

TRI·LOCK[®]
BONE PRESERVATION STEM

TRI-LOCK[®] Bone Preservation Stem

Featuring GRIPTION[®] Coating

Surgical Technique



 **DePuy Synthes**
PART OF THE *Johnson & Johnson* FAMILY OF COMPANIES



Implant Geometry

Extending the TRI-LOCK® Stem heritage

The original TRI-LOCK® Stem was introduced in 1981. This implant was the first proximally coated tapered-wedge hip stem available to orthopaedic surgeons and their patients. The original TRI-LOCK System has demonstrated 10 year stem survivorship of 95%.¹

Preserving the natural anatomy

The reduced lateral shoulder, thin geometry and reduced length of the TRI-LOCK Bone Preservation Stem is designed to allow for a reduced amount of bone to be removed from the patient. These same features, along with approach enabling instrumentation, allow the surgeon to perform minimally invasive techniques.

Delivering stable, predictable performance

The TRI-LOCK Bone Preservation Stem incorporates GRIPTION® Fixation Technology, which offers a higher coefficient of friction when compared to POROCOAT® Porous Coating.¹ GRIPTION Coating is designed to help provide consistent implant seating height, and the clinical success of the TRI-LOCK Bone Preservation Stem is based on a reproducible surgical technique developed with the aim of achieving initial fixation and allowing long term durable fixation.

Restoring high level function

The TRI-LOCK Bone Preservation Stem neck geometry has been optimized to improve range-of-motion compared to the neck geometry of the original TRI-LOCK Stem. Progressive dual offsets with direct lateralization provide the ability to optimize soft tissue tension. An extensive size range and consistent intervals between sizes help achieve proper fit and aid in recreating leg length.

Providing advanced bearing options

The TRI-LOCK Bone Preservation Stem's 12/14 ARTICUL/EZE® Taper enables the use of one of the most advanced bearing options available today. The PINNACLE® Acetabular Cup System gives the surgeon a choice of bearing materials, and the option for screw fixation.

Enabling a simple, reproducible technique

Today's total hip surgeon demands proven performance, simplified instrumentation, and surgical approach flexibility. The TRI-LOCK Bone Preservation Stem is designed to address these demands. The broach-only technique and wide range of instrumentation enable both traditional and less-invasive surgical approaches.

Note: The statements in this brochure only refer to the TRI-LOCK Bone Preservation Stem system used with DePuy Synthes Companies metal on polyethylene and ceramic on polyethylene bearing combinations.

Pre-Operative Planning

Determination of Leg Length Discrepancy

Perform a clinical evaluation in conjunction with a radiographic analysis to determine preoperative leg length discrepancy and use both to determine intraoperative leg length management. To estimate leg length discrepancy radiographically, draw a reference line across the bottom of the ischium. Measure the distance from the lesser trochanter (or greater trochanter) landmark to the reference line on each side. The difference between the two is the radiographic leg length discrepancy. Clinical examination should help determine the actual leg length irregularity.

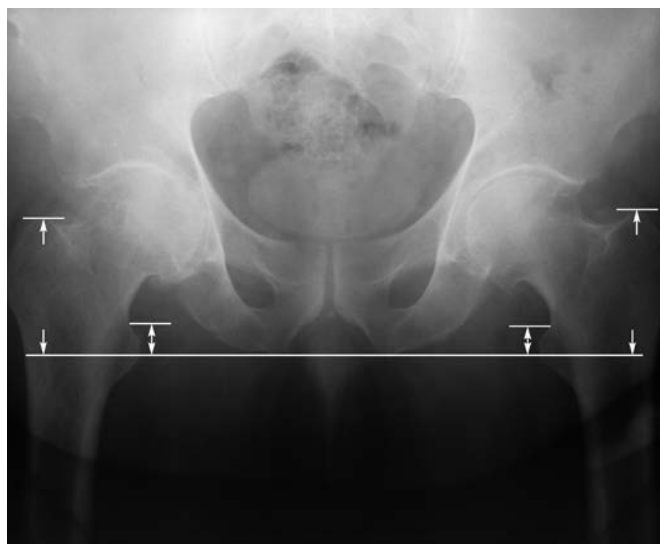


Figure 1

Acetabular Cup Sizing and Position

Most sizing determinations are made using the A/P radiograph of the hip. Determine the optimal position for the acetabular component and estimate the size using the PINNACLE Acetabular Cup System template overlays. The acetabular teardrop can be referenced as the interior margin of the acetabular reconstruction. The goal in cementless acetabular fixation is to optimize position and bone contact. Once this is determined, mark the intended center of rotation of the bearing surface on the A/P radiograph.

