# CPT® 12/14 HIP SYSTEM LONG STEMS

## Surgical Technique for Femoral Revision

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# REVISION SURGICAL TECHNIQUE FOR THE CPT 12/14 LONG STEM HIP PROSTHESIS

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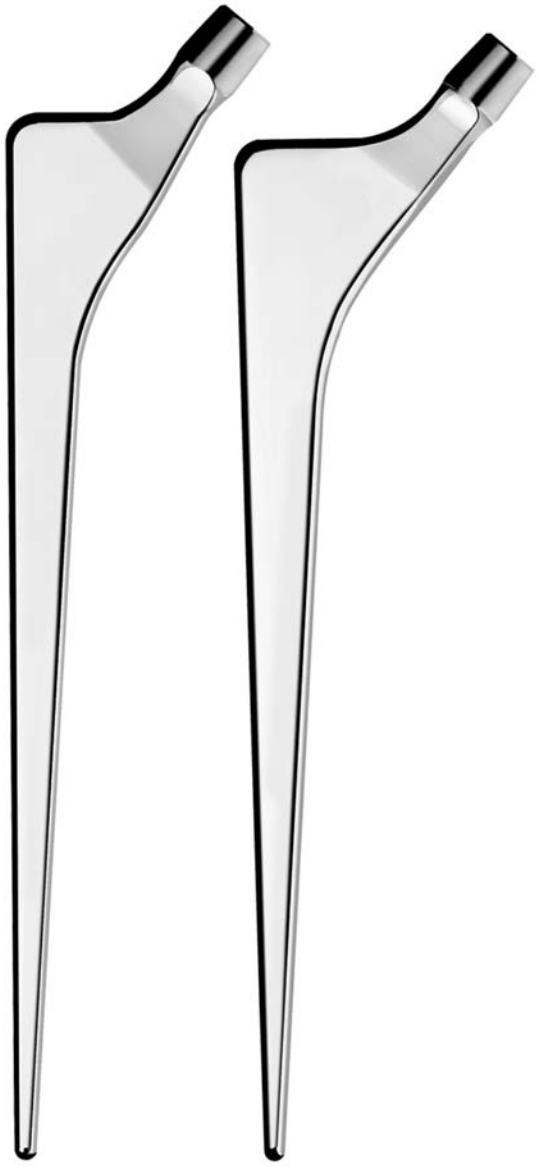


**Valgus Neck Stem Options**
provide an additional means of increasing leg length without increasing offset or a means of optimizing proximal bone support while maintaining leg length.

## INTRODUCTION

Collarless, polished tapered stems have proven to be successful during more than 25 years of clinical use.[1-5] The *CPT* Hip System has continued this tradition of success since its introduction more than a decade ago.[1,4,5,8] The *CPT* System has been available in cobalt chromium since its introduction in the United States in the early 1990s and has an excellent history of clinical results.[1]

The *CPT* 12/14 Revision Hip System includes seven long stem components. This includes two valgus neck stems that provide leg length options without altering offset. The seven long-stem components are listed below along with their length and, in parentheses, the number of millimeters longer than the standard *CPT* Hip Stem (sizes 1-5), which is 130mm. The stem length is defined as the distance from the stem tip to the intersection of the medial curve and the neutral depth indicator mark.

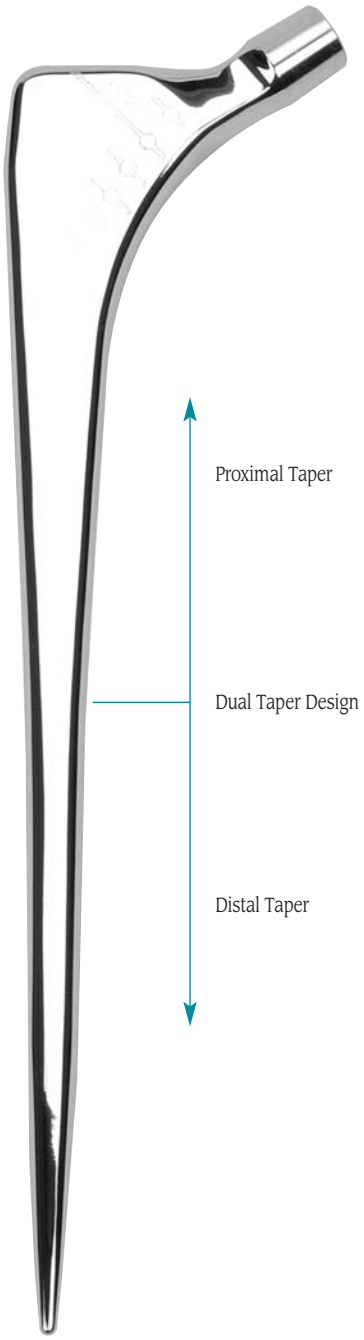
- **Size 2, Standard Offset, 180mm (+50mm)**
- **Size 2, Standard Offset, 180mm (+50mm) Valgus Neck**
- **Size 3, Extended Offset, 180mm (+50mm)**
- **Size 3, Extended Offset, 180mm (+50mm) Valgus Neck**
- **Size 4, Extended Offset, 200mm (+70mm)**
- **Size 4, Extended Offset, 230mm (+100mm)**
- **Size 4, Extended Offset, 260mm (+130mm)**
- **The Standard Stem length is 130mm.**

The 12/14 taper allows a wide selection of femoral head and stem combinations, and the optimized neck geometry enhances range of motion. The advantages of using the *CPT* Cemented Long Stem Revision System include:

- Immediate fixation, which allows rapid full weight bearing and early rehabilitation, and is particularly valuable in middle aged and elderly patients who do not cope well with partial weight bearing.
- The relative simplicity of the technique, which allows treatment of femoral deficiencies and deformities that otherwise require a trans-trochanteric approach to fit a straight cementless stem or to correct deformity.
- Minimizing the risk of periprosthetic fracture because no impaction of the stem is necessary.
- Eliminating the need for reaming of bone to fit a stem.
- Cement fixation is along the whole of the stem, so the construct can accommodate some proximal bone loss, provided there is still adequate proximal bone support for the stem.
- The polished, collarless design and the continuous taper or the consecutive dual taper allows for stem removal from the cement in cases of rerevision for instability or infection.
- Leg length can be easily modified based on the trial reduction. This may be achieved by seating the stem slightly proud or slightly recessed.

## DESIGN PHILOSOPHY

The *CPT* Prosthesis has a collarless, highly polished, double-taper design. The philosophy was developed based on the three fundamental engineering principles represented by these key design features, and the properties of PMMA bone cement. Bone cement is stronger in compression than tension or shear and is a viscoelastic material which, under a constant load, deforms over time.[6,7] The *CPT* design helps to ensure that the prosthesis remains firmly seated as the cement deforms. The polished, tapered design optimizes the transfer of compressive forces to the cement rather than shear forces. The double taper wedges solidly in the bone cement mantle as the stem stabilizes. Controlled subsidence in the first year is expected to occur, but after stabilization, subsidence is minimal. The polished surface allows the subsidence with minimal resistance or friction. The collarless feature allows subsidence and stabilization to occur without the physical constraint of a collar. Micromotion and subsidence have been shown to occur in total hip arthroplasty; therefore, the fact that these aspects are integrated into the design philosophy supports the outstanding clinical and radiographic results of the *CPT* Stem.[1-4,8,9]

