X	X	X	X
190mm	155mm	237mm	X	X	X	X	X	X	X		

Intramedullary Tibial only - Reference Hole While Using a Tibial Intramedullary Stem

Incrementally ream the tibial canal starting with the 9.5mm femoral/tibial reamers using a T-handle with *Zimmer* adapter (Fig. 118 on the next page). The depth of the hole is based on the straight stem selected. The depth marking on the reamer includes the amount of bone being resected. The markings on the reamers designate the type of implant being used and the stem length.

The following are the acronyms used on the reamers.

HF = Hinged Femur

DF = Distal Femur

HT = Hinged Tibia

PT = Proximal Tibia

The 75mm, 125mm, 175mm and 190mm straight stems are used on the system. The length marking on the implant label designates the over all composite length of the stems from the proximal tibial cut.

The hinged tibial baseplate has a cone length of 82mm. The stem options recommended are a plug, a 75mm, 125mm smooth, or the 190mm smooth or fluted stems that are shown on Tables 10 and 11.

The reamers are marked as shown below.

HF BOSS (Only on the 16.5mm reamer to prepare for the Hinged Femur Boss)

75HF

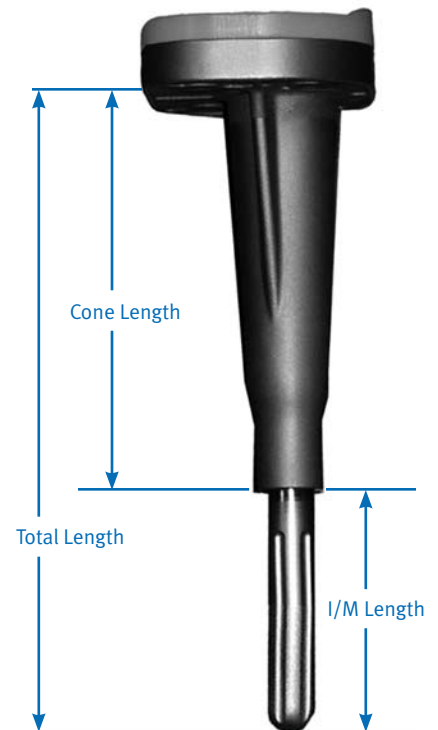
75HT/125HF

DF/PT

125HT/175HF

190HF

The combined markings on the reamers indicate that different overall lengths are equal if used with another component (ex. 75HT/125HF, hinged tibia with a 75mm stem = hinged femur with 125mm stem).



The appropriate trial stem is attached to the Trial Stem Adapter. With the handle in the “Open” position, the 8mm adapter can be locked into place by clicking the handle manually to the “Locked” position and the assembly is inserted into the tibial canal (Fig. 119). The quick disconnect handle is removed.

Tibial Alignment and Proximal Tibial Cuts

Connect the fixed zero degree Intramedullary Alignment Guide to the Slotted Tibial Cut Guide with a 10mm single ended stylus. The zero degree guide is then placed onto the 8mm (5/16”) Trial Stem Adapter located in the tibial canal. If no bone is present on which to rest the 10mm stylus, the thumbscrew located on the fixed zero degree Intramedullary Alignment Guide is used to secure the stylus tip by touching the least involved portion of the tibial plateau.

Rotational Alignment

Rotation is selected based on any remaining landmarks. The most reliable landmark will be the tibial tubercle. For proper internal/external rotation, the center of the saw block should be positioned directly over the medial one-third of the tibial tubercle (not medial to the tubercle). Extramedullary confirmation of the internal/external rotation can also be achieved by using an alignment rod placed through the outer hole of the alignment guide. This external guide rod should align with the tibial tubercle or at the ankle over the anterior tibialis tendon (Fig. 120).

Ideally, both references should be used. Rotation is then locked in place by impacting the set pin with a mallet.

