Surgical Technique

smith&nephew

GENESIS® II

Total Knee System

Distal Cut First Surgical Technique



Introduction

The GENESIS® II Total Knee System has been designed to offer the orthopaedic surgeon solutions to address intraoperative situations. Implant function is directly related to accurate surgical technique. GENESIS II instrumentation has been developed to be an easy-to-use system that will assist the surgeon in obtaining accurate and reproducible knee alignment.

The instrumentation can be used in minimally invasive or standard exposures. While it has been the designers' objective to develop accurate, easy-to-use instrumentation, each surgeon must evaluate the appropriateness of the following technique based on his or her medical training, experience and patient evaluation.

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Nota Bene:
The technique description herein is made available to the healthcare professional to illustrate the authors' suggested treatment for the uncomplicated procedure. In the final analysis, the preferred treatment is that which addresses the needs of the patient.

Distal Cut First Short Technique

Femoral Preparation



Use the 9.5mm drill to open up the femoral canal and slide the valgus alignment assembly until at least one side contacts the distal femur.



After the assembly is placed in neutral rotation, impact the floating spikes into the distal femur and secure the distal block with pins.



Remove the IM rod, unlock the lever on the valgus alignment guide and remove the valgus alignment assembly using the universal extractor.



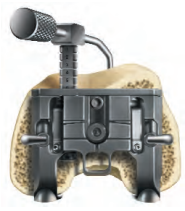
Resect the distal femur.



Position the sizing guide flush against the distal femur, while ensuring that the posterior paddles are contacting the underside of both posterior condyles.



To **posterior reference**, drill and insert two pins through the holes of the sizing guide to secure the guide and prepare holes for the A-P cutting block.



Position the sizing guide stylus so that it contacts the lateral ridge of the anterior cortex and determine the size from the graduations on the shaft of the stylus. If the femur is in-between sizes, choose the larger size.



To **anterior reference**, position the sizing guide stylus so that it contacts the lateral ridge of the anterior cortex and determine the size from the graduations on the shaft of the stylus.



If the indicated size is in-between sizes, turn the lower hex screw to raise the anterior surface to the next smaller size. Once the appropriate size is selected, turn the upper hex screw to lock in position. Drill to mark the location holes for the A-P cutting block.



Place the correctly sized A-P cutting block on the distal femur and make anterior, posterior and chamfer cuts.

Tibial Preparation



Extramedullary tibial alignment: Assemble extramedullary tibial guide with the non-spiked (shown) or spiked rod and place on tibia. Align guide over medial third of the tibial tubercle and parallel to the tibia.



Intramedullary tibial alignment: Place the intramedullary alignment assembly on the tibia. The alignment rod should align with the medial third of the tibial tubercle. Impact assembly.



Attach the tibial stylus to the tibial cutting block and lower the cutting block until the stylus touches the low point on the least affected side of the tibia. Once the resection level is determined, insert pins to secure and remove alignment assembly.



Resect the proximal tibia.



Size the tibia.

Posterior-Stabilized



Attach the P-S collet to the P-S housing block by tightening the gold thumb screw, then pin to the distal femur.



Ream through the collet until the depth stop contacts the collet and then move reamer anterior and posterior until it contacts the depth stops.



Impact the housing box chisel anteriorly and posteriorly through the housing resection collet to square the corners of the housing.

Final Preparation



Prepare the patella using surgeon's preferred technique.



After trial ROM and alignment checks, select the appropriate trial fin punch and punch through the trial.



Seat the tibial implant with the tibial impactor.



Place the femoral implant on the femur and use the femoral impactor to fully seat the implant.



Place the patellar implant onto the patella and clamp onto the bone to pressurize.



Attach the articular inserter/extractor to the tibial tray (for standard inserts). Lift inserter superiorly until the anterior lip of the insert is fully seated.

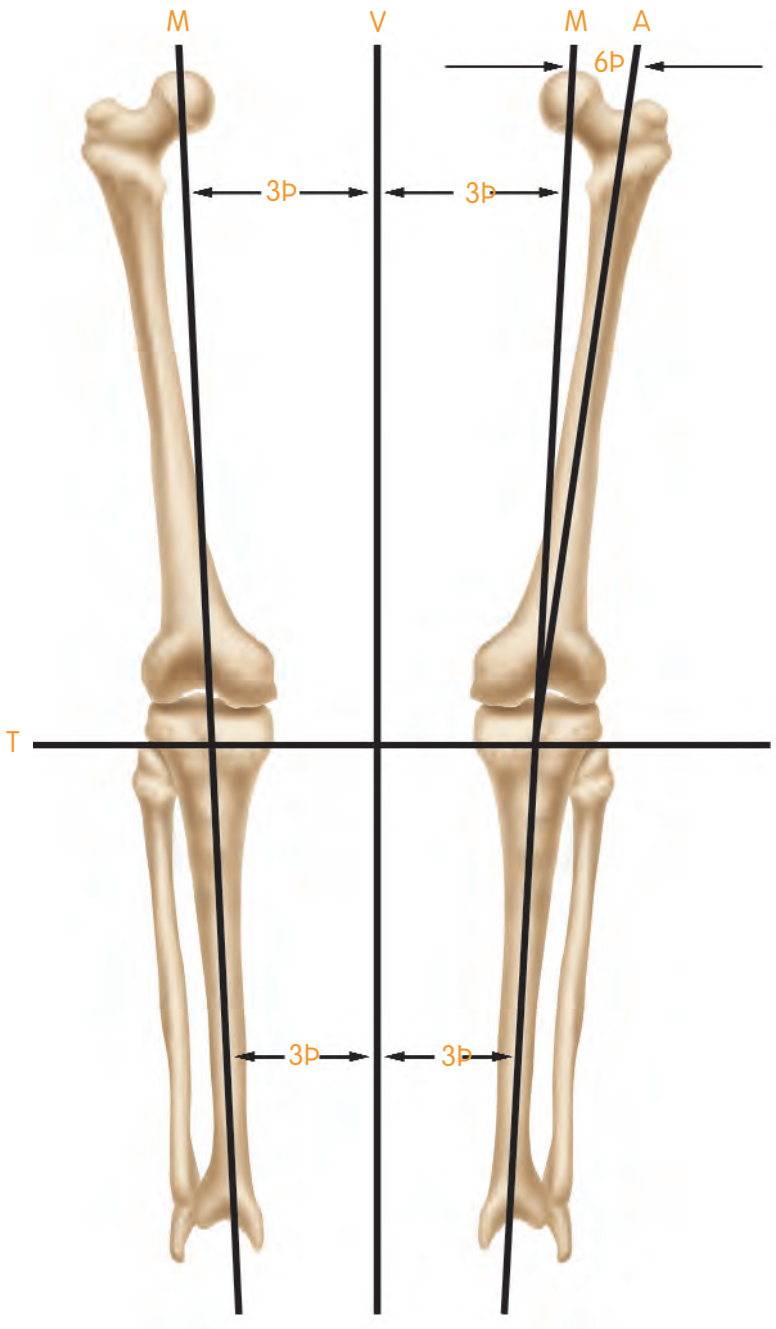
Preop Planning

Determine the angle between the anatomical and the mechanical axes. This measurement will be used intraoperatively to select the appropriate valgus angle so that correct limb alignment is restored. (*Beware of misleading angles in knees with a flexion contracture or rotated lower extremities.*) The T-template provided as part of the GENESIS® II templates will help in this determination.

Tip: Many surgeons prefer to simply select a standard angle for the distal femoral cut (i.e., 5°, 6° or 7°) based on the patient and surgical experience.

Recommended Sawblades*	
Cat. No.	**Description**
7151-2901	Stryker 2000 (Fanned)
7151-2905	Stryker 2000 (Straight)
7151-2911	Hall Powerpro (Fanned)
7151-2904	3M (Fanned)
Or any 0.053" or 1.35mm thickness sawblade	

*For MIS-style blocks only.



M = Mechanical Axis
A = Anatomical Axis
T = Transverse Axis
V = Vertical Axis

Femoral Preparation

Intramedullary Femoral Alignment

1. Open the femoral canal with a 9.5mm intramedullary drill *(Figure 1)*.

Instrument Assembly:

a. Attach the selected valgus angle bushing (5°, 6° or 7°) to the valgus alignment guide. Check the bushing position to make sure that "left" is facing anteriorly when operating on a left knee and "right" is facing anteriorly when operating on a right knee.

b. Attach a modular T-handle to the IM rod and insert through the alignment assembly *(Figure 2)*.

c. Assemble the distal femoral cutting block onto the valgus alignment guide. Positioning the block at the "primary" resection level will ensure the cut will equal the distal thickness of the femoral prosthesis. Lock by pressing the lever in a horizontal position toward the medial side.

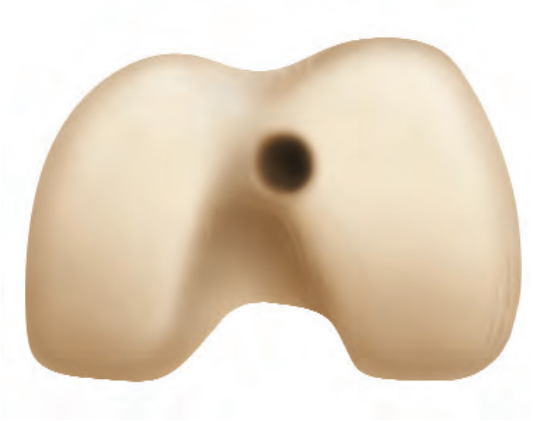


Figure 1

Tip: If desired, the distal femoral cutting block may be set to resect an additional +2, +5 or +7mm of bone.

2. Slide the intramedullary rod of the assembly into the femoral canal until the alignment guide contacts the distal femur *(Figure 3)*.

Tip: There may be times when only one side of the guide will touch bone.

3. Orient rotation of the assembly neutral to the posterior condyles *(Figure 4)* and impact one or both of the floating spikes into the distal femur.



