

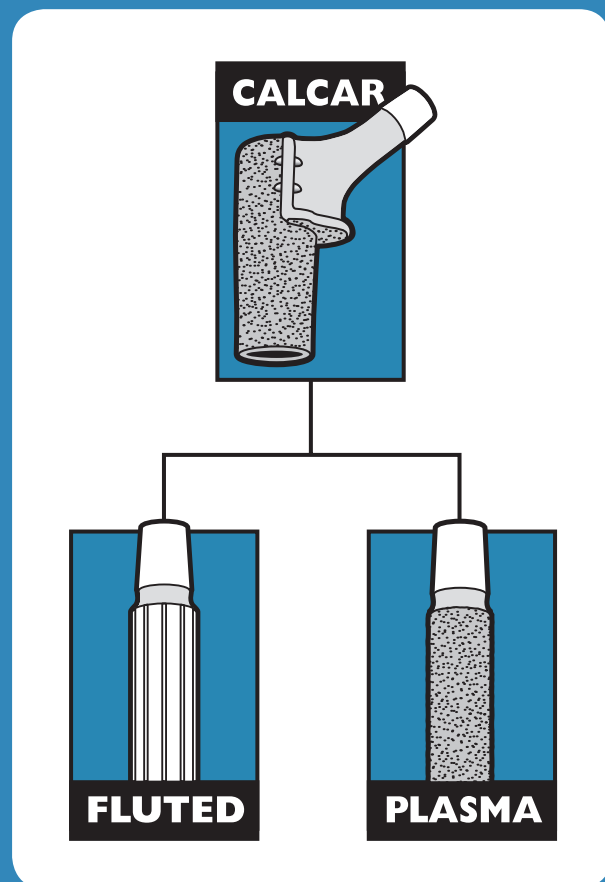
RESTORATION[®] MODULAR

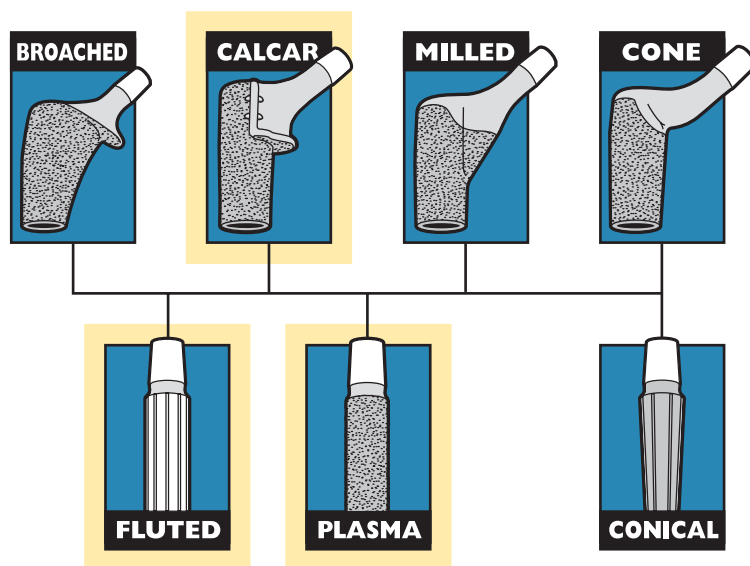
stryker[®]

REVISION HIP SYSTEM

Surgical Protocol

**Restoration Modular
Calcar Body/Fluted & Plasma
Distal Stem
Femoral Components
Using the Restoration Modular
Instrument System**





Restoration Modular
Revision Hip System

Restoration® Modular Revision Hip System

Surgical Protocol

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Femoral Components
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Indications

- Noninflammatory degenerative joint disease, including osteoarthritis and avascular necrosis;
- Rheumatoid arthritis;
- Correction of functional deformity;
- Revision procedures where other treatments or devices have failed; and,
- Nonunions, femoral neck fractures, and trochanteric fractures of the proximal femur with head involvement that are unmanageable using other techniques.
- The Restoration Modular Hip System is intended for primary and revision total hip arthroplasty as well as in the presence of severe proximal bone loss. These femoral stems are designed to be press fit into the proximal femur.

Contraindications

- Active infection or suspected latent infection in or about the hip joint;
- Bone stock that is inadequate for support or fixation of the prosthesis;
- Skeletal immaturity;
- Any mental or neuromuscular disorder that would create an unacceptable risk of prosthesis instability, prosthesis fixation failure, or complications in postoperative care.

See package insert for warnings, precautions, adverse effects, information for patients and other essential product information.

Before using Restoration Modular instrumentation, verify:

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

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

Acetabular Options

Stryker Orthopaedics offers a wide variety of acetabular components that are compatible with the Restoration Modular Femoral Components. The surgeon should refer to a specific acetabular component's surgical technique for a discussion of acetabular surgical procedures. The Restoration Modular Hip System is compatible only with Stryker Orthopaedics femoral bearing heads listed in the chart on page 19 and page 26.

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System Overview

The Modular Calcar Body/Fluted Distal Stem & Plasma Distal Stem Femoral components are part of the Restoration Modular Revision Hip System. The system takes advantage of the long clinical experience with distally fixed implants, while making use of modern technology to enhance proximal load transfer to the femur. This is achieved by mating a selected proximal body with a selected distal stem to provide a femoral prosthesis that minimizes proximal-distal mismatching, often associated with monolithic implants.

Revision hip surgery is very complex in that the surgeon may face compromised soft tissues, retained cement, severe bone loss, and poor residual bone. A set of implant options is essential to best fit the implant to the present bone defect. The Restoration Modular Calcar Body/Fluted Distal Stem & Plasma Distal Stem Femoral components were designed specifically for use in revision cases in which the femoral bone stock is severely compromised in the proximal third or proximal half of the femur. They also may be used for less challenging reconstructive surgery ranging from difficult primary up to, and including, Type III revision cases.[†]

The titanium alloy (Ti-6Al-4V ELI) Calcar Bodies are circumferentially plasma sprayed with commercially pure titanium and then over-sprayed with PureFix HA. These surface enhancements have demonstrated biocompatibility through many years of use at Stryker Orthopaedics.* Proximally, the Calcar Body segment helps maintain rotational and axial stability when adjacent to viable bone. Seven Calcar Body diameters are available (range 19mm through 31mm in 2mm increments) with three vertical offsets: +10mm, +20mm, and +30mm. These vertical offsets may be used to adjust overall stem length. (See Sizing Charts on page 3.) Cobalt chrome bushings have been added to the vertical flanges of the Calcar Body to allow the utilization of 2.0mm Dall-Miles Beaded Cables for trochanteric reattachment and cerclage fixation.

The Calcar Bodies incorporate a V40 taper and are compatible with CoCr, Biolox delta Ceramic and Alumina Ceramic Femoral Heads.

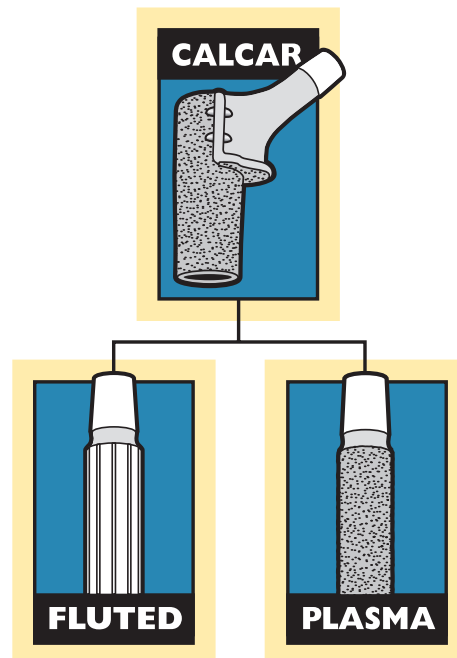
The Fluted Distal Stem design provides diaphyseal rotational stability through nine sharp, polished flutes on each stem. A tri-slot is featured on the distal end of all (13mm-26mm) 167mm, 217mm, 267mm, and 317mm stems. The stem diameter is measured on the outside of the flutes. Each flute is 1mm high, the outside of which determines the major diameter. The inside of the flutes determines the minor diameter, (e.g., a 16mm [major] diameter stem has a 14mm minor diameter – between the flutes).

The Plasma Distal Stem design provides diaphyseal rotational and axial stability. The Plasma Distal Stems are also circumferentially plasma sprayed with commercially pure titanium and then over-sprayed with PureFix HA. The bowed Plasma stems (167mm, 217mm, 267mm, 317mm) are available as a fully-coated or tri-slot option (tri-slot in 13mm - 26mm diameters). The diameters of these distal stems are measured at the mid-way point of the peak of the plasma coating.

Both the Fluted and the Plasma stem designs are available in five lengths – 127mm, 167mm, 217mm, 267mm, and 317mm. Each Fluted & Plasma Distal Stem length comes in 16 diameters from 11mm to 26mm in 1mm increments. The 127mm and 167mm Fluted & Plasma Distal Stems are offered with a straight design option. The 167mm Fluted & Plasma Distal Stem is also offered with a bowed option. The 217mm, 267mm, and 317mm Fluted & Plasma Stems are only offered with a bowed option.

The total length of the Calcar Body/Fluted Distal Stem & Plasma Distal Stem construct will be dependent upon the body and stem chosen. Standard stem lengths are measured from the +10mm Calcar Body with a +0mm (STD) Femoral Head from the head center to the distal tip of each of the five lengths of Fluted or Plasma Distal Stems. Review Sizing Charts on page 3 for stem lengths.

Note: The Calcar Body/Fluted & Plasma Distal Stem lengths are measured from the +10mm Calcar Body with a +0mm (STD) Femoral Head to the distal tip of the Fluted Distal Stem or Plasma Distal Stem.



[†] D'Antonio, J., et al. Classification of Femoral Abnormalities in Total Hip Arthroplasty. *Clin Ortho and Rel Research*. 1993; Number 296: pp. 133 – 139. Longjohn, D. & Dorr, L. Bone Stock Loss and Allografting: Femur. *Revision Total Hip Arthroplasty*. 1999. pp. 100 – 111.

* Capello WN, D'Antonio JA, Feinberg JR, Hydroxyapatite in Total Hip Arthroplasty: Clinical Results and Critical Issues. *CORR*. 355: 200-211. 1998.

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Stem Length Options

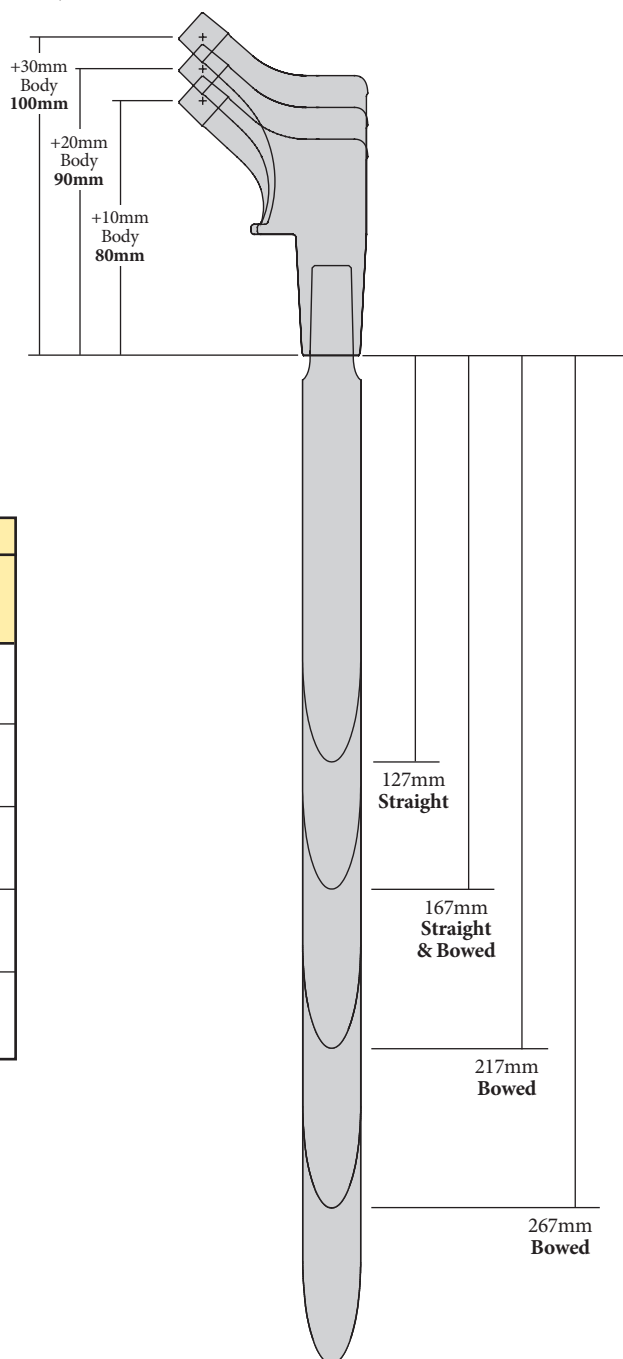
Calcar Body Sizes and Head Offsets with V40 Femoral Heads
available in 22mm, 26mm, 28mm, 32mm, 36mm, 40mm & 44mm

Calcar Body Sizes	-4mm*	+0mm (STD)	+4mm	+8mm	+12mm
19mm	31mm	34mm	37mm	40mm	43mm
21mm	33mm	36mm	39mm	42mm	45mm
23mm	37mm	40mm	43mm	46mm	49mm
25mm	41mm	44mm	47mm	50mm	53mm
27mm	41mm	44mm	47mm	50mm	53mm
29mm	41mm	44mm	47mm	50mm	53mm
31mm	41mm	44mm	47mm	50mm	53mm

*Not available in 22mm or 26mm diameter head (see Head Compatibility chart on pages 19 or 27).

Calcar Body/Fluted Distal Stem & Plasma Distal Stem Sizes

Calcar Body Sizes	Neck Angle	Distal Stem Lengths (mm)	Distal Stem Diameters
19mm 21mm 23mm 25mm 27mm 29mm 31mm	132°	127, 167, 217, 267, 317	11mm – 26mm in 1mm Increments



Calcar Body/Fluted Distal Stem & Plasma Distal Stem Combined Overall Lengths**

Fluted Distal Stem & Plasma Distal Stem Sizes	Calcar Body Heights		
	80mm +10mm	90mm +20mm	100mm +30mm
127mm Length 11mm-26mm dia. (Straight)	207mm	217mm	227mm
167mm Length 11mm-26mm dia. (Straight & Bowed)	247mm	257mm	267mm
217mm Length 11mm-26mm dia. (Bowed)	297mm	307mm	317mm
267mm Length 11mm-26mm dia. (Bowed)	347mm	357mm	367mm
317mm Length 11mm-26mm dia. (Bowed)	397mm	407mm	417mm

**Femoral head neck length options will increase overall stem lengths – range -4mm, +0mm (STD), +4mm, +8mm, and +12mm.
Head center (+0mm STD) to distal stem tip.

Cobalt Chrome Bushings are for use with 2.0mm Dall-Miles Beaded Cables.

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Bone Defect Classifications

Type 1 - Minor Bone Loss

- The metaphysis is expanded, but intact.
- The calcar is partially absent.
- There is minimal bone loss anteriorly and posteriorly.
- The diaphysis is intact.

Type 2 - Significant Bone Loss

- The metaphysis is compromised.
- There is no calcar.
- There is minimal bone loss anteriorly and posteriorly.
- The available proximal bone may be thin, sclerotic, and incapable of support.
- The diaphysis is intact.

Type 2A - The calcar is non-supportive, but the diaphysis is still intact.

Type 2B - The calcar is non-supportive, the anterolateral metaphysis is deficient, but the diaphysis is still intact.

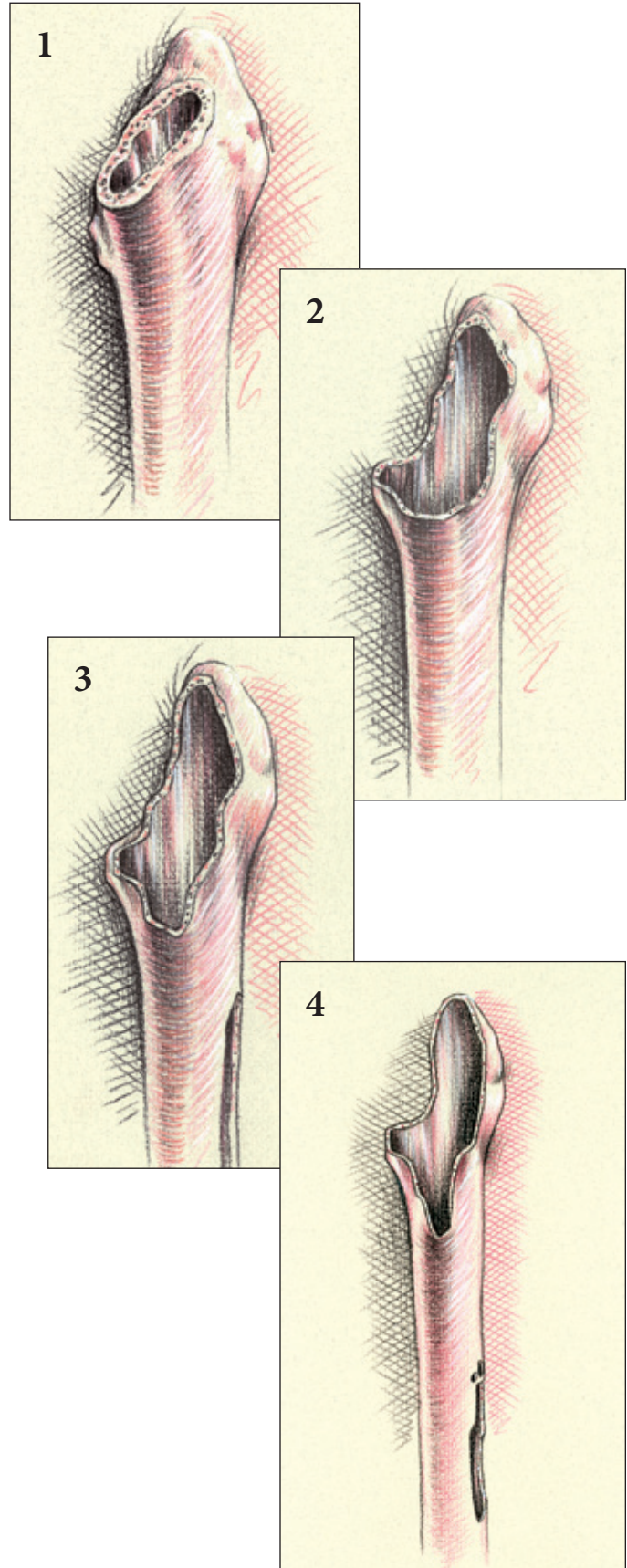
Type 2C - The calcar is non-supportive and the posteromedial part of the metaphysis is deficient, but the diaphysis is still intact.

Type 3 - Massive Bone Loss

- Complete circumferential bone loss in the metaphysis, extending to the diaphysis.
- The metaphysis and part of the diaphysis are deficient.
- The anterolateral bone and supporting subtrochanteric metaphyseal bone are absent.
- The metaphysis is not stable and will not offer rotational stability.
- There is massive bone loss anteriorly and posteriorly.
- The stability of the implant is dependent on distal diaphyseal fixation.