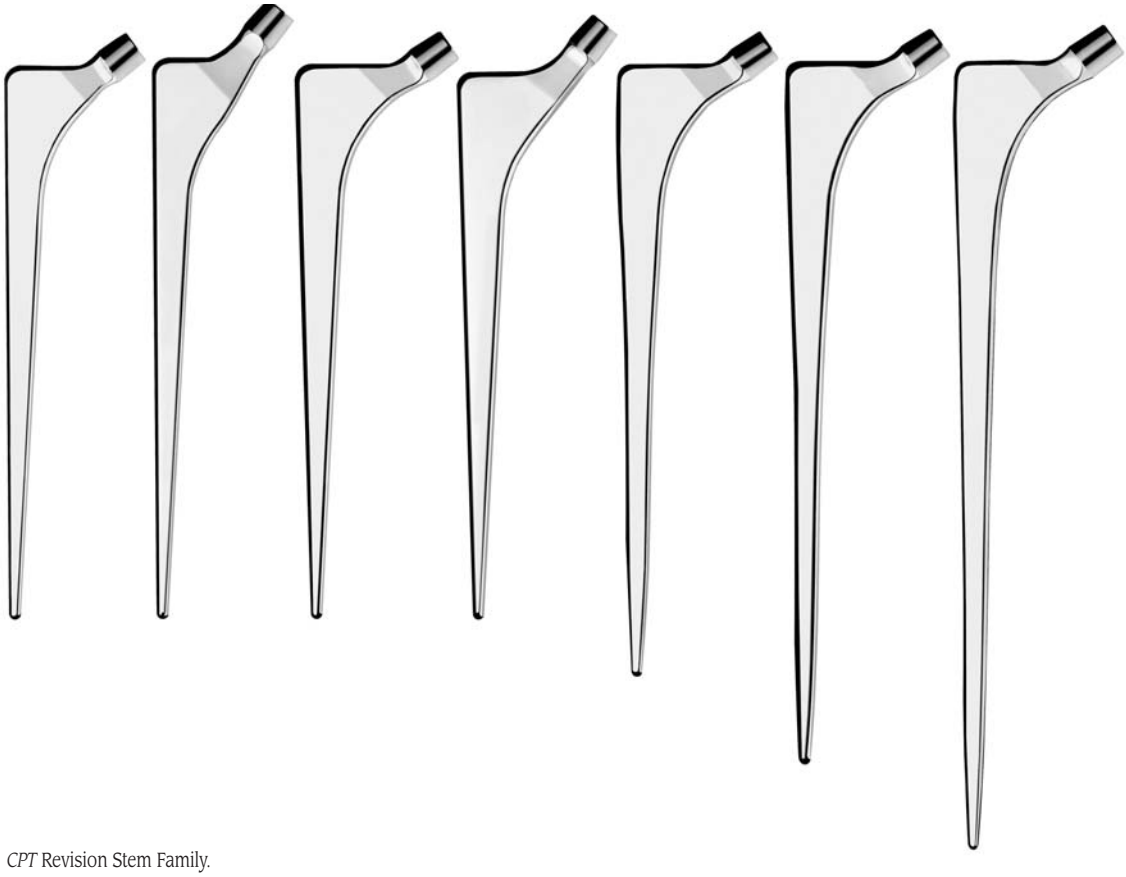



The *CPT* Long Stems are of two types. The four 180mm (+50mm) long stems have a continuous taper from proximal to distal and are suitable for many routine revisions. The two valgus neck stems are important because they allow for more options in adjusting neck length and center of rotation of the reconstructed hip. In particular, the valgus neck stems can be used to accommodate two common scenarios in revision surgery: a high hip center or slight proximal femoral bone loss. The three longer stems, 200mm (+70mm), 230mm (+100mm), 260mm (+130mm), are used for more severe proximal and distal bone damage. These stems have a distinctive dual-taper design in that they maintain the double taper principle of the collarless tapered stem, but have two consecutive tapers from proximal to distal. The proximal taper blends into the stem taper (see illustration). The dual taper is designed to maximize the advantages of a tapered cemented stem.

The combination of a collarless prosthesis with a highly polished surface and double taper wedge allows the prosthesis to slightly subside within the cement mantle to achieve a strong, self-locking construct. The technique of cemented long stem revision is successful at long term and is applicable in the majority of routine revisions.[9] In younger patients, where bone restoration is a priority, or in cases of major bone loss, the *CPT* Stem can be combined successfully with impaction grafting using the *CPT* Femoral Impaction Grafting Technique to help restore bone.

An important advantage of cemented long-stem revision is that the procedure is simplified by using the stem and cement combination as a customized construct that fits the damaged femur exactly, while aiming for stem position that approximates the axial alignment of the femur without the need to be absolutely midline in both planes. Thus, this system is forgiving of femoral deformity, and can be used to fit femoral deficiency and deformity without the need for aggressive bone removal or extended trochanteric or other corrective osteotomy.

In the small number of extreme revision cases, severe bone defects may require a variety of techniques including cemented or cementless fixation, morselized or structural allograft, and a variety of internal fixation techniques. The surgeon is advised to plan for these requirements. In these extreme cases, a general principle is to plan the most appropriate reconstruction for the individual patient needs, but to have other choices available intraoperatively.

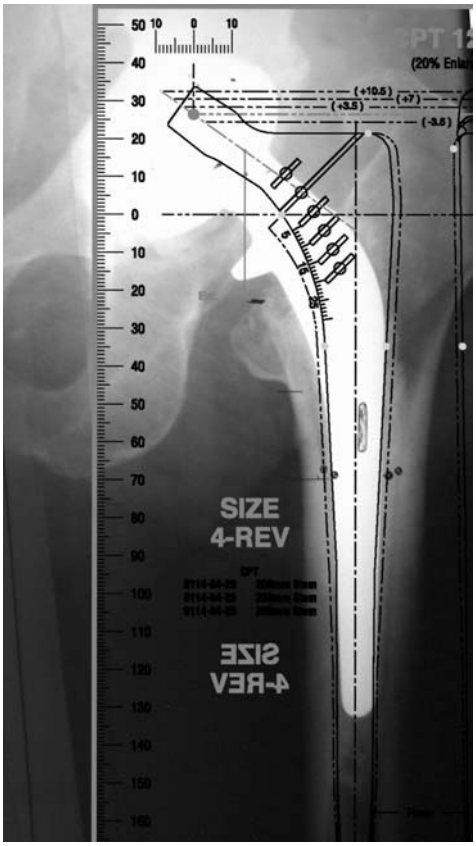


*CPT* Revision Stem Family.

# 10 QUICK STEPS FOR REVISION SURGERY

## 1 PREOPERATIVE PLANNING

Template to provide a basis for judging appropriate leg length and offset targets to achieve during surgery.




## 2 APPROACH

Expose the hip joint using your approach of choice. More extensive exposure is generally required for revision surgery.

## 3 DETERMINE LEG LENGTH

Prior to dislocating the hip, obtain a baseline measurement of leg length using your preferred method.

## 4 REMOVE FEMORAL COMPONENT

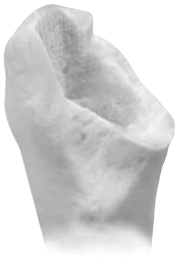
Carefully dislocate the hip and remove the femoral component, cement if present, and residual membrane.

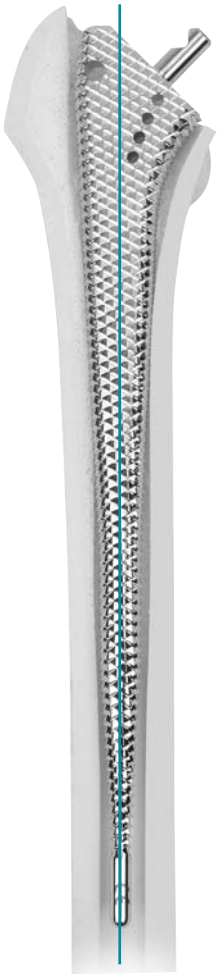
## 5 REVISE ACETABULAR COMPONENT

Proceed to implantation of the acetabular component.

## 6 FEMORAL CANAL PREPARATION

Cautiously rasp the femoral canal, ensuring sufficient bone removal at the greater trochanter to allow axial rasping.





## 7 TRIAL REDUCTION

With rasp in place, apply the cone provisional and perform a trial reduction.

The ability to adjust leg length and offset at the time of the trial reduction is a distinctive feature of the trial reduction for this collarless polished taper system.

**Note: If using a *VerSys*® Trial Head, refer to the Zimmer *VerSys* Trial Head Surgical Technique 97-8018-001-00 for additional information.**

## 8 CEMENT INTRODUCTION

Plug the distal canal, insert cement in a retrograde manner and pressurize cement until the desired viscocity is achieved.

## 9 IMPLANTATION

Assemble the stem and Stem Inserter, then attach the distal centralizer. Slowly insert the stem to the appropriate position while maintaining axial alignment. Using the Femoral Head Provisional, perform a trial reduction to confirm leg length, offset, and range of motion, then attach the femoral head.

## 10 WOUND CLOSURE

Close the wound in layers.

## PREOPERATIVE PLANNING

Comprehensive preoperative planning is helpful in revision surgery to prepare for a variety of potential circumstances. This begins with careful preoperative templating. Template the femur and plan stem length, depth of insertion, plug site, extent of bone grafting, and the need for proximal reconstruction. These may need to be modified according to intraoperative findings, but provide a base for planning.

The purpose of preoperative templating is to:

1) Gain an accurate three-dimensional understanding of the bony anatomy.
2) Estimate the stem size and length.
3) Determine the possible centers of rotation of the reconstruction (anatomic or new hip center).
4) Predict limb lengths based on the hip center, and the height of the calcar and lesser trochanter, in conjunction with clinical measurement and preoperative radiographs.
5) Determine the appropriate relationship between the height of the tip of the trochanter or other lateral landmark, and the center of femoral head rotation.
6) Determine potential difficulties in implant removal and insertion.
7) If necessary, plan the level and type of femoral or trochanteric osteotomy, and the bed for its reattachment.
8) Determine the need for bone graft reconstruction.