Figure 2

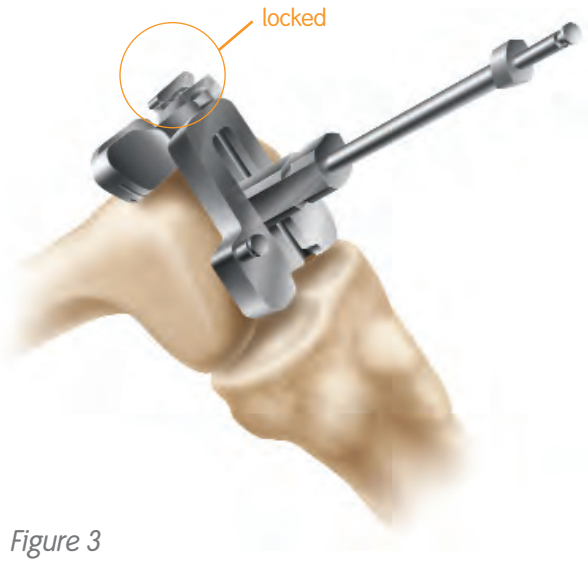


Figure 3

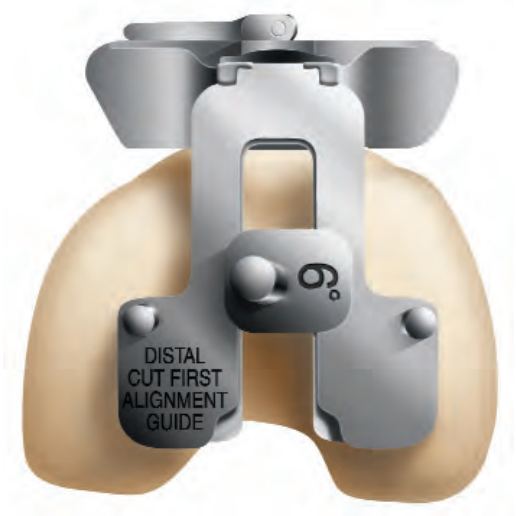


Figure 4

Femoral Preparation

Distal Femoral Resection

1. Using non-headed pins, pin the distal femoral cutting block to the anterior femur using the holes marked "0." Once adequate distal femoral resection is noted, an additional headed or non-headed pin should be placed obliquely to provide additional stability *(Figure 5)*.
2. Unlock the lever on the valgus alignment guide, remove the intramedullary rod and the valgus alignment assembly using the universal extractor *(Figure 6)*. Only the distal femoral cutting block should remain on the femur.
3. Resect the distal femur *(Figure 7)*, then remove the distal femoral cutting block.

Tip: If the distal femoral resection is not adequate, remove the oblique headed pin, and reposition the block through the pin holes marked +2, +4, or +6mm for the desired level of resection.

See the sawblade chart on page 6 for sawblades that work with GENESIS® II MIS cutting block tolerances.

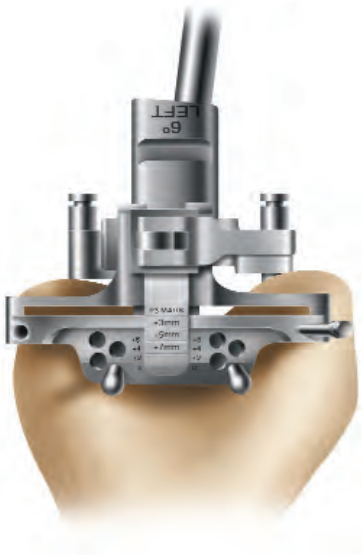


Figure 5

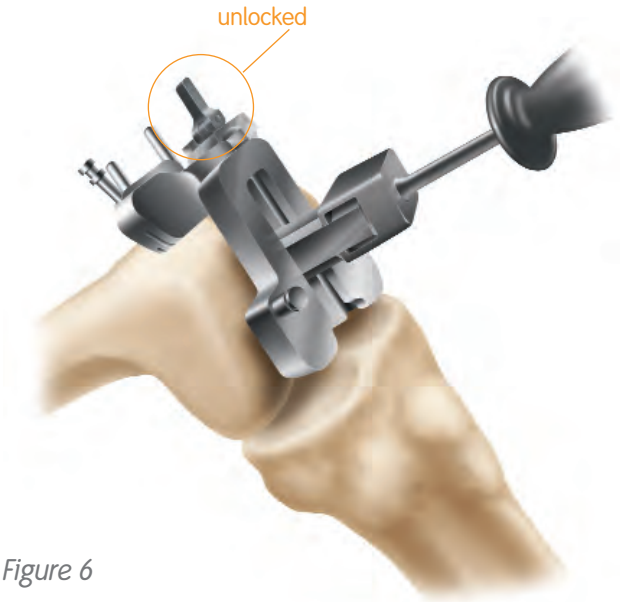


Figure 6



Figure 7

Femoral Sizing Guide Preparation

The sizing guide has drill holes that locate the A-P block *(Figure 8)*. To properly position the guide, adjustable shims (1-5mm) may be attached to the posterior paddles of the sizing guide in the event rotational alignment is not appropriate due to deficient posterior condyles *(Figure 9)*. Rotational alignment may also be checked by ensuring that the angled lines on the face of the guide are parallel with the epicondylar axis.

A unique feature of the sizing guide for this system is that it may be used in a traditional posterior referencing or anterior referencing manner. With posterior referencing, the larger size is usually chosen, which has the advantage of balancing the flexion and extension spaces. Possible disadvantages to posterior referencing may include either notching the anterior cortex or overstuffing of the patellofemoral joint. With anterior referencing, the smaller size is usually chosen, which reapproximates the patellofemoral joint and reduces the chance of notching but may leave the knee loose in flexion. For a full discussion on anterior and posterior referencing, please see Appendix C.

Surgeons wishing to use the sizing guide in a posterior referencing manner should turn to page 11.

Sizing Guide Procedure: Anterior Referencing

To use the sizing guide in this manner, femoral size is read from the graduations on the stylus arm relative to the anterior surface.

If the anterior surface of the guide is in-between two sizes when it is in the lowest position, the lower hex screw mechanism can be rotated to shift both the anterior surface and the drill holes up to the next smaller size on the stylus *(Figures 10a and 10b)*. As a result, the anterior surface and associated drill holes are shifted anteriorly to align with the next smaller implant size.

Tip: The gap between the anterior surface and the stylus graduation line indicating the smaller size is how much additional bone will be removed from the posterior condyles by choosing the smaller size (Figure 10c).

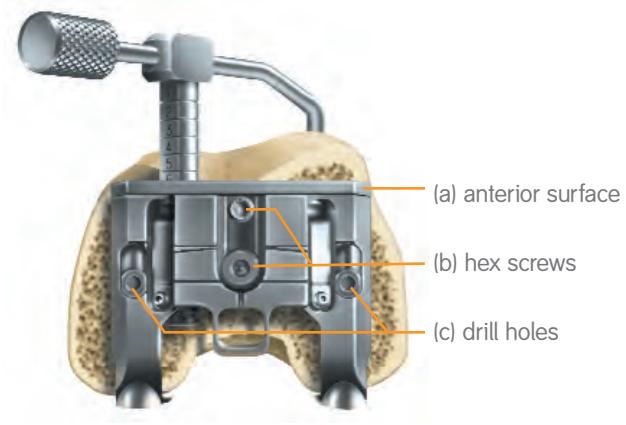


Figure 8



Figure 9

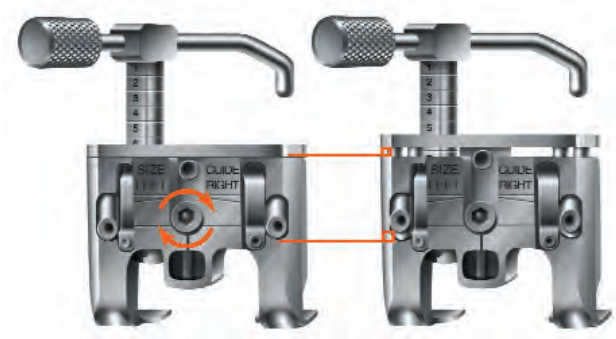


Figure 10a *Figure 10b*

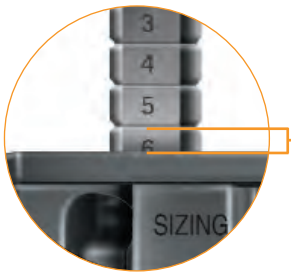


Figure 10c

Femoral Preparation

Sizing Guide Procedure: Anterior Referencing

1. Place the sizing guide flush against the distal femur, while ensuring the posterior paddles contact the underside of both posterior condyles. Ensure that the anterior portion of the sizing guide is in the lowest level position.

   Tip: It is not necessary that the guide be centered on the femur, as long as the paddles adequately reference both posterior condyles.

2. Position the sizing guide stylus so that it contacts the lateral ridge of the anterior femoral cortex where the anterior flange will end *(Figure 11)*.

   Tip: There should only be about 1/2" to 3/4" between the edge of the stylus and edge of knob.

3. Determine the size of the component from the graduations on the shaft of the stylus *(Figure 12)*.

4. If in-between sizes, turn the lower hex screw to raise the anterior surface to the next smaller size *(Figure 13)*. Once the appropriate size is selected, turn the upper hex screw to lock the anterior surface and drill holes in position.

5. Drill the holes to mark the location holes for the A-P cutting block and then remove the sizing guide.

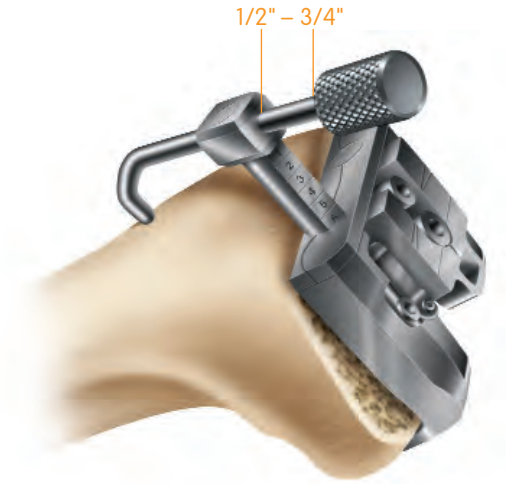


Figure 11



Figure 12

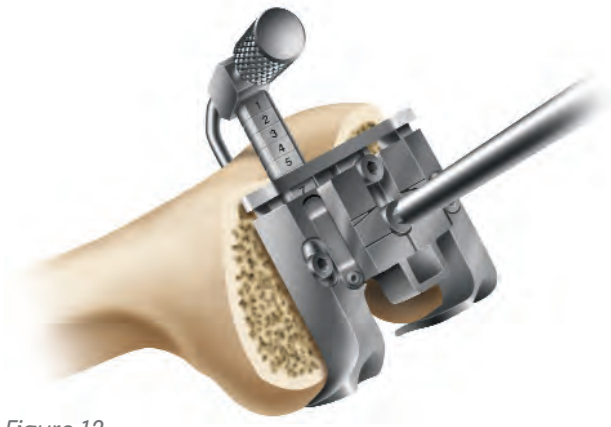


Figure 13

Sizing Guide Procedure: Posterior Referencing

To use the sizing guide in this manner, the femoral size is read from the graduations on the stylus arm relative to the anterior surface. If the anterior surface is positioned between sizes on the stylus shaft, the larger of the two sizes should be chosen.