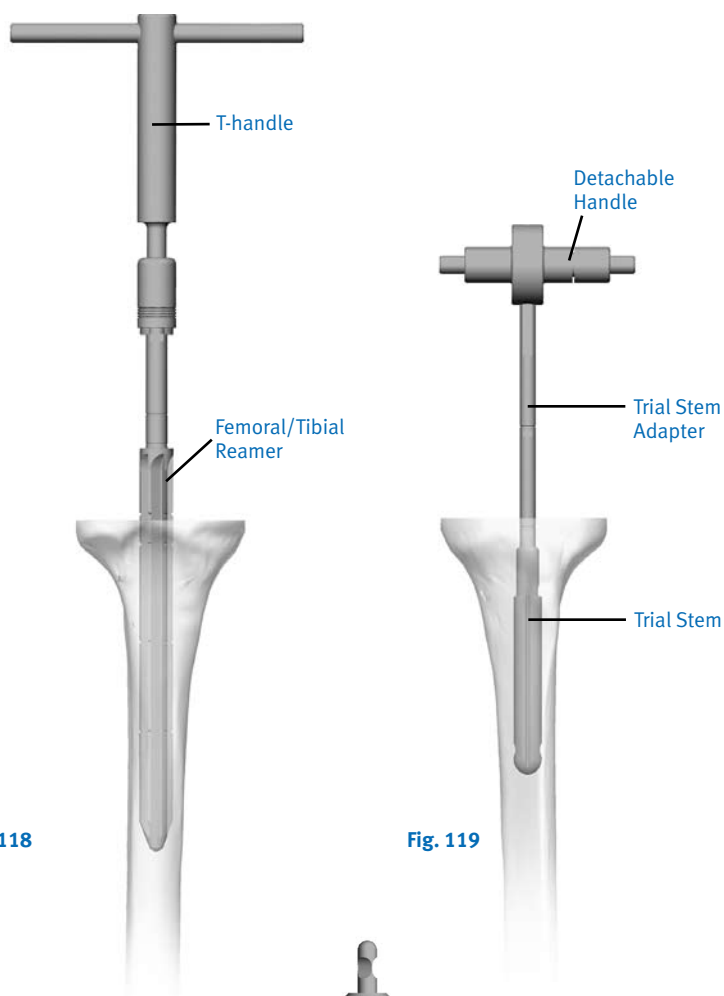


Fig. 118

Fig. 119

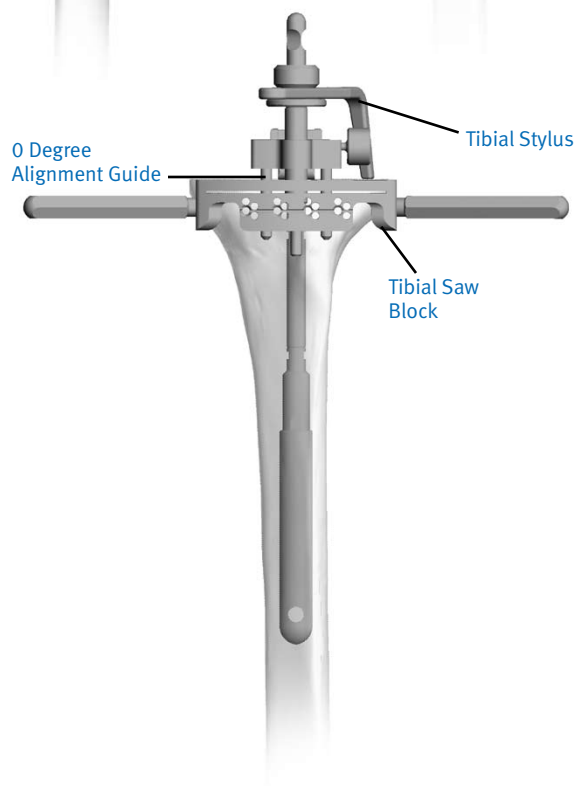


Fig. 120

Zero Degree Tibial Slope

A zero degree tibial cut is recommended to accommodate the cone of the Hinged Tibial Baseplate into the tibia. The instruments are preset to provide a zero degree tibial cut.