In femoral templating, it is important to appreciate that magnification of the size of the femur will vary depending on the distance from the x-ray source to the film and the distance from the patient to the film. The *CPT* Hip System Templates use standard 20 percent magnification, which is close to the average magnification on most clinical x-ray films. Magnification for larger patients or obese patients may be greater than 20 percent because their osseous structures are farther away from the surface of the film. To determine the magnification of any x-ray film, use a standardized marker at the level of the femur when exposing the film.

Begin by obtaining a complete set of good quality radiographs, including:

1) An A/P of the pelvis centered on the pubis.
2) An A/P and lateral of the length of the femur.

For patients with acetabular bone deficiency, obturator and iliac oblique views may be helpful.

Note the important reference points on the radiographs, including:

1) The existing center of rotation of the failed hip arthroplasty.
2) The location of the anatomic center of rotation of the hip (based on either the contralateral hip, preoperative views of the failed hip, or by using the teardrop and Kohler's lines for reference).
3) The offset of the failed hip arthroplasty.
4) The normal offset.
5) The level of the calcar.
6) The height of the tip of the greater trochanter, or other lateral landmark, in relation to the center of the femoral head.

In addition, assess any acetabular and femoral bone deficiencies, angular or rotational deformities of the femur, and all other factors related to the failed implant.

Template for the acetabular component first. In the absence of any significant bone deficiencies, select the hemispherical acetabular transparency that makes the best circumferential contact with the remaining bone stock, positioning the implant in 45 degrees of abduction. If there is major bone loss or socket break-out, template for either a smaller acetabular component at a higher than normal hip center, or a close-to-anatomic center with the use of a large hemispherical component or reconstruction cage. Indicate these possibilities as potential centers of rotation on the radiographs.

Next, template for the femoral component to determine its optimum size and length, as well as its position. Clearly delineate areas of major osteolysis, stress risers, femoral preforations and points of angulation or malrotation, all of which influence the size and length of the stem required. Determine the extent of bone grafting, if required, and the need for proximal reconstruction. These may have to be modified intraoperatively, but will provide a base for planning.

Select the template that best fits the proximal femur, leaving room for cement. The outline of the prosthesis is indicated by a solid line and the outline of the cement mantle created by the rasp is indicated by a dashed line on the template. Align the femoral template so that it is centered in the diaphysis and then move the template so that the center of the femoral head and the osteotomy line are appropriately positioned to restore the planned amount of leg length (Fig. 1). While aligning the femoral template in the canal, the presence of incongruities or an excessive bow or angulation in the A/P or lateral planes will become evident.

After indicating the planned center of rotation on the radiograph, and the proper position of the femoral component, determine the optimal head position and stem offset. By having the choice of a standard neck angle or a valgus neck angle, the 180mm stems allow versatility in the choice of neck height and hip center. A valgus neck stem, which provides an additional 15mm of leg length, may be used to gain leg length in a high hip center, or to provide a stronger construct by seating the stem distally in bone.

An important advantage of the collarless stem is that it can be adjusted proximally and distally to the required leg length. When templating, and intraoperatively, aim to achieve leg length without using the longer heads, which have a skirt. These are reserved for situations where an unplanned increase in leg length is required.

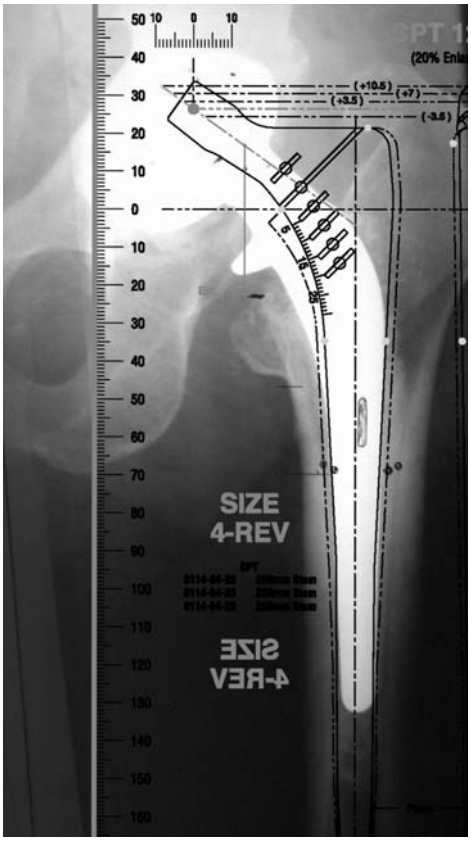



Fig. 1 - Templating

## SURGICAL TECHNIQUE

### Approach

Position the patient for routine hip surgery. Extensive exposure is recommended, especially in difficult revision cases.

### Determination of Leg Length

After exposing the joint, obtain a baseline leg length measurement before dislocating the hip. There are several methods to measure leg length. One method is to place one pin in the iliac wing and a cautery mark or a pin in the greater trochanter. With the leg in the neutral position, measure the distance between the two reference points. It is important that the measurement be taken with the leg in the neutral position so the position can be easily and accurately reproduced after the new implant has been inserted. Leave the proximal pin in place, but remove the trochanteric pin, if used, and mark the pin site with electrocautery so it can be replaced for remeasurement.

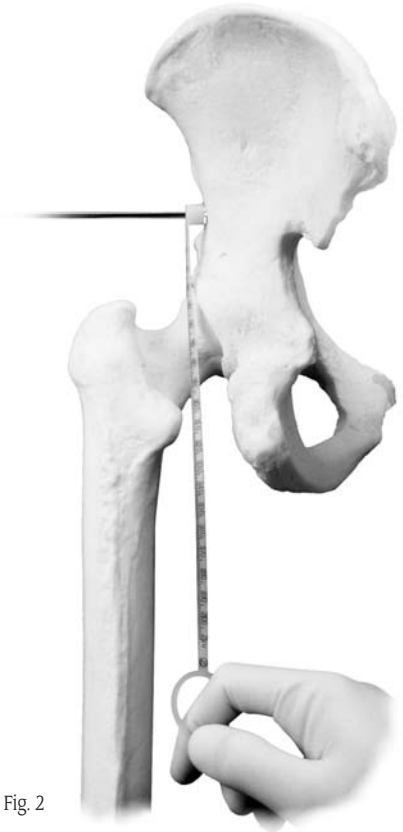


Fig. 2

Zimmer also offers a device called the Joint Ruler (Fig. 2) to measure leg length. To use the Joint Ruler, insert a 1/8-inch (3.2mm) Steinman pin superior to the acetabular rim. Place the pin in the one o'clock position for an anterior approach, or the 11 o'clock position for a posterior approach. Mark the femur using electrocautery or by inserting a 3.5mm diameter by 10mm length cortical screw. Secure the small end of the Joint Ruler by sliding it over the Steinman pin. Then align the ruler with the femoral marking and record the measurement.

### Dislocation, Removal of Implants, and Acetabular Component Insertion

Ideally, the femoral component is removed without an osteotomy because this unnecessarily converts a cavitary defect into a cortical defect, with increased risk of complications and a significant problem if union is not successful. Removal is simplified by aggressively clearing any overhanging medial bone at the greater trochanter. However, the trochanteric slide is often useful. Also, the extended trochanteric osteotomy or transfemoral approach may be necessary, and is reduced prior to preparing for a cemented long stem.

Carefully dislocate the hip to avoid the risk of fracture of the sometimes fragile femoral bone stock. Remove the implants and insert the acetabular component. Note the new center of hip rotation.

## Femoral Canal Preparation

Inspect the metaphyseal and diaphyseal regions for a neocortex, sclerotic bone formation, and remaining bone cement in the case of a cemented implant.

A rasping and trial technique is used to prepare the femoral canal. Rasps and provisional components are used to obtain the position of best fit of the stem within the femoral canal while aiming to maintain near axial alignment and avoid varus malpositioning.

Three rasps are available for *CPT* Revision Stems (Fig. 3):

Size 2 180mm Rasp

- For Size 2, 180mm (+50mm) Stems.

Size 3 180mm Rasp

- For Size 3, 180mm (+50mm) Stems.

Size 4 200mm Rasp

- For Size 4, 200mm (+70mm) Stem.
- For Size 4, 230mm (+100mm) Stem.
- For Size 4, 260mm (+130mm) Stem.

