ReUnion® TSA
Total Shoulder Arthroplasty System
Operative technique
ReUnion TSA
Total Shoulder Arthroplasty System

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This publication sets forth detailed recommended procedures for using Stryker devices and instruments. It offers guidance that you should heed, but, as with any such technical guide, each surgeon must consider the particular needs of each patient and make appropriate adjustments when and as required. A workshop training is recommended prior to performing your first surgery.

All non-sterile devices must be cleaned and sterilized before use. Follow the instructions provided in our cleaning and sterilization guide (OT-RG-1). Multi-component instruments must be disassembled for cleaning. Please refer to the corresponding assembly/disassembly instructions. Please remember that the compatibility of different product systems has not been tested unless specified otherwise in the product labeling.

See package insert (Instructions for Use V15197, V15200 and V15201) for a complete list of potential adverse effects, contraindications, warnings and precautions. The surgeon must discuss all relevant risks including the finite lifetime of the device with the patient when necessary.

This document is intended to be used by healthcare professionals only.
Description and indications

**Indications**

**For use as a Hemi or Total Shoulder Replacement**

- Aseptic necrosis of the humeral head.
- Painful, disabling joint disease of the shoulder resulting from: degenerative arthritis, rheumatoid arthritis or post-traumatic arthritis.
- Proximal humeral fracture and/or dislocation.
- Clinical management problems where arthrodesis or alternative reconstructive techniques are less likely to achieve satisfactory results.
- Revision of previous unsuccessful total shoulder replacement, resurfacing or other procedure.

**Glenoid components are intended for cemented use only. The humeral stem components are intended for both cemented and cementless use.**

**The following is applicable for US only:**

In the case of revision, when ReUnion TSA humeral stems are well fixed, the system is indicated for conversion to a total shoulder arthroplasty. In conjunction with ReUnion TSA humeral and glenoid components, if the natural glenoid provides sufficient bone stock, ReUnion TSA humeral stems can be converted from a hemiarthroplasty to a total shoulder arthroplasty, as well as revised from an existing total shoulder arthroplasty to a secondary total shoulder arthroplasty. It is also indicated for conversion to a hemiarthroplasty. In conjunction with ReUnion TSA humeral components, ReUnion TSA humeral stems can be converted from a total or ReUnion RSA reverse shoulder arthroplasty to a hemiarthroplasty, as well as revised from an existing hemiarthroplasty to a secondary hemiarthroplasty, in treatment of previously failed shoulder arthroplasty cases where revision to a reverse shoulder arthroplasty is inappropriate.

**Contraindications**

- Any active or suspected latent infection in or about the shoulder joint.
- Any mental or neuromuscular disorder which would create an unacceptable risk of prosthesis instability, prosthesis fixation failure, or complications in postoperative care.
- Bone stock compromised by disease, infection or prior implantation which cannot provide adequate support and/or fixation to the prosthesis.
- Skeletal immaturity.
- Patients whose anticipated activities would impose high stresses on the prosthesis and its fixation.
- Obesity. An overweight or obese patient can produce loads on the prosthesis which can lead to failure of fixation of the device or to failure of the device itself.

**Additional total shoulder contraindications**

- Absent, irreparable or non-functioning rotator cuff and other essential muscles.
See package insert for warnings, precautions, adverse effects and other essential product information.

**Precautions**

The ReUnion TSA has not been evaluated for safety and compatibility in the Magnetic Resonance (MR) environment. It has not been tested for heating, migration, or image artifact in the MR environment. The safety of ReUnion TSA in the MR environment is unknown. Scanning a patient who has this device may result in patient injury.

**Warnings**

See package insert (Instruction for Use V15197, V15200 and V15201) for a complete list of warnings.

**Patient counseling**

Surgeons should discuss all relevant contraindications, adverse effects and the need for post-implantation protection with their patients.
Surgical technique
Surgical technique

**Patient positioning**
For standard shoulder arthroplasty, the patient is positioned in a semi-Fowler’s (beach chair) position. The torso is inclined 30° to 45° and the legs are padded and bent. The patient’s shoulder is brought to the edge of the table to allow full extension of the arm, thus affording exposure of the humeral shaft. A bolster may be placed beneath the involved scapula to improve exposure of the articular surface.