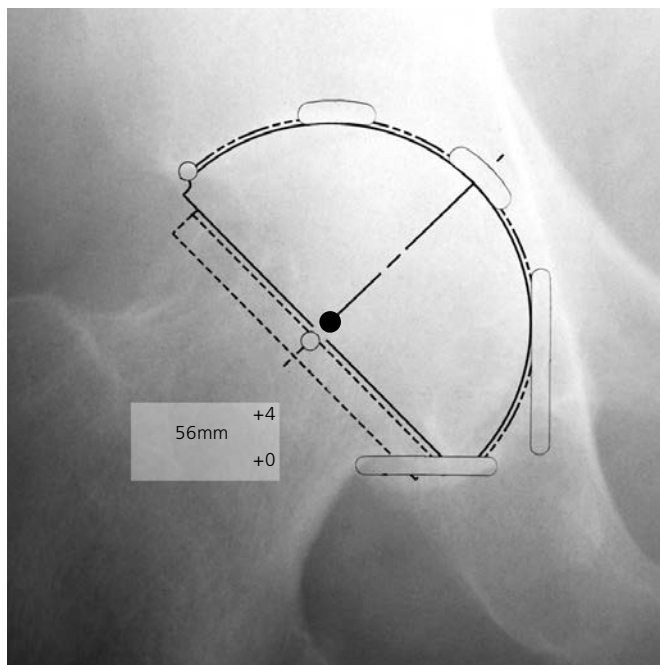


Figure 2

Femoral Stem Selection

The TRI-LOCK Bone Preservation Stem is designed to achieve intimate cortical contact proximally at the medial and lateral endosteal cortices. Select the template size that fits the proximal femur and equalizes leg lengths. 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. The vertical distance between the planned center of rotation of the acetabular component and the center of rotation of the femoral head constitutes the distance the leg length will be adjusted.

The TRI-LOCK Bone Preservation Stem is available with standard and high offset options for all stem sizes. The high offset option provides direct lateralization, increasing offset without sacrificing leg length. Through templating and trialing, determine which option restores proper offset by matching the cup's center of rotation with the desired head center of rotation.

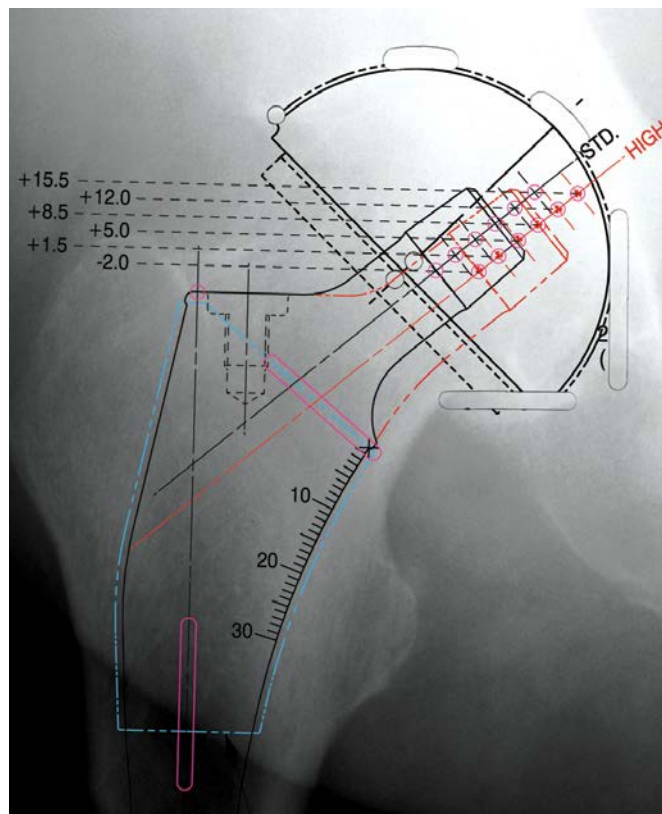


Figure 3

Surgical Technique

1. Neck Osteotomy

Align the neck resection guide with the long axis of the femur. This establishes the angle of resection at a proper 50° from the femoral axis. Determine the resection level by aligning the top of the guide with the tip of the greater trochanter or by measuring a pre-operatively determined distance above the lesser trochanter. Mark the resection line using electrocautery or methylene blue. Resect the femoral head.