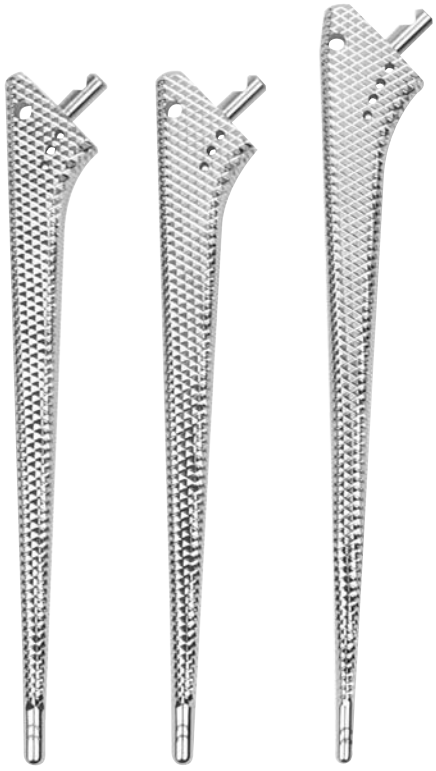


Fig. 3

Before rasping, be sure that bone is adequately removed from the trochanter by using a gouge, rongeurs, rasps, or a power burr (Fig. 4). This will enhance axial alignment. The bone removed may be a source of autograft for small defects. If using a rasp to remove this bone, rasp laterally. Then gently remove bone from the femur, as necessary to seat the rasp.

Rasping by hand alone is preferred. If a mallet is used, the rasp should advance with each moderate tap of the mallet. Do not tap the rasp again once it has stopped advancing. It is important to antevert the rasps by approximately 10 to 20 degrees, depending on the natural anteversion of the patient's femoral neck and the intraoperative plan.

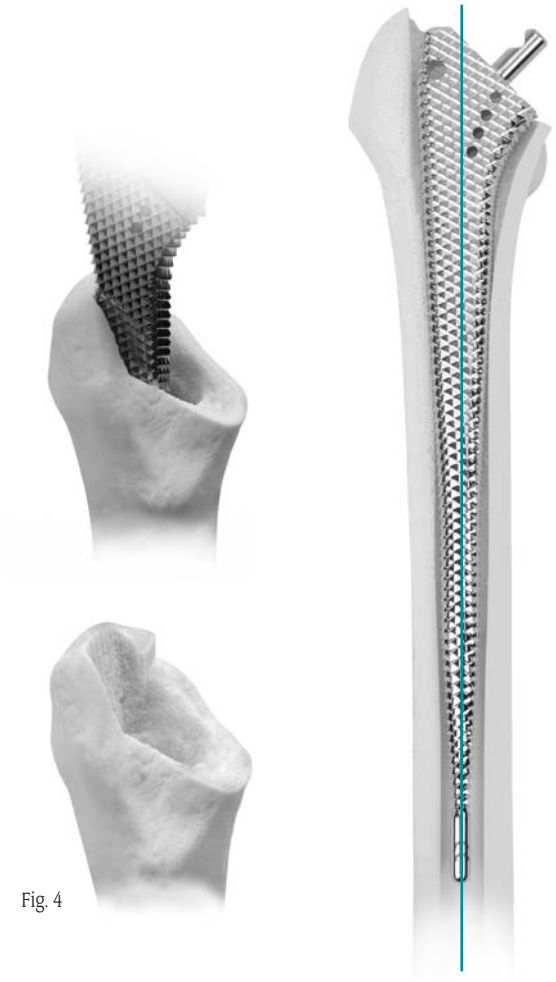


Fig. 4

Begin rasping with the Size 2 180mm Rasp and increase in size as necessary for the appropriate stem. Gently seat the rasp to the appropriate depth mark indicator. When the final rasp is seated to the appropriate level, leave the rasp in place for a trial reduction. If a Size 4, 230mm (+100mm) Stem or a Size 4, 260mm (+130mm) Stem will be used, remove the final rasp and use the appropriate provisional component for the trial reduction.

The 180mm stems allow versatility in choice of neck height and hip center as well as how far to seat the stem in the damaged bone. The Size 2 and Size 3 180mm (+50mm) Stems are also available in a valgus neck version, which provides an additional 15mm of leg length (Fig. 5). The valgus neck stems can be used to establish leg length in a high hip center, or to seat the stem to be more contained in bone where there is proximal bone loss.

The Size 4 200mm Rasp that is used for the 200mm, 230mm, and 260mm stems may or may not seat fully if the femoral canal is small or the deformity extensive. If the rasp seats and a 200mm stem is planned, leave the rasp in place for a trial reduction. If a 230mm or 260mm stem is required, remove the rasp and use the Size 4 230mm Stem Provisional and Size 4 260mm Stem Provisional to check the stem will seat in the femur. If a 200mm stem is planned and the rasp will not seat, remove the rasp and try the 230mm long-stem provisional for the trial reduction.

**Note: The dimensions for the Size 4 230mm and Size 4 260mm Stem Provisionals do not include the cement mantle. They are the same size as the implant.**

While it is ideal to seat the rasp and thereby achieve a minimum 2mm-3mm of cement mantle thickness throughout, in revisions this may be compromised somewhat, depending on the shape of the damaged femur. The forgiving nature of the polished surface and tapered stem are ideally suited for these indications.

The femoral canal is usually a mixture of predominantly sclerotic bone and some residual cancellous bone. However, on occasion, there may be an internal neocortex that can be removed with a burr or rongeur to expose underlying cancellous bone. In addition, the lesser and greater trochanters often have a neocortex that can be removed. To help cement interdigitation, make grooves in thick areas of the endocortex. Distal cortical defects should be exposed and, after cementing the stem, the defect is bone grafted with mesh support. Bone graft, mesh and bone cement can be used to address proximal medial defects.

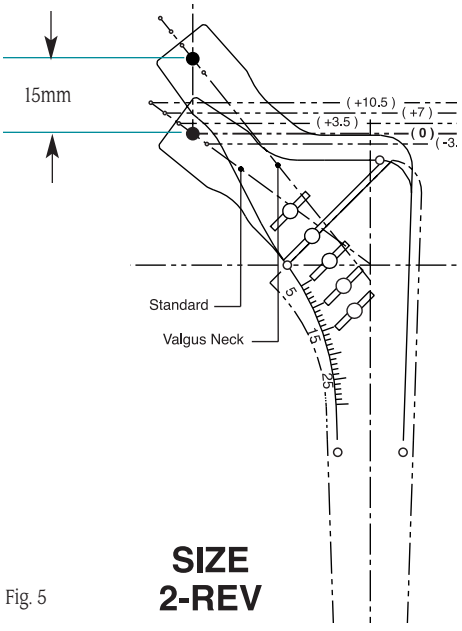



Fig. 5

## Trial Reduction

As explained in the previous section, the Stem Provisionals or the seated rasp can be used for trial reduction, depending on the stem size selected. For 180mm and 200mm stems, perform the trial reduction if the rasp is stable in the canal. For the 230mm and 260mm stems, insert the corresponding Stem Provisional. If the rasps or provisionals are not stable, insert the Trial Locating Pin through the depth indicator holes on the neck of the rasp or provisional, and use lap pads or sponges as necessary to stabilize the rasp or provisional in the canal. The depth indicator holes (Fig. 6) correspond to the depth indicator markings on the final implant. **Depth mark indicators below the osteotomy line indicate levels of stem seating under ideal circumstances of circumferential cement mantle and proximal bone support. In complex revision where rotational stability may be a concern, or in impaction situations, use of distal depth indicators is not recommended.** These depth indicators are 5mm apart vertically. If it is desired to seat the stem slightly proud, insert a Trial Locating Pin into the appropriate hole to maintain the proud position during the trial reduction (Fig. 6a). Note the insertion depth. Distal etch marks may be used to maintain stem alignment during insertion.

### Depth Indicators Below Osteotomy Line

| Stem Size | STD | EXT | XEXT |
|---|---|---|---|
| Small | 0 | na | na |
| X-Small | 0 | na | na |
| 0 | 2 | 0 | na |
| 1 | 2 | 1 | na |
| 2 | 2 | 2 | 1 |
| 3 | 2 | 2 | 2 |
| 4 | 2 | 2 | 2 |
| 5 | 2 | 2 | 2 |
| 2, 180mm | 3 | na | na |
| 2, 180mmVN | 3 | na | na |
| 3, 180mm | na | 3 | na |
| 3, 180mm VN | na | 3 | na |
| 4, 200mm | na | 4 | na |
| 4, 230mm | na | 4 | na |
| 4, 260mm | na | 4 | na |

* Small and X-Small have no depth indicator above osteotomy line. All other stems have one indicator above the osteotomy line.

