SUMMIT® TAPERED HIP SYSTEM

SURGICAL TECHNIQUE & DESIGN RATIONALE
Fixation is the foundation of long-term clinical success. A biocompatible titanium alloy stem, combined with POROCOAT® Porous Coating and underlying radial ZTT macro texture, creates a surface that is designed for initial stability, and biologic fixation to bone. DUOFIX® Stems combine POROCOAT Porous Coating, which allows for biologic fixation to bone, with the addition of a 35 micron layer of hydroxyapatite (HA) coating.¹
Clinical Results
- 1 of 96 revised (due to fall) in a 5-year follow-up study

POROCOAT Porous Coating
POROCOAT Porous Coating allows biological fixation to bone without the use of bone cement. With more than 30 years of clinical heritage, our proprietary POROCOAT Porous Coating is composed of commercially pure titanium sintered metal beads.

DUOFIX HA Coating
- 35 micron non-occluding plasma spray deposited HA coating

Grit Blasted Distal Body
- Provides roughened surface engineered for supplemental stability
Radial ZTT steps
- ZTT steps designed to eliminate hoop stress by directing radial force into compression.
- Provides lower risk of intra-operative fracture*

*See graph on page 5 for comparison to leading competitors
Radial ZTT is designed to convert hoop stresses to compression loads which may potentially reduce the risk of intraoperative fracture. Hoop stresses may increase risk of intra-operative fracture.

### 5 Year Intra-operative Fracture Rate

<table>
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<tr>
<th>Product</th>
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<tbody>
<tr>
<td>Mallory Head®</td>
<td>5.0%</td>
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<td>VerSys FM Tape®</td>
<td>4.0%</td>
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<tr>
<td>Synergy®</td>
<td>3.0%</td>
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<tr>
<td>Omnifit® HA</td>
<td>2.0%</td>
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<tr>
<td>SUMMIT®</td>
<td>1.0%</td>
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Direct Lateralization
- Enables femoral offset restoration without affecting leg length
- Ability to lateralize by 6mm–8mm to manage soft tissue laxity depending on stem size
- Offset range 30mm–50mm depending on stem size

SUMMIT Dual Offset options help surgeons more effectively manage soft tissue laxity when compared to systems with only one offset offering.
Neck Geometry
- Designed for a larger ROM to decrease the risk of dislocation due to secondary prosthetic impingement
- Provides range of motion up to 149 degrees when coupled with the PINNACLE® Acetabular Cup System

Polished Neck
- Decreases risk of wear debris generation, secondary to prosthetic impingement
TSS CORE KITS

Compatible with the SUMMIT, CORAIL® and TRI-LOCK® Bone Preservation Stem Systems, the TSS Core kits feature instrumentation to facilitate the femoral preparation for anterolateral, posterior or anterior approaches. To further enhance OR flexibility, the TSS Core kits include two sets of trial heads, up to size 40mm, and can accommodate two different TSS broach handles.
Determination of Leg Length Discrepancy

Perform clinical and radiograph analysis to determine leg length management (Figure 1).

Acetabular Cup Sizing and Positioning

Use A/P radiograph to determine acetabular component position.

Use the PINNACLE Acetabular Cup System template overlays to determine the correct implant size (Figure 2).

Optimizing the position and bone contact are the main objectives in cementless acetabular fixation.

Mark the center of rotation of bearing surface on A/P radiograph.

The vertical distance between the planned center of rotation of the acetabular component and the center of rotation of femoral head constitutes the distance the leg length will be adjusted.

Note: The targeted shell abduction (as measured on radiographs) should be 40–45 degrees taking into account each individual patient’s local soft tissue and anatomic landmarks.

The targeted shell anteversion (as measured on radiographs) should be 15–20 degrees taking into account each individual patient’s local soft tissue and anatomic landmarks.
Femoral Stem Selection

Select the template that fits the proximal femur and equalizes the leg lengths.

The femoral template should be in-line with the long axis of femur.

Mark the neck resection line at the point where the selected stem provides the desired amount of leg length.

Verify the chosen stem size also fits into the lateral plane and check for three point fixation (Figure 3).

Figure 3: Three Point Fixation
Align the neck resection guide with the long axis of the femur (Figure 4).

Determine the resection level by aligning the top of the guide with the tip of the greater trochanter or measuring the pre-operatively determined distance above the lesser trochanter.

Mark the resection line using electrocautery or methylene blue.*

Resect the femoral head.

*Tip: Make a conservative neck resection initially and use the calcar planer to adjust.
Option 1
Medullary Canal Access

Place the IM initiator at the posterior margin of the neck resection laterally near the piriformis fossa.