Level of Resection

The 10mm tibial stylus is used to determine the tibial saw guide position for minimal resection of the proximal tibia. The stylus will position the tibial saw guide 10mm below the point of reference. The tip of the stylus is placed on the lower side.

Note: A 10mm resection will raise the joint line approximately 5mm. There is a 15mm tibial stylus in the system that may be used to obtain a 15mm tibial resection.

Stabilize the cutting guide by drilling and pinning through the two outer most holes on the “DRILL ON LINE” (Fig. 121). This allows for 2mm adjustment proximally and 4mm distally. The lateral drill point is first placed after retracting the patellar tendon, followed by the medial drill point. If the medial drill point appears to “walk,” this can be easily avoided by marking the entry point through the block, then drilling outside the block to pierce the cortex. Redrill the hole through the block.

To recheck alignment, place the alignment rod on the zero degree Tibial Alignment Guide to confirm the correct rotational position. The rod should pass through the center to no more than a few millimeters lateral to the center of the ankle (Fig. 122). Remove the Tibial Alignment Guide, alignment rod, trial stem and trial stem adapter from the tibial canal.

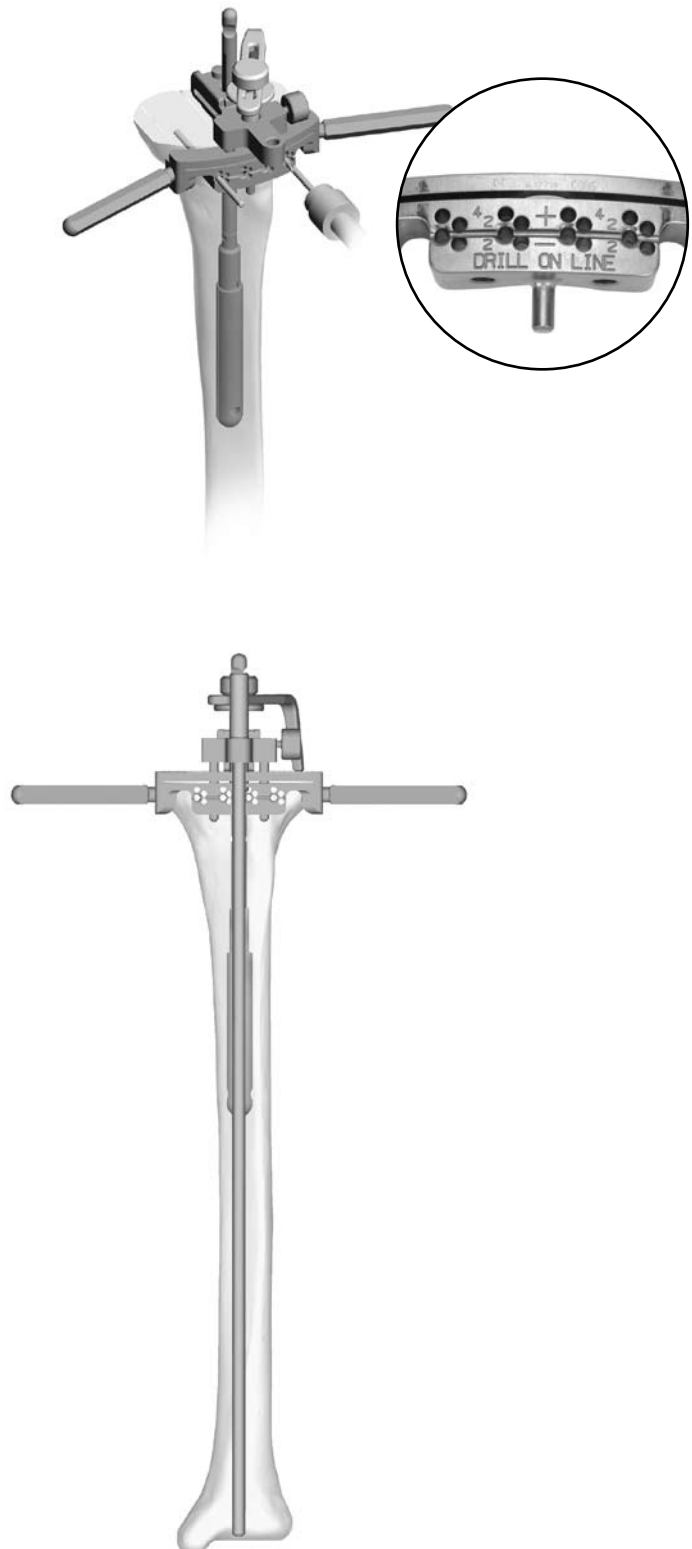


Fig. 121

Fig. 122

Cutting the Proximal Tibia

A Miller guide (angel wing) can be placed on the tibial saw guide along the medial and lateral edge of the tibia to confirm the level of desired tibial resection. Place the saw capture on the tibial saw guide. If it appears that an inadequate resection will occur, adjust the tibial saw guide in 2mm increments to a lower level. Angled retractors are used to protect soft tissue and ligaments. Cut the proximal tibia with the appropriate saw blade for the saw capture (Fig. 123).