Type 4 - Massive Bone Loss

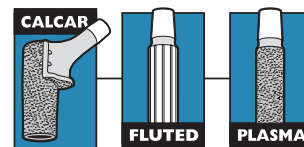
- Extensive circumferential segmental bone loss proximally.
- Extensive cavitory loss involving the entire diaphysis.
- Extensive ectasia of the diaphysis.
- Proximal femoral allograft required with reduction osteotomy of the diaphysis.
- Cortical diaphyseal bone is often thin and needs to be supplemented with cortical strut grafts.
- Segmental defects can be repaired with cortical strut graft and cerclage wiring, and cavitory defects can be filled with impacted particulate graft.



Source: D'Antonio, J., et al. Classification of Femoral Abnormalities in Total Hip Arthroplasty. *Clin Ortho and Rel Research*. 1993; Number 296: pp. 133 – 139. Longjohn, D. & Dorr, L. Bone Stock Loss and Allografting: Femur. *Revision Total Hip Arthroplasty*. 1999. pp. 100 – 111.

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Surgical Protocol



Preoperative Evaluation and Planning

The Restoration Modular Calcar Body/Fluted & Plasma Distal Stem Femoral Hip System offers a complete set of femoral X-ray templates for the surgeon to help assess the implant requirements. All seven Calcar Body Templates (with three vertical offsets each) can be combined with each of the Fluted & Plasma Distal Stem Templates. All templates are at 120% magnification. The use of mag markers will facilitate accurate magnification measurements. If mag markers are not used, measure the existing implants on the X-ray to ensure that magnification is approximately 120%.

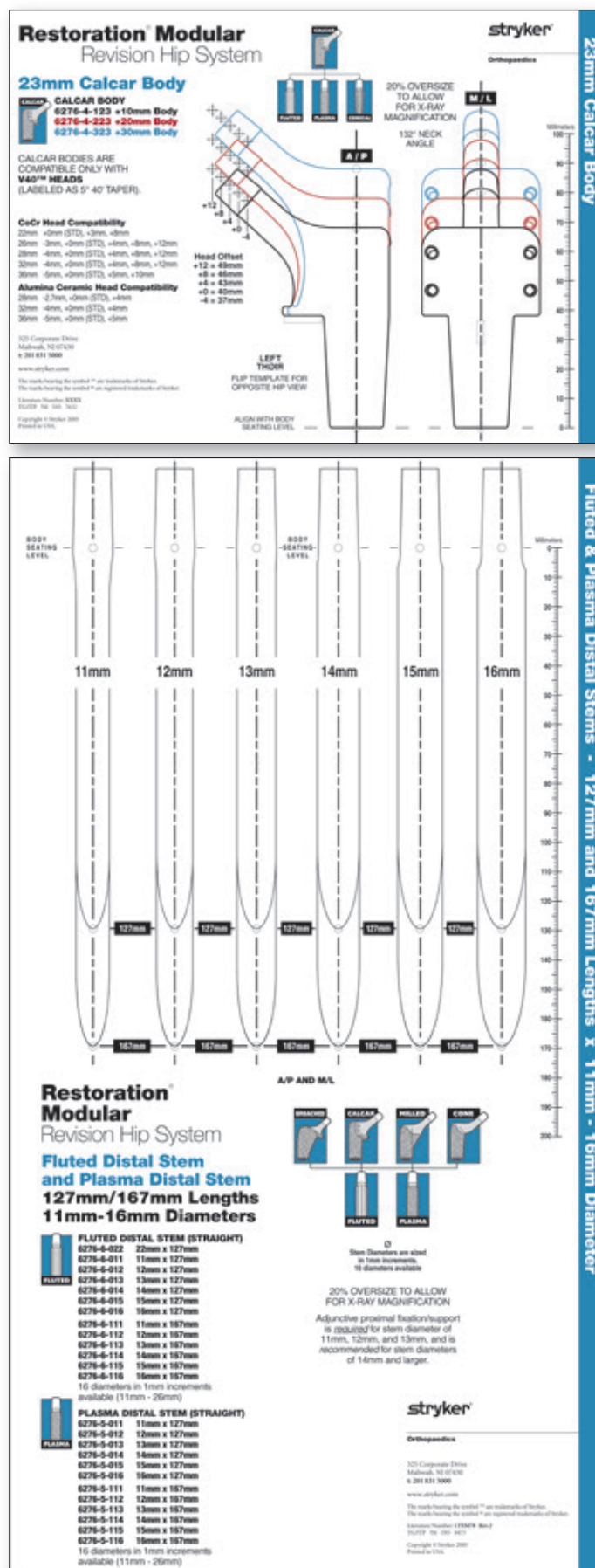
Preoperative planning is required for leg length planning, measuring the length of the existing prosthesis being revised, predicting the potential use and type of trochanteric osteotomy, the Calcar Body size and vertical offset, and the Fluted & Plasma Distal Stem diameter and length of the prosthesis to be implanted.

Anterior-Posterior (A/P) and Medial-Lateral (M/L) radiographs are necessary for X-ray templating. In cases of severe femoral compromise, a full A/P pelvic X-ray of the operative side as well as the contralateral side is helpful to assess the biomechanical requirements of the reconstruction. The lateral X-ray is informative in that it will show the anterior bow of the femur, which is useful when templating with the 127mm and 167mm straight stems, and the 167mm, 217mm, 267mm, and 317mm, bowed long stems.

First, position an acetabular template over the A/P radiograph, aligning the acetabular shell surface with the subchondral bone. Mark the center of rotation of the acetabulum indicated on the template.

Place the appropriate two-piece femoral template on the radiograph. Ensure that the distal length of the prosthesis will be sufficiently anchored in good cortical bone – this is generally two-to-three canal diameters below the tip of the existing implant or defect. The necessary proximal body height is selected to anatomically correct the leg length.

IMPORTANT: Adjunctive proximal fixation/support is for stem diameters of 11mm, 12mm, and 13mm, and is for stem diameters of 14mm and larger.



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Patient Selection

Proper implant selection is critical to the stability and longevity of the femoral stem implant in hip arthroplasty. Proper implant selection must consider design, fixation, and environmental variables including: patient weight, age, bone quality and size, activity level and preoperative level of health, as well as the surgeon's experience and familiarity with the implant device. Longevity and stability of the implant may be affected by these factors. Surgeons should advise patients of these factors.

The smaller sized femoral stem implants are intended for use in patients with smaller intramedullary femoral canals. Their geometry has been reduced to accommodate the anatomy of the smaller intramedullary femoral canal, which thereby decreases their fatigue-strength and load-bearing characteristics. Therefore, patients with high physical activity levels, poor bone quality, or who are overweight may be poor candidates for the smaller femoral implant stem.

Patients with high-activity level and/or higher weight patients are at greater risk for implant complications or failures. For patients with poor proximal bone quality, the use of supplemental adjunctive proximal fixation/support is advised for implant stability.

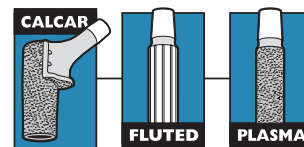
The surgeon must evaluate each situation carefully based upon the patient's clinical presentation before making any decisions regarding the selection of the implant.



A full range of implant sizes provides choice in selecting an implant to meet the specific demands of each patient.

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Determine the Approximate Implant Size

Note that the tip of the greater trochanter is approximately at the same level as the center of rotation of the femoral head. If no change in leg length is necessary, then the Calcar Body and femoral head center that is closest to the center of rotation marks the appropriate neck length, and femoral head offset required. If leg lengthening is required, choose the Calcar Body height and offset that places the center of the femoral head on the overlay above the center of rotation. If it is necessary to shorten the length of the femoral neck, then select the femoral head center below the center of rotation.

Once the proximal geometry has been determined, select the appropriate Fluted or Plasma Distal Stem diameter of the implant by establishing the region of the femoral cortices that appears to be perfectly defined or free from defects which will allow the implant to achieve 10cm - 12cm of suitable distal fixation. Determine also the length required to place the distal stem tip two-to-three canal diameters below the lowest distal defect.

IMPORTANT: Do not plan to use the +30mm Calcar Body or the +12mm Femoral Head preoperatively. Use the next larger diameter Fluted or Plasma Distal Stem in the same implant length so that additional vertical offset, neck length, and femoral head offset options are available for adjusting leg length intraoperatively.

IMPORTANT: Do not use the +16mm Femoral Head with any Restoration Modular Hip combination.

Patient Positioning and Surgical Approach

Revision total hip surgery presents challenges not seen in primary surgery. Therefore, each surgeon should position the patient and use the surgical approach for revision total hip arthroplasty with which he is most familiar. Patient positioning, prepping and draping, the skin incision, soft tissue dissection, and hip dislocation are performed according to the surgeon's preferred technique, making certain to adequately expose the acetabulum and femur as required by each revision situation.

There are also many femoral and trochanteric osteotomy techniques available to surgeons that assist in implant removal, overall reconstruction, and finally, postoperative management. The surgeon should use osteotomies that he is most familiar with and that best fit the challenge faced by each particular revision situation.

Note: To reduce the potential for femoral fracture, it is recommended that areas of defects in the femur are prophylactically cabled prior to reaming and stem insertion. Dall-Miles Beaded Cables work well to assist the surgeon in this step.



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Cement Removal

Implant removal and subsequent cement removal can be a challenging proposition. Surgeons should utilize methods they are most familiar with or are most appropriate for the many revision situations that may arise. The Gray Revision Instruments are helpful in removing the existing acetabular and femoral prostheses as well as bone cement if present.

After removal of the femoral component, the acetabular component is removed and the acetabulum is prepared. Cement and fibrous tissue still present in the femoral canal may be left to help minimize blood loss during acetabular preparation. After the acetabulum has been prepared, any remaining cement, fibrous tissue, or debris in the femoral canal may be removed and reaming begun.



Gray Revision Instruments

Calcar Neck Resection Guide

A Calcar Neck Resection Guide is available for those instances where a surgeon prefers to make the Calcar resection prior to distal femoral preparation. This method can be utilized in a primary surgery, or to excise additional bone in a revision scenario (Figure 1). Alternatively, the calcar resection can be accomplished after final distal reaming, using the Post Resection Cutting Guide (see related section on page 14).

The resection level should be identical to the level chosen during preoperative templating. There are four key features of the Neck Resection Guide (Figure 2):

1. The horizontal groove in the upper portion of the slotted area helps to reference the proximal tip of the greater trochanter. This is a good landmark that generally coincides with the center of rotation for the femoral head. Align the horizontal groove with the tip of the trochanter. The notches on the medial extension of the guide correspond with the head centers of the noted diameters.
2. The horizontal resection level slots provide a plane for marking the level of the cut, or can be used as a cutting surface for the saw blade. Determine the appropriate neck resection level (+10mm, +20mm, or +30mm).
3. The long tail of the guide is used for alignment with the femoral shaft axis. It is designed to be inserted under the soft tissues of the posterior aspect of the femur.
4. Mark the desired resection level by passing a sagittal saw blade through the resection guide. Remove the guide and complete the cuts ensuring that the proper cut angle is maintained.

Note: The total construct length including proximal Calcar Body and distal stem must be determined *PRIOR* to femoral preparation.

Figure 1

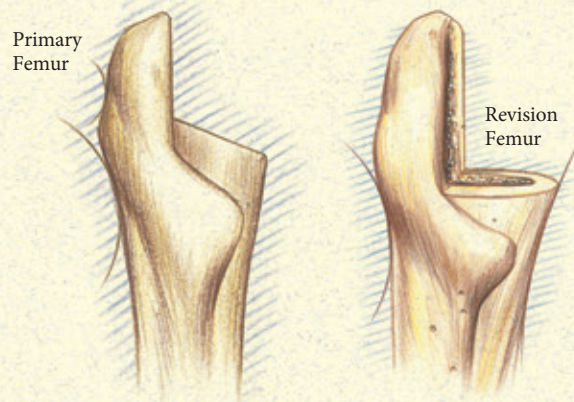
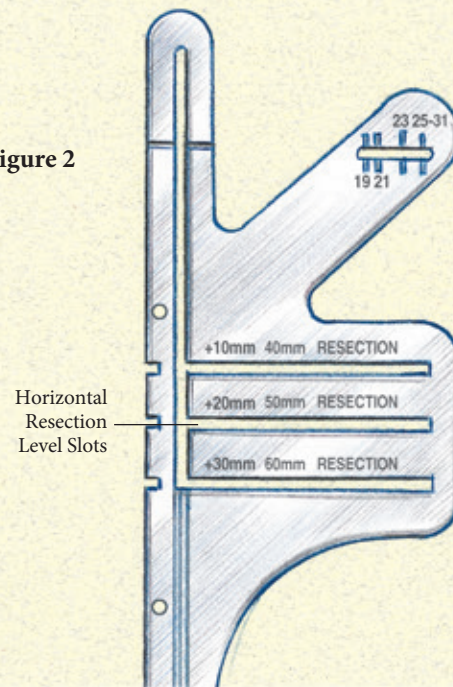
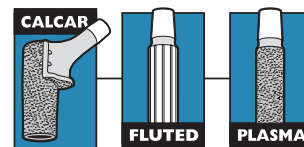


Figure 2



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Surgical Protocol



Box Chisel and Starter Awl

The Box Chisel may be used to open the proximal femur prior to use of the Starter Awl or in conjunction with the Starter Awl.

Box Chisel Use Prior to the Starter Awl

After the osteotomy has been performed, the Box Chisel is introduced into the anatomic axis of the femoral shaft (**Figure 3**). This will remove a wedge of bone at the medial base of the greater trochanter, helping to achieve neutral/lateral alignment of the Starter Awl.

Use of the Starter Awl and Depth Markings

The Starter Awl can be used by hand or on power. It is designed to open the femoral canal to a diameter of 9.5mm. Assemble the T-Handle or Power Reamer to the proximal end of the awl and target the piriformis fossa to open the canal. The awl is very sharp; therefore, care must be taken to centralize the awl within the femoral canal before reaming is started, avoiding extra osseous penetration with the tip (**Figure 4**).

There are two bold depth marking grooves on the Starter Awl (200mm and 240mm), and markings for the +10mm, +20mm, and +30mm resection levels. Measurement for depth insertion of the Starter Awl when used with all Calcar Body/Fluted & Plasma Distal Stems is at the tip of the greater trochanter.

Note: Since there is no +0mm (STD) Calcar Body, all reaming must reach a minimum depth of 210mm (200mm + 10mm on the reamer), or 250mm (240mm + 10mm on the reamer).

Figure 3

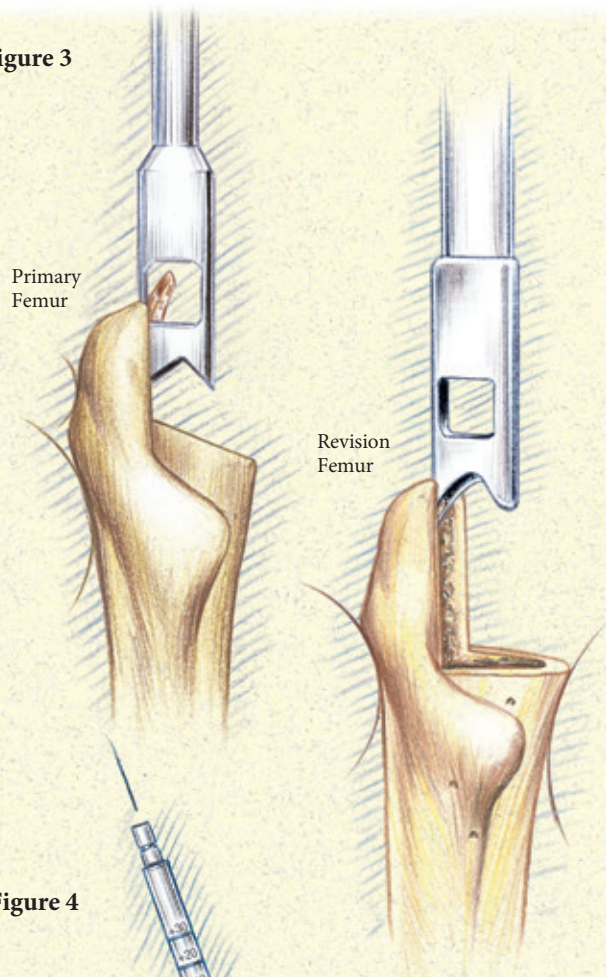
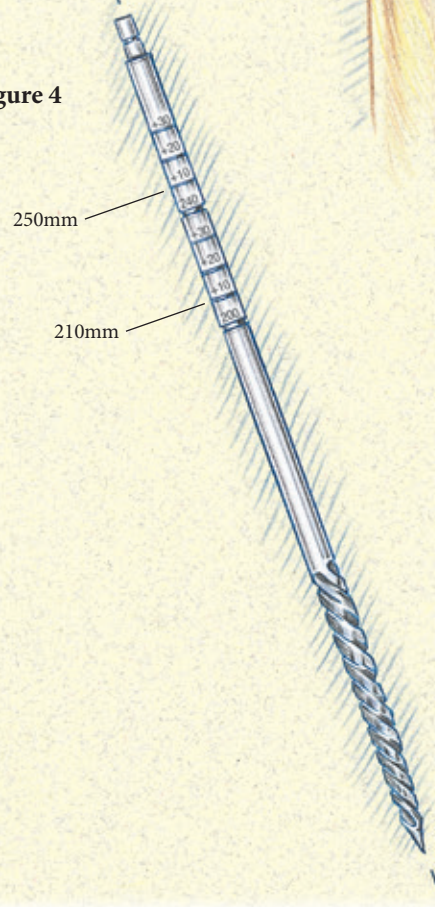


Figure 4



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Box Chisel and Starter Awl (continued)

Box Chisel Use With the Starter Awl

After the awl has been used to open the femoral canal, the T-Handle or Power Reamer is removed with the awl engaged in the isthmus of the femoral canal. The shaft of the awl may now be used as an axial guide coinciding with the long axis of the femur. The Box Chisel is cannulated so that it slides over the shaft of the awl, removing a wedge of bone at the medial base of the greater trochanter (Figure 5).

Reaming with the Cylindrical Distal Reamers progresses sequentially after use of the Starter Awl.

Note: To reduce the potential for femoral fracture, it is recommended that areas of defects in the femur are prophylactically cabled prior to reaming and stem insertion. Dall-Miles Beaded Cables work well to assist the surgeon in this step.

Clear Out Reamer Use

The Clear Out Reamer is used to open up the proximal portion of the canal when preparing for 11mm, 12mm, and 13mm cylindrical distal stems (both straight and bowed, Fluted or Plasma). The Clear Out Reamer is used after the Starter Awl and before the Cylindrical Distal Reamers (Figure 6). The function of this reamer is two-fold. First, it prepares the canal for the tapered junction of the 11mm, 12mm, and 13mm stems since the tapered junction diameter is slightly larger than 13mm. Second, it prepares the canal to accept the 19mm Proximal Cone Reamer.

The reamer is inserted into the canal until the correct depth marking on the shaft aligns with the tip of the greater trochanter. When preparing for the Calcar Body, the line corresponding to the preoperatively templated Calcar Body (+10mm, +20mm, or +30mm) should be aligned with the tip of the greater trochanter.

IMPORTANT: Adjunctive proximal fixation/support is required for stem diameters of 11mm, 12mm, and 13mm, and is recommended for stem diameters of 14mm and larger.