The head is stabilized to avoid movement during the procedure. It is recommended that anesthesia be brought to the contralateral side of the table to allow full access to the surgical field.

**Tech tip:**
Consideration may be given to a commercially available beach chair positioner.
Surgical technique

Surgical approach
For most cases, an extended delto-pectoral incision will be adequate to allow exposure to all involved structures. This begins 3-4cm medial to the acromioclavicular joint coursing distally over the coracoid process and along the delto-pectoral interval. You will note that the cephalic vein is medial to the coracoid.

The incision is then taken down through subcutaneous tissue to the delto-pectoral interval. The cephalic vein is identified and usually taken laterally with the deltoid to preserve the lateral perforators.
Surgical technique

**Pectoralis major tendon release**

A self-retaining or Richardson type retractor may be placed beneath the pectoralis medially and the deltoid laterally. The conjoined tendons, as they originate from the coracoid process, are identified and the interval deep to the tendons and superficial to the subscapularis is carefully developed by finger dissection. The medial retractor can be repositioned in this interval, respecting the musculocutaneous nerve and other neurovascular structures medially.

A blunt retractor is then passed superiorly beneath the coracoacromial ligament and acromion and superficial to the rotator cuff tendons. This allows additional exposure of the rotator interval and the anterior capsule.
Subscapularis tendon release (capsulotomy)

Prior to performing the anterior capsulotomy for exposure, the surgeon should determine the amount of passive external rotation available given the degree of soft tissue contracture or bony deformity.

In most cases, a full thickness capsulotomy releasing both subscapularis and capsule simultaneously may be performed for exposure.

The vertical limb of the capsulotomy begins 1.5cm-2cm medial to the biceps tendon. This runs from the rotator interval, superiorly to the inferior margin of the subscapularis tendon distally.

A horizontal limb, both superiorly and inferiorly, is then created and traction sutures are placed.

Tech tip:
Placement of traction sutures in the tendon aids in its release.

In most cases of arthritis of the glenohumeral joint, osteophytic spurring on the inferior portion of the humeral head will result in capsular shortening, loss of external rotation, and will necessitate release to allow exposure of the humeral head.

This is best accomplished by placing a retractor within the capsule at the inferior margin of the humeral head, externally rotating the arm, adducting and releasing that capsule intra-articularly, thus avoiding injury to the extracapsular axillary nerve. This step is critical in gaining exposure.

Tech tip:
A constant understanding of the location of the axillary nerve is critical during exposure.
Surgical technique

**Removal of osteophytes**

With the capsulotomy complete, the humeral head can be dislocated with external rotation and a pull from behind the proximal arm, delivering the humerus anterior and lateral.

Osteophytes are removed inferiorly and anteriorly to determine the level of head resection, and to define the anatomic neck and articular margins.

The humeral resection may be performed using either an intramedullary or extramedullary resection guide. Both methods are described below.

This step is critical in determining the orientation of the humeral head in relation to the glenoid. Furthermore, the extent of osteophytes, loose bodies, and humeral head deformation needs to be determined preoperatively with templating and radiographic studies.
Surgical technique

In most cases, the humeral component should be set in approximately 30° of retroversion. There are a number of techniques that may be employed to achieve this retroversion. By flexing the elbow 90° and externally rotating the arm 30°, the humeral head cut is made straight on, thereby achieving 30° of retroversion.
Humeral head resection and canal reaming
Humeral head resection and canal reaming

Instructions for extramedullary (EM) resection guide

Once the margin of the articular surface is determined, the extramedullary humeral resection guide should be placed on the anterior aspect, parallel to the long axis of the humeral shaft.

Adjust the cutting block to the proper angular stop, left or right and verify that the resection block is fully against the stop, prior to tightening the locking knob.

Note:
The correct height is determined superior-laterally by the attachment of the supraspinatus tendon.

Tech tip:
The cut should be at the margin of the cuff attachment, removing the articular surface, but preserving the tendon attachment. Care should be taken to protect the biceps tendon and rotator cuff insertion with a small Hohman, Bennett or Crego retractor during head resection.

