



S-ROM®
MODULAR HIP SYSTEM

Surgical Technique

Proven. Versatile. Simple.



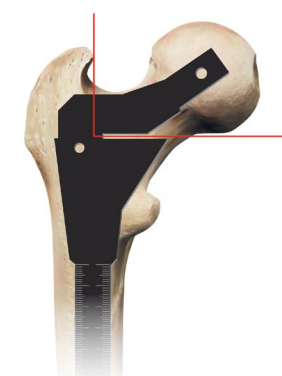
The S-ROM® Modular Hip System offers extensive metaphyseal and diaphyseal geometries, making it an excellent stem for the high-demand patient. S-ROM stems have been made available since 1984.

The S-ROM Modular Hip System is designed to provide solutions for a variety of surgical scenarios (from primary THA to complex revision or the challenges of Development Dysplasia of the Hip) by offering independent neck and sleeve options. The S-ROM Modular Hip System utilises a straightforward surgical technique that can normally be divided into:

- Canal entry
- Reaming
- Trialling
- Implantation

4 Principal Steps

1. Canal Entry



Neck resection



Opening the femoral canal

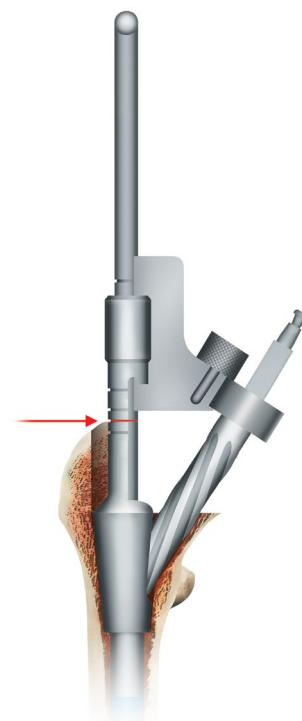
2. Reaming



A. Distal reaming

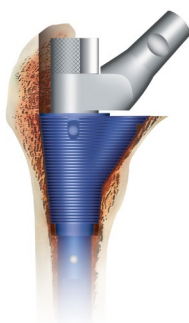


B. Cone reaming



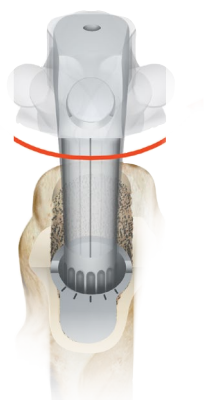
C. Triangular milling

3. Trialling



Trial implantation

4. Implantation



Stem implantation



Final implantation

Preoperative Planning

Preoperative Planning Aims

Preoperative planning enables the surgeon to prepare for the case and anticipate situations that may arise during surgery. A thorough preoperative plan incorporates elements from the patient's history, physical examination and radiographic analysis.

- 1) Determine preoperative leg length discrepancy
- 2) Assess acetabular component size and placement
- 3) Determine femoral component size, position and fit
- 4) Assess femoral offset

Radiographs

The first step in accurate templating is obtaining high-quality radiographs using a standardised protocol with known magnification. Use magnification markers attached to the patient's leg at the level of the greater trochanter to verify magnification.

The S-ROM Modular Hip System templates (Cat. No. XRT142) incorporate 15 percent magnification.

Obtain an anterior/posterior (A/P) view of the pelvis with both extremities in 15 degrees of internal rotation to position the head and neck parallel to the coronal plane. A direct lateral radiograph should also be obtained to determine desired femoral fixation.

Determination of Leg Length Discrepancy

To determine preoperative leg length, perform a clinical evaluation in conjunction with a radiographic analysis. Use both to determine intraoperative leg length management.

As an estimate of leg length discrepancy radiographically, draw a reference line along the inferior aspect of the ischial tuberosities (Figure A). Determine the distance from the lesser trochanter landmark to the reference line on each side. The difference between the two is the radiographic leg length discrepancy.

The tip of the greater trochanter may be used as an alternative reference mark in conjunction with the lines along the inferior aspect of the ischial tuberosities.

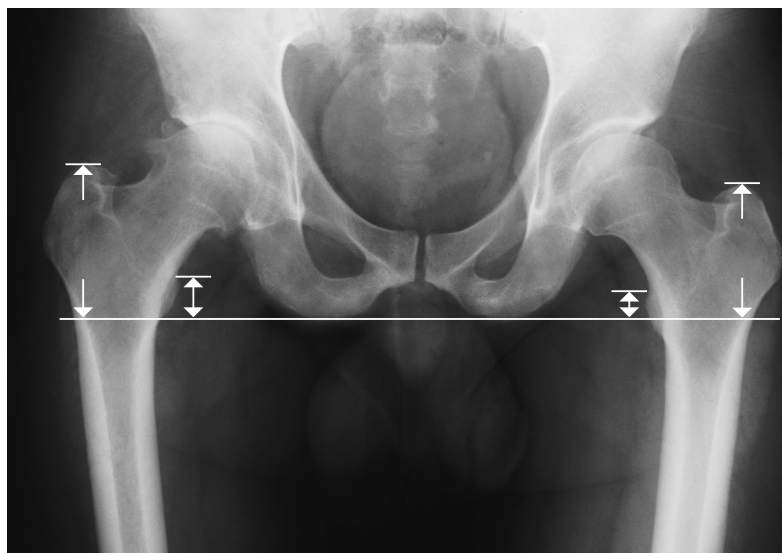


Figure A

Acetabular Cup Size and Position

Most sizing predictions are made on the A/P radiograph of the hip. Determine the optimal position for the acetabular component and predict the size using template overlays. The acetabular teardrop can be referenced as the inferior margin of the acetabular reconstruction.

The goal in cementless acetabular fixation is to maximise bone contact. Once this is determined, mark the intended centre of rotation of the bearing surface on the A/P radiograph (Figure B).