Figure 5

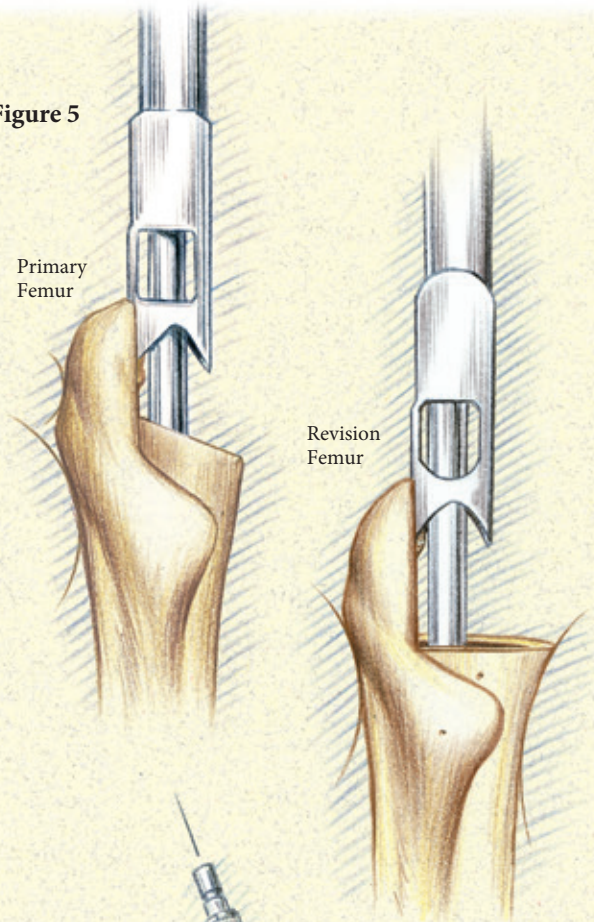
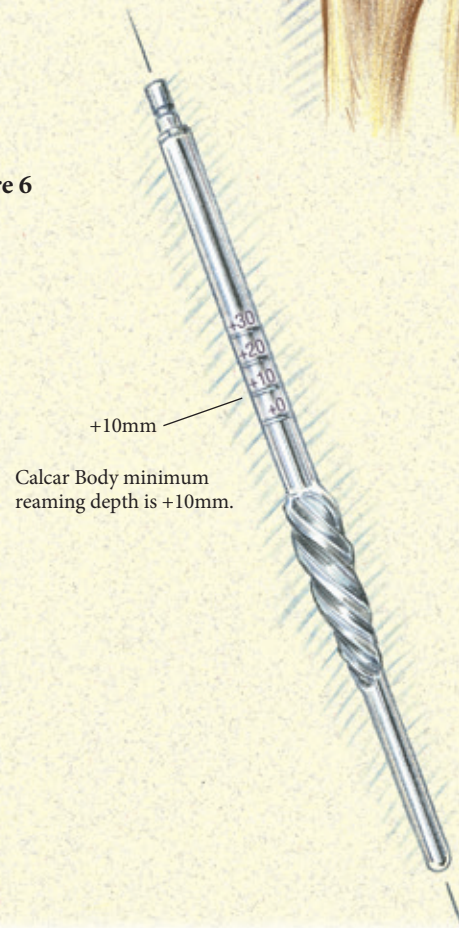
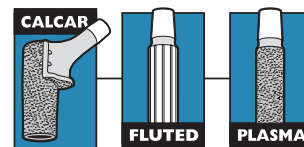


Figure 6



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Distal Reaming – Fluted & Plasma Straight Stems

Use of the Cylindrical Distal Reamer – 127mm & 167mm Straight Stems

Cylindrical distal reaming for the 127mm or 167mm Fluted & Plasma Straight Distal Stems can be accomplished by use of a T-Handle (Figure 7) or on power (Figure 8). Select the diameter of a Cylindrical Distal Reamer starting with a size two millimeters smaller than the templated size. The reamer diameters are available in 0.5mm increments from 10.0mm - 26.0mm. There are two bold depth marking grooves on the reamers, 200mm and 240mm, and markings for the +10mm, +20mm, and +30mm resection levels. Measure the distance from the tip of the greater trochanter to the tip of the 127mm and 167mm distal stems.

Note that the tip of the greater trochanter is approximately at the same level as the center of rotation of the femoral head. Therefore, the +10mm, +20mm, or +30mm depth markings must correspond to the distance from the center of a +0mm (STD) Femoral Head implant on the desired Calcar Body head center to the tip of the 127mm or 167mm Fluted & Plasma Distal Stems.

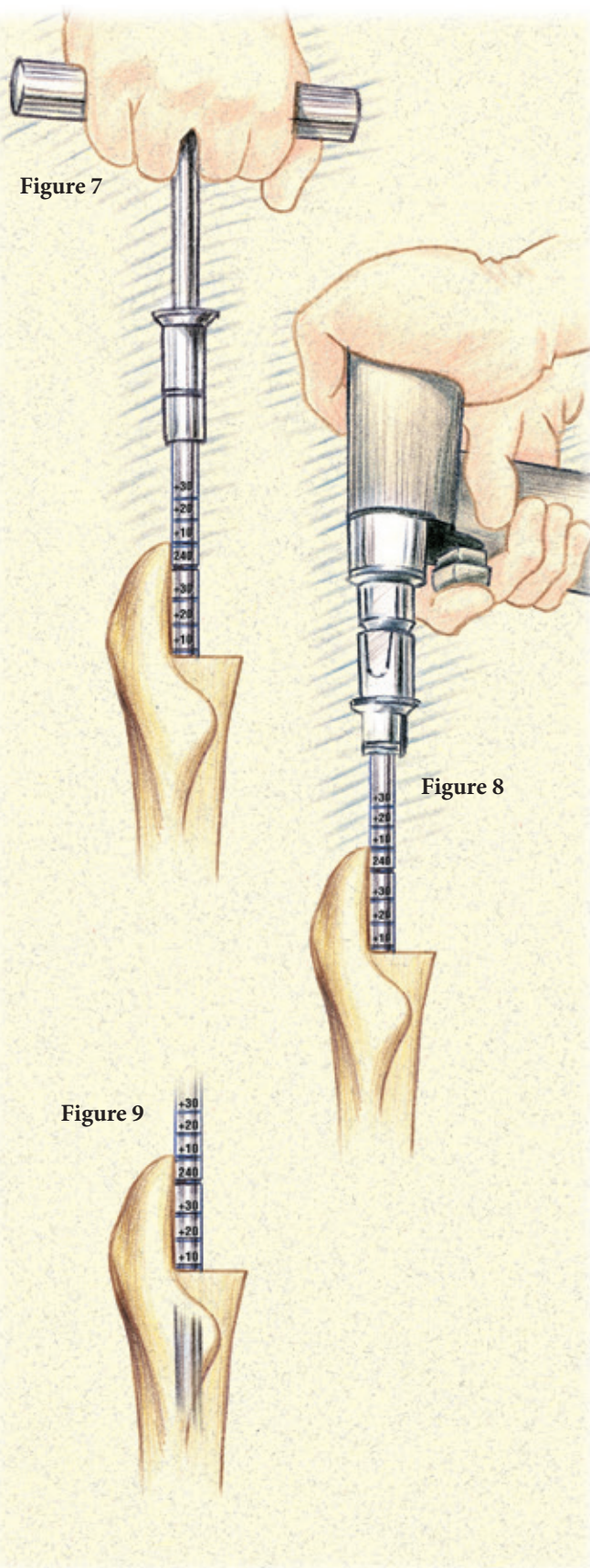
If the greater trochanter is off or not present, the measurements made during preoperative templating are necessary to determine the approximate location of the greater trochanter or head center. Alternately, measurements may be taken from an X-ray of the contralateral side.

Ream until the desired stem length depth groove aligns with the tip of the greater trochanter, or other landmark as planned during preoperative templating (Figure 9).

Note: Depending on bone quality and surgeon preference, the surgeon may choose to ream line-to-line, or under-ream for the Fluted & Plasma Distal Stems. If under-reaming, the final reamer size should be .5mm to 1mm smaller than the desired stem diameter.

Note: For the 127mm Straight Fluted or Plasma Distal Stems, reaming to at least 210mm (200mm + 10mm) is recommended.

Note: For the 167mm Straight Fluted or Plasma Distal Stems, reaming to at least 250mm (240mm + 10mm) is recommended.



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Distal Reaming – Fluted & Plasma Straight Stems (continued)

Use of the Cylindrical Distal Reamer – 127mm & 167mm Straight Stems (continued)

Progressively ream until resistance accompanied by cortical chatter is encountered. The reamers must be advanced into the femoral canal until the appropriate depth markings align with the tip of the greater trochanter, or approximate center of rotation.

If good cortical contact is not achieved, increase the reamer diameter in 0.5mm increments. Ensure that reaming depth meets preoperatively templated total construct length (210mm, 220mm, 230mm, 250mm, 260mm, 270mm).

Note: Intraoperative X-rays are valuable to gauge the position of the distal end of the Cylindrical Distal Reamers relative to the anterior bow of the femur.

Use of Flexible Reamers – 167mm, 217mm, 267mm & 317mm Bowed Long Stems

Flexible Reamers are used to prepare the distal canal to accept the anteriorly Bowed Fluted or Plasma long stem implants - 167mm, 217mm, 267mm, and 317mm (Figures 10 and 11). To determine the appropriate size Flexible Reamer, it is necessary to know the distal stem diameter planned for preoperatively. Select the diameter of a Flexible Reamer starting with a size two millimeters smaller than the templated size.

Note: It is important to use Flexible Reamers that are available in 0.5mm increments only. Flexible Reamers should always be used with a guide wire for guidance and removal in the event the reamer becomes lodged.

Reaming should progress sequentially up by 0.5mm increments under power to the closest reamer size corresponding with the stem size indicated for the patient. Ream until resistance accompanied by cortical chatter is encountered and the appropriate stem length depth is also achieved. In some instances, the curvature of the prepared canal may prevent the prosthesis from seating properly. At this point, the surgeon may choose to additionally ream 1mm to 2mm greater than the distal diameter of the intended stem. The full size Flexible Reamers correspond to the stem diameters of the Fluted & Plasma Distal Stems. Review charts on page 3 for all stem sizes.

Figure 10

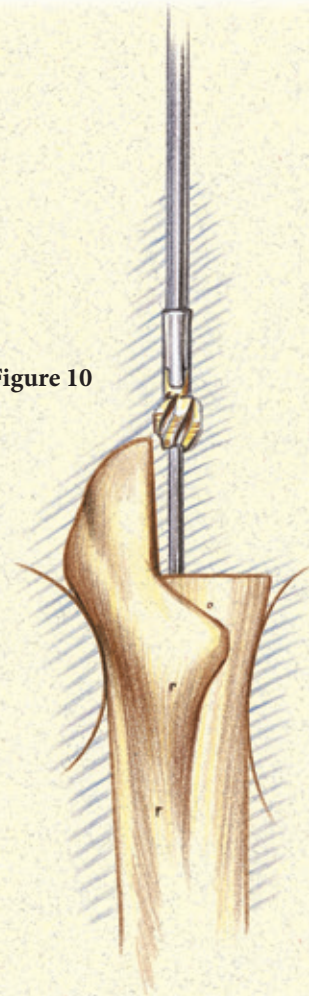
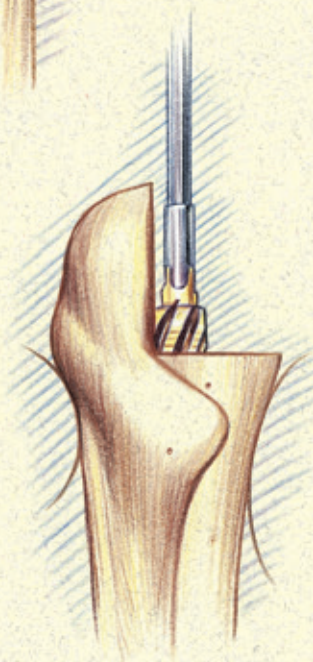
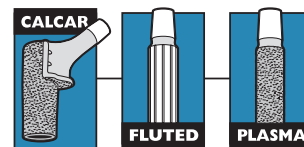


Figure 11



Restoration® Modular

Surgical Protocol



Preparing for the Calcar Body

Insertion of Proximal Cone Reamer

The Calcar Bodies are prepared by Proximal Cone Reamers which are available in 7 diameters: 19mm, 21mm, 23mm, 25mm, 27mm, 29mm, and 31mm. These diameters are measured at the most proximal level of the coating on the medial side of the Calcar Body implant.

Two methods of reaming with the Proximal Cone Reamers are available, depending upon the Calcar resection technique utilized.

Note: If a calcar resection was made using the Calcar Resection Guide, the depth groove of the Cone Reamer that aligns with the tip of the greater trochanter should correspond to the calcar resection cut made during femoral preparation; i.e., a +10mm calcar resection must correspond to a +10mm Proximal Cone Reamer depth marking (refer to Neck Resection, page 8).

Method 1 – Straight Stem

Attach the Proximal Cone Reamer to a power source and advance it over the final Cylindrical Distal Reamer (Figure 12). Starting with the 19mm Proximal Cone Reamer, commence proximal preparation for the Calcar Body. Make note of the +10mm, +20mm, and +30mm reamer grooves, using the tip of the greater trochanter as the stopping point, since this will dictate the Calcar Body height to be used (Figure 12A). If another landmark is used, note that the Proximal Cone Reamer grooves generally correspond with the femoral head center.

Note: You *MUST* ream to at least the +10mm Proximal Cone Reamer depth marking.

Method 2 – Bowed Stem

Insert the Fluted or Plasma straight or bowed Distal Stem to its appropriate seating level (refer to Distal Stem Insertion, page 17). Attach the Calcar Reamer Guidepost, and tighten with the 5mm Hex Driver. Attach the Proximal Cone Reamer to a power source, and advance it over the Calcar Reamer Guidepost (Figure 13). Begin reaming with the 19mm Proximal Cone Reamer. Commence proximal preparation for the Calcar Body. Advance the Cone Reamer over the Guidepost until it bottoms out on the post and it is impossible to advance the reamer further - visualize this by aligning the Alignment Groove on the Guidepost with the Alignment Groove on the Reamer or view the top of the proximal slot, which when fully seated, will show no gap between the reamer and Guidepost (Figure 14).

Note: The predetermined head center marking on the Proximal Cone Reamer will generally align with the tip of the greater trochanter.

Proximal Cone Reaming progresses in 2mm increments until satisfactory contact within the trochanteric region is felt. Make note of the +10, +20, +30 reamer grooves, since this will determine the Calcar Body height to be used. At this point, the surgeon has the option of performing a trial reduction or inserting the final implants.

Figure 12

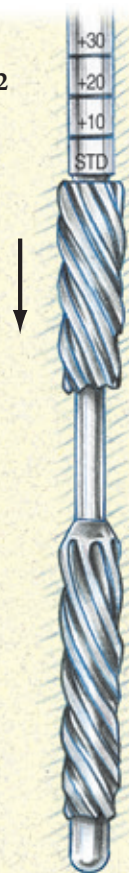


Figure 12A



Figure 13



Figure 14



WARNING: Failure to fully seat the Calcar Reamer Guidepost, or failure to fully bottom out the Proximal Cone Reamer on the Guidepost, may prevent proper preparation of the bone for the Calcar Body.

Restoration® Modular

Surgical Protocol

Calcar Post Resection Cutting Guide

As an alternative to neck resection using the Neck Resection Guide, the calcar resection can be prepared over the final distal reamer with the use of the Post Resection Cutting Guide, or over a fully implanted stem using the Calcar Guidepost.

Note: It is recommended that the calcar resection be done over the distal reamer at its final depth for the straight stems (127mm, 167mm). For longer bowed stems (167mm, 217mm, 267mm, 317mm), the resection should be done over a fully implanted stem.

Method 1 – Straight Stems

Two Post Resection Guides allow for left/right hip anatomy and surgical approach. Choose the Post Resection Guide so that the medial side of the A/P adjuster arm is positioned medially (Figure 15).

Slide the appropriate Post Resection Guide over the final distal reamer until an audible and tactile click at the 200mm or 240mm standard mark, depending on desired stem length, is heard and felt (Figure 16). The +10, +20, +30 Ring Groove markings must align with the +10, +20, +30 marking on the reamer. Slide the Calcar Resection Cutting Block over the A/P adjuster bar. The cutting block will click into place in one of several grooves. Adjust the A/P Calcar Resection Block by choosing the groove that is appropriate for the resection.

Adjust the version of the Calcar Resection Assembly on the reamer shaft. Tighten the ring adjuster firmly with the thumbscrew (Figure 17).

Use the sagittal saw to cut through the vertical and horizontal slots (Figure 17). Ensure the vertical cut clears the top of the greater trochanter.

Note: The saw blade may come in contact with the reamer shaft or post resection assembly.

Remove the Post Resection Assembly and reamer from femur. Complete the vertical and horizontal cuts through the femur.

Note: A complete cut through the femur cannot be accomplished until you remove the reamer shaft.

Figure 15

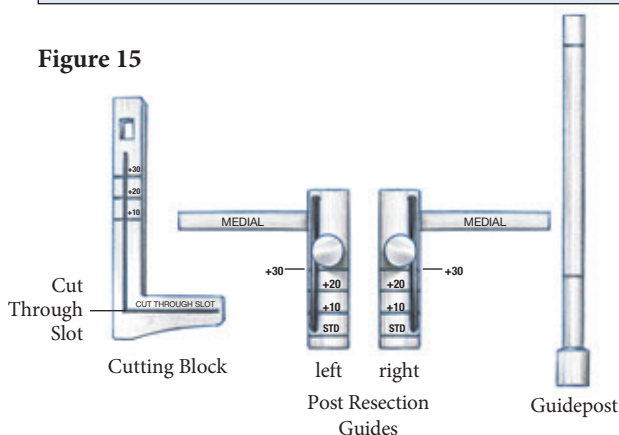


Figure 16

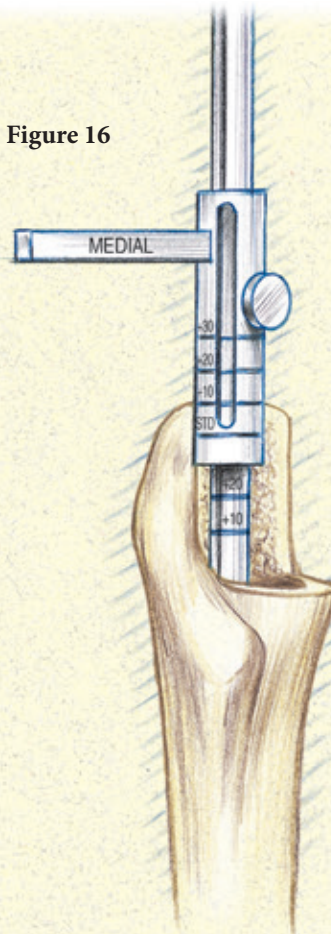
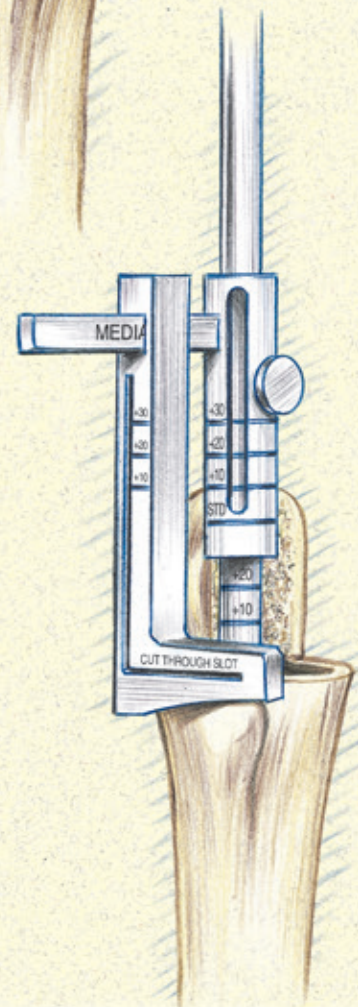
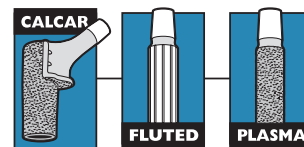


Figure 17



Restoration® Modular

Surgical Protocol



Calcar Post Resection Cutting Guide (continued)

Method 2 – Bowed Stems

Insert the Fluted or Plasma Bowed Distal Stem to its final seating level (refer to Insert the Distal Stem, page 17). Attach the Calcar Resection Guidepost.