Accurate retroversion of the cut will remove all of the articular surface posteriorly, but preserve the posterior capsule and cuff attachments.
Humeral head resection and canal reaming

Prior to headless pin insertion, ensure that the arm is in proper retroversion using the 30° version rod and setting the arm in correct retroversion.

The version rod should align with the patient’s forearm.

When the correct retroversion has been determined, pin the external humeral resection guide to the humeral shaft using the headless pins inserted at slightly diverging angles.

If desired, mark the angle of the resection at a height appropriate for the desired head resection.

The angle of resection (135°) is marked and the humeral cut is initiated.

**Note:**
Remove the version rod prior to initiating resection.

**Warning:**
Do not use the version rod to rotate the assembly.
Humeral head resection and canal reaming

Once pinned in place, the knob can be loosened and the vertical shaft of the EM cutting guide can be removed to improve access for making the resection.

Place the oscillating saw blade along the flat surface of the guide and complete the humeral head resection.

**Notes:**

- **A sagittal sawblade that has a width of ½” (12mm) or less is desirable.**
- **Ensure that the blade is oscillating prior to coming in contact with bone.**
- **Inspect sawblade for any defects prior to utilization.**

The guide can be removed and the cut completed freehand or refined with a rongeur; any residual osteophytes, especially posteriorly, should be resected using an osteotome.

The resected head should be saved for later comparison and sizing of the modular humeral head options, as well as a source for bone graft.

**Note:**

- **The saw blade should remain flush against the resection plane of the resection guide prior to initiating the humeral head resection.**

Once the cut has been completed, remove the headless pins using the headless pin removal tool and then the cutting block.
Humeral head resection and canal reaming

Retractors are placed beneath the rotator cuff tissue superiorly and medially to provide adequate exposure of the canal for reaming. Reaming begins with bullet-tip fluted cylindrical reamers.

Placement should be somewhat lateral and just posterior to the bicipital groove. This will allow for appropriate position within the canal.

Reaming should be performed manually using the quick release ratcheting T-handle and be progressive in size (i.e. 7mm, 8mm, 9mm, etc.) until friction is felt as the reamer contacts cortical bone.

**Tech tip:**
*It is important not to let the coracoid / conjoined tendon crowd posterior humeral metaphysis and force your canal entry too anterior.*
Humeral head resection and canal reaming

For a press-fit stem with the head resected, the reamer should be inserted to the top of the cutting teeth (Figure 20, Green Arrow).

If the humeral head has not already been resected and/or a cemented stem with cement restrictor is going to be utilized, the reamer should be inserted to the depth of the first line above the cutting teeth (Figure 20, Blue Arrow).

If a long stem prosthesis is indicated, reaming depth is to the second line positioned near the top of the reamer shaft (Figure 20, Red Arrow).

Notes:
These engraved marks are only present on reamer sizes 8 and above.

The last reamer size used will match the distal size of the broach to be used.

Warning:
The slotted mallet should not be utilized to strike the underside of the ratcheting T-handle for extraction or removal of the starter awl or cylindrical reamers.
Humeral head resection and canal reaming

Instructions for intramedullary (IM) resection guide

Assemble the 6mm starter awl and the ratcheting T-handle. Place the tip of the starter awl in line with the long axis of the humerus and bore a pilot hole through the humeral head along the long axis.

Placement should be somewhat lateral and just posterior to the bicipital groove. This will allow for appropriate valgus position within the canal.

The entry point is made posterior to the bicipital groove, relatively lateral on the head’s articular surface and just medial to the rotator cuff attachment. Using a mallet, lightly tap the awl into the canal.

The starter awl can be impacted through the humeral head starting position using the mallet to impact on the metal pad of the T-handle.

Note:
The T-handle can be placed into three different positions marked on the collar near the silicone handle. These positions are marked as “R” for REVERSE, “L” for LOCKED, and “F” for FORWARD. The user should align the white arrow marker with the appropriate directional setting during use.

Manually insert the starter awl until the larger diameter portion (positive stop) above the cutting teeth is located just above the humeral head.

Tech tip:
It is important not to let the coracoid / conjoined tendon crowd posterior humeral metaphysis and force your canal entry too anterior.