1. Place the sizing guide flush against the distal femur, while ensuring the posterior paddles contact the underside of both posterior condyles *(Figure 14)*. Ensure that the anterior portion of the sizing guide is in the lowest level position.

   Tip: It is not necessary that the guide be centered on the femur, as long as the paddles adequately reference both posterior condyles.

2. Drill and insert two pins through the holes of the sizing guide to secure the guide and prepare holes for the A-P cutting block *(Figure 15)*.

3. Insert the sizing guide stylus into the top of the sizing guide and position the stylus so that it contacts the lateral ridge of the anterior femoral cortex *(Figure 16)*.

   Tip: There should only be about 1/2" to 3/4" between the edge of the stylus and edge of knob.

4. Determine the size of the component from the gradations on the shaft of the stylus, choosing the larger size if in-between sizes.

5. Remove the pins and the sizing guide.



Figure 14



Figure 15

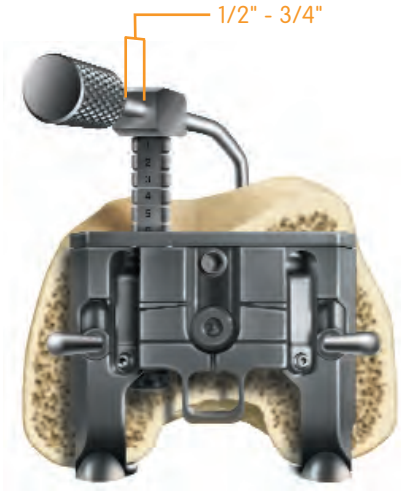


Figure 16

Femoral Preparation

A-P Femoral Resection

1. Position the fixed spikes on the A-P cutting block into the predrilled holes.

   Tip: It is not necessary that the block be centered M-L on the distal femur.

2. Ensure that the cutting block is flush with the resected distal femur. Several holes in the A-P block allow fixation of the block. Place one pin centrally through the middle holes below the quick-connect attachment. For additional stability, a smooth headed pin may be placed through the holes on the medial or lateral side of the block *(Figure 17)*.

3. Complete the anterior, posterior and chamfer cuts *(Figures 18-21)*. The block is designed to allow for angling of the sawblade during the cuts.

   Tip: To maintain block stability, the anterior chamfer cut should be completed last.

   Tip: Some surgeons prefer to make the chamfer cuts after assuring that the flexion and extension spaces are equal. If desired, chamfer cuts may be made through the posterior stabilized femoral housing block or through dedicated chamfer cutting blocks.

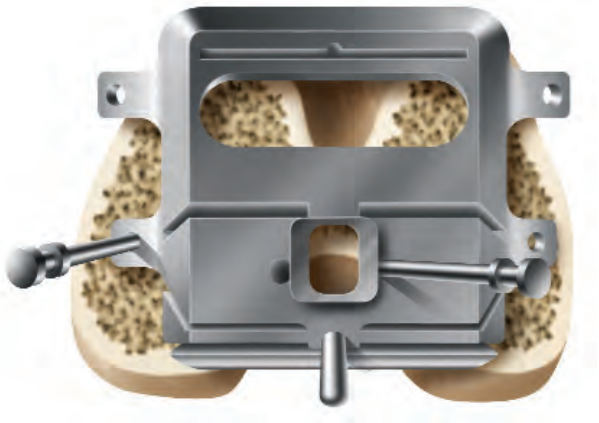


Figure 17



Figure 18



Figure 19



Figure 20



Figure 21

Femoral Preparation

Downsizing the Femoral Component

1. Attach the downsizing drill guide to the cut femur, placing the spikes on the back of the plate into the same location holes used for the A-P cutting blocks *(Figure 22)*.
2. Drill new location holes through the block (shifted 2mm anterior).
3. Place the smaller A-P cutting block into the new location holes. Redo the posterior, anterior and chamfer cuts.

Tip: It is useful to mark the original pin track holes with methylene blue in order to properly identify the new holes.



Figure 22

Tibial Preparation

The system allows the surgeon to perform either extramedullary or intramedullary tibial alignment. For intramedullary tibial alignment, turn to page 19.

When using the extramedullary tibial alignment, the surgeon may use a non-spiked or spiked fixation rod. For tibial preparation using the extramedullary guide with a non-spiked fixation rod see below. For tibial preparation using the extramedullary guide with a spiked rod, turn to page 17.

Extramedullary Tibial Alignment

Instrument Assembly:

a. Insert the ankle clamp into the distal end of the alignment tube and thread the locking pin into the ankle clamp *(Figure 23)*.
b. After the ankle clamp is moved into the proper position, lock into place with the gold knob.
c. Choose the correct left or right tibial cutting block. Select the spiked or non-spiked fixation rod.



Figure 23

Non-spiked Fixation Rod

Instrument Assembly:

a. Place the appropriate left or right tibial cutting block on top of the disc on the non-spiked fixation rod *(Figure 24)*. Tighten the central knob to lock the block into position.
b. Introduce the rod into the Extramedullary Assembly and adjust and lock the cam in the assembly.

1. Place the arms of the extramedullary alignment clamp around the ankle, and adjust the distal M-L slide directly over the middle of the tibiotalar joint, which is also approximated by the second ray of the foot proximal to the malleoli *(Figure 25)*. The cutting block on the proximal end of the assembly should be proximal to the tibial tubercle *(Figure 26)*.

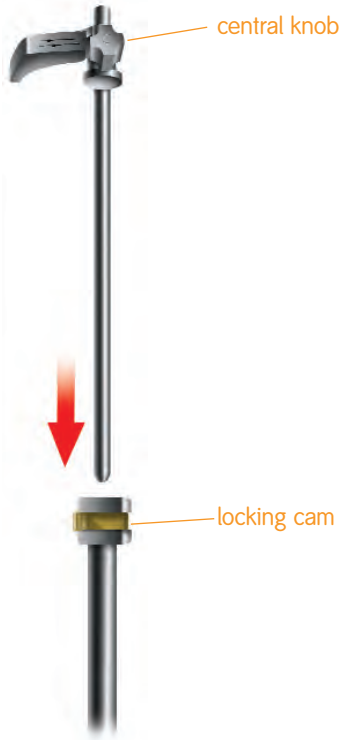


Figure 24

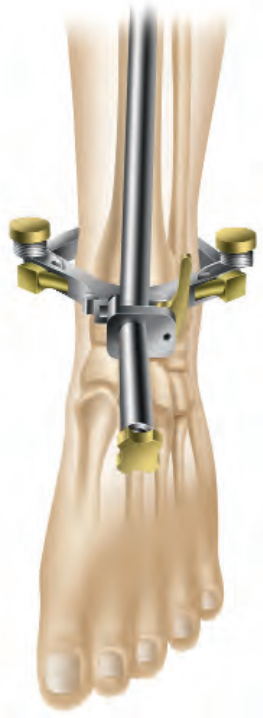


Figure 25



Figure 26

2. Assess rotation of the alignment guide and slope of the cutting plane. The goal is to align the extramedullary alignment assembly rotationally so that it aligns over the medial third of the tibial tubercle and over the second toe *(Figure 27)*.

3. Rotational alignment is critical due to the 3° posterior sloped cut. The slope can be adjusted according to the patient's anatomy *(Figure 28)*.

Note: 3-5° of slope is built into the articular insert (depending on which insert is chosen) and 3° of slope is built into the tibial cutting block. A neutral or slightly sloped alignment should usually be chosen.

Tip: Neutral or minimally sloped alignment may be achieved by palpating the fibula followed by aligning the alignment guide parallel to the fibula. Tibial bowing and soft tissue bulk may make external tibial referencing unreliable.



Figure 27



Figure 28

Spiked Fixation Rod

Instrument Assembly:

a. Place the spiked fixation rod through the central anterior hole in the tibial cutting guide; adjust the block and tighten the central knob to lock the block in position.

b. Introduce the spiked fixation rod into the proximal end of the alignment assembly and adjust and lock the cam on the assembly *(Figure 29)*.

1. Place the arms of the extramedullary alignment clamp around the ankle, and adjust the distal M-L slide directly over the middle of the tibiotalar joint which is also approximated by the second ray of the foot proximal to the malleoli *(Figure 30)*. The cutting block on the proximal end of the assembly should be proximal to the tibial tubercle *(Figure 31)*.

2. Impact the longer spike of the spiked fixation rod into the proximal tibia *(Figure 32)*.



Figure 29



Figure 30

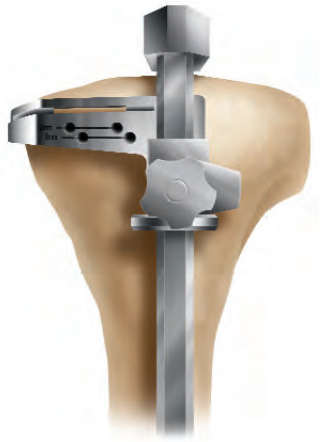


Figure 31



Figure 32

3. Assess rotation of the alignment guide and slope of the cutting plane. The goal is to align the extramedullary alignment assembly rotationally so that it aligns over the medial third of the tibial tubercle and over the second toe *(Figure 33)*.
4. Rotational alignment is critical due to the 3° posterior sloped cut. The slope can be adjusted according to the patient's anatomy *(Figure 34)*. Impact the second spike to secure the assembly *(Figure 35)*.

Note: 3-5° of slope is built into the articular insert (depending on which insert is chosen) and 3° of slope is built into the tibial cutting block. A neutral or slightly sloped alignment should usually be chosen.

Tip: Neutral or minimally sloped alignment may be achieved by palpating the fibula followed by aligning the alignment guide parallel to the fibula. Tibial bowing and soft tissue bulk may make external tibial referencing unreliable.



Figure 33



Figure 34



Figure 35

Intramedullary Tibial Alignment

Instrument Assembly:

a. Insert the external rod of the Intramedullary Tibial Alignment Guide through the middle hole on the correct left or right tibial cutting block and lock the cam *(Figure 36)*.

b. Attach the T-handle to the IM rod and pass it through the cannulated alignment sleeve on the alignment assembly *(Figure 37)*.

1. Make a 9.5mm pilot hole into the tibial canal *(Figure 38)* (generally 5mm medial to the midline). A preliminary resection of the tibial spine may facilitate seating of the tibial drill guide onto the proximal tibia.