Fig. 6

Fig. 6 a

The seven CPT long stem revision components are represented by the combinations below. Please note, some cone provisionals are from the primary instrument set and some are from the revision instrument set (Fig. 7).

Attach the appropriate Femoral Head Provisional and perform a trial reduction (Fig. 8). If necessary, adjust the provisional components to optimize joint stability, leg length, and range of motion. Aim for a neutral head center (+0mm)

**Note: If using a *VerSys* Trial Head, refer to the Zimmer VerSys Trial Head Surgical Technique 97-8018-001-00 for additional information.**

to avoid the need for a skirted head (+7.0mm and +10.5mm). Observe the relationship of the center of the femoral head to the top of the greater trochanter to confirm the preoperative plan. Check the sciatic nerve tension and range of motion, and confirm positions of potential instability. Also, confirm that the preoperative goal for leg length has been achieved by using the preferred method of measurement. After performing the trial reduction, remove the rasp and provisional components.

| Stem | Rasp | Stem Provisional | Cone Provisional | Instrument Set for Cone Provisional |
|---|---|---|---|---|
| Size 2, 180 | Size 2, 180 | | Size 2 STD | Primary Set |
| Size 2, 180 VN | Size 2, 180 | | Size 2 VN | Revision Set |
| Size 3, 180 | Size 3, 180 | | Size 3 EXT | Primary Set |
| Size 3, 180 VN | Size 3, 180 | | Size 3 VN | Revision Set |
| Size 4, 200 | Size 4, 200 | | Size 4 EXT | Primary Set |
| Size 4, 230* | | Size 4, 230 | None for Stem Prov | |
| Size 4, 260* | | Size 4, 230 | None for Stem Prov | |

* The Size 4, 200 rasp with the Size 4 EXT cone provisional may be used for all Size 4 stem trial reductions, but the rasp is shorter than the two longer stems. Stem Provisionals do not model the cement mantle. They are line-to-line with the final implant and should be used to check length. Rasps model the cement mantle.

Fig. 7 - Rasp and Cone Provisional Combinations

Fig. 8

## Component Implantation

Use the Medullary Canal Sizers to determine the appropriate size of the Allen Medullary Bone Plug. One technique is to use the plug with the core size that corresponds to the last sizer that passed through the isthmus.

Use the Allen Medullary Bone Plug Inserter to insert the bone plug to the mark on the inserter which corresponds to approximately 2.5cm below the tip of the stem. Alternatively, use the Distal Plug Inserter supplied with the *CPT* System, which has marks indicating the depth of insertion of the plug for different stems (Fig. 9). Position the inserter laterally in the femur in the same orientation of the midline of the stem, and level with the site of the neck cut normally made in primary arthroplasty. Introduce the plug with gentle hammering until the mark for the chosen stem is level with the oblique neck cut.

If in doubt, check to be sure that the bone plug is inserted to a depth that will accommodate the selected stem length by inserting the rasp or Stem Provisional.

If the site of the plug will be below the isthmus, a variety of techniques can be used, including:

- Use a small amount of cement to secure the bone plug in place.
- Insert a second plug over the initial plug if it is somewhat unstable.
- Insert a temporary Steinman pin through the femur at the site below the plug to support the plug. Insert the pin through a safe approach and remove it after cementing.

Cover or occlude any perforations or windows in the femoral canal.

Once the femoral canal is prepared, use pulsatile lavage to remove any loose bone and control bleeding. One technique is to use a femoral brush followed by pulsatile lavage, insertion of a thin plastic suction tube, and femoral packing. The pack may be presoaked in a variety of fluids to minimize bleeding.

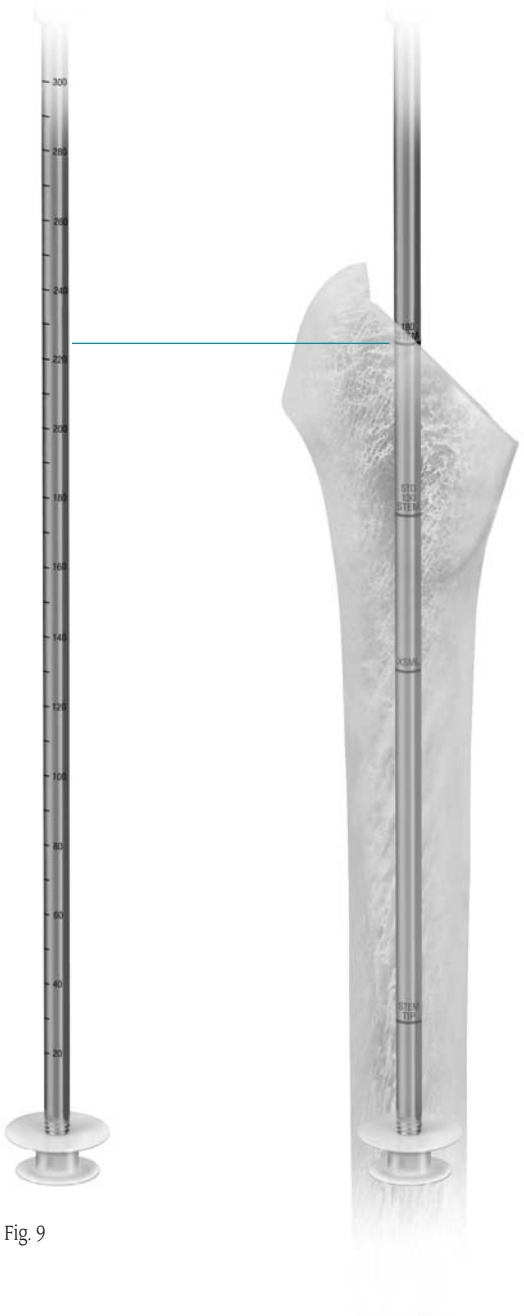


Fig. 9

Fig. 10

Fig. 11

Prepare four 40gm packets of PMMA bone cement. One useful technique is to use two cartridges. The PMMA bone cement is introduced in a low viscosity state. Using a cement gun, inject cement into the canal in a retrograde fashion. When the canal is filled and the first cartridge exhausted, change to the second cartridge which already has the nozzle broken off, and the Femoral Pressurizer Seal attached. Inject additional cement, maintaining pressure until the cement reaches a doughy state (Fig. 10). The Femoral Pressurizer Plate can be used to enhance pressure applied to the seal (Fig. 11).

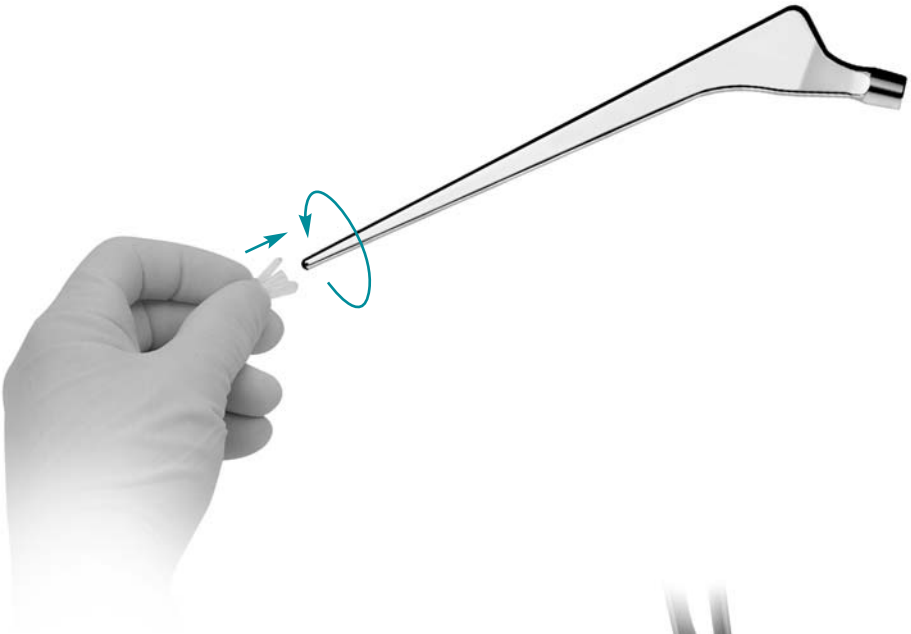


Fig. 12

Attach the distal centralizer to the femoral stem (Fig. 12) with a twisting motion. Two distal centralizers are available. The Standard Distal Centralizer (Fig. 13) has wings and is recommended for use with cemented long-stem revisions.