Note: Saw blades especially designed for this system are recommended. The blades are 25mm (1") wide by 90mm (3.5") long with a shank thickness of 0.058" and will best match the saw guide.

Disassemble the jig by removing the stylus and Trial Stem Adapter. A slaphammer may be placed under the body of the guide to aid in removal of the Trial Stem Adapter and jig, leaving the saw guide fixed to the anterior face of the tibia.

Tibial Cone Preparation (Intramedullary Tibial Option with a long stem only)

To prepare the tibial cone, attach the appropriate trial stem to the revision cone reamer. The reaming is done with a power reamer or with the reamer attached to the T-handle via a *Zimmer* fitting (Fig. 124). Ream until the end of the reamer is just above the tibial plateau.



Fig. 123

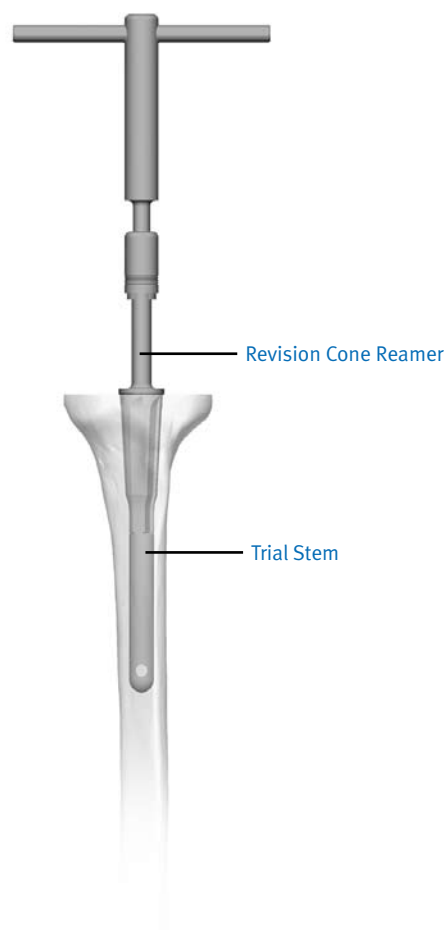


Fig. 124

Proximal Tibia Sizing and Drilling

Select the appropriate size tibial profile by using the Tibial Baseplate Sizer/Reamer Guide and Baseplate Sizing Bushing. Place the assembly over the Revision Cone Reamer and trial stem assembly that are still in the tibia (Fig. 125).

The tibial profile dimensions correspond to the following A/P and M/L dimensions.

Tibial Size	A/P	M/L
1	46mm	65mm
2	48mm	71mm
3	51mm	77mm
4	54mm	83mm

Tibial Keel Preparation and Tibial Trial Insertion

Once the appropriate size tibia has been selected, the Hinged Tibial Trial and trial stem are assembled and then inserted into the tibia. Rotate the Hinged Tibial Trial to the proper position. The keel broach and modular handle are assembled and inserted into the Hinged Tibial Trial. The modular handle of the keel broach is gently impacted until it is fully seated (Fig. 126). Remove the modular handle from the Hinged Tibial Trial (Fig. 127). For hinge selection and trial assembly, please refer to page 13.