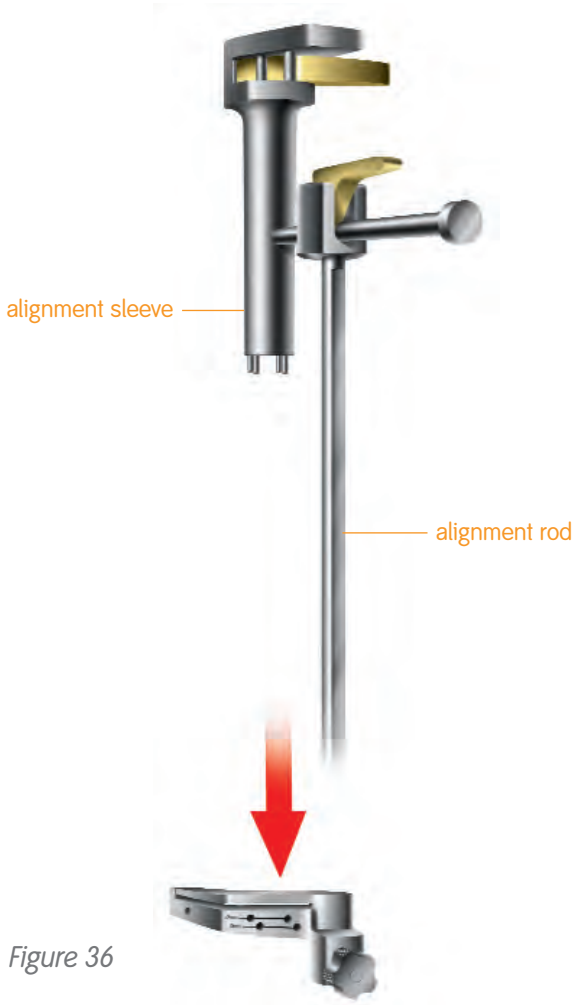


Figure 36



Figure 37



Figure 38

2. Slowly insert the IM rod into the tibial canal.
3. Assess rotation of the intramedullary tibial alignment guide. Rotational alignment is critical due to the 3° posterior sloped cut. The alignment rod of the intramedullary tibial alignment assembly should align with the medial third of the tibial tubercle *(Figure 39)*.
4. Impact the proximal end of the cannulated alignment sleeve to drive the distal spikes into the proximal tibia to lock rotational alignment *(Figure 40)*.



Figure 39

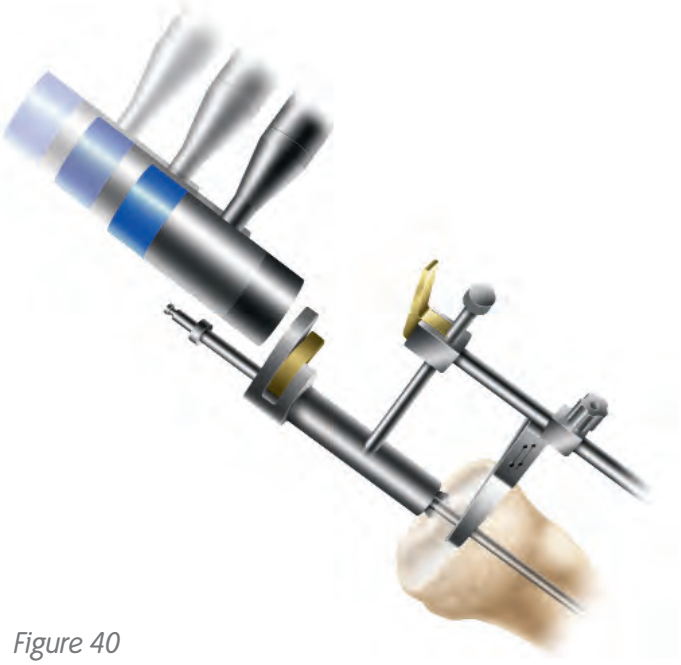


Figure 40

Tibial Resection

1. Attach the tibial stylus to the tibial cutting block by inserting the stylus foot into the cutting slot.
2. Lower the cutting block until the stylus touches the low point on the less affected side of the tibia *(Figures 41)*. The stylus can be adjusted for a 9, 11 or 13mm tibial resection by twisting the knob on top of the stylus.
3. Pin the tibial cutting block to the tibia by inserting pins first through the central holes; then the oblique hole.

Tip: Pinning through the central holes marked 0mm with smooth pins will allow the block to be moved +2mm should additional resection be required (Figure 42).

Tip: A 9mm resection is recommended since 9mm of metal and plastic is the thinnest available component.

Tip: To do an extramedullary alignment check, place the extramedullary alignment rod through the tibial cutting block.



Figure 41

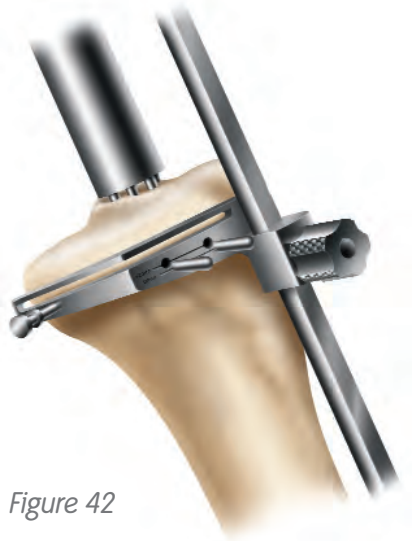


Figure 42

4. To remove the assembly:

   a. For the intramedullary alignment assembly, use the universal extractor leaving the cutting block on the anterior tibia *(Figure 43)*.

   b. For the extramedullary assembly with spiked rod, release the cam at the top of the alignment tube and using the slap hammer to remove the spiked fixation rod *(Figure 44)*.

   c. The extramedullary assembly with the non-spiked rod may be left in place or removed by loosening the thumbscrew and lowering the non-spiked rod to disengage from the tibial cutting block.



Figure 43



Figure 44

5. Cut the tibia by first directing the blade in the posterior direction and then laterally *(Figure 45)*.
6. Check alignment and balance with spacer block and rod *(Figures 46 & 47)*. Balance ligaments in standard fashion.

Tip: Since the spacer block has one end for flexion and one for extension, ensure that the appropriate end is used.



Figure 45



Figure 46



Figure 47

Tibial Sizing

Option A – Stemless Tibial Trials

1. Attach a quick-connect handle to a stemless trial one size below the femoral component size and place on the cut tibia to assess coverage *(Figure 48)*. As needed, additional sizes should be templated using the stemless trials.
2. Once the appropriate size is determined, pin the medial size of the selected stemless trial with a short headed pin.
3. Place a trial insert into the stemless tibial trial tray and perform a trial range of motion to allow the baseplate to center on the femoral trial. (As a secondary check, the surgeon may pass the alignment rod through the quick-connect handle to assess alignment) *(Figure 49)*. Pin the lateral side of the trial.

   Tip: After putting the knee through a trial ROM, the surgeon should note the proper rotation of the trial tibial component on the proximal tibia and mark the tibia for future reference.

   Tip: The center-line marks on the femoral and tibial trial components usually line up.

4. Using the tibial fin/stem punch, rotational alignment may be set now or at the time of trial placement. See page 38.

   Tip: In the case of sclerotic bone, first drill for the stem using the 11mm tibial drill. To avoid fracture, predrill the tibial plateau with a 1/8" drill bit.

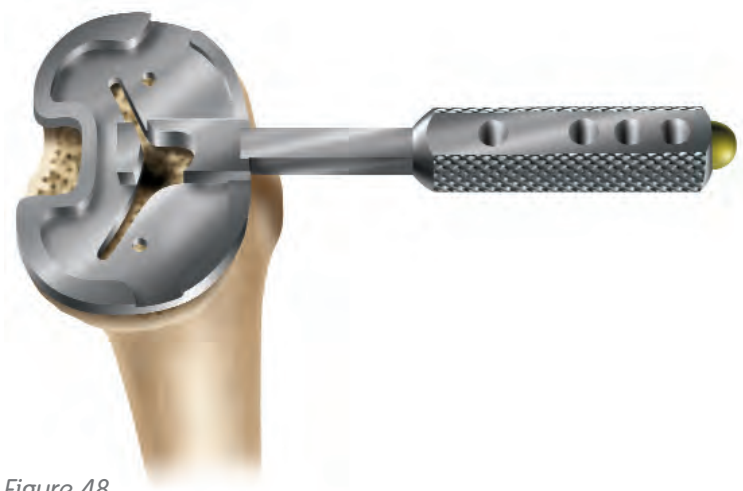


Figure 48

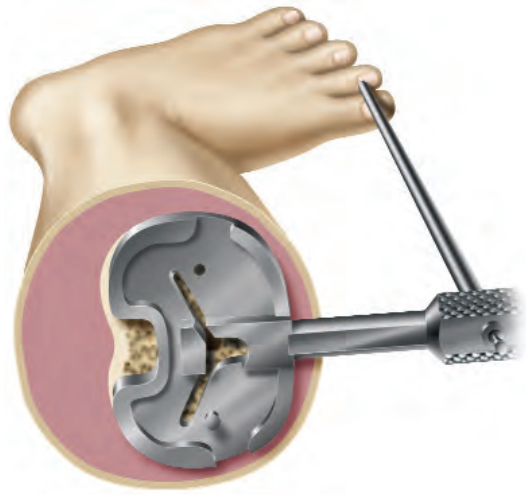


Figure 49

Option B – Stemmed Tibial Trials

1. Place a tibial drill guide one size below the femoral component size on the cut tibia to assess coverage. As needed, additional sizes should be templated *(Figure 50)*.
2. Once the tibial drill guide has been centralized on the proximal tibia, pin the drill guide in place. Retract the gold collar on the drill guide handle and insert the 11mm tibial collet.
3. With the 11mm tibial collet in place, drill with the 11mm tibial drill *(Figure 51)* and punch with the 11mm tibial punch *(Figure 52)*. If a 9.5mm hole has already been made for use of the intramedullary tibial alignment assembly, you only need to utilize the 11mm tibial punch at this time.
4. Remove the tibial drill guide.
5. Place the stemmed tibial trial into the prepared hole.
6. Using the tibial fin punch, rotational alignment may be set now or at the time of trial placement. See page 38.

Tip: After putting the knee through a trial ROM, the surgeon should note the proper rotation of the trial tibial component on the proximal tibia and mark the tibia for future reference.

Tip: The center-line marks on the femoral and tibial trial components usually line up.