Fig. 13

A Standard Distal Centralizer is packaged with the stem. Attach the femoral component to the Stem Inserter by placing the release lever in the engage position, marked "E" and turning the barrel to thread the inserter onto the stem (Fig. 14). A small pin engages the dimple on the stem shoulder to control component anteversion during insertion.

Fig. 14

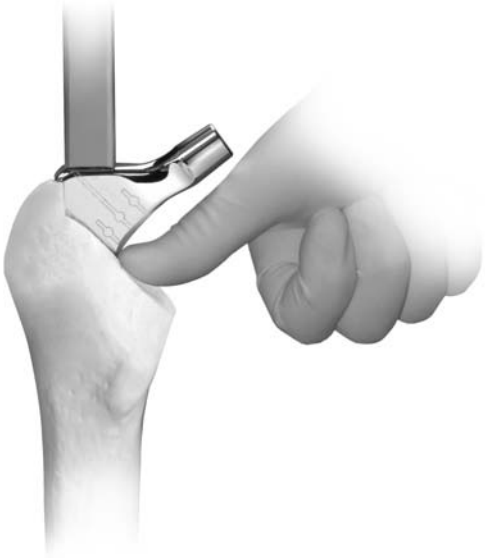


Fig. 15

Place a thumb or finger over the medial femoral neck while inserting the stem to maintain cement pressure and to help ensure that the stem does not move into varus (Fig. 15). The goal is to center the stem within the cement mantle that has been created by the rasp.

Aim for a minimum 4mm of cement on the medial side of the stem. Slowly advance the stem into the cement mantle. The Stem Inserter has a mark along the stem center line to aid in insertion. It also has a thread between the handle and barrel to assemble the Anteversion Rod (Fig. 16). The Anteversion Rod represents a reference for zero degrees of anteversion so that the desired anteversion of between 10 degrees and 20 degrees can be achieved. Slowly advance the stem into the cement mantle. Insert the stem to the final position and stabilize the stem with one hand while removing the inserter with the other.

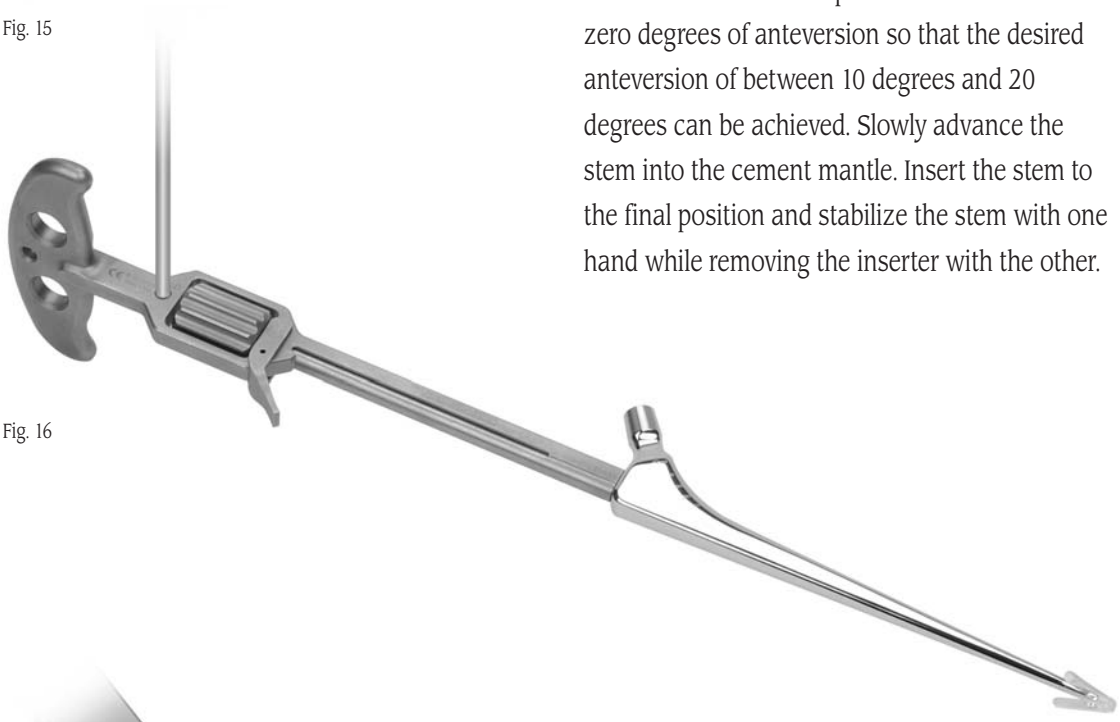


Fig. 16

Fig. 17

To disengage the stem from the Stem Inserter, continue to support the inserter while flipping the release lever to the disengage position marked "D" (Fig. 17). It is recommended to gently push a small amount of cement over the lateral shoulder of the stem so that stem/cement subsidence may be evaluated on radiographs. This also helps prevent the remote possibility of the stem backing out inadvertently should a postoperative dislocation require reduction.

The aim is to have the stem reach its final position as the cement becomes quite viscous, thereby maintaining pressure on the cement.

Apply the Cement Restrictor and Cement Restrictor Plate, if needed. Maintain pressurization and stem position until the cement hardens.

Once the cement has hardened, the Femoral Head Provisional may be used during a trial reduction to assess leg length, range of motion, stability, abductor tension, and to confirm final femoral head size.

**Note: If using a *VerSys* Trial Head, refer to the Zimmer *VerSys* Trial Head Surgical Technique 97-8018-001-00 for additional information.**

Verify that the neck taper is clean and dry. Assemble the femoral head on the taper and impact the head with the femoral head impactor. Test the security of the head fixation by trying to remove it by hand.

## Wound Closure

After obtaining hemostasis, insert a *Hemovac*® Wound Drainage Device, if desired. Then close the wound in layers.

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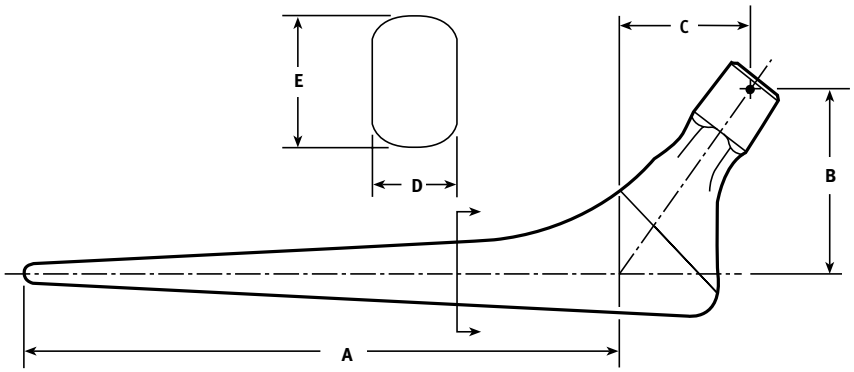