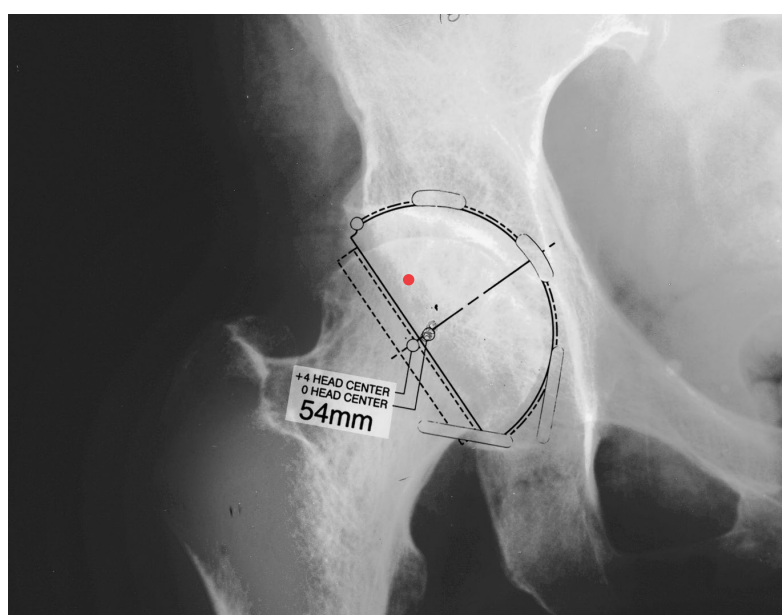


Figure B

Preoperative Planning, continued

Cementless Femoral Component Selection

Select the femoral component template size that will fit the distal femur and equalise leg lengths (Figure C). The distal stem diameter determines the range of possible ZTT® Sleeves that can be used proximally. The appropriate ZTT Sleeve will allow for proximal fit and fill for stable fixation.

The femoral template should be in line with the long axis of the femur and the neck resection line drawn at the point where the selected stem provides the desired amount of leg length (Figure C). The vertical distance between the planned centre of rotation of the acetabular component and the centre of rotation of the femoral head constitutes the distance the leg length will be adjusted. The level of neck resection depends on the stem size and the desired leg length, with the goal of using a non-skirted modular head to optimise range of motion prior to prosthetic impingement.

A lateral radiograph should also be obtained as part of preoperative planning. To help properly position the template on the lateral radiograph, estimate the distance between the tip of the greater trochanter and the neck resection line of the stem using the A/P radiograph. Verify that the stem size chosen in the A/P plane also fits in the lateral plane. The lateral radiograph of a properly sized implant will typically exhibit appropriate fixation.

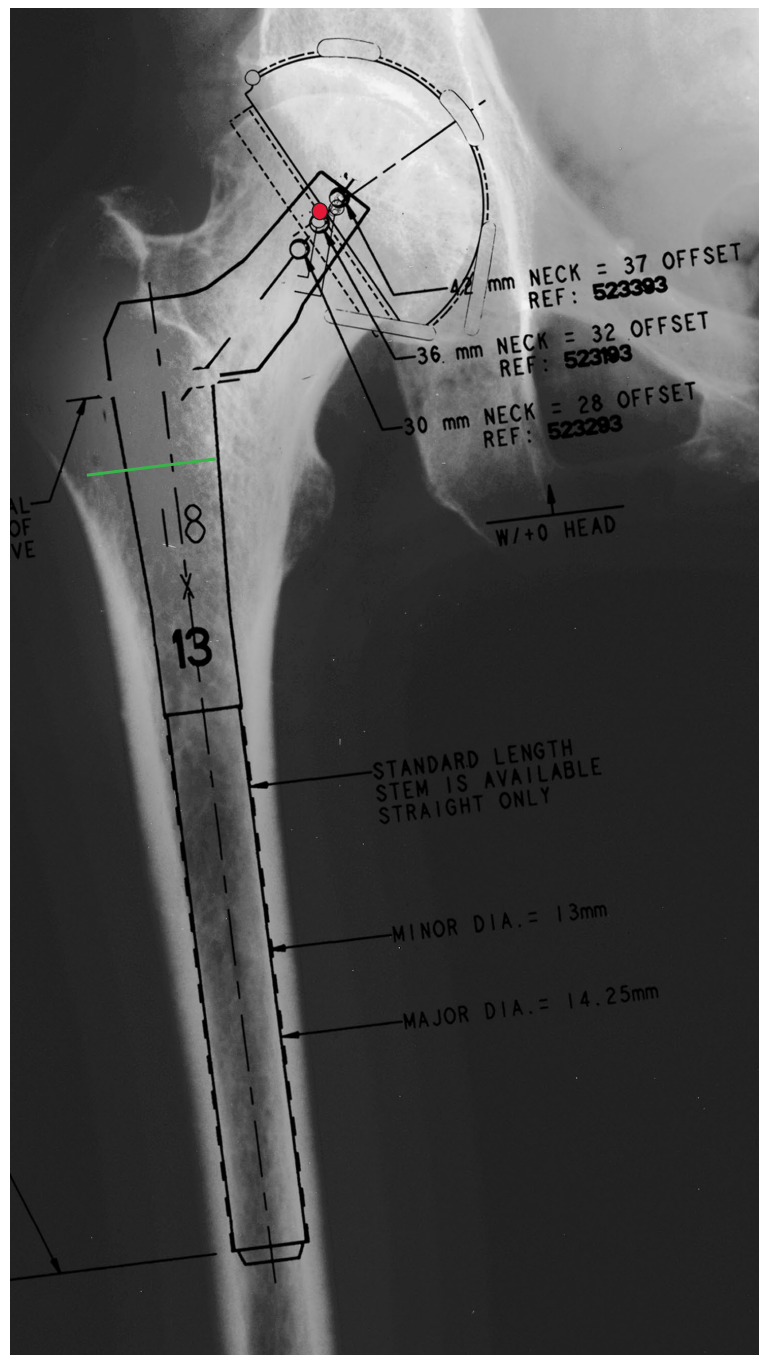
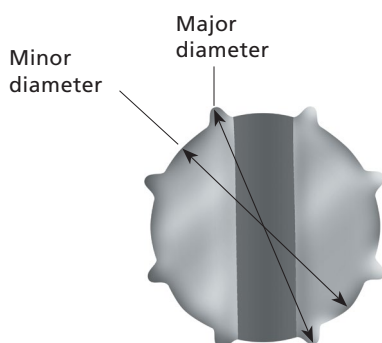


Figure C

Note: The minor diameter is designated by the solid outline of the implant on the x-ray template, where as the major diameter is denoted by the dotted line. Reference the minor diameter to take into account the 1 - 1.25 mm of cortical engagement of the distal flutes.