Once the entry point has been made through the humeral canal, remove the 6mm starter awl and begin to ream the humeral canal with the fluted cylindrical humeral reamers.
Humeral head resection and canal reaming

Retractors are placed beneath the rotator cuff tissue superiorly and medially to provide adequate exposure of the canal for reaming. A Darrach retractor along the posterior humerus can lever against the coracoid, exposing the entire humeral metaphysis. Reaming begins with bullet-tip fluted cylindrical reamers.

Reaming should be performed manually using the quick release ratcheting T-handle and be progressive in size (i.e. 7mm, 8mm, 9mm, etc) until friction is felt as the reamer contacts cortical bone.

When cortical contact is achieved, detach the ratcheting T-handle and leave the last reamer used within the humeral canal.

**Notes:**
These engraved marks are only present on reamer sizes 8 and above.

The last reamer size used will match the distal size of the broach to be used.

**Warning:**
The slotted mallet should not be utilized to strike the underside of the ratcheting T-handle for extraction or removal of the starter awl or cylindrical reamers.

When utilizing the IM resection guide or whenever utilizing a cement restrictor, the fluted cylindrical reamers should be inserted to the first line above the cutting teeth (Figure 24, Blue Arrow).

If a long stem prosthesis is to be utilized, reaming depth is to the second line positioned near the top of the reamer shaft (Figure 24, Red Arrow).
Humeral head resection and canal reaming

Make sure that the clamp tower can be assembled correctly by aligning the engraved arrow on the clamp tower to the engraved arrow on the cylindrical reamer.

**Note:**
The starter awl and all of the cylindrical reamers have the “D” shaped cross section marked by a large arrow, to mate with the large arrow marked IM resection guide’s clamp tower.

Once aligned, depress the cantilever arm of the clamp tower and slide it down over the shaft of the starter awl until the clamp tower comes in contact with the humeral head.

Assemble the IM resection guide to the resection guide block by depressing the superior plunger on the resection guide and attaching the resection guide block.

Make sure to correctly orient the IM resection guide to the correct side of the resection guide block as noted by the L or R markings on each of the instruments.

There are two existing resection guide blocks available, Rev. A and Rev. AB (Figure 27). Both revisions are assembled to the superior plunger in the same fashion.
Humeral head resection and canal reaming

Slide the IM resection guide and resection block assembly onto the clamp tower making sure the orientation is correct by visualizing the markings L or R.

The cantilever arm should be used for macro height adjustments, while the fine adjustment wheel located just below the superior plunger should be utilized for micro height adjustments.

Prior to headless pin insertion, ensure the arm is properly retroverted. Thread the version rod into the resection guide block at the desired retroversion to either 20°, 30° or 40° of retroversion.

**Note:**

Rev. A accommodates 30° of retroversion while Rev. AB accommodates either 20°, 30° or 40° of retroversion.

**Warnings:**

The version rod is not intended to be a load bearing instrument.

Do not use the version rod to rotate the assembly or the awl/reamer.

It is recommended that the resection level be confirmed by sliding the bladerunner instrument through the cutting block’s captured cutting slot and assessing the planned thickness and plane of resection.
Humeral head resection and canal reaming

When the level of the humeral head resection is confirmed. Pin the humeral IM cutting block to the humerus using the provided headless pins, to secure the resection block to the bone.

Using the pin driver attachment or pin collet, drive two (2) straight pins, perpendicular to the resection guide block, into place.

With the humeral resection guide block pinned to the humerus with two (2) straight pins, remove the version rod and then depress the plunger on the IM Resection Guide Assembly (Fig. 32, Blue Arrow).

Pull the IM Resection Guide Assembly and Fluted Cylindrical Reamer from the humeral canal in one piece, leaving only the cutting block behind (Fig. 32, Red Arrow).

With only the humeral cutting block in place drive the third and final cross pin into the humeral cutting block to secure it in place prior to starting the humeral resection.

Note:
Hole marked as “X” is for insertion of the cross-pin.
Humeral head resection and canal reaming

With all three (3) headless pins in place, position the saw blade through the cutting slot for a captured cut.

**Notes:**
- A sagittal sawblade that has a width of \( \frac{1}{2}'' \) (12mm) or less is desirable.
- Ensure that the blade is oscillating prior to coming in contact with bone.
- Inspect sawblade for any defects prior to utilization.