| Prod. No. | Stem Size (mm) | A Stem Length (mm) | B Offset (mm) When Head/Neck Component Selected is: | | | | | C Neck Height (mm) When Head/Neck Component Selected is: | | | | | D A/P Width | E M/L Width |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Standard Offset** | | | -3.5 | 0 | +3.5 | +7 | +10.5 | -3.5 | 0 | +3.5 | +7 | +10.5 | | |
| 00-8114-000-00 | 0-STD | 105 | 29 | 32 | 35 | 37 | 40 | 24 | 26 | 28 | 30 | 32 | 7.5 | 9.0 |
| 00-8114-001-00 | 1-STD | 130 | 31 | 34 | 37 | 39 | 42 | 24 | 26 | 28 | 30 | 32 | 9.0 | 10.5 |
| 00-8114-002-00 | 2-STD | 130 | 33 | 36 | 38 | 41 | 44 | 24 | 26 | 28 | 30 | 32 | 9.0 | 13.0 |
| 00-8114-003-00 | 3-STD | 130 | 35 | 37 | 40 | 43 | 46 | 24 | 26 | 28 | 30 | 32 | 9.0 | 15.5 |
| 00-8114-004-00 | 4-STD | 130 | 35 | 38 | 41 | 44 | 46 | 24 | 26 | 28 | 30 | 32 | 10.0 | 17.5 |
| 00-8114-005-00 | 5-STD | 130 | 37 | 40 | 43 | 45 | 48 | 24 | 26 | 28 | 30 | 32 | 10.0 | 20.0 |
| **Extended Offset** | | | | | | | | | | | | | | |
| 00-8114-000-10 | 0-EXT | 105 | 34 | 37 | 40 | 42 | 45 | 24 | 26 | 28 | 30 | 32 | 7.5 | 9.0 |
| 00-8114-001-10 | 1-EXT | 130 | 36 | 39 | 42 | 44 | 47 | 24 | 26 | 28 | 30 | 32 | 9.0 | 10.5 |
| 00-8114-002-10 | 2-EXT | 130 | 38 | 41 | 43 | 46 | 49 | 24 | 26 | 28 | 30 | 32 | 9.0 | 13.0 |
| 00-8114-003-10 | 3-EXT | 130 | 40 | 42 | 45 | 48 | 51 | 24 | 26 | 28 | 30 | 32 | 9.0 | 15.5 |
| 00-8114-004-10 | 4-EXT | 130 | 40 | 43 | 46 | 48 | 51 | 24 | 26 | 28 | 30 | 32 | 10.0 | 17.5 |
| 00-8114-005-10 | 5-EXT | 130 | 42 | 45 | 47 | 50 | 53 | 24 | 26 | 28 | 30 | 32 | 10.0 | 20.0 |
| **Extra Extended Offset** | | | | | | | | | | | | | | |
| 00-8114-002-30 | 2-XEXT | 130 | 43 | 46 | 48 | 51 | 54 | 29 | 31 | 33 | 35 | 37 | 9.0 | 13.0 |
| 00-8114-003-30 | 3-XEXT | 130 | 45 | 47 | 50 | 53 | 56 | 29 | 31 | 33 | 35 | 37 | 9.0 | 15.5 |
| 00-8114-004-30 | 4-XEXT | 130 | 45 | 48 | 51 | 53 | 56 | 29 | 31 | 33 | 35 | 37 | 10.0 | 17.5 |
| 00-8114-005-30 | 5-XEXT | 130 | 47 | 50 | 52 | 55 | 58 | 29 | 31 | 33 | 35 | 37 | 10.0 | 20.0 |
| **Small** | | | | | | | | | | | | | | |
| 00-8114-040-00 | X-Small | 85 | 25 | 28 | 31 | 34 | 37 | 21 | 23 | 25 | 27 | 29 | 7.0 | 8.0 |
| 00-8114-050-00 | Small | 95 | 27 | 30 | 33 | 36 | 39 | 22 | 24 | 26 | 28 | 30 | 7.5 | 9.0 |
| **Revision - Long** | | | | | | | | | | | | | | |
| 00-8114-002-18 | 2, 180mm | 180 | 33 | 36 | 38 | 41 | 44 | 24 | 26 | 28 | 30 | 32 | 9.5 | 13.0 |
| 00-8114-012-18 | 2, 180mm VN | 180 | 33 | 36 | 38 | 41 | 44 | 39 | 41 | 43 | 45 | 47 | 9.5 | 13.0 |
| 00-8114-003-18 | 3, 180mm | 180 | 40 | 42 | 45 | 48 | 51 | 24 | 26 | 28 | 30 | 32 | 9.5 | 16.0 |
| 00-8114-013-15 | 3, 180mm VN | 180 | 40 | 42 | 45 | 48 | 51 | 39 | 41 | 43 | 45 | 47 | 9.5 | 16.0 |
| 00-8114-004-20 | 4, 200mm | 200 | 40 | 43 | 46 | 49 | 51 | 24 | 26 | 28 | 30 | 32 | 11.0 | 16.0 |
| 00-8114-004-23 | 4, 200mm | 230 | 40 | 43 | 46 | 49 | 51 | 24 | 26 | 28 | 30 | 32 | 11.0 | 16.0 |
| 00-8114-004-26 | 4, 260mm | 260 | 40 | 43 | 46 | 49 | 51 | 24 | 26 | 28 | 30 | 32 | 11.0 | 16.0 |

# CPT Instrument Sets

| Prod. No. | Description |
|---|---|
| **00-8334-000-02** | **CPT Primary Instrument Set** |
| 00-8334-030-00 | General Instrument Case Assembly |
| 00-8334-014-00 | Osteotomy Guide |
| 31-8334-005-00 | Stem Extractor Adapter |
| 00-6601-054-00 | Box Osteotome, Sm |
| 00-6601-056-00 | Box Osteotome, Lrg |
| 00-8334-065-00 | Starter Awl, 8mm |
| 00-8334-065-01 | Medium Awl, 11mm dia |
| 00-8334-065-02 | Large Awl, 14mm dia |
| 00-8334-035-00 | Primary Instrument Case Assembly |
| 00-8334-010-00 | Rasp Handle |
| 00-8334-011-00 | Trial Locking Pin |
| 00-8334-013-00 | Stem Inserter |
| 00-8334-060-00 | Size 0 Rasp |
| 00-8334-060-01 | Size 1 Rasp |
| 00-8334-060-02 | Size 2 Rasp |
| 00-8334-060-03 | Size 3 Rasp |
| 00-8334-060-04 | Size 4 Rasp |
| 00-8334-060-05 | Size 5 Rasp |
| 31-8334-013-00 | Cement Restrictor Plate |
| 00-8334-080-10 | Femoral Pressurizer Plate |
| 00-8334-015-00 | Size 0 Std Cone Prov |
| 00-8334-015-01 | Size 1 Std Cone Prov |
| 00-8334-015-02 | Size 2 Std Cone Prov |
| 00-8334-015-03 | Size 3 Std Cone Prov |
| 00-8334-015-04 | Size 4 Std Cone Prov |
| 00-8334-015-05 | Size 5 Std Cone Prov |
| 00-8334-020-00 | Size 0 Ext Cone Prov |
| 00-8334-020-01 | Size 1 Ext Cone Prov |
| 00-8334-020-02 | Size 2 Ext Cone Prov |
| 00-8334-020-03 | Size 3 Ext Cone Prov |
| 00-8334-020-04 | Size 4 Ext Cone Prov |
| 00-8334-020-05 | Size 5 Ext Cone Prov |
| 00-8334-025-02 | Size 2 X-Ext Cone Prov |
| 00-8334-025-03 | Size 3 X-Ext Cone Prov |
| 00-8334-025-04 | Size 4 X-Ext Cone Prov |
| 00-8334-025-05 | Size 5 X-Ext Cone Prov |
| 00-7895-028-01 | Fem Head Prov, 28mm -3.5 |
| 00-7895-028-02 | Fem Head Prov, 28mm +0 |
| 00-7895-028-03 | Fem Head Prov, 28mm +3.5 |
| 00-7895-028-04 | Fem Head Prov, 28mm +7 |
| 00-7895-028-05 | Fem Head Prov, 28mm +10.5 |
| | |
| **00-8334-000-03** | **CPT Revision Supplementary Instrument Set** |
| 00-8334-040-00 | Revision Instrument Case Assembly |
| 00-8334-060-22 | Size 2 Rasp, 180mm |
| 00-8334-060-23 | Size 3 Rasp, 180mm |
| 00-8334-060-24 | Size 4 Rasp, 200mm |
| 00-8334-070-25 | Size 4 Stem Prov, 230mm |
| 00-8334-070-26 | Size 4 Stem Prov, 260mm |
| 00-8334-026-02 | Size 2 Valgus Nk Cone Prov |
| 00-8334-026-03 | Size 3 Valgus Nk Cone Prov |

This is to be used with the Primary Instrument Set.