Sleeve Selection

Overlay the ZTT Sleeve template cone size that corresponds to the selected stem and provides adequate proximal bone fill (Figure D). Position the sleeve template using the centreline of the stem, the centreline of the sleeve and the horizontal resection line. The ZTT sleeve is estimated most accurately from the lateral endosteum (i.e., the metaphyseal A/P diameter).

Offset Requirements

The S-ROM cementless femoral components are available in a range of offsets and calcar options. Through templating and intraoperative trialling, determine which option restores proper offset by matching the cup's centre of rotation with the desired head centre of rotation (Figure D).

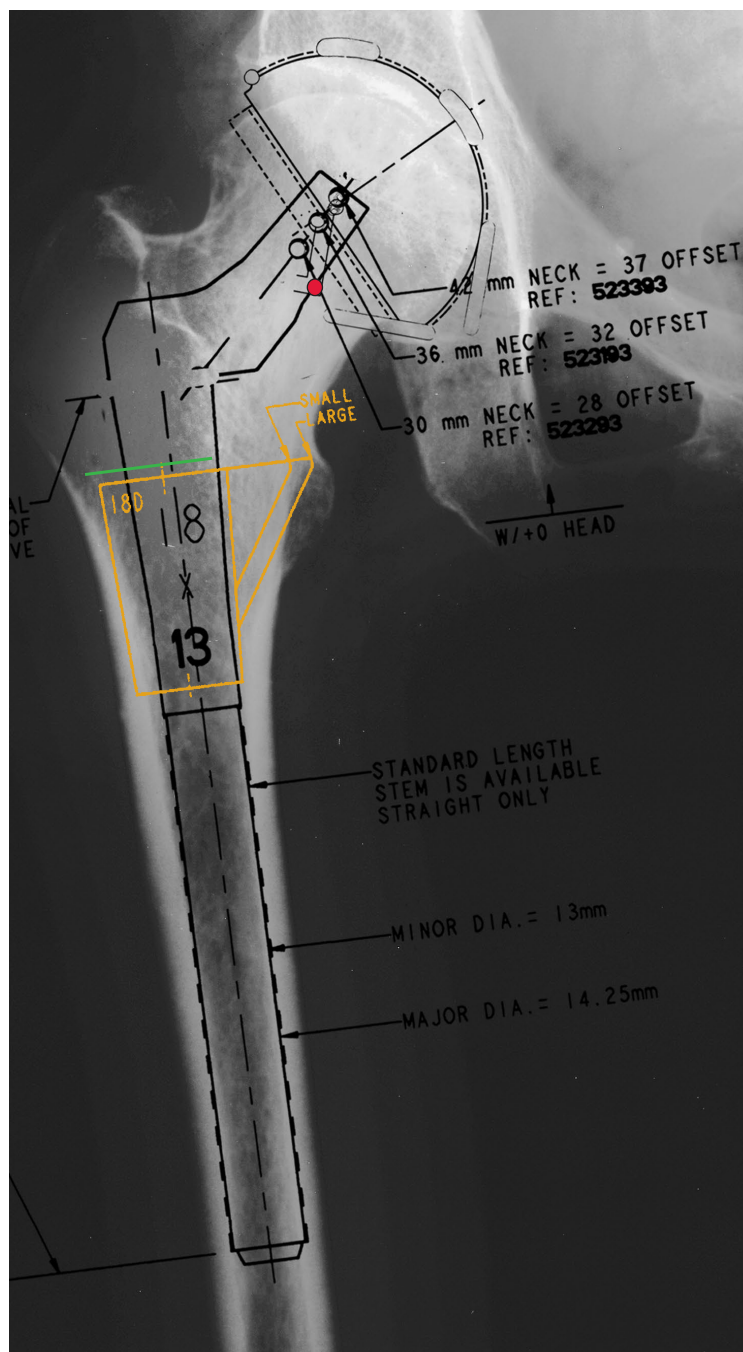


Figure D

Femoral Preparation

Neck Osteotomy

With S-ROM, a higher, more conservative, perpendicular neck osteotomy may be utilised.

It is recommended that preoperative templating be used to make the neck cut.

Additionally, a preliminary resection of the femoral neck can be performed using the biomechanical femoral neck resection template (Cat.No 531420) as a guide (Figure 1). The hole in the neck of the resection template is located at the centre of the femoral head (28mm). The notch on the medial aspect of the template indicates the most distal point for making the neck resection. Final neck preparation can be performed later in the procedure (during calcar reaming).

Opening Canal

Open the femoral canal by penetrating the superior femoral cortex with the IM initiator (Cat. No. 2576-00-006) (Figure 2). Start the IM initiator at the junction of the neck resection and the complementary cut at the trochanteric fossa. To protect against varus positioning, the circular box osteotome (not shown) (Cat. No. 2576-00-002) can be used to remove additional bone from the medial aspect of the greater trochanter.

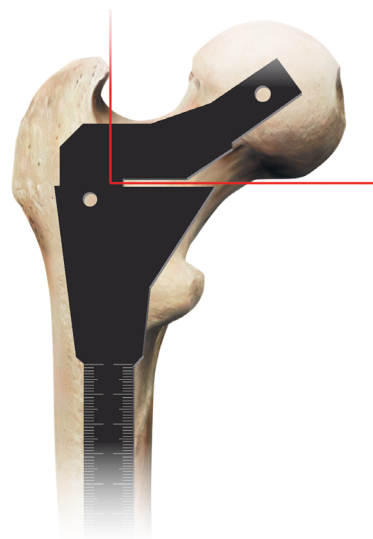


Figure 1
Neck resection



Figure 2
Opening the femoral canal

Distal Ream

Distal Preparation

The distal diameter determines the corresponding proximal stem diameter, which is always 5 mm larger than its distal diameter. The final distal diameter reamed will also dictate the colour-coded instrumentation needed for the remainder of the case (Table 1).

Begin axial reaming with the smallest reamer in your set (8 mm for the standard set and 6 mm for the DDH set) in conjunction with the T-handle attachment. The smallest reamer in each set is end cutting, whereas all consecutive sizes are blunt-nosed side-cutting only. Continue to ream sequentially with increasing reamer diameters until cortical contact is achieved. In keeping with preoperative planning, the final straight reamer should correspond to, or be a half millimetre larger than, the minor diameter of the selected femoral stem (Table 1). The appropriate reamer depth has been established when the witness mark on each distal reamer aligns with the tip of the greater trochanter (Figure 3).