2. Femoral Canal Initiation

Utilize the modular box osteotome to enter the femoral canal and to establish version. If needed the box osteotome can be used to clear bone laterally.



3. Femoral Canal Preparation

The TRI-LOCK Bone Preservation Stem offers several broach handles that enable the many surgical approaches for hip replacement. Select the handle that best suits the needs of the performed approach. Begin using a broach at least two sizes smaller than the preoperatively templated stem size. The starter broach can be used when needed for small femoral geometries, or for clearing bone laterally. While taking care to maintain proper alignment and version, sequentially advance the broaches down the femoral canal. Continue to increase broach size until intimate contact is made between the broach and the medial and lateral cortices. The final size is achieved when the broach maintains axial and rotational stability, and is at a seating level that recreates proper leg length.



Note: The TRI-LOCK Stem diamond tooth broaches grow consistently 1.25 mm laterally and 2 mm distally between each increasing stem size. Initial medial cortical contact should be the goal in broaching this system since the broaches will only grow towards the lateral cortex as they increase in size.

Note: It is not recommended to rotate the broach into the anterior and posterior planes until it is time for the final rotational stability check. Rotating the broach prematurely can create open spaces between the final stem and the cancellous bone on the anterior and posterior sides.



4. Calcar Preparation

Calcar planing is optional, as the TRI-LOCK Bone Preservation Stem is a collarless design. With the final broach fully seated, place the planer over the broach stud. Apply power prior to engaging the calcar to prevent the planer from binding. Mill the calcar to the level of the broach face.



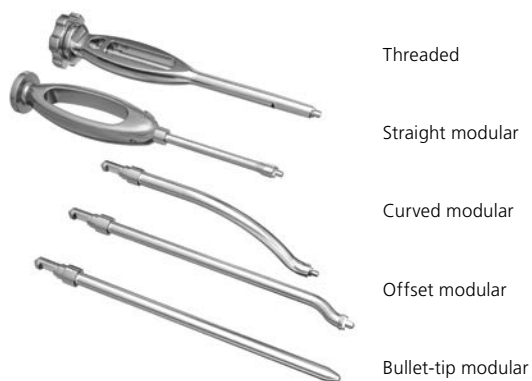
5. Trial Reduction

Trial neck segments and trial heads are available to assess proper component position, joint stability, range-of-motion and leg length. Standard and high offset options are available for each stem size. Offset increases 6-8 mm (depending on stem size) from the standard to the high offset option, via direct lateralization. With the final broach in-situ, attach the appropriate trial neck and trial head. Reduce the hip and assess what adjustments, if any, are required to ensure stability through a full range of motion. When stability is achieved, note the broach size and head/neck offset.



6. Femoral Component Insertion

Stem inserters with various geometries are available to enable the many surgical approaches for hip replacement. The threaded stem inserter can be used if a positive connection between the implant and instrument is required. Select the stem size that corresponds to the final broach. In the area of GRIPTION Coating, the implant is oversized in the medial-lateral dimension by 0.25 mm per side relative to the broach. Introduce the implant into the femoral canal by hand. Take care to orient the implant with proper alignment and version. Using moderate mallet blows, advance the stem into position. The implant is fully seated when the top of the GRIPTION Coating reaches the level where the face of the broach previously sat and the implant is stable. Excessive force should not be needed to seat the stem.



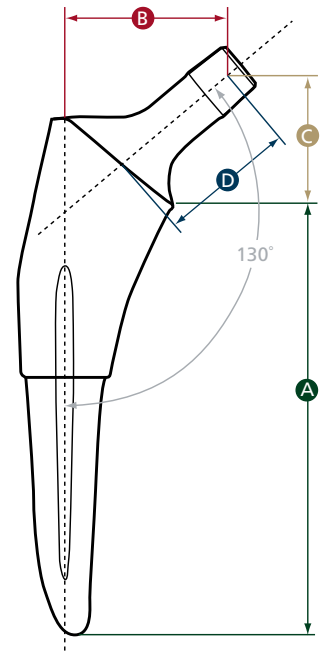
7. Femoral Head Impaction

Following the final trial reduction, clean and dry the taper to ensure it is free of debris. Place the appropriate femoral head onto the taper. Using the head impactor, engage the head with light taps. Clean the bearing surfaces, and reduce the hip.