IMPORTANT: Note the final seating level of the implanted distal stem, this will determine the calcar resection level. Ideally, this should correspond to the preoperatively templated construct.

Two Post Resection Guides allow for left/right hip anatomy and surgical approach. Choose the Post Resection Guide so that the medial side of the A/P adjuster arm is positioned medially (Figure 15).

Slide the appropriate Post Resection Guide over the Calcar Resection Guidepost until an audible and tactile click at the most distal groove is heard and felt (Figure 18). Slide the cutting block over the A/P adjuster arm into one of the grooves that is appropriate for the resection (Figure 19).

Adjust the version of the Calcar Resection Assembly on the Guidepost. Tighten the ring adjuster firmly with the thumbscrew.

Use the sagittal saw to cut through the vertical and horizontal slots (Figure 19). Manually control the version of the Post Resection Guide to achieve the desired resection. Ensure the vertical cut clears the top of the greater trochanter.

Note: The saw blade may come in contact with the Guidepost or Post Resection Assembly.

Remove the Post Resection Assembly and reamer from femur, and complete the vertical and horizontal cuts through the femur.

Note: A complete cut through the femur cannot be accomplished until the Guidepost is removed.

Figure 18

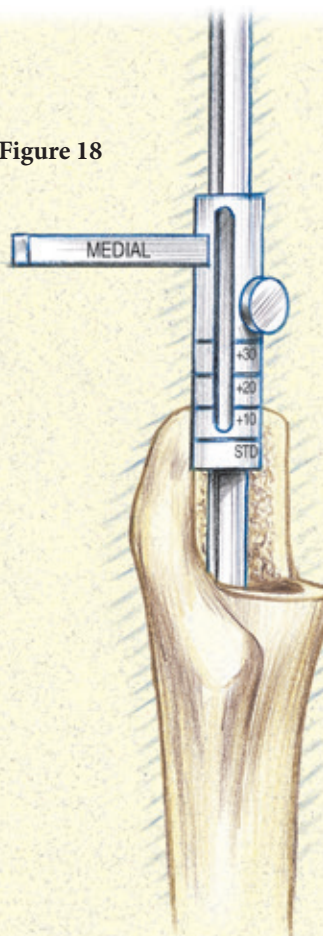
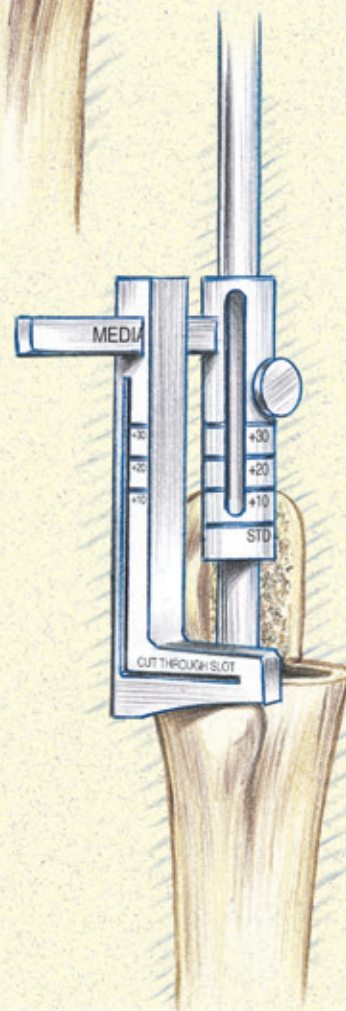


Figure 19



Restoration® Modular

Surgical Protocol

Trial Reduction–Calcar Body Trials with Fluted & Plasma Distal Stem Trials

Trial Reduction with Calcar Body Trial and Distal Stem Trials – Optional

Once calcar resection, cylindrical distal and proximal cone reaming has been accomplished, a Calcar Body Trial can be assembled to the 127mm or the 167mm Straight Distal Stem Trial or 167mm, 217mm, 267mm, or 317mm Bowed Distal Stem Trial, to assess fit of the proximal and distal components (Figure 20).

The Calcar Body Trial offers a slightly undersized fit to the Calcar Body implant. The 127mm and 167mm Straight Distal Stem Trials offer a slight (1mm) oversize (spline) portion to assist in stabilization during trial reduction - the remainder of the trial is line-to-line, i.e., 16mm reamer = 16mm trial.

The Bowed Distal Stem Trials (167mm, 217mm, 267mm, 317mm) are available in whole 1mm increments.

For Fluted Distal Stems, they match the actual stem diameter measured at the outside of the flutes. For Plasma Distal Stems, the trials are slightly undersized.

Note: The Bowed Distal Stem Trials do not have the oversized spline portion.

Assemble Calcar Body Trial to Straight Distal Stem Trial

Position the appropriate Calcar Body Trial with the integral locking bolt onto the distal stem trial. Tighten the locking bolt with the 8mm Hex Driver, Version Control Stem Inserter, or Distal Stem Inserter (Figure 21). Excessive torque is not required when tightening. Insert into the femur and assess distal and proximal fit, leg length, range of motion, etc.

At this point, the final implants are ready for insertion.

Trial Reduction with Bowed Trials

The Calcar Body Trials/Bowed Distal Stem Trials are available to evaluate prosthetic stem size, biomechanical function, and implant stability prior to final insertion of the bowed stem implants. Optional Bowed Stem Trials are not necessarily identical in size and shape to the intended prosthesis and thus can only provide an estimation of the distal fit of the intended stem. The Bowed Stem Trials are inserted with the Version Control Stem Inserter or Distal Stem Inserter (Figure 22).

At this point, the final implants are ready for insertion.

Note: The bowed femoral canal, which is prepared by flexible reamers, may be slightly mismatched to the bow of the prosthesis.

Figure 20

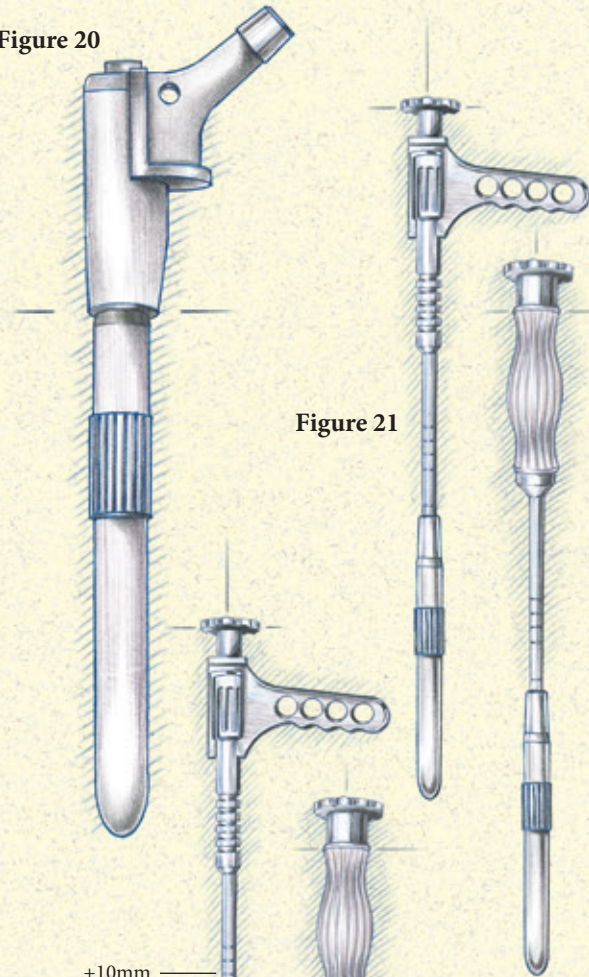


Figure 21

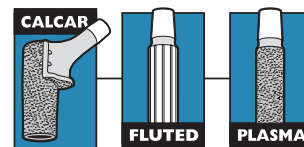
+10mm

Figure 22

+10mm

Restoration® Modular

Surgical Protocol



Implant Insertion – Version Control Stem Inserter & Distal Stem Inserter with Fluted & Plasma Distal Stems

Distal Stem Insertion

There are two options for inserting distal stems, the Version Control Stem Inserter (**Figure 23**) and the Distal Stem Inserter (**Figure 24**).

The Version Control Stem Inserter has a removable sleeve which can be used for distal stem impaction (alone) or impaction of the proximal body and distal stem together. This feature is especially useful when impacting a long, bowed distal stem with a Calcar Body. The two components are held independent of each other (separated by 3mm - 5mm) upon impaction. This allows the distal stem to rotate freely upon impaction and give the surgeon the option of placing the Calcar Body in the most appropriate anteversion required for the patient. See page 21 for more details on this inserter.

The stem inserters are used only for distal stem impaction.

Thread the appropriate Fluted or Plasma Distal Stem onto either the Version Control Stem Inserter or the Distal Stem Inserter (**Figure 25**). The distal end of each inserter has a hex geometry with a spring-loaded threaded end that mates with a corresponding hex geometry on the stem. Make sure that the distal tip of the chosen inserter is correctly aligned with the hex orientation feature of the insertion hole of the implant. Fully and securely attach the instrument to the distal stem by turning the locking knob clockwise.

Insert the Distal Stem

Impact the stem until the desired calcar resection depth is reached. The top three markings on the inserter correspond with the +10mm, +20mm, and +30mm resection levels. (**Note: The +10 is the second groove up from the bottom.**)

Note: Preoperative planning should have ensured that the tip of the distal stem will pass any distal defects by two to three canal diameters and will have 10cm - 12cm satisfactory mechanical stability. Make sure that sufficient distal fixation is attained with all Fluted or Plasma Distal Stems, especially those that are significantly larger than the templated stem size.

Note: The final implanted stem depth *MUST* correspond to the desired predetermined calcar resection level.

Figure 23

+10mm
+10mm level
to be used

Figure 24

+10mm
+10mm level
to be used

Figure 25

Restoration® Modular

Surgical Protocol

Implant Insertion – Fluted & Plasma Distal Stems (continued)

Fluted Distal stems

Impact the Fluted Distal Stem into the femoral canal until the stem achieves rotational stability and is positioned at the desired seating level corresponding to the appropriate calcar resection level (+10mm, +20mm, +30mm) on the impactor. The Fluted Distal Stem offers limited axial stability, so it is important to stop inserting the stem upon reaching the desired Calcar Body resection level (+10mm, +20mm, or +30mm) (**Figure 26**).

Plasma Distal Stems

Impact the Plasma Distal Stem into the femoral canal until the stem achieves rotational stability and axial stability and is positioned corresponding to the appropriate calcar resection level (+10mm, +20mm, +30mm) on the impactor.

Note: The depth groove of the Distal Stem Inserter must correspond to the measurement taken during preoperative templating.

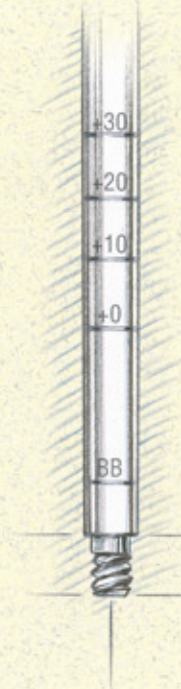
The Fluted or Plasma Distal Stem may advance further into the canal than originally templated and reamed. If this occurs, one of the following techniques may be suitable.

- Remove the stem and ream to the next higher diameter.
- Impact the stem to the next calcar resection level and reattach Calcar Guidepost and resect using Post Resection Guide.

If the distal stem advances beyond the +30mm Calcar Body level, ream up with the distal reamers until rotational (and axial) stability is achieved. Perform a trial reduction and insert the corresponding distal diameter stem.

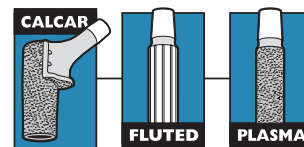
Note: The Calcar Body and straight Fluted or Plasma Distal Stem combination may be assembled and impacted together on the back table prior to insertion into the femur. Back table assembly with a Bowed Stem/Calcar Body construct is not recommended.

Figure 26



Restoration® Modular

Surgical Protocol



Calcar Body Trial – Fluted & Plasma Distal Stems

Assemble the Appropriate Calcar Body Trial to Cylindrical Distal Stem

Select the Calcar Body Trial corresponding to the previously made resection cut and final proximal Cone Reamer diameter. Assemble the 8mm Hex Locking Bolt Driver Shaft to the T-Handle. Position the appropriate Calcar Body Trial with the integral locking bolt onto the distal stem. Determine the appropriate version for the trial and then tighten the locking bolt with the 8mm Hex Locking Bolt Driver assembly or the Distal Stem Inserter (**Figure 27**). Excessive torque is not required when tightening (**Figure 28**).

Attach Head Trial

Select the head diameter according to surgeon preference. The Femoral Head Trials have a circumferential groove, which identifies the level of the center of rotation. Select the appropriate Femoral Head Trial based on preoperative templating from the chart below or surgical need. Attach the Femoral Head Trial to the Calcar Body Trial (**Figure 29**). The head center of the +0mm (STD) Head Trial, when attached to the implant construct, should correspond with the tip of the greater trochanter.

Head	Head Size	Head Offsets
CoCr V40	22	+0, +3, +8
	26	-3, +0, +4, +8, +12
	28	-4, +0, +4, +8, +12
	32	-4, +0, +4, +8, +12
	36	-5, +0, +5, +10
	40	-4, +0, +4, +8, +12
	44	-4, +0, +4, +8, +12
Alumina V40	28	-2.7, +0, +4
	32	-4, +0, +4
	36	-5, +0, +5
Alumina C-Taper (when used with C-Taper Adaptor Sleeve-catalog #17-0000E)	28	-2.5, +0, +5
	32	-2.5, +0, +5
	36	-5, +0, +5
delta BIOLOX V40	28	-4, -2.7, +0, +4
	32	-4, +0, +4
	36	-5, -2.5, +0, +2.5, +5, +7.5
delta Biolox C-Taper (when used with C-Taper Sleeve - catalog #17-0000E)	28	-2.5, +0, +2.5, +5
	32	-2.5, +0, +2.5, +5
	36	-5, -2.5, +0, +2.5, +5, +7.5
delta Biolox Universal Taper (when used with Universal Taper Sleeve - catalog #6519-T-XXX)	28	-2.5, +0, +4
	32	-2.5, +0, +4
	36	-2.5, +0, +4
	40	-2.5, +0, +4
	44	-2.5, +0, +4

Figure 27

Figure 28

Figure 29

Figure 30

Trial Reduction

Perform a trial reduction and assess the hip for stability, leg length, and overall range of motion. Adjust the Calcar Body Trial and Head Trial as necessary to achieve maximum joint stability. Mark the desired anteversion on the bone with methylene blue or with a Bovie, in line with the neck. Carefully remove the Head Trial and Calcar Body Trial.

If additional leg length is required, a longer body may be used.

Additionally, if the trial reduction indicates that a Femoral Head with a “skirt” is required, it may be possible to increase the body height by 10mm and use a shorter Femoral Head to produce an equivalent neck length without using a “skirted” Femoral Head. This may be beneficial in increasing range of motion.

Note: If the Calcar Body Trial becomes fixed in the canal, it may be removed with a bone hook or Trial Body Removal Device (Figure 30).

Restoration® Modular

Surgical Protocol

Calcar Body Impaction

Calcar Body Impaction

Based on the trial reduction, select the appropriate size Calcar Body implant. Lavage the area surrounding the proximal taper of the distal stem. Wipe the cylindrical distal stem trunnion clean, and align the neck and trunnion of the Calcar Body implant with the methylene blue marking or Bovie mark, indicating the desired anteversion on the distal stem trunnion. Attach the Proximal Body Impactor to the Calcar Body (**Figure 31**) and impact the Calcar Body implant onto the trunnion of the cylindrical distal stem maintaining proper anteversion. The impaction of the Calcar Body onto the trunnion of the cylindrical distal stem cold-welds the tapers, locking the components together (**Figure 32**).

Figure 31

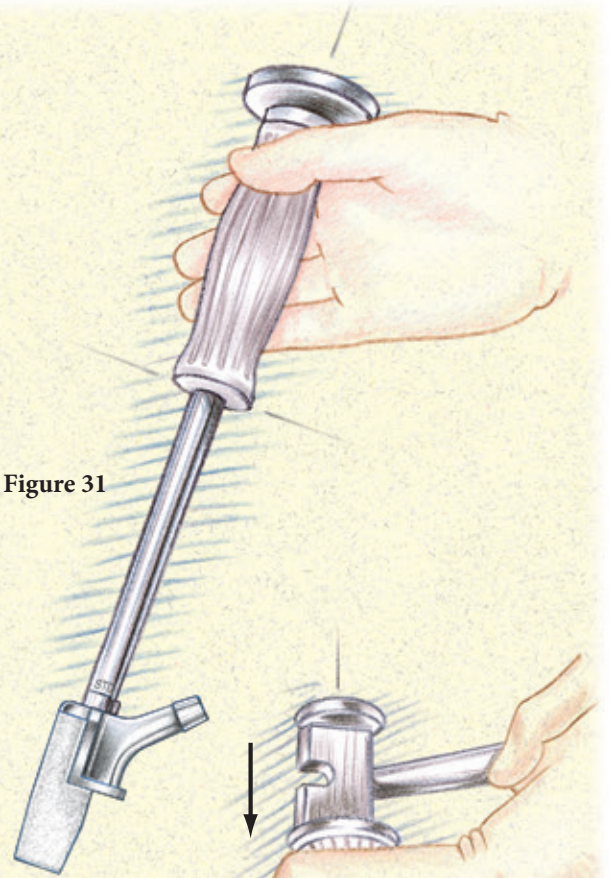
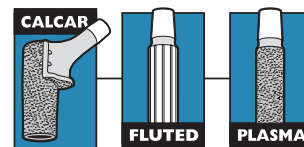


Figure 32



Restoration® Modular

Surgical Protocol



Implant Insertion

Assemble Implants onto the Version Control Stem Inserter – Optional

Attach the Calcar Body onto the Proximal Impactor and lock it into the correct position on the Version Control Stem Inserter. The three highest positions correspond to the +10mm, +20mm, and +30mm Calcar Bodies respectively. When the Proximal Impactor is locked into the correct position it maintains a short gap (approximately 3mm - 5mm) between the Calcar Body and distal stem tapers. Next, load the distal stem onto the tip of the Version Control Stem Inserter. Fully and securely attach the instrument to the distal stem with the thumb-wheel locking knob or hand knob clockwise.