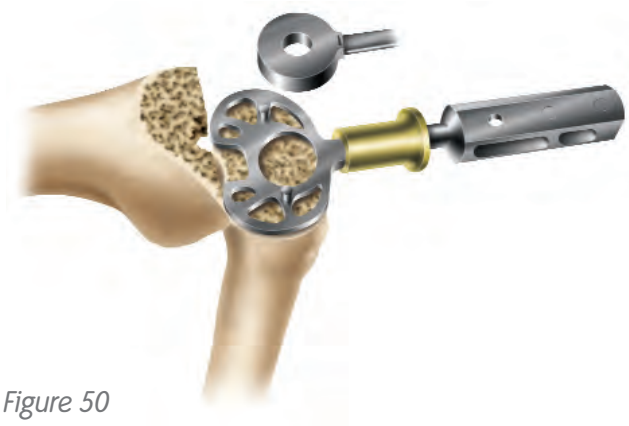


Figure 50

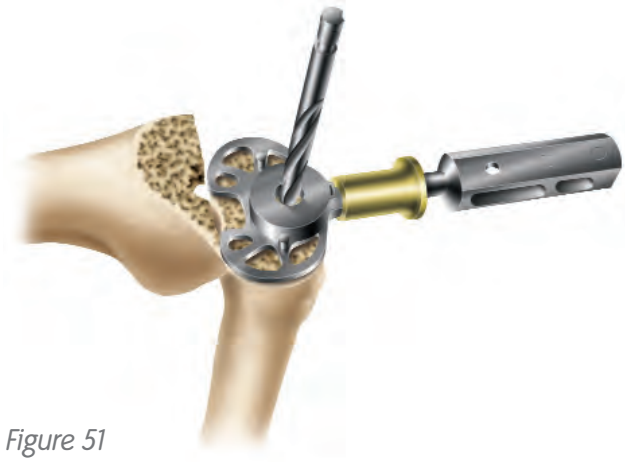


Figure 51

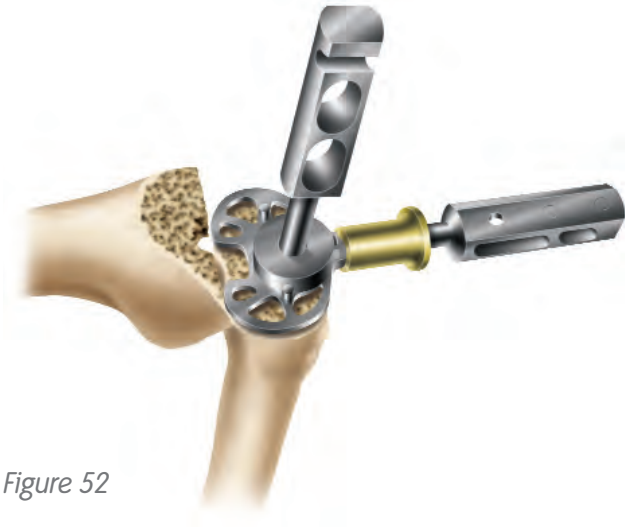


Figure 52

Posterior-Stabilized Femoral Resection

1. Attach the P-S housing resection collet to the housing resection block by tightening the gold thumbscrew in the most anterior position *(Figure 53)*.
2. The P-S housing resection block must be centered on the femur, as this will determine component position.

   Tip: The housing resection blocks have the same M-L dimension as the implants.

   Tip: The only difference between the cruciate-retaining and the posterior-stabilized femoral components is the addition of the housing for the cam mechanism. All other box dimensions are the same. The anterior and posterior chamfer resections can be made through the posterior-stabilized housing resection block.
3. Secure with 1/8" trocar pins through the straight holes in the front of the block. If the chamfer cuts are made through this block, the angled holes in the sides of the block should be used.

Instrument Assembly:
Attach the housing reamer dome and the P-S reamer sleeve to the patellar reamer shaft *(Figure 54)*.

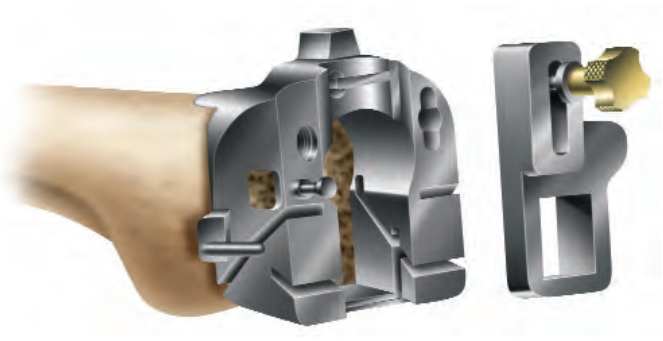


Figure 53



Figure 54

4. Ream through the housing resection collet until the automatic depth stop contacts the collet, loosen the thumbscrew and then move the reamer anterior and posterior until it contacts the automatic stop *(Figure 55)*.
5. Impact the housing box chisel through the housing resection collet to square the corners of the housing. The housing box chisel should be used anteriorly and posteriorly to ensure that the full length of the box is prepared *(Figure 56)*.
6. If the chamfer resections have not been made, they can now be made by cutting through the chamfer slots in the housing resection block.

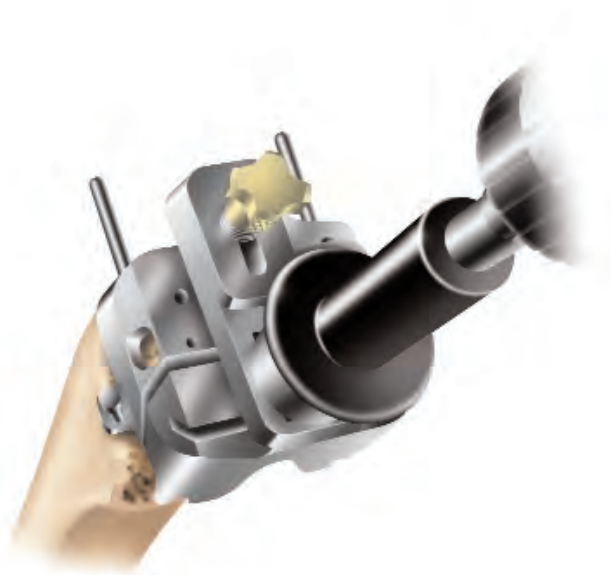


Figure 55

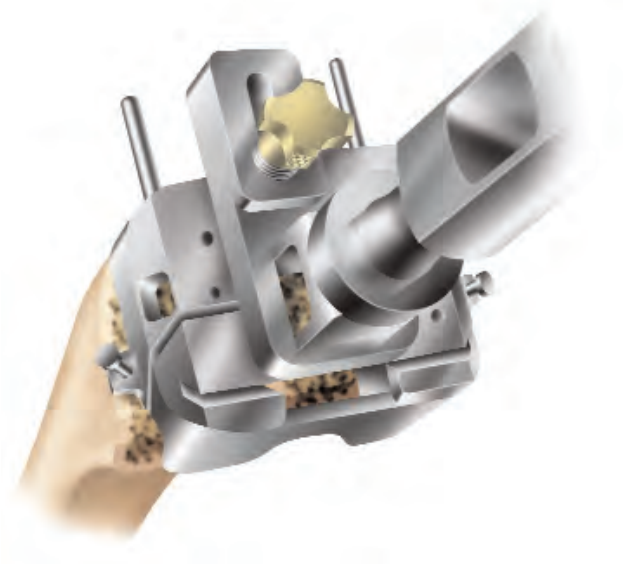


Figure 56

Resurfacing Patellar Preparation

The surgeon can choose from a freehand cutting technique with towel clips or if desired, he or she can choose one of the following instrumented techniques.



Figure 57

Resection Guide Technique

1. Measure the overall thickness of the patella with the patellar calipers *(Figure 57)*.
2. Subtract from this number the thickness of the GENESIS® II round resurfacing patellar component, which is 9mm.

   Note: The thickness of the GENESIS II oval resurfacing patellar component varies by diameter. See the chart on page 33.
3. The guide is set at the amount of bone that should remain after cutting the patella – i.e. the difference between the original patellar thickness and 9mm. The guide is set at this level by turning the knurled knob *(Figure 58)*.

   For example:

   A. Measure the overall thickness of the patella with the patellar calipers. For this example, the patella measures 25mm.

   B. Subtract the thickness of the round resurfacing patellar component. In this example, 9mm. (25mm - 9mm = 16mm). The guide should be set at 16mm for this example.

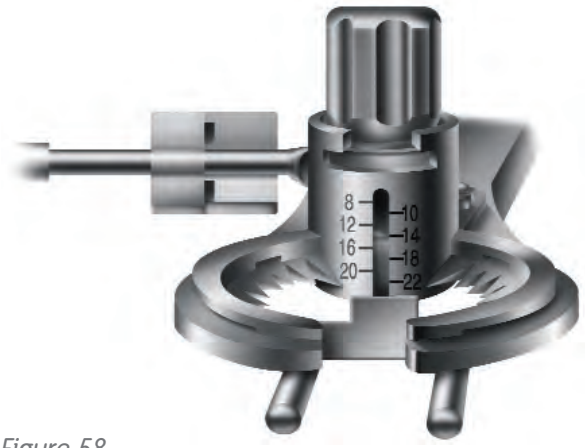


Figure 58

4. Cut the patella through the dedicated saw guides *(Figure 59)*.

5. Drill for the three pegs *(Figure 60)*, insert the resurfacing patellar trial and remeasure. The overall thickness should be equivalent to the original thickness *(Figure 61)*.



Figure 59

Reaming Technique

The reaming technique described for the biconvex patella on page 35 can be used with the resurfacing patellar implant as well. The only differences in technique between it and the biconvex are the use of the RED resurfacing depth gauge, resurfacing reamers and the resurfacing drill guides.



Figure 60



Figure 61

Resurfacing Patellar Preparation

Patellar Large Reamer Resurfacing Instrumentation

The objective of this technique is to resurface the articular surface of the patella with the precision of a reaming technique. The reamed patellar surface can accommodate an oval or round resurfacing patellar component.

1. Trim tissue surrounding the patella using electrocautery (bovie) *(Figure 62)*.
2. Use a rongeur to remove osteophytes and reduce the patella to its true size *(Figure 63)*. The bovie should also be used to release soft tissue attachments to the estimated level of resection.
3. Place the collet over the patella so that it fits snugly around the patellar diameter *(Figure 64)*. The goal is to reduce the patella to its smallest diameter so that the smallest possible collet will fit around the entire patella. Use the patellar reamer collet as a sizing template to select the appropriately sized collet and reamer.