Press-fit can be achieved when over-reaming by 0.5 mm because the distal flutes add 1.25 mm total to the specified distal stem minor diameter on sizes 13 mm and greater. Distal stem sizes of 7, 8, 9, & 11 mm have 1.0 mm total of additional flute diameter (Table 1). The 6 mm DDH distal stem has 0.75 mm of additional flute diameter.

Caution: Before moving past any one of the final distal reamer diameters listed in Table 1, make sure you are comfortable reaching the next largest final distal reamer diameter. For example, if you distally ream past 13.5 mm, be confident that the anatomy will allow you to reach to a minimum of 15.5 mm.

DISTAL REAMER SELECTION FOR STRAIGHT STEMS			
Colour Code	Stem Size	Final Distal Reamer	Distal Flute Outer Diameter
Pink	6 x 12 mm	6 or 6.5 mm	6.75 mm
Pink	7 x 12 mm	7 or 7.5 mm	8 mm
Silver	8 x 14 mm	8 or 8.5 mm	9 mm
Silver	9 x 14 mm	9 or 9.5 mm	10 mm
Gold	11 x 16 mm	11 or 11.5 mm	12 mm
Green	13 x 18 mm	13.5 mm	14.25 mm
Blue	15 x 20 mm	15.5 mm	16.25 mm
Black	17 x 22 mm	17.5 mm	18.25 mm
Brown	19 x 24 mm	19.5 mm	20.25 mm

Table 1

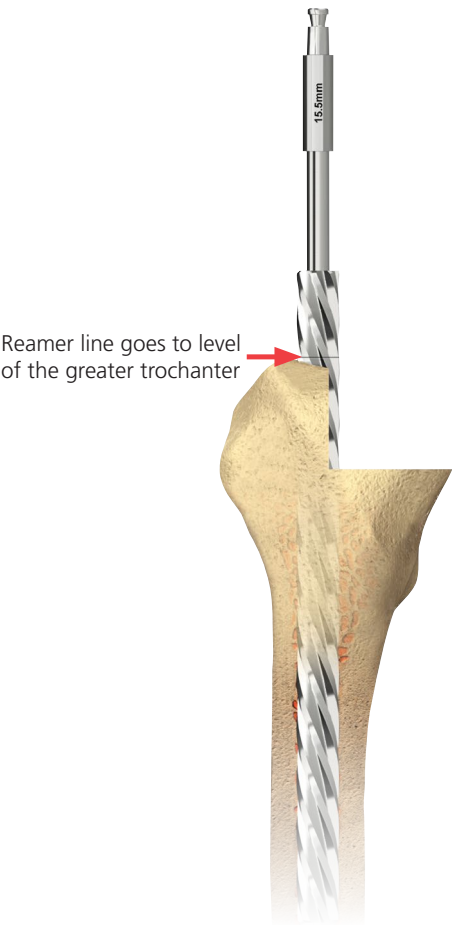


Figure 3
Distal reaming

Proximal Ream

Select the cone reamer that corresponds to the pre-determined distal diameter of the femur, and screw in the appropriate, colour coded, distal pilot shaft.

Attach the Hudson reamer extension to the proximal reamer, and attach the assembly to either the T-handle or a power source. Introduce the assembly into the femur and advance the cone reamer until the mark indicating the desired neck length (30, 36 or 42 mm, Figure 4) aligns with the tip of the greater trochanter. Use successively larger cone reamers until contact is made with the cortical bone of the proximal femur. Contact will be felt first in the anterior femur, in the subtrochanteric region. Do not drive the reamer in reverse.

Once cone reaming is complete, note the number on the colour-coded band of the cone reamer and select the corresponding triangular reamer.

Caution: You must always place the appropriate size colour-coded pilot shaft on the distal end of the proximal reamers.



Figure 4
Cone Reaming

Cone Sizing

STEM SIZING (MM)		OUTER SLEEVE PROXIMAL DIAMETER (MM)			
Distal Diameter	Proximal Diameter (cone size)	B	D	F	Oversize
6	12	15	17	19	N/A
7	12	15	17	19	N/A
8	14	17	19	21	N/A
9	14	17	19	21	N/A
11	16	19	21	23	25
13	18	21	23	25	27
15	20	23	25	27	29
17	22	25	27	29	31
19	24	27	29	31	35

Table 2

For example, if the final distal stem is a 15, then cone reamers will begin with the smallest of the “20” proximal series, that is, 20 B. Each successive cone reamer will add on an additional +3 mm (B), +5 mm (D) and +7 mm (F) to the 20 mm internal diameter. Thus for a “20” the final outer sleeve diameters for B, D, and F are 23, 25 and 27 mm respectively.

Oversize options (which add +9 mm) are also available in some sizes. S-ROM stems have been sized by the inside diameter of the proximal sleeve to assure precise mating of stem and sleeve. The chart above shows the stem’s actual distal diameter and how it correlates with a range of proximal sleeve sizes.

Calcar Ream / Mill

Lastly, the spout or triangle of the proximal sleeve must be machined. Spout sizing comes in Small, Large or XX-Large. The spout size on the ZTT sleeve is proportional to the diameter of the stem.

Use the triangle miller to prepare the femur to accommodate the calcar spout of the final sleeve. In most instances, the final triangle is placed in the medial proximal femur. However, because the placement does not dictate the neck version, the triangle can be rotated 360 degrees to place the sleeve in optimal bone. SPA sleeves (without a spout) are also available in this system to accommodate unusual anatomies. Spout preparation will not be necessary if using a SPA sleeve.

Select the miller shell that corresponds in size to the final cone reamer. (Figure 5). Numeric markings of the proximal diameter are found on cone reamers and miller shells for cross reference verification.

After attaching the miller shell and the miller frame to the appropriate pilot shaft, gently lower the triangle miller. Align the desired neck length witness mark with the tip of the greater trochanter (Figure 5 red arrow).

The ring of the miller frame can be rotated so that it targets the best available host bone (Figure 6).

Caution: You must always place the appropriate colour-coded pilot shaft on the distal end of the triangle miller frame.