| Prod. No. | Description |
|---|---|
| **00-8334-000-05** | **CPT Extra Small/Small Supplementary Instrument Set** |
| 00-8334-045-00 | Extra Small/Small Instrument Case Assembly |
| 00-8334-060-40 | Extra Small Rasp |
| 00-8334-060-50 | Small Rasp |
| 00-8334-015-40 | Extra Small Stem Prov |
| 00-8334-015-50 | Small Stem Prov |
| 00-7895-022-20 | Fem Head Prov, 22mm -2 |
| 00-7895-022-02 | Fem Head Prov, 22mm +0 |
| 00-7895-022-30 | Fem Head Prov, 22mm +3 |
| | |
| **00-8334-000-01** | **CPT Extra Small-Sie 3 Instrument Set** |
| 00-8334-030-00 | General Instrument Set Case Assembly |
| 00-8334-014-00 | Osetotomy Guide |
| 31-8334-005-00 | Stem Extractor Adapter |
| 00-6601-054-00 | Box Osteotome, Small |
| 00-6601-056-00 | Box Osteotome, Large |
| 00-8334-065-00 | Starter Awl, 8mm |
| 00-8334-065-01 | Medium Awl, 11mm dia |
| 00-8334-065-02 | Larger Awl, 14mm dia |
| 00-8334-050-00 | Extra Small-Size 3 Instrument Case Assembly |
| 00-8334-010-00 | Rasp Handle |
| 00-8334-011-00 | Trial Locating Pin |
| 00-8334-013-00 | Stem Inserter |
| 00-8334-060-00 | Size 0 Rasp |
| 00-8334-060-01 | Size 1 Rasp |
| 00-8334-060-02 | Size 2 Rasp |
| 00-8334-060-03 | Size 3 Rasp |
| 00-8334-060-40 | Small Rasp |
| 00-8334-060-50 | Extra Small Rasp |
| 31-8334-013-00 | Cement Restrictor Plate |
| 00-8334-080-10 | Femoral Pressurizer Plate |
| 00-8334-015-00 | Size 0 Std Cone Prov |
| 00-8334-015-01 | Size 1 Std Cone Prov |
| 00-8334-015-02 | Size 2 Std Cone Prov |
| 00-8334-015-03 | Size 2 Std Cone Prov |
| 00-8334-020-00 | Size 0 Ext Cone Prov |
| 00-8334-020-01 | Size 1 Ext Cone Prov |
| 00-8334-020-02 | Size 2 Ext Cone Prov |
| 00-8334-020-03 | Size 3 Ext Cone Prov |
| 00-8334-025-02 | Size 2 X-Ext Cone Prov |
| 00-8334-025-03 | Size 3 X-Ext Cone Prov |
| 00-8334-015-40 | Extra Small Stem Prov |
| 00-8334-015-50 | Small Stem Prov |
| 00-7895-028-01 | Fem Head Prov, 28mm -3.5 |
| 00-7895-028-02 | Fem Head Prov, 28mm +0 |
| 00-7895-028-03 | Fem Head Prov, 28mm +3.5 |
| 00-7895-028-04 | Fem Head Prov, 28mm +7 |
| 00-7895-028-05 | Fem Head Prov, +10.5 |
| 00-7895-022-20 | Fem Head Prov, 22mm -2 |
| 00-7895-022-02 | Fem Head Prov, 22mm +0 |
| 00-7895-022-30 | Fem Head Prov, 22mm +3 |
| **Sterile Pack Items** | |
| 32-8334-010-01 | Femoral Pressurizer Seal, Sm |
| 32-8334-010-02 | Femoral Pressurizer Seal, Lrg |

| Prod. No. | Description |
|---|---|
| **CoCr Femoral Head Options** | |
| 00-8018-022-20 | Fem Head -2 x 22mm Dia |
| 00-8018-022-02 | Fem Head 0 x 22mm Dia |
| 00-8018-022-30 | Fem Head +3 x 22mm Dia |
| 00-8018-026-01 | Fem Head -3.5 x 26mm Dia |
| 00-8018-026-02 | Fem Head 0 x 26mm Dia |
| 00-8018-026-03 | Fem Head +3.5 x 26mm Dia |
| 00-8018-026-04 | Fem Head +7 x 26mm Dia |
| 00-8018-026-05 | Fem Head +10.5 x 26mm Dia |
| 00-8018-028-01 | Fem Head -3.5 x 28mm Dia |
| 00-8018-028-02 | Fem Head 0 x 28mm Dia |
| 00-8018-028-03 | Fem Head +3.5 x 28mm Dia |
| 00-8018-028-04 | Fem Head +7 x 28mm Dia |
| 00-8018-028-05 | Fem Head +10.5 x 28mm Dia |
| 00-8018-032-01 | Fem Head -3.5 x 32mm Dia |
| 00-8018-032-02 | Fem Head 0 x 32mm Dia |
| 00-8018-032-03 | Fem Head +3.5 x 32mm Dia |
| 00-8018-032-04 | Fem Head +7 x 32mm Dia |
| 00-8018-032-05 | Fem Head +10.5 x 32mm Dia |
| 00-8018-036-01 | Fem Head -3.5 x 36mm Dia |
| 00-8018-036-02 | Fem Head 0 x 36mm Dia |
| 00-8018-036-03 | Fem Head +3.5 x 36mm Dia |
| 00-8018-036-04 | Fem Head +7 x 36mm dia |
| 00-8018-036-05 | Fem Head +10.5 x 36mm Dia |
| 00-8018-040-01 | Fem Head -3.5 x 40mm Dia |
| 00-8018-040-02 | Fem Head 0 x 40mm Dia |
| 00-8018-040-03 | Fem Head +3.5 x 40mm Dia |
| 00-8018-040-04 | Fem Head +7 x 40mm Dia |
| 00-8018-040-05 | Fem Head +10.5 x 40mm Dia |

| Prod. No. | Description |
|---|---|
| **Ceramic Femoral Head Options*** | |
| 00-8775-028-01 | *BIOLOX* delta Ceramic Femoral Head -3.5x28mm |
| 00-8775-028-02 | *BIOLOX* delta Ceramic Femoral Head 0x28mm |
| 00-8775-028-03 | *BIOLOX* delta Ceramic Femoral Head +3.5x28mm |
| 00-8775-032-01 | *BIOLOX* delta Ceramic Femoral Head -3.5x32mm |
| 00-8775-032-02 | *BIOLOX* delta Ceramic Femoral Head 0x32mm |
| 00-8775-032-03 | *BIOLOX* delta Ceramic Femoral Head +3.5x32mm |
| 00-8775-032-04 | *BIOLOX* delta Ceramic Femoral Head +7x32mm |
| 00-8775-036-01 | *BIOLOX* delta Ceramic Femoral Head -3.5x36mm |
| 00-8775-036-02 | *BIOLOX* delta Ceramic Femoral Head 0x36mm |
| 00-8775-036-03 | *BIOLOX* delta Ceramic Femoral Head +7x36mm |
| 00-8775-036-04 | *BIOLOX* delta Ceramic Femoral Head -3.5x40mm |
| 00-8775-040-01 | *BIOLOX* delta Ceramic Femoral Head -3.5x40mm |
| 00-8775-040-02 | *BIOLOX* delta Ceramic Femoral Head 0x40mm |
| 00-8775-040-03 | *BIOLOX* delta Ceramic Femoral Head +3.5x40mm |
| 00-8775-040-04 | *BIOLOX* delta Ceramic Femoral Head +7x40mm |
| 00-8777-028-01 | *BIOLOX* delta Option Femoral Head, -3.0x28mm |
| 00-8777-028-02 | *BIOLOX* delta Option Femoral Head, +0x28mm |
| 00-8777-028-03 | *BIOLOX* delta Option Femoral Head, +3.5x28mm |
| 00-8777-028-04 | *BIOLOX* delta Option Femoral Head, +7x28mm |
| 00-8777-032-01 | *BIOLOX* delta Option Femoral Head, -3.0x32mm |
| 00-8777-032-02 | *BIOLOX* delta Option Femoral Head, +0x32mm |
| 00-8777-032-03 | *BIOLOX* delta Option Femoral Head, +3.5x32mm |
| 00-8777-032-04 | *BIOLOX* delta Option Femoral Head, +7x32mm |
| 00-8777-036-01 | *BIOLOX* delta Option Femoral Head, -3.0x36mm |
| 00-8777-036-02 | *BIOLOX* delta Option Femoral Head, +0x36mm |
| 00-8777-036-03 | *BIOLOX* delta Option Femoral Head, +3.5x36mm |
| 00-8777-036-04 | *BIOLOX* delta Option Femoral Head, +7x36mm |
| 00-8777-040-01 | *BIOLOX* delta Option Femoral Head, -3.0x40mm |
| 00-8777-040-02 | *BIOLOX* delta Option Femoral Head, +0x40mm |
| 00-8777-040-03 | *BIOLOX* delta Option Femoral Head, +3.5x40mm |
| 00-8777-040-04 | *BIOLOX* delta Option Femoral Head, +7x40mm |
| 12.28.05 | *BIOLOX* forte Ceramic Femoral Head -3.5x28mm |
| 12.28.06 | *BIOLOX* forte Ceramic Femoral Head 0x28mm |
| 12.28.07 | *BIOLOX* forte Ceramic Femoral Head +3.5x28mm |
| 12.32.05 | *BIOLOX* forte Ceramic Femoral Head -3.5x32mm |
| 12.32.06 | *BIOLOX* forte Ceramic Femoral Head 0x32mm |
| 12.32.07 | *BIOLOX* forte Ceramic Femoral Head +3.5x32mm |
| 00-6428-028-01 | Alumina Ceramic Femoral Head -3.5x28mm |
| 00-6428-028-02 | Alumina Ceramic Femoral Head 0x28mm |
| 00-6428-028-03 | Alumina Ceramic Femoral Head +3.5x28mm |
| 00-6428-032-01 | Alumina Ceramic Femoral Head -3.5x32mm |
| 00-6428-032-02 | Alumina Ceramic Femoral Head 0x32mm |
| 00-6428-032-03 | Alumina Ceramic Femoral Head +3.5x32mm |

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