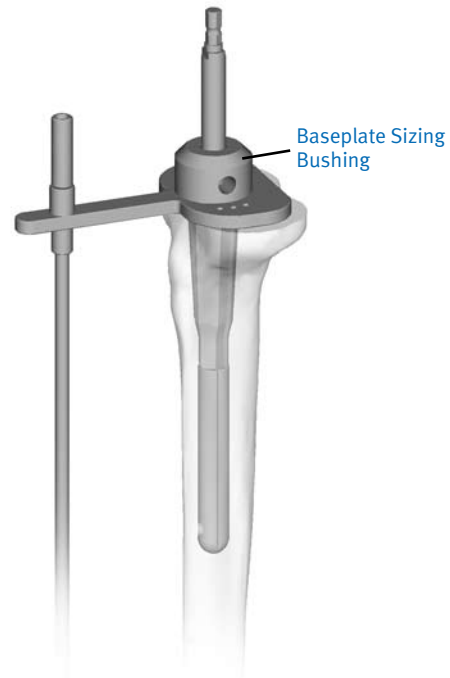


Fig. 125

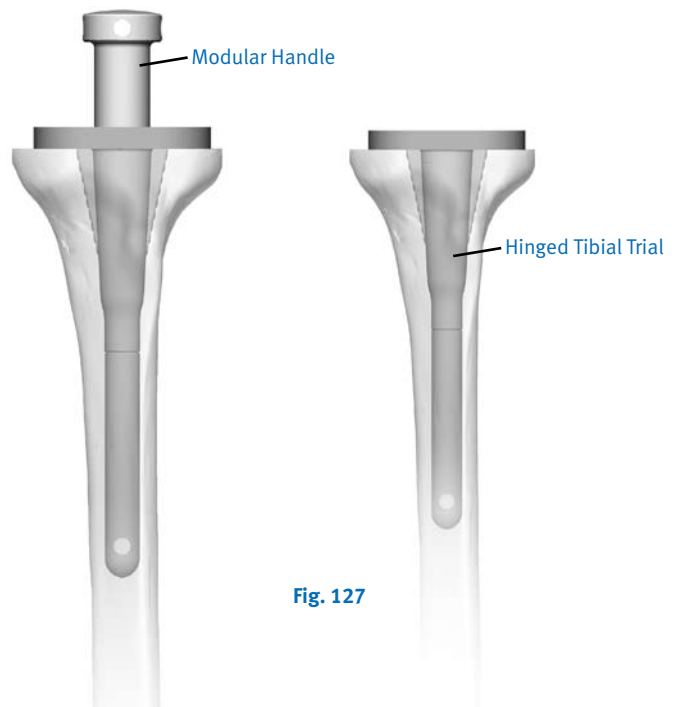


Fig. 126

Fig. 127

Appendix D

Patellar Preparation

Stabilize the patella with two towel clips or a rake retractor to keep the patella everted. Incise soft tissue around the patella down to the insertion of the quadriceps and the patellar tendons. Use the patella caliper to measure the existing patellar thickness (Fig. 128). This measurement is compared to the preoperatively determined patellar thickness that usually ranges between 20mm and 26mm.

Calculate the amount of additional bone resection required to reproduce the normal patella height using the following as a reference. Any *MOST* Options System patella can be used on any size femoral component.

Size	Dimensions	Thickness
Small	29mm x 32mm	7.55mm
Medium	32mm x 35mm	8mm
Large	35mm x 38mm	10mm

Select the patella size using the patella-sizing template (Fig. 129). Apply the patella osteotomy guide to the patella parallel to the dorsal surface with the stylus set to the desired additional bone resection.

Cut the patella with the oscillating saw (Fig. 130).