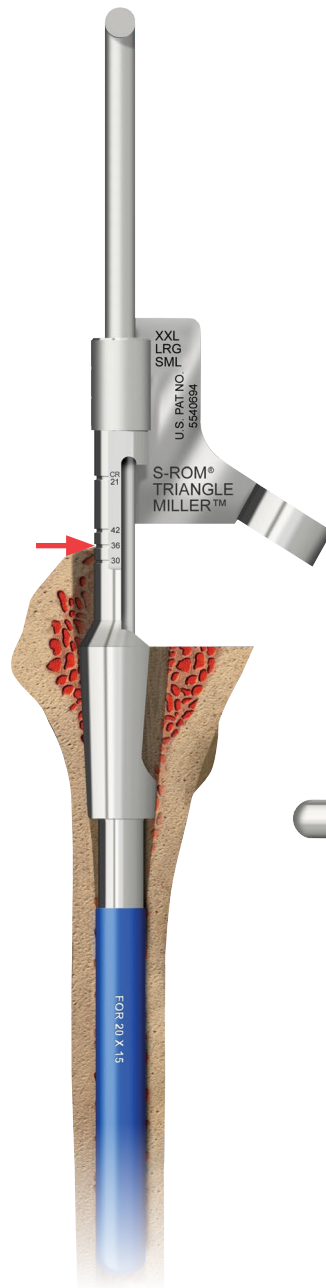


Figure 5
Positioning of triangle
miller shell

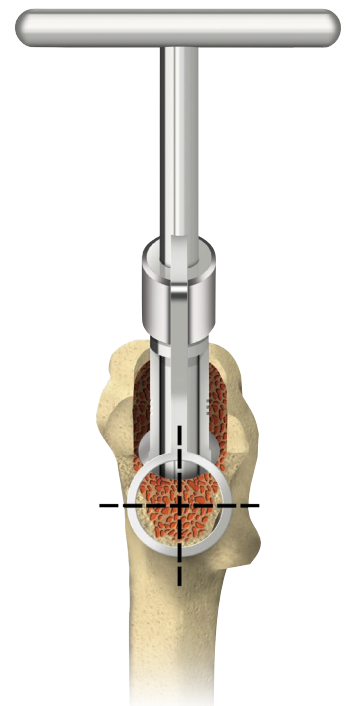


Figure 6
Positioning of triangle
miller frame

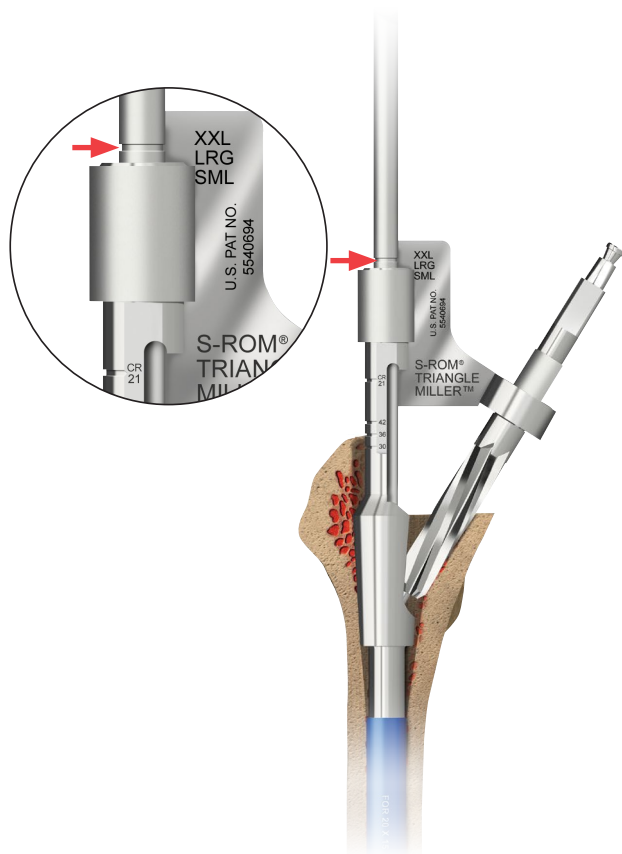


Figure 7
Calcar reaming

Recess to the top of the groove in the triangle miller for the desired spout size as shown by the red arrow in Figure 7.

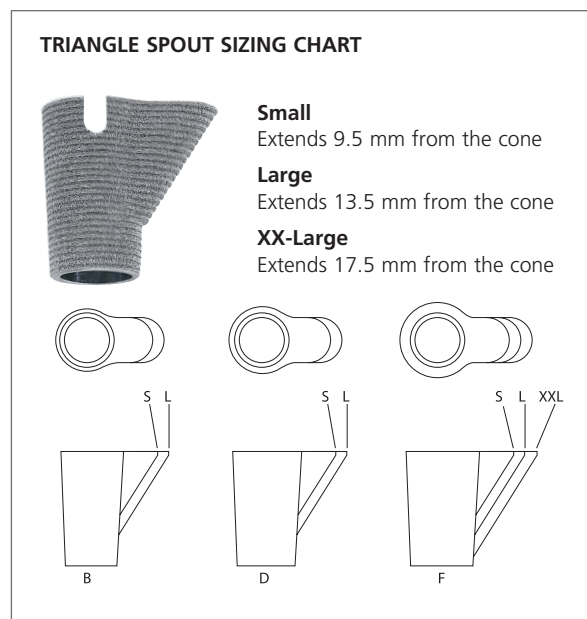
If using a B or D cone, be careful not to allow the triangle milling to go to XXL, since XXL spouts are not available for these cone sizes.

Select the appropriate size miller drill that corresponds to the proximal size of selected stem or colour used throughout the procedure.

Pass the miller drill through the ring and load the drill tip into the guide hole before starting the drill. Lower the miller frame so that the miller drill makes contact with the cancellous bone to be milled (Figure 7).

Mill on power until desired cortical bone has been exposed. To determine the final spout size (Small, Large, or XXL), make note of the size indicated where the markings on the miller frame align with the top of the miller shell as shown by the red arrow in Figure 7.

Caution: Before proceeding from one spout size to the next, confirm that there is enough calcar bone to accommodate 4 mm of additional reaming to reach the next spout size (i.e., Small to Large or Large to XXL). Please review the Triangle Spout Sizing Chart for more detail.