Advance the IM initiator until sufficient circumferential clearance for the box osteotome and canal probe is achieved (Figure 5).

Option 2
Box Osteotome

Use the box osteotome to enter the femoral canal at the junction of the femoral neck and greater trochanter (Figure 6).

If needed the box osteotome may be used to clear bone laterally.
Canal Probing

Utilize the tapered canal probe to establish a direct pathway to the medullary canal. Advance the probe so that the superior margin of the cutting flutes meet the neck resection (Figure 7).

Note: The probe should pass easily if proper alignment has been achieved.

Tip: Circumferential clearance of the probe is important to avoid reaming in the varus orientation.

Alignment Verification and Lateralizing

The path established by the canal probe will dictate the route for trochanteric reaming, tapered reamers and broaches.

Note: It is important to gain neutral alignment of the canal.

Trochanteric reaming (lateralizing) may be used to lateralize the proximal entry point for the tapered reamers; broaches aid in neutral stem alignment (Figure 8).
Tapered Reaming

Sequential Ream starting 2–3 sizes below the pre-operatively templated size.

**Example:** If the hip pre-operatively templated for a size 6 implant then tapered reaming would begin with the size 2–3 reamer and progress to the size 6–7 reamer.

Each reamer has dual depth calibration lines for each of the two stem sizes, distally located for calcar referencing and proximally for greater trochanter referencing (Figure 9).
**FEMORAL BROACHING**

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**Broaching the Femur**

With the broach oriented laterally towards the greater trochanter, broach sequentially starting 2–3 sizes below the pre-operatively templated size.

There is one broach for every implant size.

During sequential broaching, the broach may become difficult to remove, therefore the broach extractor is recommended.

The final broach should fit and fill the proximal femur with the top of the cutting teeth at the desired neck resection. This final broach should feel rotationally stable.

**Example:** If the femur was reamed to a size 6, it should then be broached to a size 6 and assessed for axial and rotational stability.

**Tip:** The SUMMIT Instrumentation is designed to prepare the femur line-to-line. The porous-coated region of the femoral component is oversized by 0.375mm per side relative to the instrumentation. If the broach size is countersunk more than 4mm below the neck resection, re-evaluate the resection level. If the neck resection level is determined to be correct, the next larger size broach is recommended.
Calcar Planing/Milling

Calcar planing is optional.

Create a definitive landmark for stem insertion by milling a precise resection level.

Place the planer over the broach stud and mill the calcar to the broach face (Figure 11).

**Note:** Make sure the planer is rotating prior to engaging the calcar.

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Trial Reduction

Standard and high offset neck segments and trial modular heads are available to assess proper component position, joint stability and range of motion (Figure 12).

Trial heads are color coded to indicate different neck offsets. The brown +5 head is the neutral head and doesn’t change the offset of the trial.

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Broach Extraction

Use the broach handle or broach extractor to remove the final broach.
Stem Inserter Options

Stem inserters with various geometries are available to enable the many surgical approaches for hip replacement. The retaining stem inserter can be used if a positive connection between the implant and instrument is required (Figure 13).

![Figure 13: Stem Inserter Options](image)

Final Implantation

Select the stem size that corresponds to the final broach. Introduce the implant into the femoral canal by hand and orient the implant with proper alignment and version. Using moderate mallet blows, advance the stem into position. In the area of POROCOAT Porous Coating, the implant is oversized by 0.375mm per side relative to the broach.

Excessive force should not be needed to seat the stem. The implant is fully seated when the top of the POROCOAT Coating reaches the level where the face of the broach previously sat and the implant is stable (Figure 14). It is possible for the implant to be seated and stable and still display 2–3 rows of POROCOAT Coating proximally (Figure 14).

![Figure 14: Final Implantation](image)
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. (Figure 15).
TAPERED REAMING

Resistance and chatter from cortical engagement may be used as a signal to cease tapered reaming. The reamer depth reference lines for either referencing landmark are calibrated to the center of rotation of the corresponding femoral component with a 28mm + 5 ARTICUL/EZE® Femoral Head.

It is important to ensure the reaming is performed sequentially through the reamer sizes. The reamer sizes are designed to ensure the reamed cavity does not breach the cortical bone.

FEMORAL BROACHING

Ensure sequential reaming is completed before broaching.

If the broach size is countersunk more than 4mm below the neck resection, re-evaluate the resection level. If the neck resection level is determined to be correct, ream up and use the next size broach.