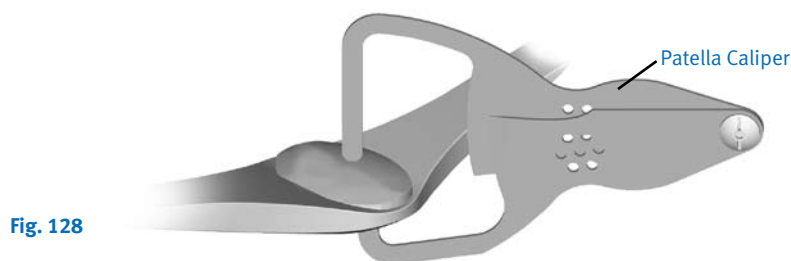


Fig. 128

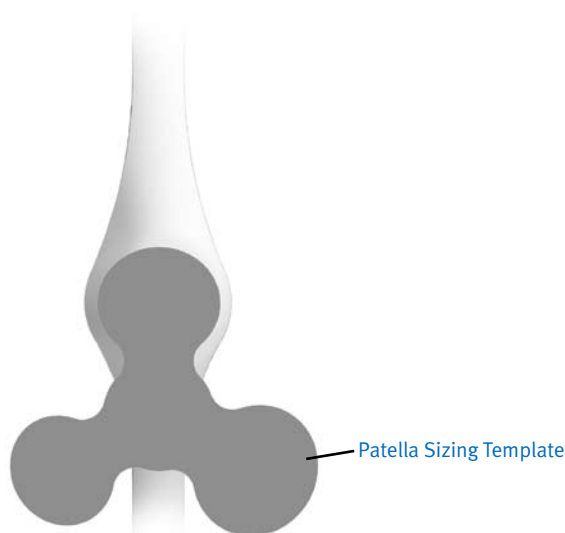


Fig. 129

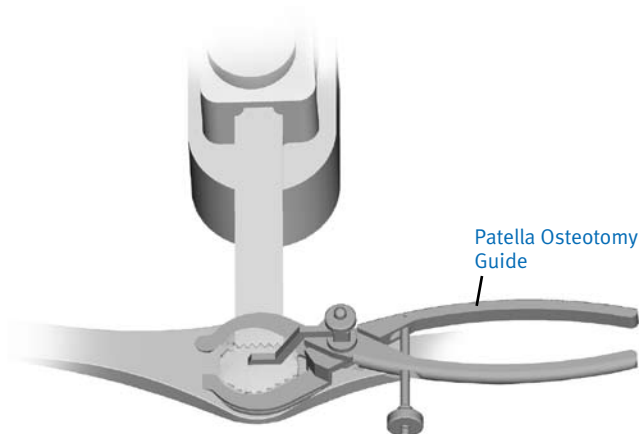


Fig. 130

Apply the patella bushing toward the medial side of the resected patellar bone (Fig. 131). The reamer is used if additional bone resection or countersinking is desired (Fig. 132).

Insert the Patella Drill Guide and drill the three holes drilled for the pegs with the Patella Stop Drill Bit (Fig. 133).

The trial patellar component is inserted and overall patellar thickness is confirmed (Fig. 134). Patellar tracking can be checked, but additional soft tissue releases to improve patellar tracking should be delayed until after the tourniquet is deflated.