Tip: The collet should be resting on the soft tissue surrounding the patella. If the patella does not enter the collet evenly but instead enters at an angle, the collet may not be completely surrounding the patella, but instead resting on part of the bone. If the collet is only slightly smaller than the patella, you may trim 1-2mm of the medial and lateral edges of the patella to ensure a snug fit. If the collet is far smaller than the patella, choose the next size up and assess fit.



Figure 62



Figure 63



Figure 64

Surgeon Acknowledgement: The technique for the Patellar Large Reamer Resurfacing System was developed in conjunction with Warren Jablonsky, MD, McHenry County Orthopedics, Crystal Lake, IL.

4. Measure patellar thickness with the patellar calipers *(Figure 65)*.

Tip: The patella should measure a minimum of 19mm before reaming to use this resurfacing technique.

Determine the design and diameter of the patellar implant to be used. A round or oval resurfacing design may be chosen. The round resurfacing patella is 9mm thick, and the depth stop for this technique prepares for 9mm resection. The oval patella's thickness is variable.

Tip: Minor adjustments may be necessary at the time of resection to accommodate the largest diameter oval patellar implants. Please see chart on page 33.

Instrument Assembly:

a. Slide the correct diameter of patellar reamer collet into place on the patellar reamer guide.
b. Attach the patellar reamer guide to the patella.
c. Secure the patellar reamer guide on the patella by tightening the set screw.
d. Attach the matching size patellar reamer dome and large patellar depth stop to the patellar reamer shaft.

5. Rotate the BLACK resurfacing patellar depth gauge around so that the hooked end or "claw" surrounds the patellar reamer shaft *(Figure 66)*. Lower the depth stop by compressing the button until it meets the depth gauge *(Figure 67)*. Remove the depth gauge from the assembly. Ream the patella until the depth stop engages the patellar reamer guide *(Figure 68)*.

Tip: Excessive force on the reamer shaft may alter the depth of resection, causing overreaming.



Figure 65



Figure 66



Figure 67



Figure 68

Resurfacing Patellar Preparation

6. After reaming, the patella should have a completely flat articular surface *(Figure 69)*. Measure the resected patella to ensure adequate resection (the resected patella should measure its original depth minus 9mm).
7. Drill the appropriate fixation holes for the resurfacing patellar implant using the correctly sized drill guide and resurfacing drill *(Figure 70)*.
8. Place the patellar trial into the prepared patella. If desired, use the calipers to remeasure the composite thickness of bone and trial.



Figure 69



Figure 70

Oval Patellar Preparation

The oval patellar implant can be prepared for use with any resurfacing technique; however, there are a few differences in final preparation. The patella has to be implanted in the proper orientation, where the extended lateral flange will be riding on the lateral side of the femoral component.

The oval patellar implant does not have the same thickness for all sizes. This is due to the varying offset needed to obtain the correct design for the different diameters. (See the chart for sizing/ thickness options.)

1. Mark the medial facet axis of the patella superior and inferiorly with a marking pen or use the laser etch line on the sizing guide to mark the vertical ridge of the patella.
2. Measure the depth of the patella at its maximum depth centrally along the medial facet *(Figures 71 & 72)*.

Oval Patellar Sizing Options	
Oval Resurfacing Implant	
Diameter	**Thickness**
29mm	8.5mm
32mm	9.0mm
35mm	9.0mm
38mm	9.5mm
41mm	10.0mm



Figure 71



Figure 72

The technique for the Oval Patella was developed in conjunction with William J. Robb III, MD, Illinois Bone and Joint Institute, Glenbrook Hospital, Evanston Northwestern Healthcare.

Resurfacing Patellar Preparation

3. Resect the patella using the preferred method.
4. Measure the diameter of the resected patella with the trial templates *(Figure 73)*.
5. Centralize the thickest portion of the prosthetic patella along the line of the previously marked medial facet eminence.
6. Place the appropriate drill guide on the patellar reamer guide and clamp the guide to the patella. Drill to the measured depths *(Figure 74)*.
7. Place the trial on the patella and remeasure the patella if desired *(Figures 75 & 76)*.



Figure 73

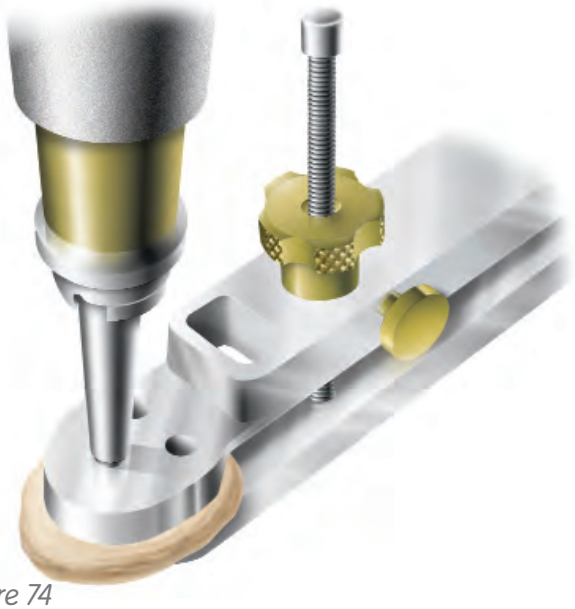


Figure 74



Figure 75

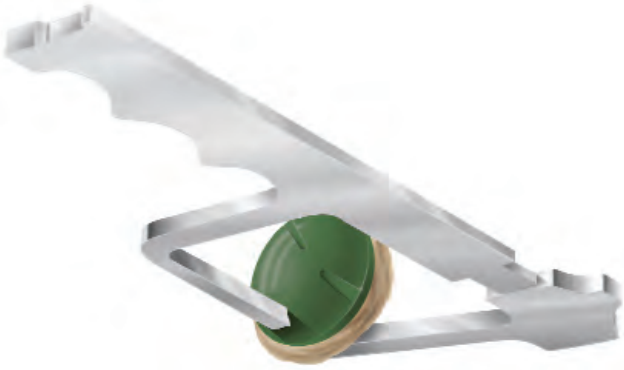


Figure 76

Biconvex Patellar Preparation

Biconvex Patella

Instrument Assembly:
Determine the appropriate diameter patellar implant, and select the correctly-sized patellar reamer collet and slide it into place on the patellar reamer guide *(Figure 77)*.

1. Attach the patellar reamer guide to the patella. Tighten the patellar reamer guide on the patella *(Figure 78)*.
2. Use the patellar calipers to measure the thickness of the patella *(Figure 79)*.

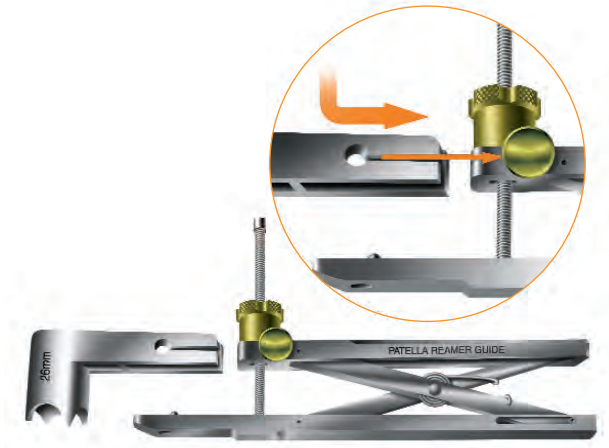


Figure 77

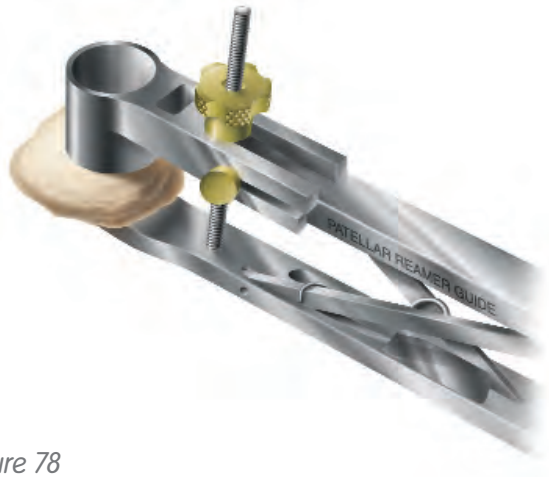


Figure 78

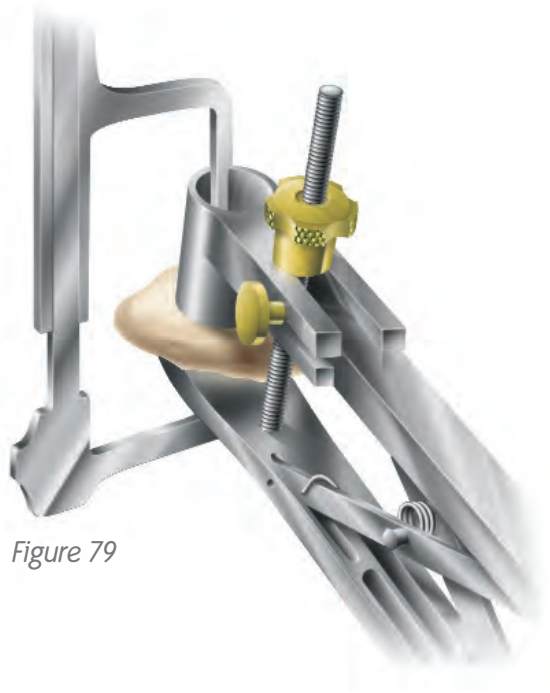


Figure 79

Instrument Assembly:

a. Attach the BLUE patellar depth gauge to the reamer guide *(Figure 80)*.

b. Attach the matching sized patellar reamer dome and patellar depth stop to the patellar reamer shaft *(Figures 81 & 82)*. Lower the assembly through the patellar reamer guide until the reamer dome contacts the patella.

3. Swing the patellar depth gauge around so that the "claw" surrounds the patellar reamer shaft.
4. Lower the patellar depth stop by pushing the gold button until it contacts the patellar depth gauge. The patellar depth stop will automatically lock in place *(Figure 83)*.
5. Remove the depth gauge.
6. Ream the patella until the depth stop engages the patellar reamer guide.