Alternatively, place the saw blade directly on the resection block for an open cut.

**Warning:**
- To avoid cutting through the posterior capsule, stop the oscillating blade just short of the capsule and complete the cut with an osteotome.
Humeral head resection and canal reaming

Once the cut has been completed, remove the headless pins using the headless pin removal tool and then the cutting block.

**Tech tips:**
Care should be taken to protect the biceps tendon and rotator cuff insertion with a small Hohman or Crego retractor during head resection.

The correct cut should remove all of the articular surfaces at the margins of the capsule and rotator cuff attachments superior and posterior. Those soft tissue attachments must be preserved.
Humeral preparation
Humeral preparation

Broaching the humerus
Upon completion of humeral canal reaming, select a humeral broach that is at least 4mm smaller than the size of the last reamer used.

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Warning:
Do not use the Broach handle/Stem Inserter for removal of a well fixed or cemented humeral stem.
Humeral preparation

Ensure the broach handle/stem inserter is in proper retroversion by threading in the version rod and aligning the patient’s forearm with the version rod.

**Warnings:**
The version rod is not intended to be a load bearing instrument.

Do not use the version rod like a breaker bar and attempt to rotate the broach handle to adjust the version.

The version rod must be removed prior to striking the underside of the impaction pad to avoid damaging the version rod during evaluation.

Attach the broach to the broach handle/stem inserter by making sure the locking pin is engaged and the broach is drawn onto the alignment pin while closing the handle.

The broach and broach handle/stem inserter will lock together via the handle on the medial side of the broach handle. It can be disengaged by releasing the same handle.

**Note:**
Prior to impaction, ensure that handle is closed and firmly grasped during mallet blows.
Humeral preparation

Impact the broach along the long axis of the humerus. The broach is fully seated when the superior face of the broach is sitting flush to the resection surface of the humerus.

**Caution:**
*Avoid excessive impaction of a well fixed broach as this may lead to fracture of the humerus.*

Sequentially broach the humeral canal until the last humeral broach size used matches the diameter of the final cylindrical reamer used.

**Warning:**
*Do not use a humeral broach larger than the last cylindrical reamer used without first reaming up to the appropriate diameter if increased proximal fit is desired.*

**Note:**
*When removing the humeral broaches using the broach handle, make sure that upward mallet blows are placed on the strike pad.*

The final broach utilized should be left in place as a trial and modular head and/or neck trials can be evaluated.
Humeral preparation

**Osteotomy evaluation and calcar planing**

Assess the planer’s relationship to the resected plane. If the angle diverges, then the calcar planer shall be utilized to finalize the plane, providing an optimum resection for the fixed head configuration (Figure 42).

If required, select the appropriate size calcar planer (see table below) to refine the resected surface.

Insert the calcar planer into the ratcheting T-handle and then insert the calcar planer’s guide post into the mating surface on the humeral broach (Figure 42, inset).

<table>
<thead>
<tr>
<th>Humeral head size</th>
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<tbody>
<tr>
<td>40, 44, 48</td>
<td>Small</td>
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<tr>
<td>52, 56</td>
<td>Large</td>
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**Warning:**

Do not use the calcar planers under power. They are intended for manual use only.

The angle of the calcar planer, when correctly placed into the broach, will be perpendicular to the standard neck angle of 135°.

Apply axial pressure onto the ratcheting T-handle and carefully refine the resected humeral surface.

**Note:**

To cut, depress the spring loaded shaft until a positive stop is reached.
Humeral preparation

Humeral protector plate
Upon completion of the humeral head resection and calcar planing, place the appropriate sized humeral resection protector plate onto the resected humeral surface.

This will protect the humerus during retraction, for glenoid preparation.

Notes:
The long pin of the calcar plate should be utilized in rotating and positioning the plate on the resected surface.

The humeral protector plate may not fully seat if the broach is not fully seated.

Warning:
Make sure not to damage the cortical bone around the perimeter of the resection of the humerus.
Glenoid surface preparation
Glenoid surface preparation

Pre-operative planning and glenoid exposure

There is a wide variation of glenoid bone pathology. Accurate radiographs, CT scans, and MRI scans allow for pre-operative assessment of bone stock available to support an implant, as well as the proper positioning. Templates are available for sizing.