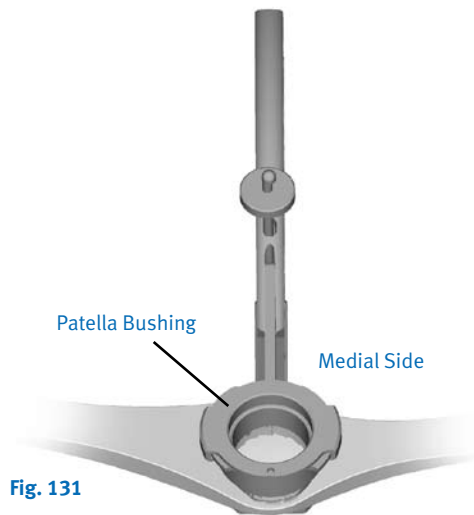


Fig. 131

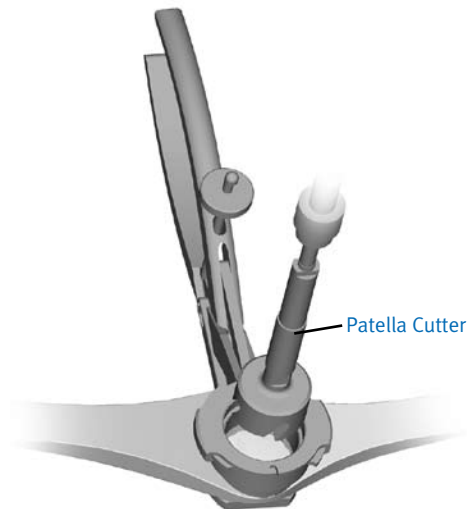


Fig. 132

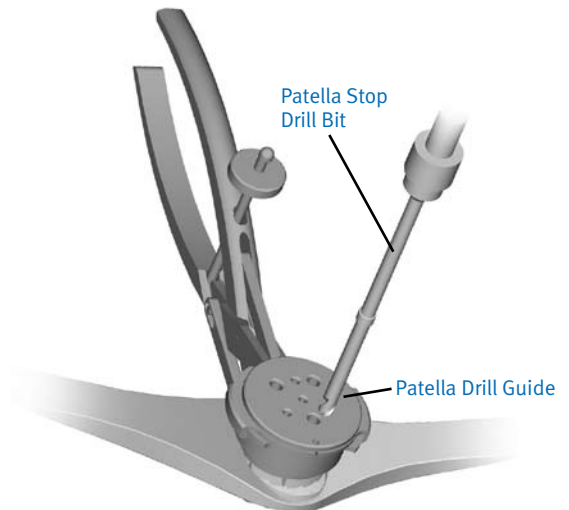


Fig. 133



Fig. 134

Appendix E

Hinged Tibia Augment Preparation

Tibial Spacer Cuts

Note: It is recommended that a trial reduction be performed PRIOR to preparation for tibial spacers. It is critical to remember that this cut will determine the final rotational position of the tibial implant.

Attach the Tibial Spacer Cut Block to the sagittal cut block using the thumbscrew on the Tibial Spacer Cut Block. With the stem trial and the 8mm trial stem adapter in the tibial canal, slide the sagittal cut block over the 8mm trial stem adapter and position it on the proximal tibial surface and against the anterior cortex.

For proper internal/external rotation of the Tibial Spacer Cut Block, position the center of the block directly over the medial one-third of the tibial tubercle (not medial to the tubercle).

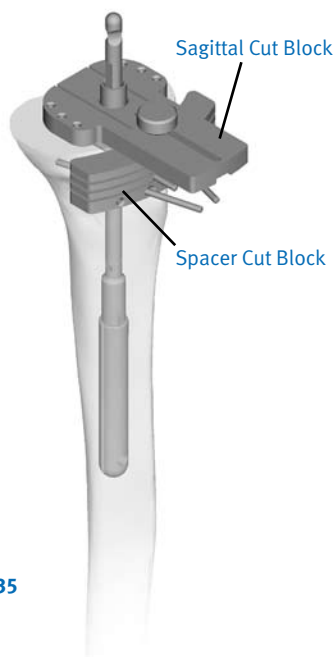


Fig. 135

With the Tibial Spacer Cut Block positioned against the anterior cortex, drill and pin the block using the two holes in the middle and two of the oblique holes located at the bottom of the block. Pins can also be used to secure the Tibial Spacer Sagittal Cut Block.

When the cutting block has been secured, medial or lateral spacer cuts are made through the 6mm or 11mm slots (Fig. 135). The initial cut is made horizontally, anterior to posterior. A notch osteotome should be placed through the spacer cut block to protect the sagittal cut from going too deep into the tibia (Fig. 136). When both cuts are complete, remove the pins and unthread the block. Remove the trial stem adapter and the trial stem using the quick disconnect handle.

If tibial spacers are used, they can be assembled onto the underside of the tibial baseplate with the use of two screws packaged with each spacer (Fig. 137).