Insert the Calcar Body and Distal Stem – Optional

The Version Control Stem Inserter allows independent control of both the proximal Calcar Body and distal stem during insertion (**Figure 33**).

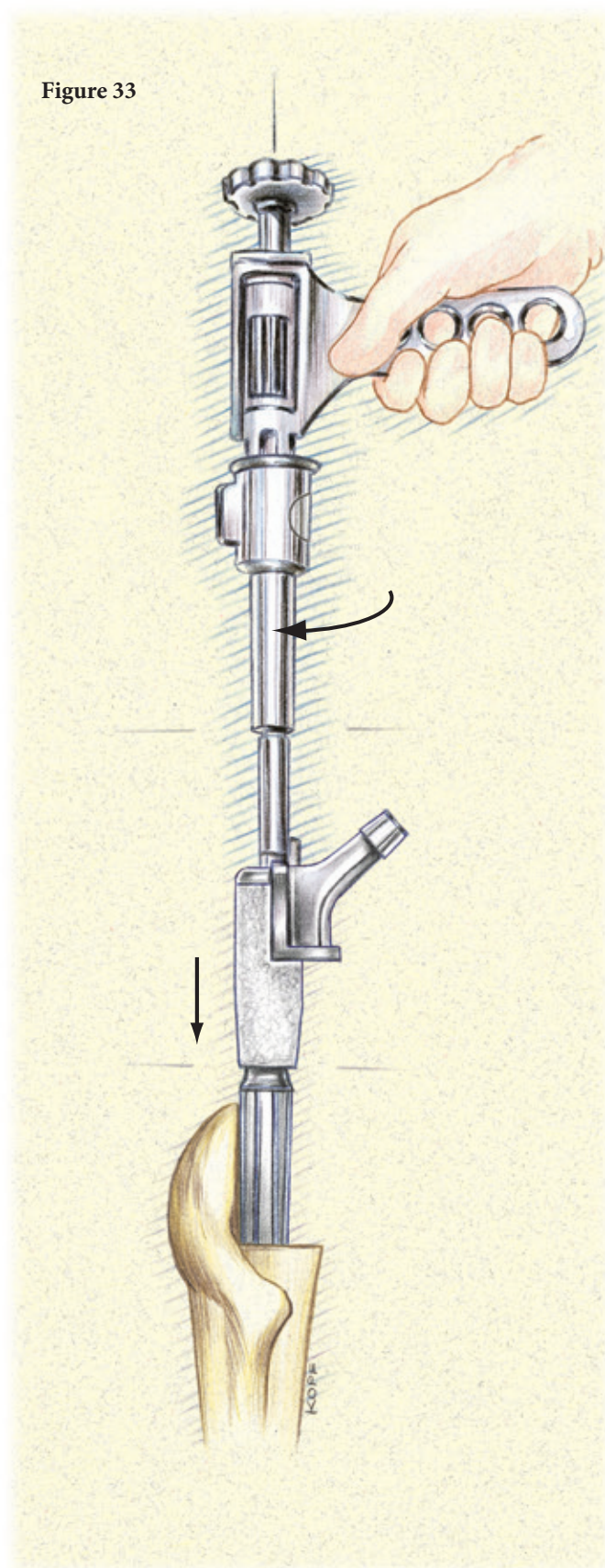
As the construct is impacted, the handle of the Version Control Inserter Body controls the version of the distal stem while the grip of the Proximal Impactor independently controls the version of the proximal body. Impact the components into the femoral canal until the Calcar Body lies approximately 1cm - 2cm proud of its final seating position. Detach the Version Control Stem Inserter from the distal stem and remove the instrument while simultaneously depressing the button on the Proximal Body Impactor. Impact the Proximal Body Impactor with a mallet to lock the proximal body and distal stem taper and drive the assembly to the final seating position.

If the Version Control Stem Inserter is utilized without the Proximal Body Impactor to seat the distal stem, the corresponding Calcar Body height marking should align with the tip of the greater trochanter.

IMPORTANT: Do not fully seat the final implant before setting rotation; make a final assessment and then secure the body to the stem.

IMPORTANT: Insert and tighten the Locking Bolt after the construct has been fully impacted into the femur.

Figure 33



Restoration® Modular

Surgical Protocol

Taper Lock Gauge

Taper Lock Gauge

After the Calcar Body has been impacted onto the distal stem, the Taper Lock Gauge can be used to assess proper engagement of the body with the stem. Insert the Taper Lock Gauge through the proximal body until it is seated on the distal stem (**Figure 34**). Slide the handle down until it is fully seated in the proximal body (**Figure 35**). The slotted indicator on the top of the handle will align within the groove corresponding to the Calcar Body height implanted (+10mm, +20mm, +30mm) (**Figure 36**).

Note: If the indicator is outside the corresponding groove, it may be necessary to further impact the body, or re-ream the proximal femur to clear out any bone stock that may interfere with the body properly seating on the stem.

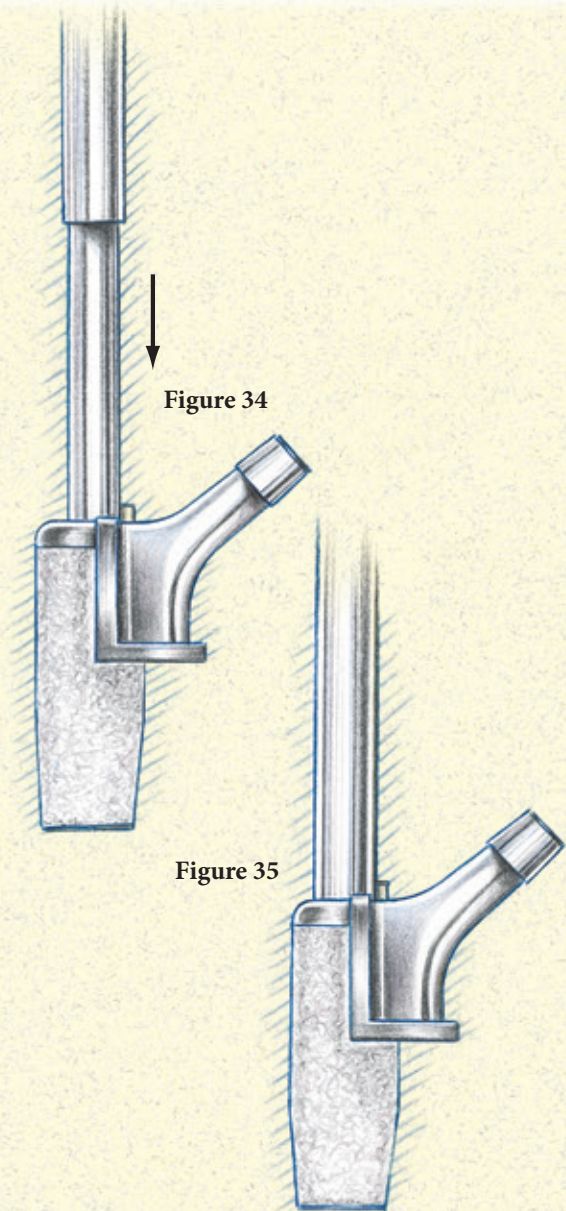
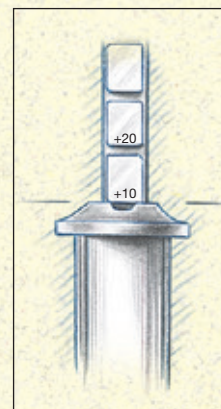
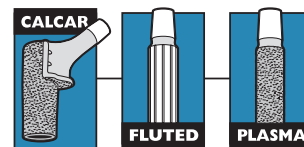


Figure 36



Restoration® Modular

Surgical Protocol



Locking Bolt Assembly and Tightening

Locking Bolt Assembly and Tightening

Place the Locking Bolt into the Calcar Body and tighten the Locking Bolt with the 5mm Hex Locking Bolt Driver assembly (Figure 37). Assemble the Torque Wrench and Torque Wrench Adapter, and apply a minimum load of 150in-lb and a maximum load of 180in-lb torque to ensure that the Locking Bolt is sufficiently tightened (Figure 38). The Calcar Body Steady Handle must be used to hold the anteversion of the Calcar Body in place while applying torque. The Steady Handle counter balances the torque applied to the bolt to ensure that only the implant and not the femur is torqued.

IMPORTANT: For the Calcar Bodies, when the body and stem tapers are fully engaged, the entire head of the locking bolt will be seen 1mm-2mm above the shoulder of the Calcar Body (Figure 39).

Note: The Fluted & Plasma Distal Stems have Spirallock threads that will not loosen if the Locking Bolt is sufficiently tightened. The Spirallock thread form reduces vibration loosening, provides a more uniform load distribution, reduces stress concentration, reduces fatigue failure, and eliminates the need for additional locking devices such as end caps.

Bone Grafting

Femoral deficiencies should be planned for and appropriately addressed as discussed in the preoperative planning part of this protocol. If the femoral cortex above the diaphyseal stem fixation point is deficient, the surgeon should be prepared to apply cortical strut grafts to repair and strengthen the femur.

Figure 37

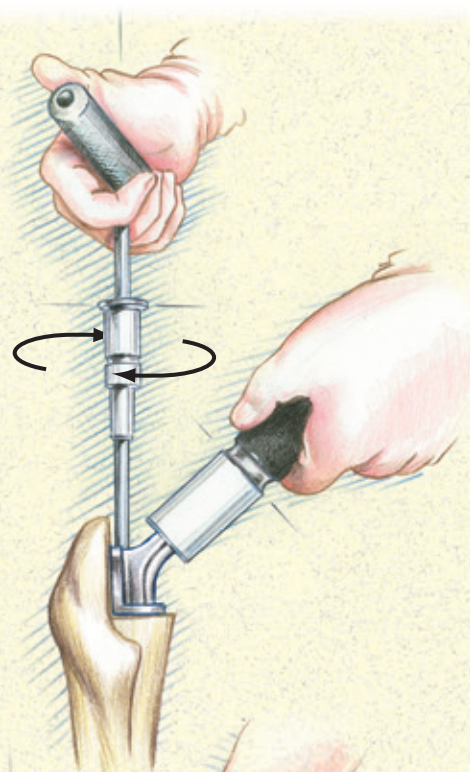


Figure 38

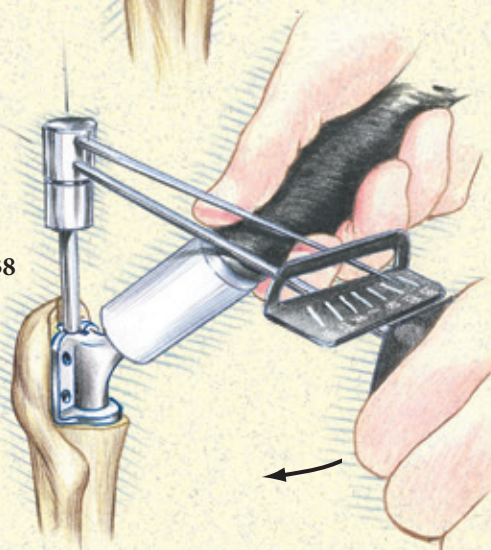
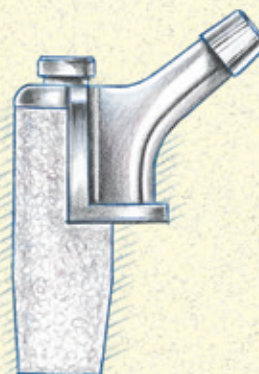


Figure 39



Restoration® Modular

Surgical Protocol

Preparing for Cable Use

Preparing for Cable Use

Each Calcar Body has holes fitted with Cobalt-Chrome bushings that allow the use of Dall-Miles 2.0mm Beaded Cables to pass through the vertical flanges of the body. The +10mm Calcar Body has four available holes, and the +20mm and +30mm Calcar Bodies have six. The Dall-Miles Recon and Trauma Cable System provides the surgeon with a means of achieving trochanteric reattachment and a variety of methods for cerclage fixation.

The most proximal holes are angled upward and outward, while the remaining sets of holes are only angled outward, to allow for cabling to pass around the greater trochanter. Additionally, drill guides may be used to prepare the bone to allow cables to pass through the bone.

Drilling may be performed either medially using the Calcar Drill Guide, or laterally using the Lateral Drill Guide.

IMPORTANT: Do not use Non-Beaded Cables with the Calcar Body. A Beaded Cable is required for each hole used. Cables should NEVER be wrapped around the implant body or neck.

Method 1 – Medial Preparation

Preparation from the medial to the lateral side is performed using the Calcar Drill Guide and a 2.2mm drill. Place the tip of the 2.2mm drill into the Calcar Drill Guide (**Figure 40**). Be sure to keep the drill away from the neck of the implant. Insert the drill guide until the tip seats in the hole (**Figure 41**). Drill through the holes and completely through the bone on the lateral side of the implant, ensuring that the proper drilling angle is achieved (**Figure 42**). Pass the non-beaded side of the cable through the hole from the medial side of the implant to the lateral side of the bone.

Figure 40

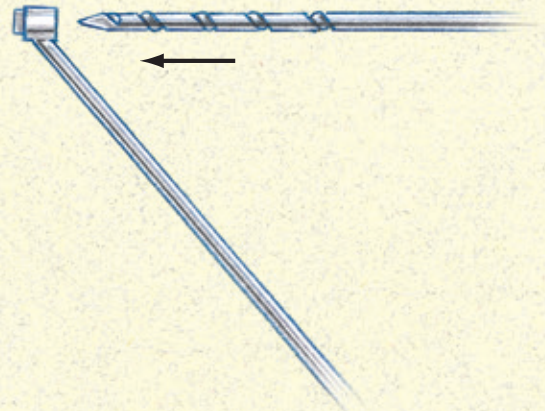


Figure 41

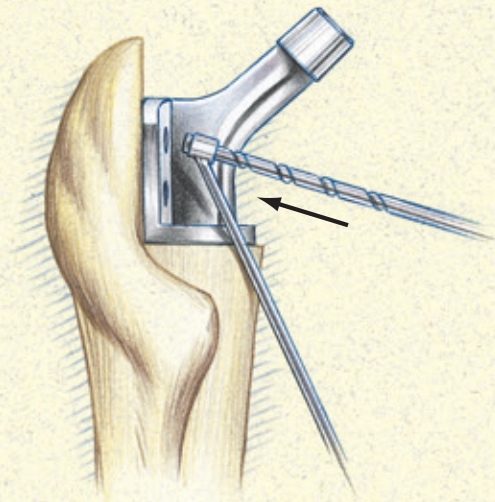
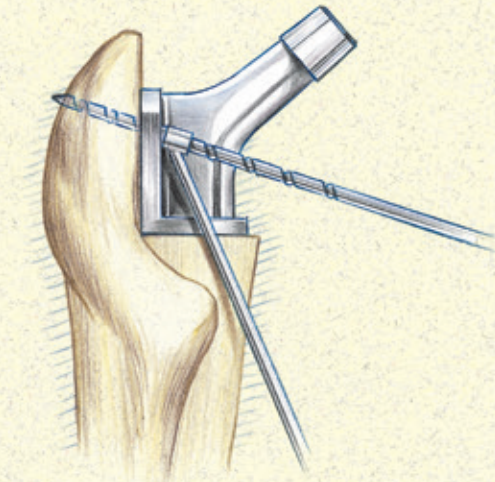
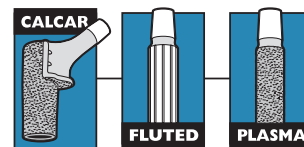


Figure 42



Restoration® Modular

Surgical Protocol



Preparing for Cable Use (continued)

Method 2 – Lateral Preparation

Preparation from the lateral side to the medial side is performed using the Lateral Drill Guide. Turn the knob counter-clockwise to open the Lateral Guide Arm and allow for placement over the greater trochanter. Insert the Centering Post on the fixed portion of the guide into the holes on the medial side of the implant. Place the Lateral Drill Guide into the proper orientation and turn the knob clockwise to secure the guide on the bone. Use the 3.2mm drill and drill through the hole in the Lateral Guide Arm up to the implant, ensuring the proper drilling angle is achieved (**Figure 43**). Pass the non-beaded side of the cable through the hole from the medial side of the implant to the lateral side of the bone (**Figures 43A and 43B**).

See the Dall-Miles surgical technique for details on the use of this system.

Note: It is important to secure the bone on the lateral side of the implant when drilling to facilitate the passage of the cables.

IMPORTANT: Do not use Non-Beaded Cables with the Calcar Body. A Beaded Cable is required for each hole used. Cables should NEVER be wrapped around the implant body or neck.

Figure 43

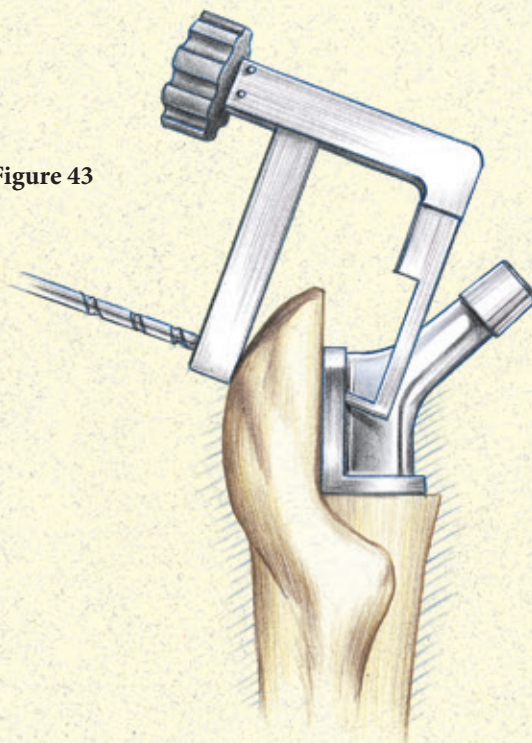


Figure 43A

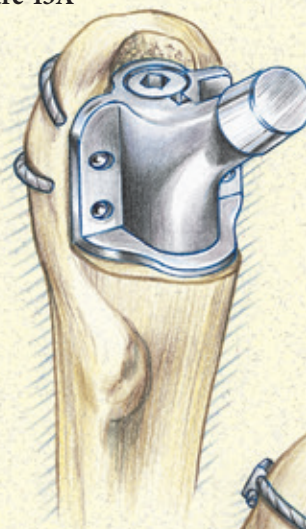
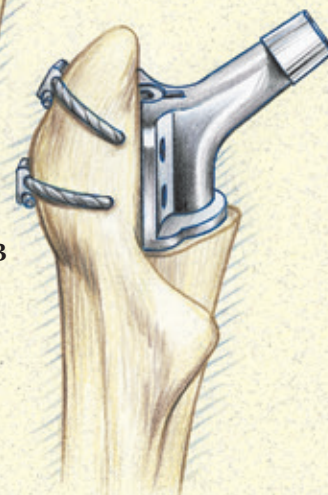


Figure 43B



Restoration® Modular

Surgical Protocol

Final Trial Reduction

Attach Head Trial

Select the head diameter according to surgeon preference. The Femoral Head Trials have a circumferential groove, which identifies the level of the center of rotation (Figure 44). Select the desired Femoral Head Trial based on trial reduction from the chart below. Attach the Femoral Head Trial to the Calcar Body. The head center of the Femoral Head Trial, when attached to the implant construct, should correspond with the tip of the greater trochanter.