Additionally, for the occasional scenario when the pegged configuration cannot be inserted (e.g. revision without defined peg-hole support, or difficult exposure), a central keeled glenoid component remains available as a back-up alternative.

Glenoid preparation can be done either immediately following humeral head osteotomy, or alternatively, after the humeral canal has been prepared and broached (surgeon’s choice).

Retraction of the humerus posteriorly is facilitated by adequate release of the capsule from along the humeral calcar. The capsule is also stripped from the anterior and inferior rim of the glenoid, along with excision of the labrum. The arm is taken to a position of abduction, external rotation, and extension.

A pitchfork retractor is placed anteriorly; posteriorly the ‘retractor of choice’ varies from one surgeon to another. It is prudent to have several alternatives (Hohman, Fakuda, custom) and to employ whichever facilitates the task.
Glenoid surface preparation

**Humeral retraction**

To achieve optimal exposure of the glenoid, the ReUnion TSA Humeral Retractor should be utilized in conjunction with the humeral protector plates.

*Figure 47*
Glenoid surface preparation

**Glenoid sizing and reaming**

Upon achieving desired exposure of the glenoid fossa, the color coded translucent glenoid surface trials should be used to determine the appropriate size of the glenoid to be implanted.

This step is also critical in determining the size of the spherical reamer to be used. It is important to note, all of the spherical reamers have the same radius of curvature. As such, in addition to the size that matches the appropriate glenoid surface trial, larger reamer sizes can also be used as the soft tissue permits.

**Warning:**

Do not use the color coded glenoid surface trials as drill guides or drill templates. Attempting to drill through the surface trials may potentially damage the trials.

Using a surgical marking pen draw two (2) lines, superior-inferior and anterior-posterior to indicate the approximate center of the glenoid (Figure 49).

The ReUnion TSA variable angle drills are convertible instruments allowing for both fixed angle and variable angle use.

To use the drill driver in variable angled mode, loosen the drill bit by tightly grasping the metal collar and slowly activating the drill in REVERSE mode. The cone shaped end of the drill bit will now be outside of the metal sleeve (Figure 50, top).

To use the drill driver in a straight or fixed angle mode, tighten the drill bit by tightly grasping the metal sleeve and slowly activating the drill in FORWARD mode. The cone shaped end of the drill bit will sit flush to the metal sleeve (Figure 50, bottom).

**Note:**

In those cases where the metal collar is difficult to grasp and use, the non-threaded end of the humeral version rod can be used as a breaker bar, when inserted into the hole on the collar (Figure 50 inset).
Glenoid surface preparation

Place the centering drill guide on the glenoid and align the markings on the drill guide with those lines drawn in the previous step.

Use the centering guide with the variable angle center-hole drill bit to prepare the center hole in the glenoid at the desired angle of version.

**Caution:**
Prior to drilling, make sure the drill bit is fully seated within the drill guide to prevent damage to the drill bit and/or drill guide.

Also make sure that the settings on power instruments are set for “DRILL” mode or be sure to utilize drill specific attachments for proper RPM and torque settings.

The previously prepared center hole will accept the stabilizing post of the spherical glenoid reamer during glenoid contouring (Figure 52, inset).

**Tech tip:**
Effort should be made to keep the axis of the drill bit and guide holes in line.

The centering drill guide head is the same size and shape of the smallest glenoid implant, size 40.

**Straight reamer driver**

Select the correct spherical glenoid reamer size, as determined previously in the sizing of the glenoid with surface trials, for contouring of the glenoid fossa.

The objective is to provide a uniform contour at the desired angle of version to achieve uniform contact for the glenoid trials and implant.

**Note:**
A full awareness of the patient’s existing glenoid deformity/version prior to reaming is necessary to determine the amount of correction necessary for effective glenoid implantation.
Glenoid surface preparation

The ReUnion TSA glenoid reamers are designed to be assembled via a hex shaped quick connect feature.

**Notes:**
During reaming, make sure to use the power instruments in “REAM” mode or be sure to utilize reamer specific attachments for proper RPM and torque settings.