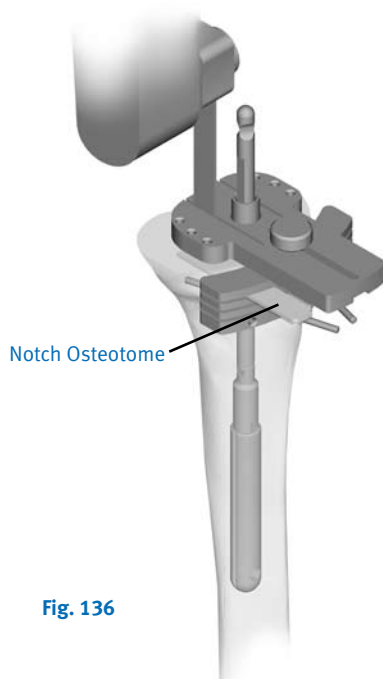


Fig. 136

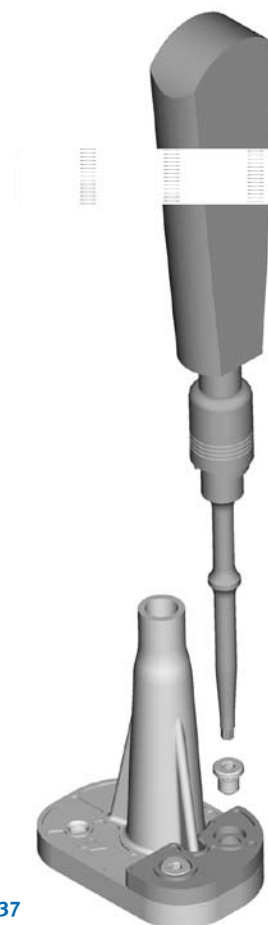


Fig. 137

Appendix F

Hinged Femur Augment Preparation

Distal Femoral Spacer Cuts

If additional bone resection is needed, as determined from pre-operative templating, the saw block can be moved proximally on the fixed pins in 2mm increments to position a slot at the desired level. If there is asymmetrical bone loss, medial or lateral distal femoral spacer cuts can be made through the slots marked 5mm or 10mm (Fig. 138).

If the femur has been prepared for distal femoral spacers, the 5mm and 10mm spacer trials can be attached to the A/P cutting block (Fig. 139). This will help to ensure instrument stability by providing total contact between the A/P cutting block and the distal femoral bone surface.

If femoral spacers are used, attach them with the screw included using the hex bit and handle (Fig. 140).

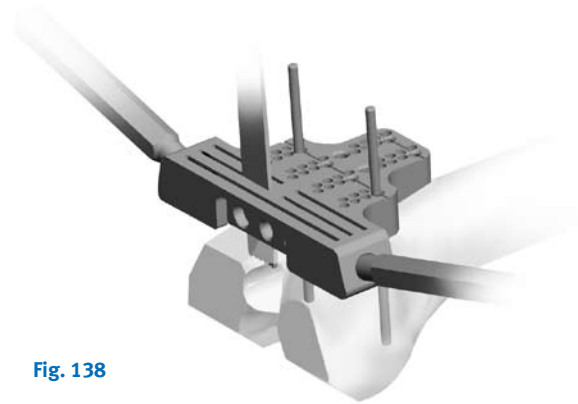


Fig. 138

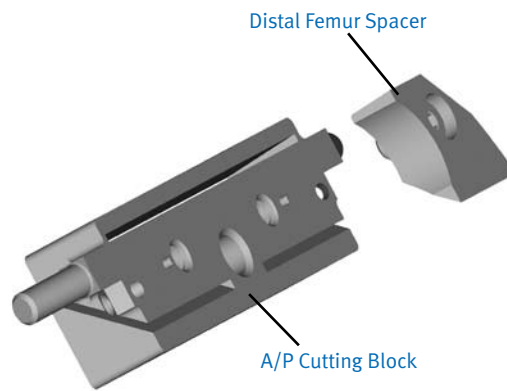


Fig. 139



Fig. 140

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