At this point, a final trial reduction can be performed using the attached Femoral Head Trial.

Head	Head Size	Head Offsets
CoCr V40	22	+0, +3, +8
	26	-3, +0, +4, +8, +12
	28	-4, +0, +4, +8, +12
	32	-4, +0, +4, +8, +12
	36	-5, +0, +5, +10
	40	-4, +0, +4, +8, +12
	44	-4, +0, +4, +8, +12
Alumina V40	28	-2.7, +0, +4
	32	-4, +0, +4
	36	-5, +0, +5
Alumina C-Taper (when used with C-Taper Adaptor Sleeve-catalog #17-0000E)	28	-2.5, +0, +5
	32	-2.5, +0, +5
	36	-5, +0, +5
delta BIOLOX V40	28	-4, -2.7, +0, +4
	32	-4, +0, +4
	36	-5, -2.5, +0, +2.5, +5, +7.5
delta Biolox C-Taper (when used with C-Taper Sleeve - catalog #17-0000E)	28	-2.5, +0, +2.5, +5
	32	-2.5, +0, +2.5, +5
	36	-5, -2.5, +0, +2.5, +5, +7.5
delta Biolox Universal Taper (when used with Universal Taper Sleeve - catalog #6519-T-XXX)	28	-2.5, +0, +4
	32	-2.5, +0, +4
	36	-2.5, +0, +4
	40	-2.5, +0, +4
	44	-2.5, +0, +4

Impact Head onto Calcar Body Trunnion

Select the appropriate corresponding V40 Femoral Head (CoCr, Alumina Ceramic, Biolox delta Ceramic) or sleeve and place it onto the dry trunnion of the femoral stem with a slight twist. Impact the the head with two moderate impactations using the Femoral Head Impactor (Figures 45 and 46).

Reduce Joint and Close

Relocate the Femoral Head into the acetabular cup and check the stability and range of motion. The surgical site is then closed according to the standard procedure for the surgical approach chosen.

Postoperative Care

Postoperative care should progress according to surgeon preference and recommendation.

Figure 44

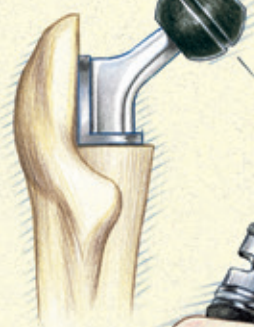


Figure 45

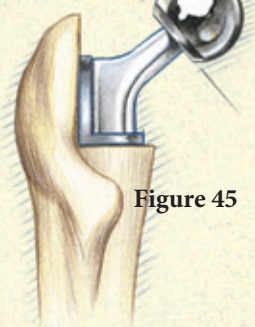
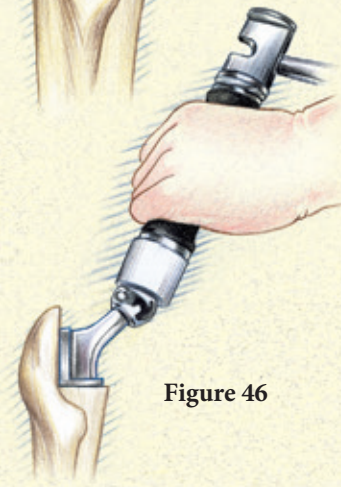


Figure 46



Optional Step

When selecting a BIOLOX delta Universal Taper Ceramic Femoral Head (6519-1-0xx) for implantation, use of a Universal Adaptor Sleeve is necessary.

Catalog No.	Offset (mm)	Taper
6519-T-025	-2.5	V40
6519-T-100	+0	V40
6519-T-204	+4	V40

After completing the trialing process, intra-operatively assemble the adaptor sleeve to the femoral stem manually. The Universal Adaptor Sleeve must be fully seated on the stem taper before the head is assembled.

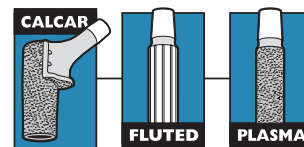
Note

In no instance should any attempt be made to pre-assemble the adaptor sleeve inside the BIOLOX delta Universal Ceramic Head.

Intra-operatively assemble the BIOLOX delta Universal Taper Ceramic Head onto the sleeved femoral stem and set with two moderate strikes using the Head Impactor. Care must be taken to avoid excessive impact forces when assembling the Ceramic Head to the sleeved femoral component.

Restoration® Modular

Surgical Protocol



Restoration Modular Calcar Body/Fluted & Plasma Distal Stem Removal

If new components are to be disassembled during surgery (i.e., to readjust version) inspect the proximal body and distal stem closely for damage prior to re-impacting the body onto the distal stem. If the proximal body or distal stem shows damage, do not reuse the components but instead re-implant new, undamaged components.

Note: The Locking Bolt must be removed prior to using stem removal instruments (Figure 47).

Calcar Body Removal

The Body/Stem Separator is made up of three parts: Jackscrew, Shaft Puller, and a reverse-thread Distal Collet (**Figure 48**). Two modular handles are also available for use with the Body/Stem Separator, which assist in counter-rotation when tightening with the T-Handle.

Unthread the Jackscrew completely from the Shaft Puller prior to inserting through the Calcar Body. Ensure that the Distal Collet is fully threaded into the Shaft Puller, keeping in mind that the Collet and Shaft Puller are reverse-threaded. Insert the Shaft Puller/Distal Collet assembly through the Calcar Body until the collet is fully inserted. An audible click will be heard along with a decrease in resistance upon full insertion.

Thread the Jackscrew through the Shaft Puller/Distal Collet by hand until the Jackscrew cannot be advanced further. Insert the modular handle(s) into the upper hub of the Puller Shaft. The handles are spring-loaded and will engage when rotated to the correct position. Assemble the T-Handle to the Jackscrew and turn the T-Handle until the Calcar Body disengages from the distal stem (**Figure 49**).

Note: In order to remove the body from the Shaft Puller assembly, remember that the Distal Collet is a *REVERSE THREAD*, and must be completely removed from the assembly to release the body.

Figure 48



Figure 47

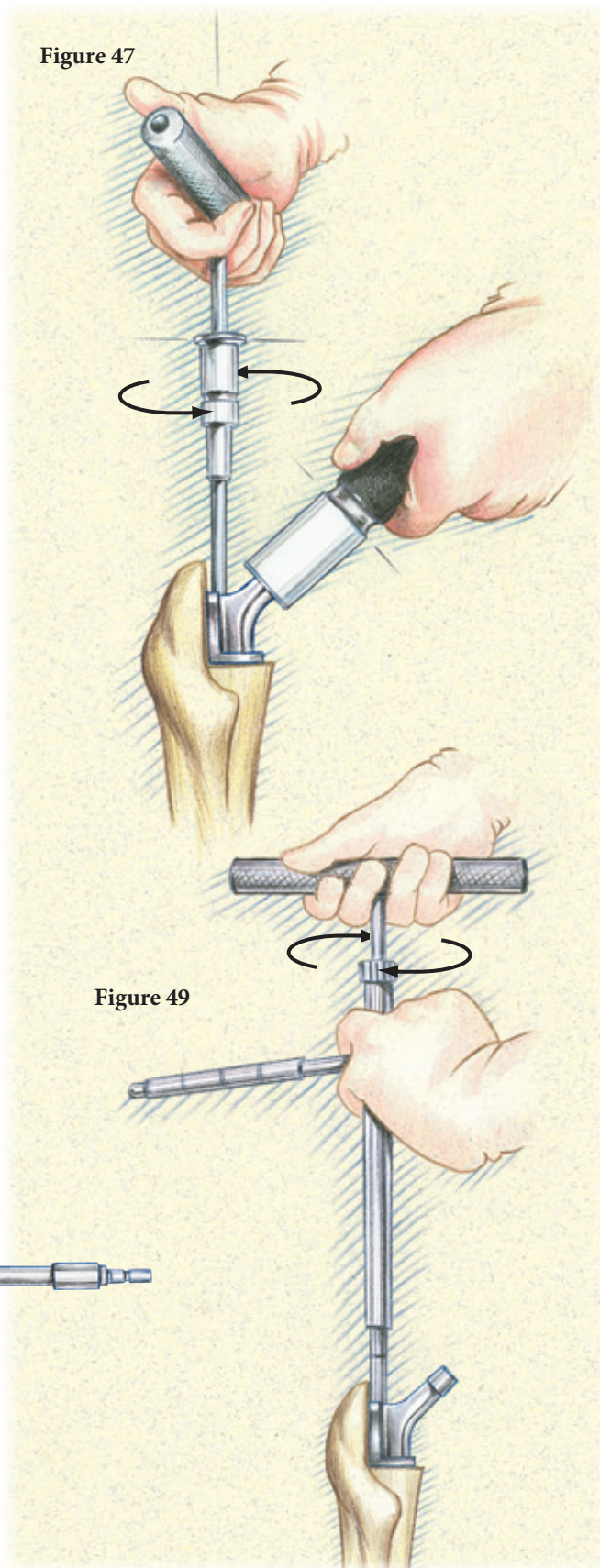
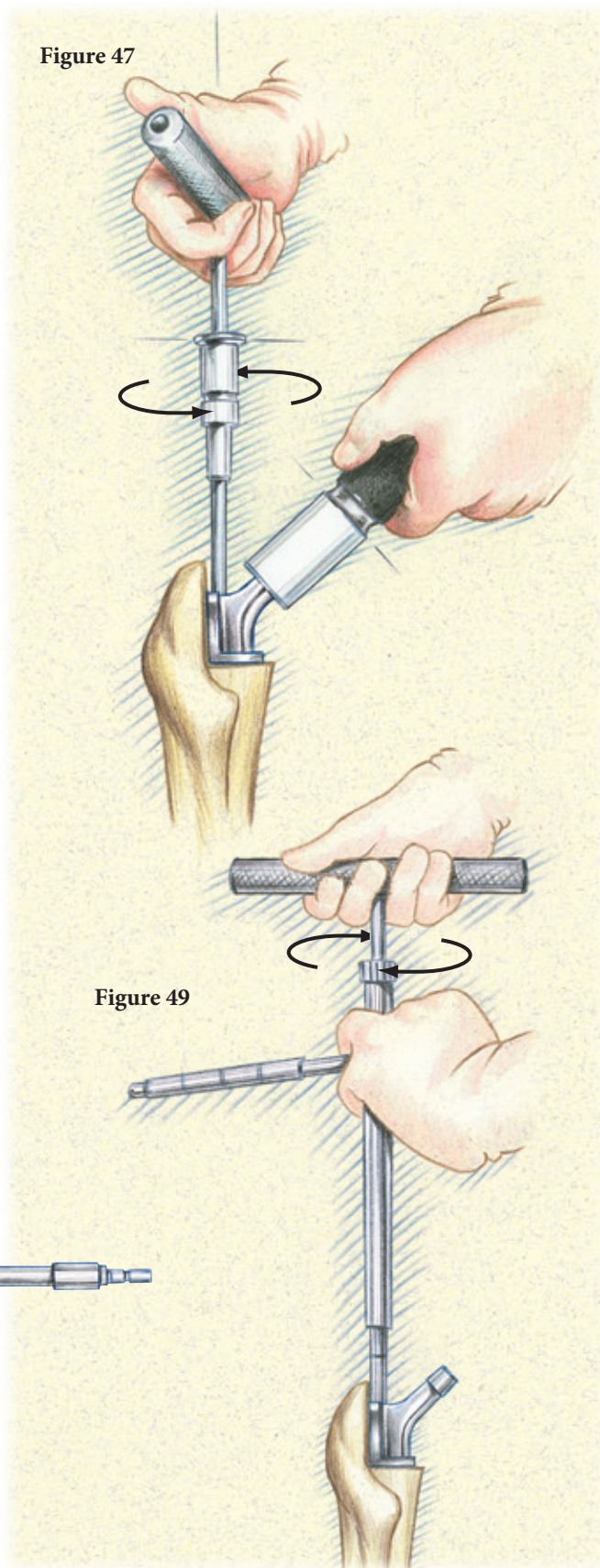


Figure 49



Restoration® Modular

Surgical Protocol

Restoration Modular Calcar Body/Fluted & Plasma Distal Stem Removal (continued)

Distal Stem Removal

Assemble the Distal Stem Removal Adapter to the McReynolds Driver-Extractor. Thread the distal stem removal assembly into the insertion feature of the distal stem (**Figure 50**). Use the slap hammer to remove the distal stem from the canal.

Restoration Modular Calcar Body/Fluted & Plasma Stem Removal

The Distal Stem Removal Adapter/McReynolds Driver-Extractor assembly may be threaded through the Calcar Body into the distal stem to remove the entire Stem Assembly. Use the slap hammer to remove the Stem Assembly from the canal (**Figures 51 and 52**).

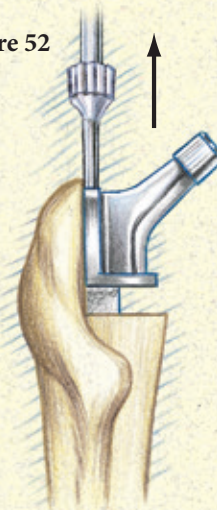
Figure 50



Figure 51



Figure 52



Restoration® Modular

Surgical Protocol

Calcar Bodies



Calcar Bodies	
CATALOG NO.	SIZE
6276-4-119	19mm +10mm
6276-4-219	19mm +20mm
6276-4-319	19mm +30mm
6276-4-121	21mm +10mm
6276-4-221	21mm +20mm
6276-4-321	21mm +30mm
6276-4-123	23mm +10mm
6276-4-223	23mm +20mm
6276-4-323	23mm +30mm
6276-4-125	25mm +10mm
6276-4-225	25mm +20mm
6276-4-325	25mm +30mm
6276-4-127	27mm +10mm
6276-4-227	27mm +20mm
6276-4-327	27mm +30mm
6276-4-129	29mm +10mm
6276-4-229	29mm +20mm
6276-4-329	29mm +30mm
6276-4-131	31mm +10mm
6276-4-231	31mm +20mm
6276-4-331	31mm +30mm

Restoration® Modular

Surgical Protocol

Fluted Distal Stems



Fluted Stems - Straight	
CATALOG NO.	SIZE
6276-6-011	11mm x 127mm
6276-6-012	12mm x 127mm
6276-6-013	13mm x 127mm
6276-6-014	14mm x 127mm
6276-6-015	15mm x 127mm
6276-6-016	16mm x 127mm
6276-6-017	17mm x 127mm
6276-6-018	18mm x 127mm
6276-6-019	19mm x 127mm
6276-6-020	20mm x 127mm
6276-6-021	21mm x 127mm
6276-6-022	22mm x 127mm
6276-6-023	23mm x 127mm
6276-6-024	24mm x 127mm
6276-6-025	25mm x 127mm
6276-6-026	26mm x 127mm

Fluted Stems - Bowed	
CATALOG NO.	SIZE
6276-6-211	11mm x 167mm
6276-6-212	12mm x 167mm
6276-6-213	13mm x 167mm
6276-6-214	14mm x 167mm
6276-6-215	15mm x 167mm
6276-6-216	16mm x 167mm
6276-6-217	17mm x 167mm
6276-6-218	18mm x 167mm
6276-6-219	19mm x 167mm
6276-6-220	20mm x 167mm
6276-6-221	21mm x 167mm
6276-6-222	22mm x 167mm
6276-6-223	23mm x 167mm
6276-6-224	24mm x 167mm
6276-6-225	25mm x 167mm
6276-6-226	26mm x 167mm

Fluted Stems - Bowed	
CATALOG NO.	SIZE
6276-6-511	11mm x 267mm
6276-6-512	12mm x 267mm
6276-6-513	13mm x 267mm
6276-6-514	14mm x 267mm
6276-6-515	15mm x 267mm
6276-6-516	16mm x 267mm
6276-6-517	17mm x 267mm
6276-6-518	18mm x 267mm
6276-6-519	19mm x 267mm
6276-6-520	20mm x 267mm
6276-6-521	21mm x 267mm
6276-6-522	22mm x 267mm
6276-6-523	23mm x 267mm
6276-6-524	24mm x 267mm
6276-6-525	25mm x 267mm
6276-6-526	26mm x 267mm

Fluted Stems - Straight	
CATALOG NO.	SIZE
6276-6-111	11mm x 167mm
6276-6-112	12mm x 167mm
6276-6-113	13mm x 167mm
6276-6-114	14mm x 167mm
6276-6-115	15mm x 167mm
6276-6-116	16mm x 167mm
6276-6-117	17mm x 167mm
6276-6-118	18mm x 167mm
6276-6-119	19mm x 167mm
6276-6-120	20mm x 167mm
6276-6-121	21mm x 167mm
6276-6-122	22mm x 167mm
6276-6-123	23mm x 167mm
6276-6-124	24mm x 167mm
6276-6-125	25mm x 167mm
6276-6-126	26mm x 167mm

Fluted Stems - Bowed	
CATALOG NO.	SIZE
6276-6-411	11mm x 217mm
6276-6-412	12mm x 217mm
6276-6-413	13mm x 217mm
6276-6-414	14mm x 217mm
6276-6-415	15mm x 217mm
6276-6-416	16mm x 217mm
6276-6-417	17mm x 217mm
6276-6-418	18mm x 217mm
6276-6-419	19mm x 217mm
6276-6-420	20mm x 217mm
6276-6-421	21mm x 217mm
6276-6-422	22mm x 217mm
6276-6-423	23mm x 217mm
6276-6-424	24mm x 217mm
6276-6-425	25mm x 217mm
6276-6-426	26mm x 217mm

Fluted Stems - Bowed	
CATALOG NO.	SIZE
6276-6-611	11mm x 317mm
6276-6-612	12mm x 317mm
6276-6-613	13mm x 317mm
6276-6-614	14mm x 317mm
6276-6-615	15mm x 317mm
6276-6-616	16mm x 317mm
6276-6-617	17mm x 317mm
6276-6-618	18mm x 317mm
6276-6-619	19mm x 317mm
6276-6-620	20mm x 317mm
6276-6-621	21mm x 317mm
6276-6-622	22mm x 317mm
6276-6-623	23mm x 317mm
6276-6-624	24mm x 317mm
6276-6-625	25mm x 317mm
6276-6-626	26mm x 317mm

Restoration® Modular

Surgical Protocol

Plasma Distal Stems



Plasma Stems - Straight	
CATALOG NO.	SIZE
6276-5-011	11mm x 127mm
6276-5-012	12mm x 127mm
6276-5-013	13mm x 127mm
6276-5-014	14mm x 127mm
6276-5-015	15mm x 127mm
6276-5-016	16mm x 127mm
6276-5-017	17mm x 127mm
6276-5-018	18mm x 127mm
6276-5-019	19mm x 127mm
6276-5-020	20mm x 127mm
6276-5-021	21mm x 127mm
6276-5-022	22mm x 127mm
6276-5-023	23mm x 127mm
6276-5-024	24mm x 127mm
6276-5-025	25mm x 127mm
6276-5-026	26mm x 127mm