Trial

Trial Sleeve

Secure the sleeve introducer handle (Cat. No. 53-5801) onto the appropriate size sleeve introducer corresponding to the selected sleeve size. As an example, a proximal sleeve trial designated 20 D large is a sleeve that will fit a 15 x 20 stem with a D outer diameter (adding 5 mm to the proximal diameter) and a large spout (extending 13.5 mm). Proximal sleeve trials are colour coded. Attach the appropriate coloured pilot shaft onto the sleeve introducer and slide on the sleeve.

Note: The trial sleeve is not secured / retained on the sleeve introducer so care must be taken to prevent the trial sleeve from falling off the introducer.

Gently impact the trial sleeve into the prepared metaphysis (Figure 8). Seat the trial sleeve completely and withdraw the introducer handle (Figure 9). At this point, evaluate the sleeve in relation to its final position.

Caution: Make sure that the bolt on the sleeve introducer handle is facing toward the spout. If the bolt cannot be seen, the handle could disconnect from the sleeve introducer attachment.

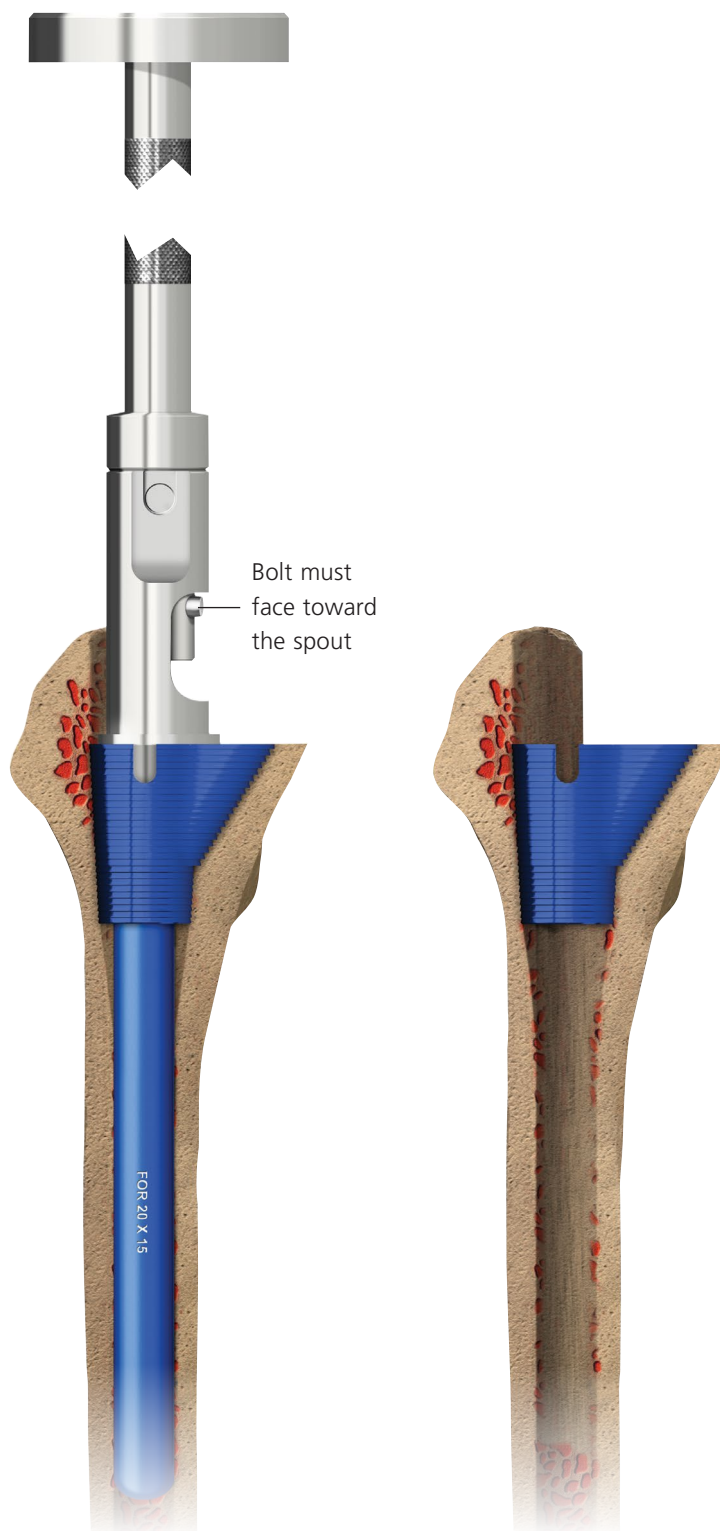


Figure 8
Trial sleeve insertion

Figure 9
Trial sleeve position

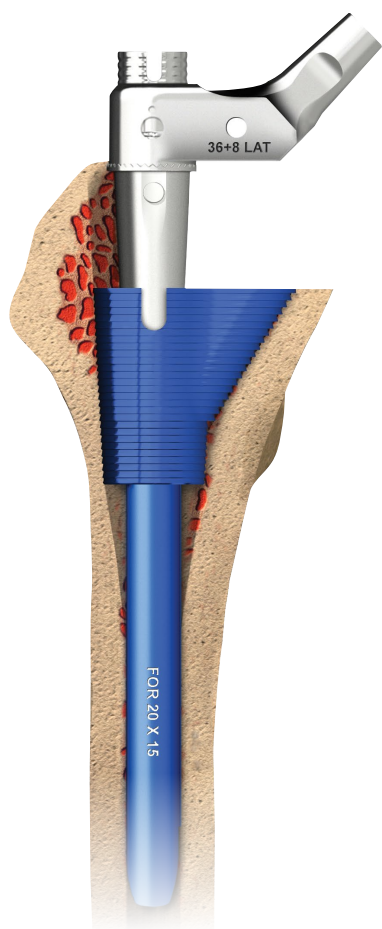


Figure 11
Trial stem insertion

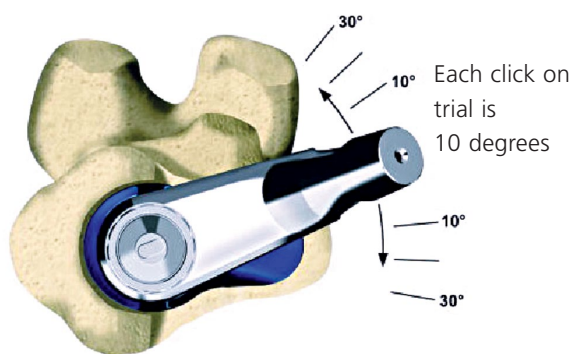


Figure 12
Version adjustment

Trial Stem

Restoring patient biomechanics is achieved with a wide range of neck options (Table 3).