Technical Specifications

Note: When moving from a Standard to High Offset stem in sizes 0 to 3, you gain 6 mm of direct lateralization. You gain 8 mm of direct lateralization in moving to a High Offset stem in sizes 4 to 12.



Size	A Stem Length (mm)	B Offset with Head (mm)						C Leg Adjustment Length with Head (mm)						D Neck Length with Head (mm)					
		-2	+1.5	+5	+8.5	+12	+15.5	-2	+1.5	+5	+8.5	+12	+15.5	-2	+1.5	+5	+8.5	+12	+15.5
0 Standard	95	31	34	36	39	42	44	23	25	27	30	32	34	23	27	30	34	37	41
0 High	95	37	40	42	45	48	50	23	25	27	30	32	34	27	31	34	38	41	45
1 Standard	97	31	34	36	39	42	44	23	25	27	30	32	34	23	27	30	34	37	41
1 High	97	37	40	42	45	48	50	23	25	27	30	32	34	27	31	34	38	41	45
2 Standard	99	33	36	38	41	44	46	24	26	28	31	33	35	25	28	32	35	39	42
2 High	99	39	42	44	47	50	52	24	26	28	31	33	35	29	32	36	39	43	46
3 Standard	101	33	36	38	41	44	46	25	27	29	32	34	36	25	28	32	35	39	42
3 High	101	39	42	44	47	50	52	25	27	29	32	34	36	29	32	36	39	43	46
4 Standard	103	34	37	40	42	45	48	26	28	30	33	35	37	26	30	33	37	40	44
4 High	103	42	45	48	50	53	56	26	28	30	33	35	37	32	35	39	42	46	49
5 Standard	105	34	37	40	42	45	48	26	29	31	33	35	38	26	30	33	37	40	44
5 High	105	42	45	48	50	53	56	26	29	31	33	35	38	32	35	39	42	46	49
6 Standard	107	36	39	42	44	47	50	28	30	32	34	37	39	28	32	35	39	42	46
6 High	107	44	47	50	52	55	58	28	30	32	34	37	39	33	37	40	44	47	51
7 Standard	109	36	39	42	44	47	50	28	31	33	35	37	40	28	32	35	39	42	46
7 High	109	44	47	50	52	55	58	28	31	33	35	37	40	33	37	40	44	47	51
8 Standard	111	38	41	44	46	49	52	30	32	34	36	39	41	30	34	37	41	44	48
8 High	111	46	49	52	54	57	60	30	32	34	36	39	41	36	39	43	46	50	53
9 Standard	113	38	41	44	46	49	52	30	33	35	37	39	42	30	34	37	41	44	48
9 High	113	46	49	52	54	57	60	30	33	35	37	39	42	36	39	43	46	50	53
10 Standard	115	40	43	46	48	51	54	32	34	36	38	41	43	32	35	39	42	46	49
10 High	115	48	51	54	56	59	62	32	34	36	38	41	43	37	41	44	48	51	55
11 Standard	117	40	43	46	48	51	54	32	34	36	38	41	43	32	35	39	42	46	49
11 High	117	48	51	54	56	59	62	32	34	36	38	41	43	37	41	44	48	51	55
12 Standard	119	40	43	46	48	51	54	32	34	36	38	41	43	32	35	39	42	46	49
12 High	119	48	51	54	56	59	62	32	34	36	38	41	43	37	41	44	48	51	55

References:

1. Burt CF et al. A Femoral Component Inserted without Cement in Total Hip Arthroplasty. A Study of the TRI-LOCK Component with an Average Ten Year Duration of Follow-up. JBJS 1998 Jul 80(7) 952-60.

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DePuy Orthopaedics, Inc.

700 Orthopaedic Drive
Warsaw, IN 46582
USA

Tel: +1 (800) 366-8143

Fax: +1 (574) 267-7196

DePuy Ireland UC

Loughbeg, Ringaskiddy
Co. Cork
Ireland

Tel: +353 214914278

www.depuysynthes.com