Plasma Stems - Bowed	
CATALOG NO.	SIZE
6276-5-211	11mm x 167mm
6276-5-212	12mm x 167mm
6276-5-213	13mm x 167mm
6276-5-214	14mm x 167mm
6276-5-215	15mm x 167mm
6276-5-216	16mm x 167mm
6276-5-217	17mm x 167mm
6276-5-218	18mm x 167mm
6276-5-219	19mm x 167mm
6276-5-220	20mm x 167mm
6276-5-221	21mm x 167mm
6276-5-222	22mm x 167mm
6276-5-223	23mm x 167mm
6276-5-224	24mm x 167mm
6276-5-225	25mm x 167mm
6276-5-226	26mm x 167mm

Plasma Stems - Bowed	
CATALOG NO.	SIZE
6276-5-511	11mm x 267mm
6276-5-512	12mm x 267mm
6276-5-513	13mm x 267mm
6276-5-514	14mm x 267mm
6276-5-515	15mm x 267mm
6276-5-516	16mm x 267mm
6276-5-517	17mm x 267mm
6276-5-518	18mm x 267mm
6276-5-519	19mm x 267mm
6276-5-520	20mm x 267mm
6276-5-521	21mm x 267mm
6276-5-522	22mm x 267mm
6276-5-523	23mm x 267mm
6276-5-524	24mm x 267mm
6276-5-525	25mm x 267mm
6276-5-526	26mm x 267mm

Plasma Stems - Straight	
CATALOG NO.	SIZE
6276-5-111	11mm x 167mm
6276-5-112	12mm x 167mm
6276-5-113	13mm x 167mm
6276-5-114	14mm x 167mm
6276-5-115	15mm x 167mm
6276-5-116	16mm x 167mm
6276-5-117	17mm x 167mm
6276-5-118	18mm x 167mm
6276-5-119	19mm x 167mm
6276-5-120	20mm x 167mm
6276-5-121	21mm x 167mm
6276-5-122	22mm x 167mm
6276-5-123	23mm x 167mm
6276-5-124	24mm x 167mm
6276-5-125	25mm x 167mm
6276-5-126	26mm x 167mm

Plasma Stems - Bowed	
CATALOG NO.	SIZE
6276-5-411	11mm x 217mm
6276-5-412	12mm x 217mm
6276-5-413	13mm x 217mm
6276-5-414	14mm x 217mm
6276-5-415	15mm x 217mm
6276-5-416	16mm x 217mm
6276-5-417	17mm x 217mm
6276-5-418	18mm x 217mm
6276-5-419	19mm x 217mm
6276-5-420	20mm x 217mm
6276-5-421	21mm x 217mm
6276-5-422	22mm x 217mm
6276-5-423	23mm x 217mm
6276-5-424	24mm x 217mm
6276-5-425	25mm x 217mm
6276-5-426	26mm x 217mm

Plasma Stems - Bowed	
CATALOG NO.	SIZE
6276-5-611	11mm x 317mm
6276-5-612	12mm x 317mm
6276-5-613	13mm x 317mm
6276-5-614	14mm x 317mm
6276-5-615	15mm x 317mm
6276-5-616	16mm x 317mm
6276-5-617	17mm x 317mm
6276-5-618	18mm x 317mm
6276-5-619	19mm x 317mm
6276-5-620	20mm x 317mm
6276-5-621	21mm x 317mm
6276-5-622	22mm x 317mm
6276-5-623	23mm x 317mm
6276-5-624	24mm x 317mm
6276-5-625	25mm x 317mm
6276-5-626	26mm x 317mm

Restoration® Modular

Surgical Protocol

Plasma Distal Stems Tri-Slot



Plasma Stems - Bowed Tri-Slot	
CATALOG NO.	SIZE
6276-8-213	13mm x 167mm
6276-8-214	14mm x 167mm
6276-8-215	15mm x 167mm
6276-8-216	16mm x 167mm
6276-8-217	17mm x 167mm
6276-8-218	18mm x 167mm
6276-8-219	19mm x 167mm
6276-8-220	20mm x 167mm
6276-8-221	21mm x 167mm
6276-8-222	22mm x 167mm
6276-8-223	23mm x 167mm
6276-8-224	24mm x 167mm
6276-8-225	25mm x 167mm
6276-8-226	26mm x 167mm

Plasma Stems - Bowed Tri-Slot	
CATALOG NO.	SIZE
6276-8-413	13mm x 217mm
6276-8-414	14mm x 217mm
6276-8-415	15mm x 217mm
6276-8-416	16mm x 217mm
6276-8-417	17mm x 217mm
6276-8-418	18mm x 217mm
6276-8-419	19mm x 217mm
6276-8-420	20mm x 217mm
6276-8-421	21mm x 217mm
6276-8-422	22mm x 217mm
6276-8-423	23mm x 217mm
6276-8-424	24mm x 217mm
6276-8-425	25mm x 217mm
6276-8-426	26mm x 217mm

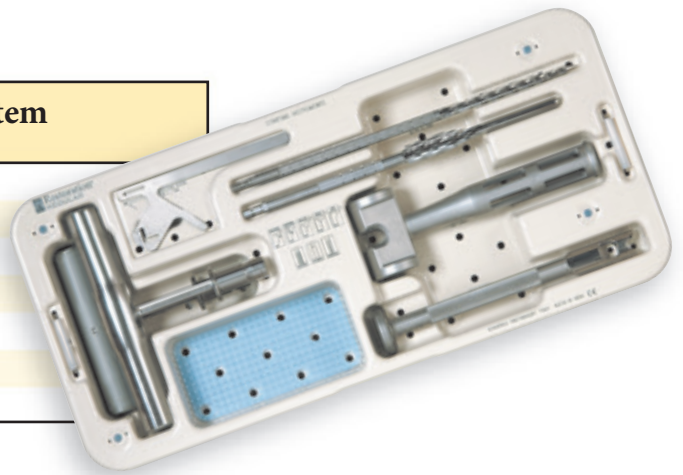
Plasma Stems - Bowed Tri-Slot	
CATALOG NO.	SIZE
6276-8-513	13mm x 267mm
6276-8-514	14mm x 267mm
6276-8-515	15mm x 267mm
6276-8-516	16mm x 267mm
6276-8-517	17mm x 267mm
6276-8-518	18mm x 267mm
6276-8-519	19mm x 267mm
6276-8-520	20mm x 267mm
6276-8-521	21mm x 267mm
6276-8-522	22mm x 267mm
6276-8-523	23mm x 267mm
6276-8-524	24mm x 267mm
6276-8-525	25mm x 267mm
6276-8-526	26mm x 267mm

Plasma Stems - Bowed Tri-Slot	
CATALOG NO.	SIZE
6276-8-613	13mm x 317mm
6276-8-614	14mm x 317mm
6276-8-615	15mm x 317mm
6276-8-616	16mm x 317mm
6276-8-617	17mm x 317mm
6276-8-618	18mm x 317mm
6276-8-619	19mm x 317mm
6276-8-620	20mm x 317mm
6276-8-621	21mm x 317mm
6276-8-622	22mm x 317mm
6276-8-623	23mm x 317mm
6276-8-624	24mm x 317mm
6276-8-625	25mm x 317mm
6276-8-626	26mm x 317mm

Restoration® Modular

Surgical Protocol

Restoration® Modular Instrument System Starter Tray #6278-9-900	
6278-1-150	Resection Guide
6278-5-200	Starter Awl
6278-5-250	Box Chisel
6278-9-090	Large T-Handle
1101-2100	Small T-Handle
1120-1000	Mallet
6278-5-300	Clear Out Reamer

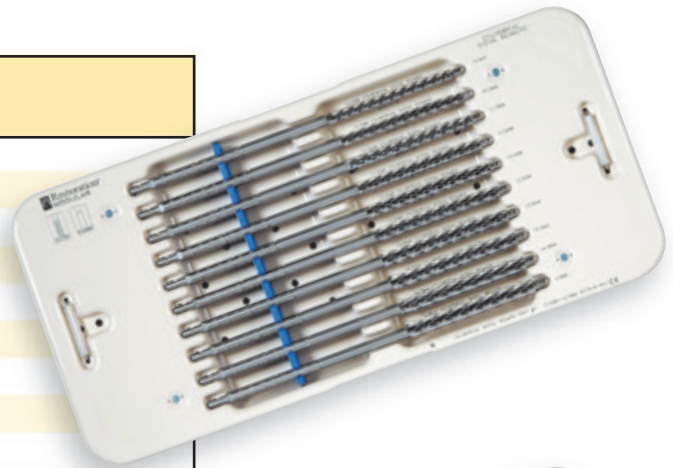


Restoration® Modular

Surgical Protocol

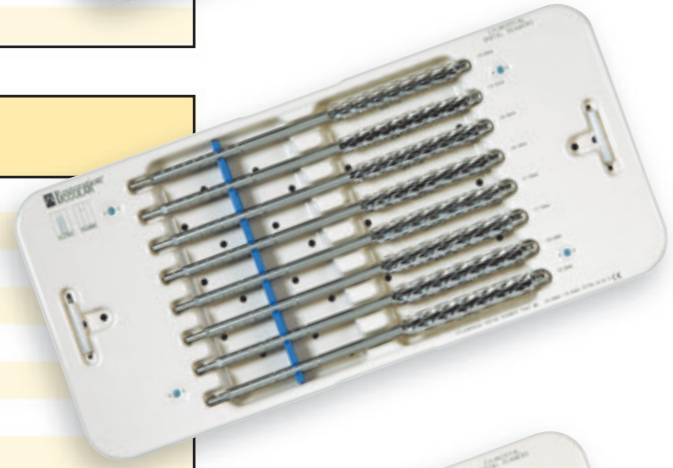
Cylindrical Distal Reamer Tray #1 10.0mm - 14.5mm #6278-9-912

6278-7-100	10.0mm Cylindrical Distal Reamer
6278-7-105	10.5mm Cylindrical Distal Reamer
6278-7-110	11.0mm Cylindrical Distal Reamer
6278-7-115	11.5mm Cylindrical Distal Reamer
6278-7-120	12.0mm Cylindrical Distal Reamer
6278-7-125	12.5mm Cylindrical Distal Reamer
6278-7-130	13.0mm Cylindrical Distal Reamer
6278-7-135	13.5mm Cylindrical Distal Reamer
6278-7-140	14.0mm Cylindrical Distal Reamer
6278-7-145	14.5mm Cylindrical Distal Reamer



Cylindrical Distal Reamer Tray #2 15.0mm - 18.5mm #6278-9-913

6278-7-150	15.0mm Cylindrical Distal Reamer
6278-7-155	15.5mm Cylindrical Distal Reamer
6278-7-160	16.0mm Cylindrical Distal Reamer
6278-7-165	16.5mm Cylindrical Distal Reamer
6278-7-170	17.0mm Cylindrical Distal Reamer
6278-7-175	17.5mm Cylindrical Distal Reamer
6278-7-180	18.0mm Cylindrical Distal Reamer
6278-7-185	18.5mm Cylindrical Distal Reamer



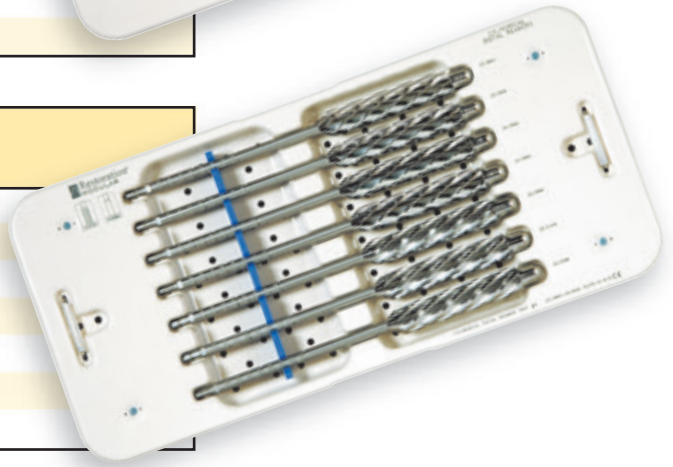
Cylindrical Distal Reamer Tray #3 19.0mm - 22.5mm #6278-9-914

6278-7-190	19.0mm Cylindrical Distal Reamer
6278-7-195	19.5mm Cylindrical Distal Reamer
6278-7-200	20.0mm Cylindrical Distal Reamer
6278-7-205	20.5mm Cylindrical Distal Reamer
6278-7-210	21.0mm Cylindrical Distal Reamer
6278-7-215	21.5mm Cylindrical Distal Reamer
6278-7-220	22.0mm Cylindrical Distal Reamer
6278-7-225	22.5mm Cylindrical Distal Reamer



Cylindrical Distal Reamer Tray #4 23.0mm - 26.0mm #6278-9-915

6278-7-230	23.0mm Cylindrical Distal Reamer
6278-7-235	23.5mm Cylindrical Distal Reamer
6278-7-240	24.0mm Cylindrical Distal Reamer
6278-7-245	24.5mm Cylindrical Distal Reamer
6278-7-250	25.0mm Cylindrical Distal Reamer
6278-7-255	25.5mm Cylindrical Distal Reamer
6278-7-260	26.0mm Cylindrical Distal Reamer

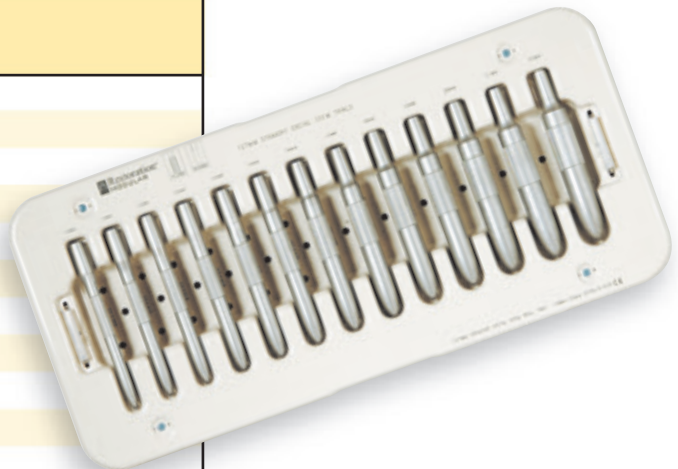


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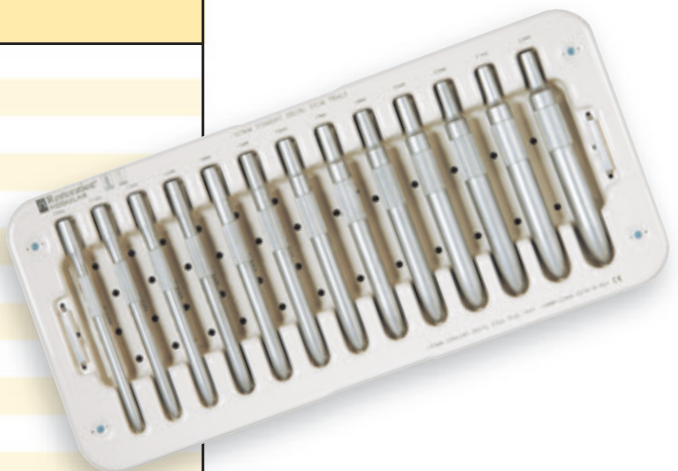
127mm Straight Distal Stem Trial Tray #6278-9-920

6278-9-010	10mm x 127mm Straight Distal Stem Trial
6278-9-011	11mm x 127mm Straight Distal Stem Trial
6278-9-012	12mm x 127mm Straight Distal Stem Trial
6278-9-013	13mm x 127mm Straight Distal Stem Trial
6278-9-014	14mm x 127mm Straight Distal Stem Trial
6278-9-015	15mm x 127mm Straight Distal Stem Trial
6278-9-016	16mm x 127mm Straight Distal Stem Trial
6278-9-017	17mm x 127mm Straight Distal Stem Trial
6278-9-018	18mm x 127mm Straight Distal Stem Trial
6278-9-019	19mm x 127mm Straight Distal Stem Trial
6278-9-020	20mm x 127mm Straight Distal Stem Trial
6278-9-021	21mm x 127mm Straight Distal Stem Trial
6278-9-022	22mm x 127mm Straight Distal Stem Trial



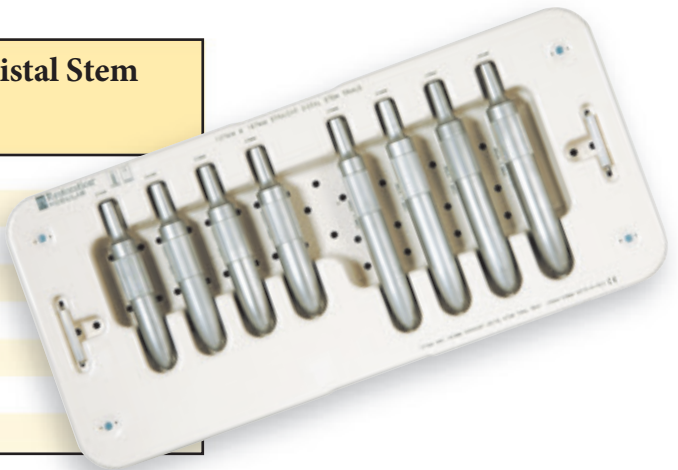
167mm Straight Distal Stem Trial Tray #6278-9-921

6278-9-110	10mm x 167mm Straight Distal Stem Trial
6278-9-111	11mm x 167mm Straight Distal Stem Trial
6278-9-112	12mm x 167mm Straight Distal Stem Trial
6278-9-113	13mm x 167mm Straight Distal Stem Trial
6278-9-114	14mm x 167mm Straight Distal Stem Trial
6278-9-115	15mm x 167mm Straight Distal Stem Trial
6278-9-116	16mm x 167mm Straight Distal Stem Trial
6278-9-117	17mm x 167mm Straight Distal Stem Trial
6278-9-118	18mm x 167mm Straight Distal Stem Trial
6278-9-119	19mm x 167mm Straight Distal Stem Trial
6278-9-120	20mm x 167mm Straight Distal Stem Trial
6278-9-121	21mm x 167mm Straight Distal Stem Trial
6278-9-122	22mm x 167mm Straight Distal Stem Trial



127mm & 167mm Large Diameter Straight Distal Stem Trial Tray 23mm-26mm #6278-9-922

6278-9-023	23mm x 127mm Straight Distal Stem Trial
6278-9-024	24mm x 127mm Straight Distal Stem Trial
6278-9-025	25mm x 127mm Straight Distal Stem Trial
6278-9-026	26mm x 127mm Straight Distal Stem Trial
6278-9-123	23mm x 167mm Straight Distal Stem Trial
6278-9-124	24mm x 167mm Straight Distal Stem Trial
6278-9-125	25mm x 167mm Straight Distal Stem Trial
6278-9-126	26mm x 167mm Straight Distal Stem Trial