**NECK SIZING CHART — ASSUMES USE OF +0 11/13 HEAD
(All necks have an included angle of 135 degrees)**

Neck Style	Neck Length (mm)	Lateral Offset (mm)	Leg Length Adjustment (mm)
Standard	30	28	21
Standard	36	32	25
Standard	42	37	30
Standard + 4 Lat	30	32	21
Standard + 6 Lat	36	38	25
Standard + 8 Lat	36	40	25
Standard + 12 Lat	36	44	25

Table 3

Figure 10 shows the neck shaft angle and how neck length, lateral offset, and leg length adjustment are measured.

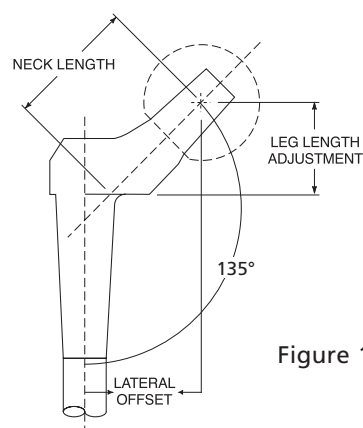


Figure 10

Assemble the trial implant by snapping the chosen neck onto the appropriate size distal stem trial. Align the lateral laser marks in neutral initially and introduce the trial neck and trial stem construct into the femoral canal (Figure 11). The trial neck can be adjusted in 10-degree increments until desired version is obtained (Figure 12).

Note: Version should be recorded by notching the femur with electro-cautery

Final Implantation

You can separate the trial sleeve and trial stem using the stem-sleeve separator (Cat. No. 53-6450). Remove the trial stem and use the sleeve extractor (not shown), (Cat. No. 53-5790) to remove the trial sleeve. The sleeve extractor works by being placed on an extreme angle to catch the distal lip of the sleeve.

Place the proximal sleeve implant onto the sleeve introducer assembly and gently impact the sleeve into the metaphysis (Figure 13).

Again, note that the sleeve is not secured/ retained on the sleeve introducer assembly.

Introduction of the femoral implant into the femoral canal can be done by hand initially until the distal flutes begin to make cortical contact (Figure 14). A witness mark located on the medial aspect of the femoral implant can be aligned with the corresponding radial laser markings on the superior aspect of the sleeve implant to determine anteversion. Each radial mark on the sleeve represents 20 degrees (Figure 14). Use these orientation lines on the stem and sleeve to ensure that the final implant alignment is consistent with trial alignment.



Figure 13
Sleeve insertion

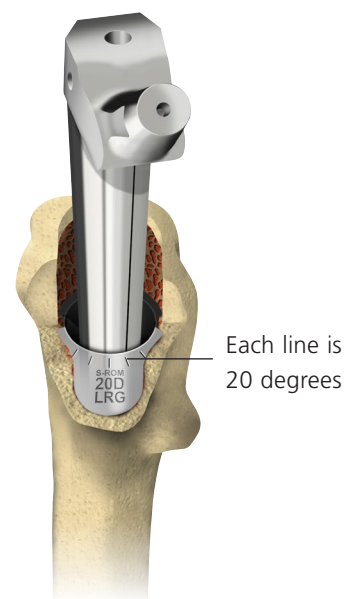
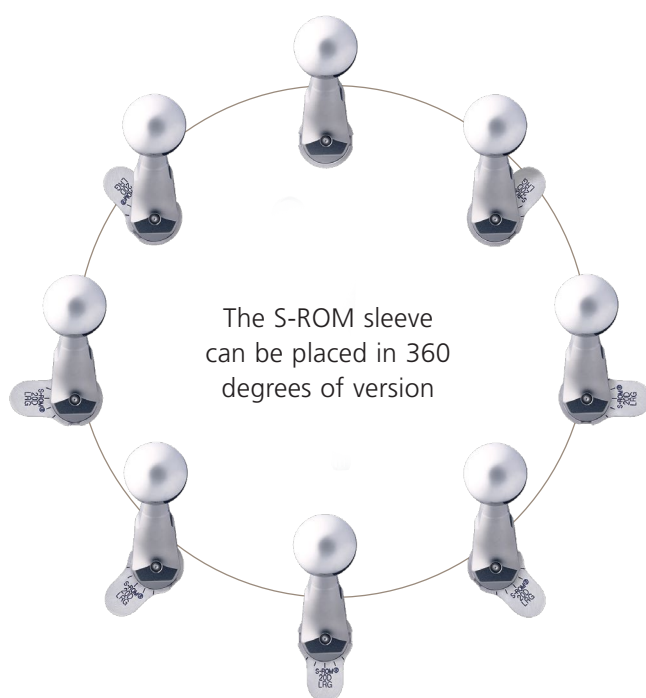


Figure 14
Stem insertion



Figure 15
Stem insertion



Place the stem introducer handle (Cat. No. 53-2029) onto the femoral implant and insert the pin punch (Cat. No. 53-1500) into the rotational alignment hole in the femoral neck (Figure 15). Using the pin punch as a version control guide, impact the femoral implant until securely seated. The taper is locked when the stem will no longer advance and 2-3 mm remains between the inferior aspect of the femoral neck and the superior aspect of the implant sleeve.

Stem Removal Note: It is critical to first unlock the taper between the stem and the sleeve using the stem-sleeve separator (Cat. No. 53-6450). To extract the stem, use the slap hammer instrumentation found in the S-ROM Long Trials & Extraction Instruments case. To assemble the slap hammer, slide the handle (53-1207) into the side of the weight (53-1205), place the weight through the shaft (53-1206). Screw the extractor stem loop (53-4400) onto the end of the slide hammer shaft. Place the extractor stem loop over the head/neck of the stem until the loop engages the trunion/head. Using appropriate force slide the slide hammer weight up impacting the handle stop of the slide hammer shaft until the stem is dislodged.