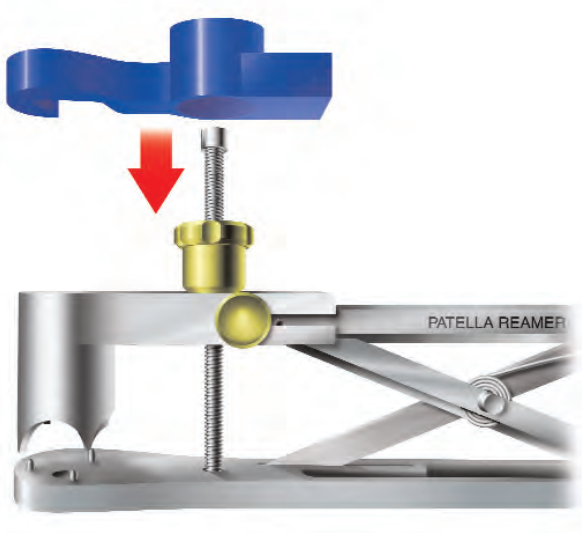


Figure 80



Figure 81



Figure 82

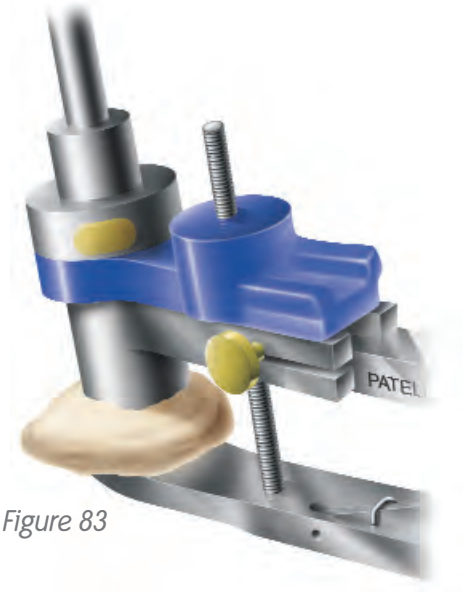


Figure 83

Component Trialing

1. Flex the knee to 90° and insert the femoral trial using the femoral trial impactor *(Figure 84)*.
2. Use the appropriate insert trial (begin with a 9mm trial) to determine stability and alignment.
3. Perform a trial range of motion. The alignment marks on the front of the femoral and tibial trials should line up *(Figure 85)*. The quick-connect handle may be attached to the tibial trial and used to set the appropriate rotational alignment.

Option: Extend the knee fully with the handle attached to the tibial trial. Pass the extramedullary rod through the handle to assess full leg alignment (Figure 86).

Tip: The technique of tibial trial, then femoral trial and then trial insert works for all GENESIS® II inserts EXCEPT the dished inserts. For the deep dished, insert the trial bearing BEFORE the femoral trial.

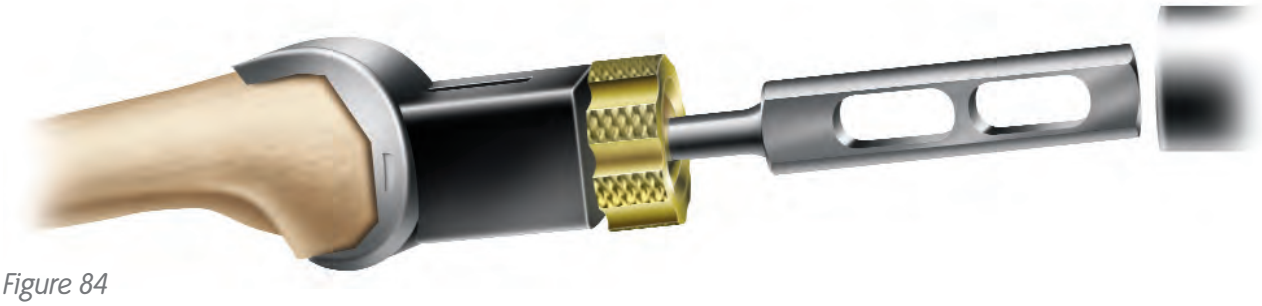


Figure 84

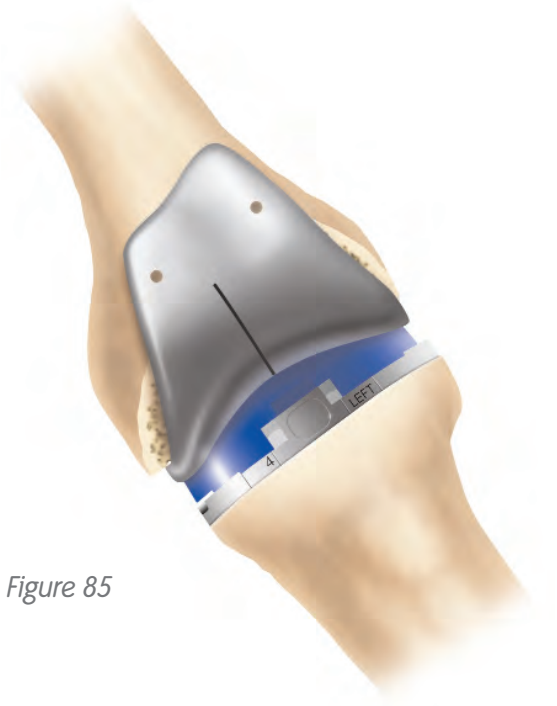


Figure 85

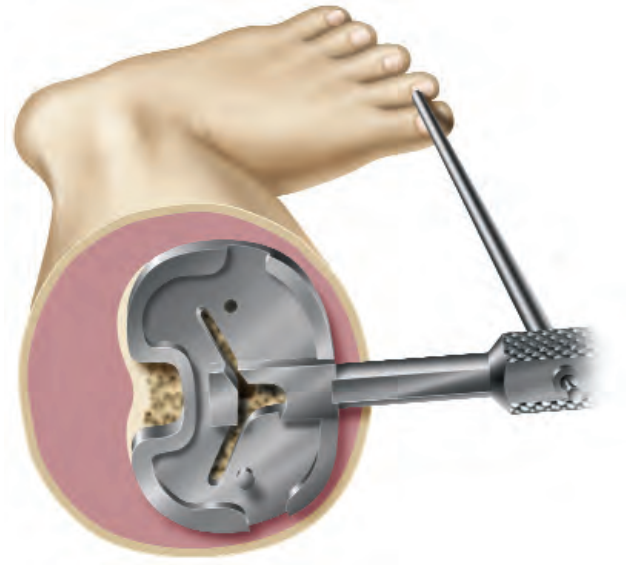


Figure 86

Component Trialing

4. Mark correct tibial rotational alignment on the anterior tibia using a cautery knife *(Figure 87)*.
5. Determine whether a porous or nonporous tibial implant will be used. Select the appropriate tibial fin punch to prepare the fins and punch through the tibial trial *(Figure 88)*.

   Tip: If the tibial bone is sclerotic, begin the fin slot with a burr or thin sawblade before using the fin punch to prevent tibial fracture.
6. Place the patellar trial into the prepared patella *(Figure 89)*.

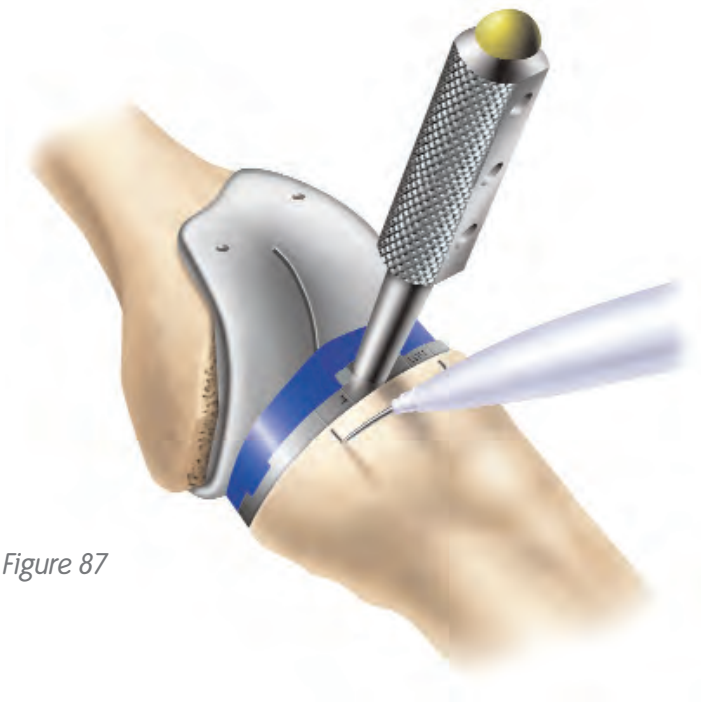


Figure 87



Figure 88



Figure 89

7. Perform a trial range of motion to assess patellar tracking. With cruciate-retaining knees, medial-lateral placement of the femoral trial can be adjusted to optimize patellar tracking *(Figure 90)*.
8. For cruciate-retaining femorals, prepare the femoral lug holes through the femoral trial with the femoral lug punch *(Figure 91)*.
9. Remove the tibial trial. Attach the end of the universal extractor to the femoral trial *(Figure 92)*. Remove the femoral trial. Use a towel clip to remove the patellar trial.

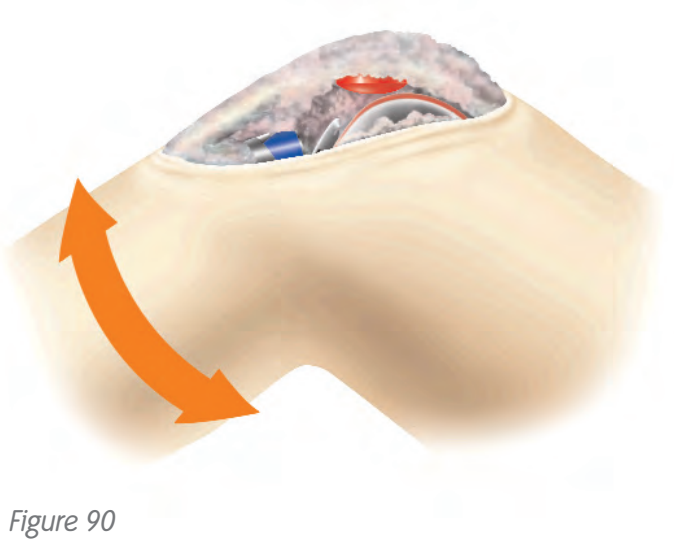


Figure 90



Figure 91



Figure 92

Implantation

Tibial Implantation

1. Apply cement on the proximal tibia and/or the implant and seat the tibial implant with the tibial impactor *(Figure 93)*. Remove excess cement.
2. If using the porous tray and screws, orient the tibial screw drill guide over the holes and drill using the tibial screw drill. Determine the appropriate screw length using the screw depth gauge. Insert screws with alternating tightening to avoid liftoff.

Femoral Implantation

1. Mix and prepare bone cement for femoral component and distal femur. Apply to the femoral component or prepared bone, based on the surgeon's preference.