TRIAL REDUCTION

Three sources of instability:

1. **Soft tissue laxity:** This can be resolved by increasing modular head length or by choosing the high offset option. In extreme cases, these solutions can be employed in conjunction with trochanteric advancement.

2. **Component orientation:** Choosing a face-changing acetabular liner and positioning it in the proper orientation to achieve the desired stability can correct this condition. If the face-changing liner does not provide adequate stability, the acetabular shell may require repositioning.

3. **Bony impingement:** Where instability is due to acetabular osteophytes or trochanteric prominence, relieve these areas. Substitution of a longer modular head or selecting the high offset neck trial may be required to relieve bony impingement.

**INSERTER SELECTION**

When using the retaining inserter, verify that it is assembled with the inserter shaft threaded into the inserter handle. Ensure the tines in the inserter are aligned with the recesses of the inserter platform on the top of the implant. Fully engage the threads of the inserter into the implant to ensure the inserter is securely attached to the implant.

**IMPLANT INSERTION**

When inserting the SUMMIT DUOFIX HA Stem, avoid contact with the HA coating to ensure it is not damaged by metal insertion instrumentation.
### TECHNICAL SPECIFICATIONS

#### Neck Length (B) vs. Leg Length Adjustment (D)

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<tr>
<th>Neck Length (B)</th>
<th>Leg Length Adjustment (D)</th>
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<td><strong>1 High</strong> 125mm</td>
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<td><strong>2 High</strong> 130mm</td>
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<td><strong>3 Std</strong> 135mm</td>
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<td><strong>3 High</strong> 135mm</td>
<td>29.1</td>
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**Notes:**
- Design Rationale & Surgical Technique: SUMMIT® Tapered Hip System
- DePuy Synthes Companies
### IMPLANTS

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<tr>
<th>SUMMIT POROCOAT Stem Standard Offset</th>
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**Note:** All SUMMIT Tapered Hip System femoral implants are compatible with the DePuy Synthes Joint Reconstruction* ARTICUL/EZE 12/14 Taper.

### INSTRUMENTATION

#### General Instrumentation

- Universal Broach Handle 2570-00-000
- Broach Extractor 2570-00-002
- Calcar Planer-Small 2570-04-100
- Calcar Planer-Large 2570-04-200
- Retaining Implant Inserter 2598-07-570
- Standard Implant Inserter 2570-05-100
- Case Complete 2570-10-000
- Universal Neck Resection Guide 2570-01-600
- T-handle 2001-42-000
- IM Initiator 2001-80-501
- Femoral Head Impactor 2001-65-000
- Muller AWL Reamer 2354-10-000
- Core 2 Instrument Case Complete 2611-20-000
- Femoral Rasp 85-3927
- Box Osteotome 85-4673
- Anteversion Osteotome 2002-25-000
- Broach Handle Alignment Rod 85-3928
- Lateralizer 2570-00-005
- Slap Hammer 2570-05-250
- Modular Calcar Reamer Shaft 2570-04-500
- Modular Calcar Reamer Disc, Small 2001-47-000
- Modular Calcar Reamer Disc, Medium 2001-48-000
- Modular Calcar Reamer Disc, Large 2001-49-000

#### Tapered Reamer

- 0/1 2570-02-000
- 2/3 2570-02-100
- 4/5 2570-02-200
- 6/7 2570-02-300
- 8/9 2570-02-400
- 10 2570-02-500

#### Broach

- 0 2570-00-060
- 1 2570-00-070
- 2 2570-00-080
- 3 2570-00-090
- 4 2570-00-100
- 5 2570-00-110
- 6 2570-00-120
- 7 2570-00-135
- 8 2570-00-150
- 9 2570-00-165
- 10 2570-00-180

#### Standard Neck Segment

- 0/1 2570-03-000
- 2/3 2570-03-100
- 4/5 2570-03-200
- 6/7 2570-03-300
- 8/9 2570-03-400
- 10 2570-03-500

#### High Neck Segment

- 0/1 2570-03-050
- 2/3 2570-03-150
- 4/5 2570-03-250
- 6/7 2570-03-350
- 8/9 2570-03-450
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**Any Two Handles**

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<tr>
<td>2001-66-000</td>
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References:


6. Akhaven, Sam MD., Goldberg, Victor M. MD., “Clinical Outcome of a Fibermetal Taper Stem Minimum 5-year Followup” CLINICAL ORTHOPAEDICS AND RELATED RESEARCH Number 465, pp. 106–111


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CAUTION: USA Law restricts these devices to sale by or on the order of a physician.

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