Implant Ordering Information

Ordering Information for 11/13 Stems

STEM DIAMETER & LENGTHS	FEMORAL NECKS STANDARD			FEMORAL NECKS LATERALISED				FEMORAL NECKS CALCAR REPLACEMENT & LATERALISED		
Neck Length	30	36	42	30 +4	36 +6	36 +8	36 +12	36 +21	36 +21 +4	36 +21 +8
Lateral Offset w/ +0 Femoral Head	28	32	37	32	38	40	44	32	36	40
Leg Adjustment Length	21	25	30	21	25	25	25	46	46	46

12x6	N Standard	115mm 523206								
	N Standard	115mm 523207								
14x8	N Standard	130mm 523208								
14x9	N Standard	130mm 523291 150mm 523251	130mm 523191		130mm 563514					
	N,L,R Long		205mm 526514N 526514L 526514R		205mm 563214N 563214L 563214R			205mm 526614N		
16x11	N Standard	150mm 523292	150mm 523192		150mm 563516	150mm 563517		150mm 526676		
	N,L,R Long		205mm 526516N 526516L 526516R		205mm 563216N 563216L 563216R				205mm 563016N 563016L 563016R	
	N,L,R X-Long								240mm 563036N 563036L 563036R	
	N,L,R XX-Long								300mm 563056N 563056L 563056R	
18x13	N Standard	160mm 523293	160mm 523193	160mm 523393	160mm 563518		160mm 523418	160mm 563618	160mm 526678	
	N,L,R Long		215mm 526518N 526518L 526518R	215mm 526418N 526418L 526418R			215mm 563118N 563118L 563118R			215mm 563018N 563018L 563018R
	N,L,R X-Long						255mm 563138L 563138R			255mm 563038N 563038L 563038R
	N,L,R XX-Long						315mm 563158L 563158R			315mm 563058N 563058L 563058R

STEM DIAMETER & LENGTHS	FEMORAL NECKS STANDARD			FEMORAL NECKS LATERALISED				FEMORAL NECKS CALCAR REPLACEMENT & LATERALISED		
Neck Length	30	36	42	30 +4	36 +6	36 +8	36 +12	36 +21	36 +21 +4	36 +21 +8
Lateral Offset w/ +0 Femoral Head	28	32	37	32	38	40	44	32	36	40
Leg Adjustment Length	21	25	30	21	25	25	25	46	46	46

20x15	N Standard		165mm 523194	165mm 523394			165mm 523420	165mm 563620	165mm 526680		
	N,L,R Long		225mm 526520N 526520L 526520R	225mm 526420N 526420L 526420R			225mm 563120N 563120L 563120R				225mm 563020N 563020L 563020R
	N,L,R X-Long						270mm 563140L 563140R				270mm 563040N 563040L 563040R
	N,L,R XX-Long						325mm 563160L 563160R				325mm 563060N 563060L 563060R
22x17	N Standard		165mm 523195	165mm 523395			165mm 523422	165mm 563622	165mm 526682		
	N,L,R Long		230mm 526522N 526522L 526522R	230mm 526422N 526422L 526422R			230mm 563122N 563122L 563122R				230mm 563022N 563022L 563022R
	N,L,R X-Long						275mm 563142L 563142R				275mm 563042N 563042L 563042R
	N,L,R XX-Long						325mm 563162L 563162R				325mm 563062N 563062L 563062R
24x19	N Standard		175mm 523196	175mm 523396			175mm 523424	175mm 563624	175mm 526684		
	N,L,R Long			230mm 526424N 526424L 526424R			230mm 563124N 563124L 563124R				230mm 563024N 563024L 563024R
	N,L,R X-Long						275mm 563144L 563144R				

Implant Ordering Information

Proximal Sleeves ZTT / ZTT SPA

Size	Small	Large	XX Large	SPA
12B	550570	550571		
12D	550572	550573		
14B	550501	550502		535342
14D	550503	550504		535344
14F	550505	550506		
16B	521463	521465		535362
16D	550513	550514		535364
16F	550515	550516	550520	535366
18F Oversized	550717	550718	550721	

Size	Small	Large	XX Large	SPA
18B	521483	521485		535382
18D	550523	550524		535384
18F	550525	550526	550530	535386
20F Oversized	550727	550728	550731	
20B	521403	521405		
20D	550533	550534		
20F	550535	550536	550540	
22F Oversized	550737	550738	550741	

Size	Small	Large	XX Large	SPA
22B	521423	521425		
22D	550543	550544		
22F	550545	550546	550550	
24F Oversized	550747	550748	550751	
24B	550561	550562		
24D	550564	550565		
24F	550567	550568	550569	
24D Undersized	550770	550771	550772	
24F Undersized	550777	550778	550779	

S-ROM Femoral Heads

Cat. No.	Description
52-2022	S-ROM FEM HEAD CoCr 22.225MM +0
52-2028	S-ROM FEM HEAD CoCr 28MM +0
52-2029	S-ROM FEM HEAD CoCr 28MM +6
52-2030	S-ROM FEM HEAD CoCr 28MM +12
52-2032	S-ROM FEM HEAD CoCr 32MM +0
52-2033	S-ROM FEM HEAD CoCr 32MM +6
52-2034	S-ROM FEM HEAD CoCr 32MM +12
87-5953	S-ROM FEM HEAD CoCr 28MM +3
87-5954	S-ROM FEM HEAD CoCr 28MM +9
87-5955	S-ROM FEM HEAD CoCr 32MM +3
87-5956	S-ROM FEM HEAD CoCr 32MM +9

BIOLOX[®] *delta* 11/13 Femoral Heads

Cat. No.	Description
136528210	DELTA CER HEAD 11/13 28MM +0
136528220	DELTA CER HEAD 11/13 28MM +3
136528230	DELTA CER HEAD 11/13 28MM +6
136536210	DELTA CER HEAD 11/13 36MM +0
136536220	DELTA CER HEAD 11/13 36MM +3
136536230	DELTA CER HEAD 11/13 36MM +6
136536240	DELTA CER HEAD 11/13 36MM +9
136536250	S-ROM DELTA CERAMIC 36MM +12
136532210	DELTA CER HEAD 11/13 32MM +0
136532220	DELTA CER HEAD 11/13 32MM +3
136532230	DELTA CER HEAD 11/13 32MM +6

For full product details and precautions, please consult the Instructions For Use.

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