   Tip: Many surgeons put cement on the bone rather than, or supplemental to, cement on the underside of the implant.

2. Place the femoral implant onto the femur and use the femoral impactor to fully seat the implant *(Figure 94)*.
3. Remove excess cement. Extend the knee to remove cement anteriorly without retracting the proximal soft tissue.
4. Place the tibial insert trial onto the tibial implant and extend the leg to pressurize the cement.

   Tip: Place the C-R tibial trial in the tibial implant tray to assist with aligning the femoral component during implantation.



Figure 93



Figure 94

Patellar Implantation

1. Assemble the patellar cement clamp to the patellar reamer guide.
2. Apply bone cement to the patella.
3. Place the patellar implant onto the patella and clamp into the bone *(Figure 95)*. Remove excess cement.

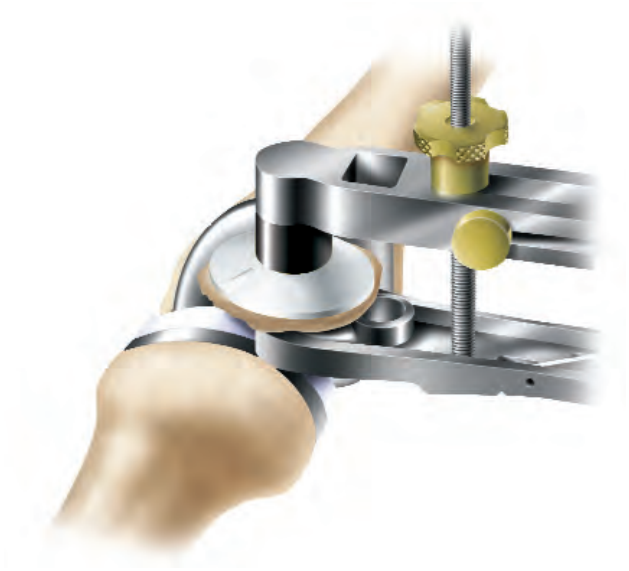


Figure 95

Cruciate-Retaining, Dished and Posterior-Stabilized Insert Placement

1. Determine the correct articular insert thickness.
2. Clear any debris from the locking mechanism and slide the insert into the tibial baseplate engaging the locking mechanism. For the P-S insert, begin insertion in flexion and extend the leg to engage the locking mechanism.
3. Attach the articular inserter/extractor to the tibial tray. Lift the inserter superiorly until the anterior lip of the articular insert is fully seated *(Figure 96)*.

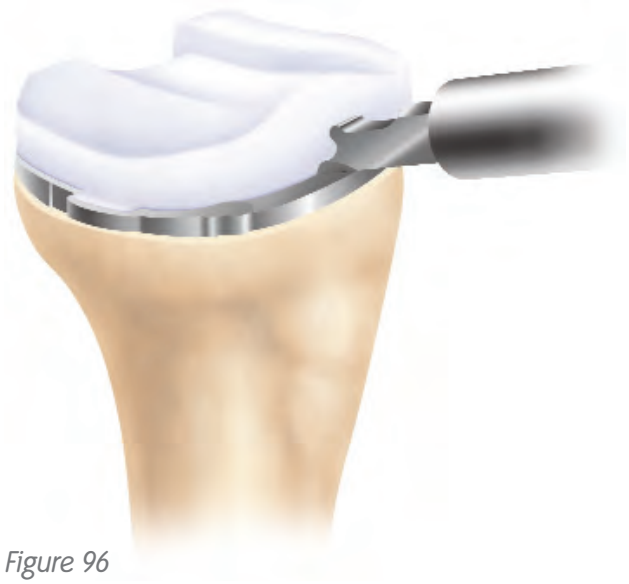


Figure 96

P-S High Flex and C-R Deep Flex Insert Placement

1. Attach the appropriately sized bumper (either 1-2 or 3-8) to the impactor handle.
2. Position the knee in approximately 90° flexion.
3. Align the articular insert with the locking mechanism of the tibial baseplate.
4. Push the insert posteriorly until the top of the anterior rail of the baseplate is visible.
5. Place the bumper on the anterior chamfer of the insert. The mating surfaces should be very conforming *(Figures 97 & 98)*.
6. Impact the handle until the insert is fully seated.

MIS Note: To use the P-S High Flexion Insert in minimally invasive surgery, please see the technique described in Appendix A.

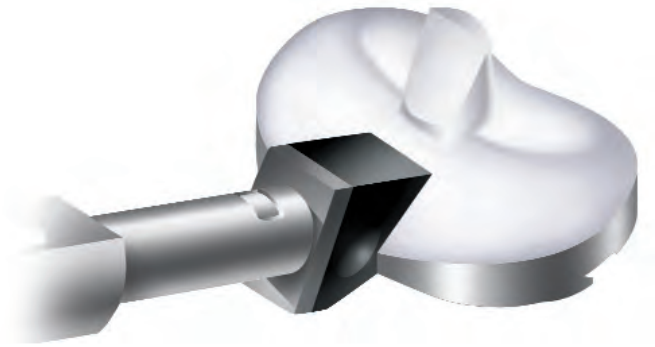


Figure 97



Figure 98

Appendix A
GENESIS® II P-S High Flex Insert Impaction Technique for MIS

When using the P-S High Flex Insert in a minimally invasive procedure, the femoral cam mechanism is likely to prevent the insert from fully seating into the locking mechanism while the knee is in flexion. To use the P-S High Flex Insert in a MIS case:

1. Flex the knee to 90° and push the insert as far back as it will go posteriorly with the knee in flexion *(Figure 99)*.

   Tip: Lift the distal femur to prevent scratching of the posterior condyle of the component.

2. Placing your thumb on the anterior of the insert to hold it on the baseplate *(Figure 100)*, move the knee into extension.

3. Use the impactor handle with the appropriately sized bumper to fully seat the insert and engage the anterior portion of the dovetail locking mechanism *(Figure 101)*.

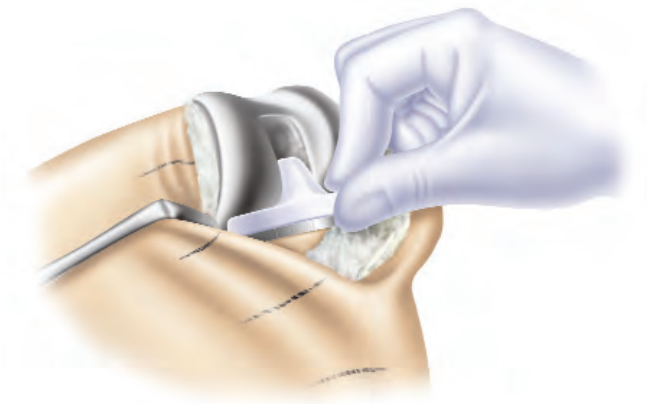


Figure 99

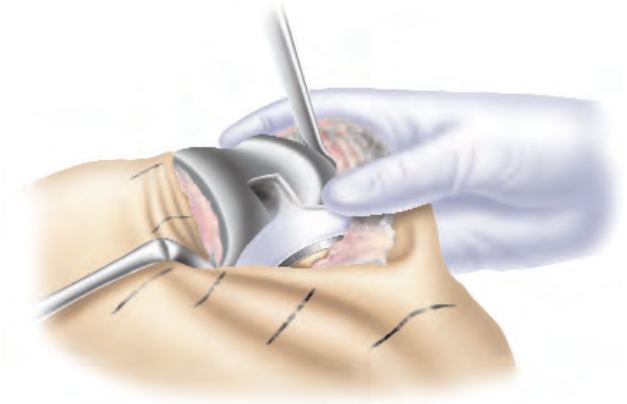


Figure 100

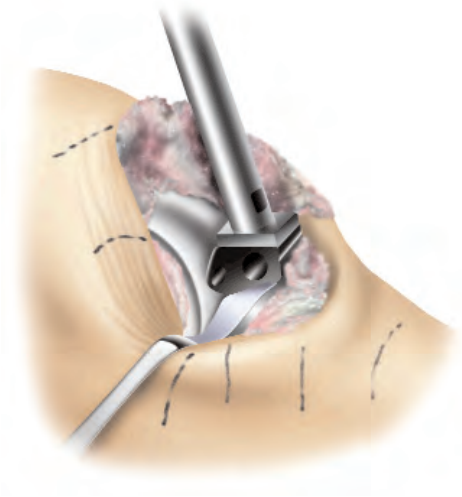


Figure 101

Appendix B
GENESIS® II Articular Insert Interchangeability Chart

Cruciate-Retaining Inserts: Completely interchangeable with all size femoral components

Posterior-Stabilized (PS), **Dished** (DD) and **Constrained** (Con), **High Flex Posterior-Stabilized** (HFPS) and **Cruciate-Retaining Deep Flex** (CRDF): Limited interchangeability; chart applies.

	Femoral Size								
Insert Size	1	2	3	4	5	6	7	8	9
1-2 PS, DD, Con	●	●	●						
1-2 HFPS, CRDF	●	●	●	●					
3-4 PS, DD, Con		●	●	●	●				
3-4 HFPS, CRDF		●	●	●	●	●			
5-6 PS, DD, Con				●	●	●	●		
5-6 HFPS, CRDF				●	●	●	●	●	
7-8 PS, DD, Con						●	●	●	
7-8 HFPS, CRDF						●	●	●	●

Appendix C
Anterior and Posterior Referencing

Anterior Referencing

An anterior referencing technique is based on the anterior cortex, which serves as the primary reference point. The anterior resection is fixed while the posterior resection varies with size. Because the component will be flush against the anterior cortex, this will enable the reapproximation of the patellofemoral joint. When the sizing guide indicates the femoral implant is between two sizes, the smaller size should be selected. Choosing the smaller size results in more bone resection from the posterior condyles thereby increasing the flexion space.

Anterior Referencing	
Advantages	**Disadvantages**
Reapproximation of the patellofemoral joint	Knee may be loose in flexion
Reduced chance of notching the anterior cortex	

Posterior Referencing

A posterior referencing technique is based on the posterior femoral condyles which serve as the reference point. The posterior resection remains constant while the anterior resection varies with respect to the anterior cortex. Therefore, the posterior resection will equal the posterior thickness of the prosthesis, resulting in a balanced flexion-extension space. When the sizing guide indicates the femoral implant is between two sizes, the larger size should be chosen. Even though there is a slight chance in overstuffing the patellofemoral joint with a larger size, there is a reduced risk in notching the anterior cortex of the femur.

Posterior Referencing	
Advantages	**Disadvantages**
Balanced flexion and extension spaces	May overstuff the patellofemoral joint

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