Restoration® Modular

Surgical Protocol

167mm Bowed Distal Stem Trial Tray #6278-9-923

6278-9-210	10mm x 167mm Bowed Distal Stem Trial
6278-9-211	11mm x 167mm Bowed Distal Stem Trial
6278-9-212	12mm x 167mm Bowed Distal Stem Trial
6278-9-213	13mm x 167mm Bowed Distal Stem Trial
6278-9-214	14mm x 167mm Bowed Distal Stem Trial
6278-9-215	15mm x 167mm Bowed Distal Stem Trial
6278-9-216	16mm x 167mm Bowed Distal Stem Trial
6278-9-217	17mm x 167mm Bowed Distal Stem Trial
6278-9-218	18mm x 167mm Bowed Distal Stem Trial
6278-9-219	19mm x 167mm Bowed Distal Stem Trial
6278-9-220	20mm x 167mm Bowed Distal Stem Trial
6278-9-221	21mm x 167mm Bowed Distal Stem Trial
6278-9-222	22mm x 167mm Bowed Distal Stem Trial

217mm Bowed Distal Stem Trial Tray #6278-9-924

6278-9-410	10mm x 217mm Bowed Distal Stem Trial
6278-9-411	11mm x 217mm Bowed Distal Stem Trial
6278-9-412	12mm x 217mm Bowed Distal Stem Trial
6278-9-413	13mm x 217mm Bowed Distal Stem Trial
6278-9-414	14mm x 217mm Bowed Distal Stem Trial
6278-9-415	15mm x 217mm Bowed Distal Stem Trial
6278-9-416	16mm x 217mm Bowed Distal Stem Trial
6278-9-417	17mm x 217mm Bowed Distal Stem Trial
6278-9-418	18mm x 217mm Bowed Distal Stem Trial
6278-9-419	19mm x 217mm Bowed Distal Stem Trial
6278-9-420	20mm x 217mm Bowed Distal Stem Trial
6278-9-421	21mm x 217mm Bowed Distal Stem Trial
6278-9-422	22mm x 217mm Bowed Distal Stem Trial

167mm and 217mm Bowed Distal Stem Trial Tray #6278-9-925

6278-9-223	23mm x 167mm Bowed Distal Stem Trial
6278-9-224	24mm x 167mm Bowed Distal Stem Trial
6278-9-225	25mm x 167mm Bowed Distal Stem Trial
6278-9-226	26mm x 167mm Bowed Distal Stem Trial
6278-9-423	23mm x 217mm Bowed Distal Stem Trial
6278-9-424	24mm x 217mm Bowed Distal Stem Trial
6278-9-425	25mm x 217mm Bowed Distal Stem Trial
6278-9-426	26mm x 217mm Bowed Distal Stem Trial

267mm Bowed Distal Stem Trial Tray #6278-9-926

6278-9-510	10mm x 267mm Bowed Distal Stem Trial
6278-9-511	11mm x 267mm Bowed Distal Stem Trial
6278-9-512	12mm x 267mm Bowed Distal Stem Trial
6278-9-513	13mm x 267mm Bowed Distal Stem Trial
6278-9-514	14mm x 267mm Bowed Distal Stem Trial
6278-9-515	15mm x 267mm Bowed Distal Stem Trial
6278-9-516	16mm x 267mm Bowed Distal Stem Trial
6278-9-517	17mm x 267mm Bowed Distal Stem Trial
6278-9-518	18mm x 267mm Bowed Distal Stem Trial
6278-9-519	19mm x 267mm Bowed Distal Stem Trial

267mm Bowed Distal Stem Trial Tray #6278-9-927

6278-9-520	20mm x 267mm Bowed Distal Stem Trial
6278-9-521	21mm x 267mm Bowed Distal Stem Trial
6278-9-522	22mm x 267mm Bowed Distal Stem Trial
6278-9-523	23mm x 267mm Bowed Distal Stem Trial
6278-9-524	24mm x 267mm Bowed Distal Stem Trial
6278-9-525	25mm x 267mm Bowed Distal Stem Trial
6278-9-526	26mm x 267mm Bowed Distal Stem Trial

317mm Bowed Distal Stem Trial Tray #6278-9-928

6278-9-610	10mm x 317mm Bowed Distal Stem Trial
6278-9-611	11mm x 317mm Bowed Distal Stem Trial
6278-9-612	12mm x 317mm Bowed Distal Stem Trial
6278-9-613	13mm x 317mm Bowed Distal Stem Trial
6278-9-614	14mm x 317mm Bowed Distal Stem Trial
6278-9-615	15mm x 317mm Bowed Distal Stem Trial
6278-9-616	16mm x 317mm Bowed Distal Stem Trial
6278-9-617	17mm x 317mm Bowed Distal Stem Trial
6278-9-618	18mm x 317mm Bowed Distal Stem Trial
6278-9-619	19mm x 317mm Bowed Distal Stem Trial

317mm Bowed Distal Stem Trial Tray #6278-9-929

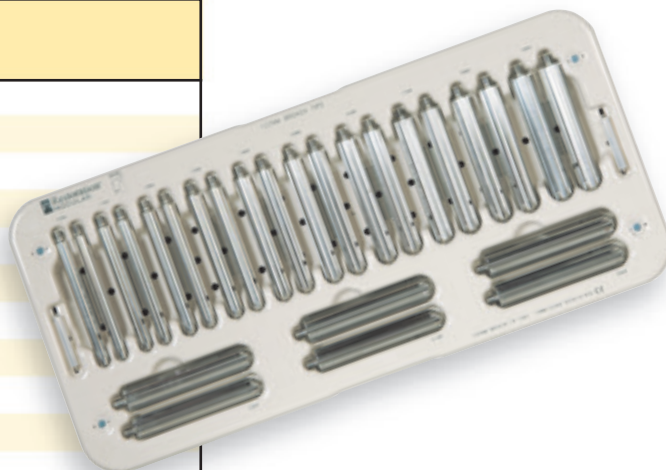
6278-9-620	20mm x 317mm Bowed Distal Stem Trial
6278-9-621	21mm x 317mm Bowed Distal Stem Trial
6278-9-622	22mm x 317mm Bowed Distal Stem Trial
6278-9-623	23mm x 317mm Bowed Distal Stem Trial
6278-9-624	24mm x 317mm Bowed Distal Stem Trial
6278-9-625	25mm x 317mm Bowed Distal Stem Trial
6278-9-626	26mm x 317mm Bowed Distal Stem Trial

Restoration® Modular

Surgical Protocol

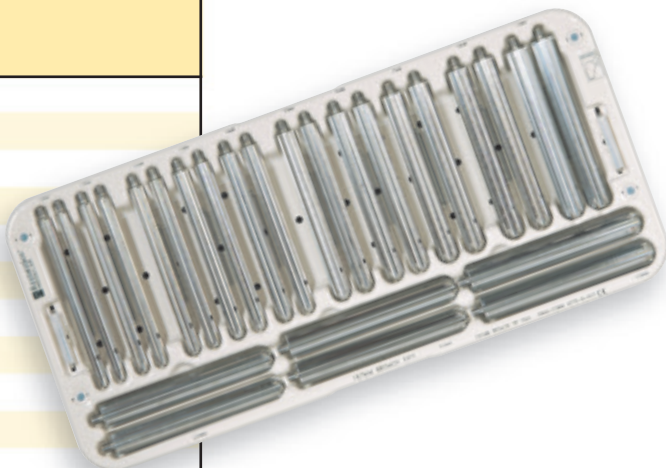
127mm Broach Tip Tray 10mm - 22mm #6278-9-932

6278-3-100	10mm x 127mm Broach Tips (2 per tray)
6278-3-110	11mm x 127mm Broach Tips (2 per tray)
6278-3-120	12mm x 127mm Broach Tips (2 per tray)
6278-3-130	13mm x 127mm Broach Tips (2 per tray)
6278-3-140	14mm x 127mm Broach Tips (2 per tray)
6278-3-150	15mm x 127mm Broach Tips (2 per tray)
6278-3-160	16mm x 127mm Broach Tips (2 per tray)
6278-3-170	17mm x 127mm Broach Tips (2 per tray)
6278-3-180	18mm x 127mm Broach Tips (2 per tray)
6278-3-190	19mm x 127mm Broach Tips (2 per tray)
6278-3-200	20mm x 127mm Broach Tips (2 per tray)
6278-3-210	21mm x 127mm Broach Tips (2 per tray)
6278-3-220	22mm x 127mm Broach Tips (2 per tray)



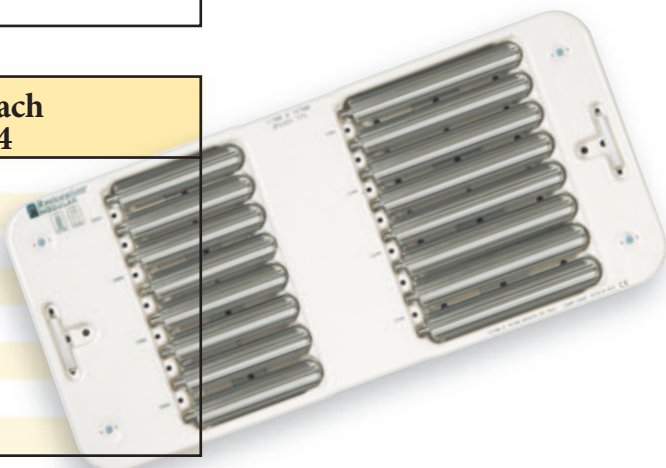
167mm Broach Tip Tray 10mm - 22mm #6278-9-933

6278-4-100	10mm x 167mm Broach Tips (2 per tray)
6278-4-110	11mm x 167mm Broach Tips (2 per tray)
6278-4-120	12mm x 167mm Broach Tips (2 per tray)
6278-4-130	13mm x 167mm Broach Tips (2 per tray)
6278-4-140	14mm x 167mm Broach Tips (2 per tray)
6278-4-150	15mm x 167mm Broach Tips (2 per tray)
6278-4-160	16mm x 167mm Broach Tips (2 per tray)
6278-4-170	17mm x 167mm Broach Tips (2 per tray)
6278-4-180	18mm x 167mm Broach Tips (2 per tray)
6278-4-190	19mm x 167mm Broach Tips (2 per tray)
6278-4-200	20mm x 167mm Broach Tips (2 per tray)
6278-4-210	21mm x 167mm Broach Tips (2 per tray)
6278-4-220	22mm x 167mm Broach Tips (2 per tray)



127mm & 167mm Large Diameter Broach Tip Tray 23mm - 26mm #6278-9-934

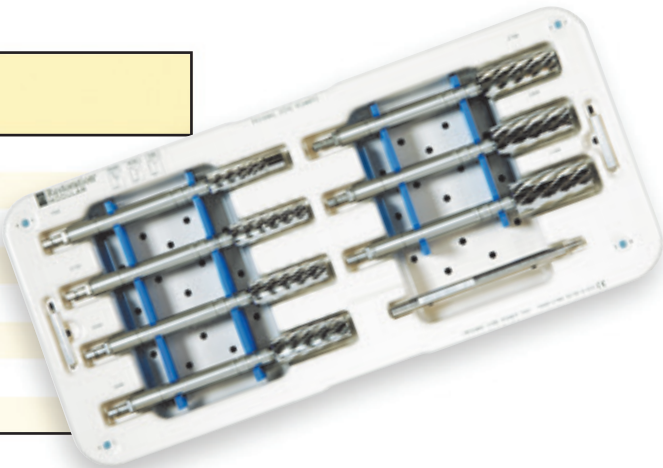
6278-3-230	23mm x 127mm Broach Tips (2 per tray)
6278-3-240	24mm x 127mm Broach Tips (2 per tray)
6278-3-250	25mm x 127mm Broach Tips (2 per tray)
6278-3-260	26mm x 127mm Broach Tips (2 per tray)
6278-4-230	23mm x 167mm Broach Tips (2 per tray)
6278-4-240	24mm x 167mm Broach Tips (2 per tray)
6278-4-250	25mm x 167mm Broach Tips (2 per tray)
6278-4-260	26mm x 167mm Broach Tips (2 per tray)



Restoration® Modular

Surgical Protocol

Proximal Cone Reamer Tray #6278-9-942	
6278-1-519	19mm Proximal Cone Reamer
6278-1-521	21mm Proximal Cone Reamer
6278-1-523	23mm Proximal Cone Reamer
6278-1-525	25mm Proximal Cone Reamer
6278-1-527	27mm Proximal Cone Reamer
6278-1-529	29mm Proximal Cone Reamer
6278-1-531	31mm Proximal Cone Reamer
6278-9-500	Proximal Cone Reamer Post

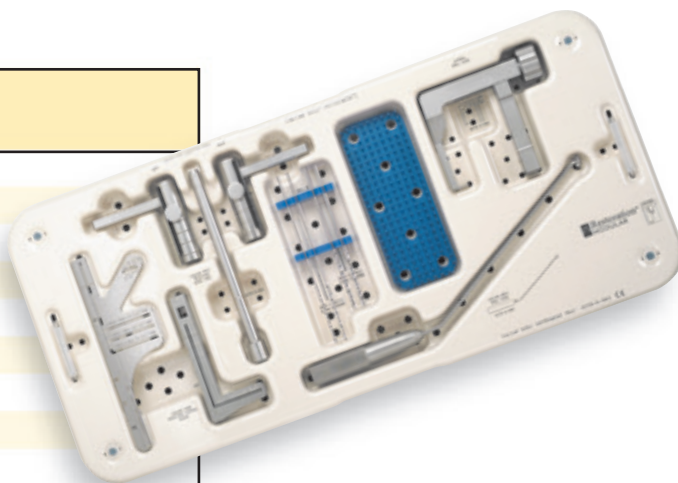


Restoration® Modular

Surgical Protocol

Calcar Instrument Tray #6278-9-962

6278-4-500	Calcar Body Resection Guide
6278-4-550	Calcar Body Drill Guide
6278-4-400	Calcar Post Resection Cutting Block
6278-4-401	Calcar Post Resection Ring - R
6278-4-402	Calcar Resection Guide Post
6278-4-403	Calcar Post Resection Ring - L
6278-4-450	Lateral Drill Guide
5085-1-227	2.2mm x 150mm Drill (2 per tray)
5800-5-125	3.2mm x 125mm Drill (2 per tray)



Calcar Body Trial Tray #1 19mm - 25mm #6278-9-960

6278-0-119	19mm +10mm Calcar Body Trial
6278-0-219	19mm +20mm Calcar Body Trial
6278-0-319	19mm +30mm Calcar Body Trial
6278-0-121	21mm +10mm Calcar Body Trial
6278-0-221	21mm +20mm Calcar Body Trial
6278-0-321	21mm +30mm Calcar Body Trial
6278-0-123	23mm +10mm Calcar Body Trial
6278-0-223	23mm +20mm Calcar Body Trial
6278-0-323	23mm +30mm Calcar Body Trial
6278-0-125	25mm +10mm Calcar Body Trial
6278-0-225	25mm +20mm Calcar Body Trial
6278-0-325	25mm +30mm Calcar Body Trial



Calcar Body Trial Tray #2 27mm - 31mm #6278-9-961

6278-0-127	27mm +10mm Calcar Body Trial
6278-0-227	27mm +20mm Calcar Body Trial
6278-0-327	27mm +30mm Calcar Body Trial
6278-0-129	29mm +10mm Calcar Body Trial
6278-0-229	29mm +20mm Calcar Body Trial
6278-0-329	29mm +30mm Calcar Body Trial
6278-0-131	31mm +10mm Calcar Body Trial
6278-0-231	31mm +20mm Calcar Body Trial
6278-0-331	31mm +30mm Calcar Body Trial

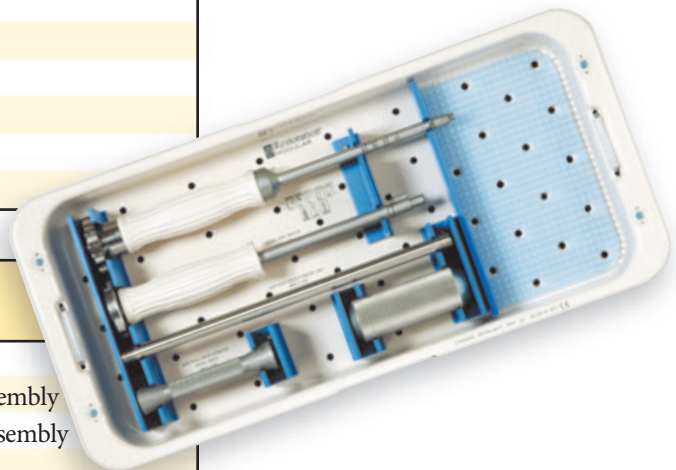
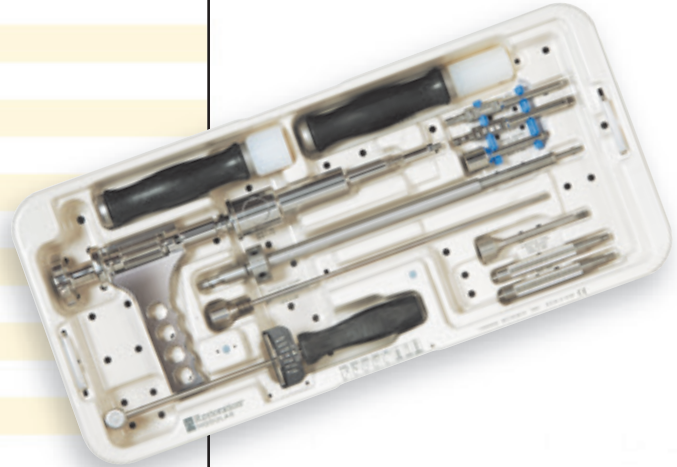


Restoration® Modular

Surgical Protocol

Finishing Instrument Tray #1 #6278-9-970

6278-1-100	Version Control Stem Inserter
6278-1-110	Stem Inserter Proximal Body Impactor
6278-9-070	Body/Stem Separator
8000-0000	Body/Stem Separator Handles (2 per tray)
6278-9-080	McReynolds Proximal Body Adapter
6266-0-140	Head Impactor
6260-4-070	Proximal Body Steady Handle
6260-4-080	Torque Wrench Adapter
6260-4-090	McReynolds Distal Stem Adapter
6278-5-100	5mm Hex Locking Bolt Driver
6278-5-120	8mm Hex Locking Bolt Driver
6060-2-640	Torque Wrench
6264-8-122R	22mm +0 Head Trial
6264-8-222R	22mm +3 Head Trial
6264-8-322R	22mm +8 Head Trial
6264-8-026R	26mm -3 Head Trial
6264-8-126R	26mm +0 Head Trial
6264-8-226R	26mm +4 Head Trial
6264-8-326R	26mm +8 Head Trial
6264-8-426R	26mm +12 Head Trial
6264-8-028R	28mm -4 Head Trial
6264-8-128R	28mm +0 Head Trial
6264-8-228R	28mm +4 Head Trial
6264-8-328R	28mm +8 Head Trial
6264-8-428R	28mm +12 Head Trial
6264-8-032R	32mm -4 Head Trial
6264-8-132R	32mm +0 Head Trial
6264-8-232R	32mm +4 Head Trial
6264-8-332R	32mm +8 Head Trial
6264-8-432R	32mm +12 Head Trial
6264-8-036R	36mm -5 Head Trial
6264-8-136R	36mm +0 Head Trial
6264-8-236R	36mm +5 Head Trial
6264-8-336R	36mm +10 Head Trial



Finishing Instrument Tray #2 #6278-9-971

6869-1-000	Shaft, McReynolds Extractor Assembly
6869-2-000	Driving Handle, McReynolds Extractor Assembly
6869-3-000	Sliding Hammer, McReynolds Extractor Assembly
6278-1-200D	Distal Stem Impactor
6278-1-350	Proximal Body Impactor



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