For reamer disassembly please refer to the “Instrument disassembly” section of the Appendix.

Once reaming is initiated, the axis of the reamer driver should be held constant and any rocking movements should be avoided to prevent irregular or uneven surface preparation.

Care should be taken to monitor reaming and verify the desired bone removed during the process.

To ensure accuracy in reaming depth, a pulsing action should be utilized when reaming the glenoid.

Once the glenoid surface preparation has been completed, surface congruency can be checked a final time utilizing the color coded translucent surface trials.

Any uneven surfaces on the face of the glenoid will be presented through the translucent glenoid surface trials. (Figure 56).

Continue to Pegged Glenoid preparation on page 46 or with the Keeled Glenoid preparation on page 58.
Glenoid surface preparation

**Angled reamer driver**

In addition to the Straight Reamer Driver, the ReUnion TSA Shoulder System also includes an optional Angled Reamer Driver.

The Angled Reamer Driver is offset 45 degrees from center and is designed to facilitate the contouring of the glenoid face in those cases where access to the glenoid is particularly difficult.

Select the correct spherical glenoid reamer size, as determined previously in the sizing of the glenoid with surface trials, for contouring of the glenoid fossa.

The objective is to provide a uniform contour at the desired angle of version to achieve uniform contact for the glenoid trials and implant.

**Note:**

*A full awareness of the patient’s existing glenoid deformity/version prior to reaming is necessary to determine the amount of correction necessary for effective glenoid implantation.*

Once reaming is initiated, the axis of the reamer driver should be held constant and any rocking movements should be avoided to prevent irregular or uneven surface preparation.

Care should be taken to monitor reaming and verify the desired bone removed during the process.

To ensure accuracy in reaming depth, a pulsing action should be utilized when reaming the glenoid.

**Note:**

*During reaming, make sure to use the power instruments in “REAM” mode or be sure to utilize reamer specific attachments for proper RPM and torque settings.*

For reamer disassembly please refer to page 86 of this protocol.
Glenoid surface preparation

Once the glenoid surface preparation has been completed, surface congruency can be checked a final time utilizing the color coded translucent surface trials. To ensure accuracy in reaming depth, a pulsing action should be utilized when reaming the glenoid.
Glenoid surface preparation

Any uneven surfaces on the face of the glenoid will be presented through the translucent glenoid surface trials. (Figure 60).

Continue to Pegged Glenoid preparation on page 46 or with the Keeled Glenoid preparation on page 58.
Pegged
glenoid preparation
Pegged glenoid preparation

**Glenoid drilling**

The ReUnion Self-Pressurizing pegged and keeled glenoids require precise void preparations in order to be effectively implanted. Care must be taken to utilize the proper drill guides.

The use of temporary peg locating pins is absolutely required and should not be ignored in order to properly prepare the bone voids.

With the glenoid face fully contoured and checked for congruency, insert the central stabilization post of the drill guide head into the central reamer pilot hole.

Rotate the guide around its central axis to properly orient the drill guide. The two (2) drill hole guides should now be on the inferior portion of the glenoid and guide.

**Note:**

Drill guide pilot posts are intentionally designed for a precise fit to the prepared central holes in order to achieve and maintain precision in preparation of the glenoid drill holes.

The ReUnion TSA variable angle drills are convertible instruments allowing for both fixed angle and variable angle use.

To use the drill driver in variable angled mode, loosen the drill bit by tightly grasping the metal collar and slowly activating the drill in REVERSE mode. The cone shaped end of the drill bit will now be outside of the metal sleeve (Figure 63, top).

To use the drill driver in a straight or fixed angle mode, tighten the drill bit by tightly grasping the metal sleeve and slowly activating the drill in FORWARD mode. The cone shaped end of the drill bit will sit flush to the metal sleeve (Figure 63, bottom).

**Note:**

In those cases where the metal collar is difficult to grasp and use, the non-threaded end of the humeral version rod can be used as a breaker bar, when inserted into the hole on the collar (Figure 63 inset).
Pegged glenoid preparation

Take the variable angle glenoid drill and drill the anterior-inferior hole until the drill bit is completely engaged and the drill bit’s positive stop is in direct contact with the drill guide instrument.

**Caution:**
Prior to drilling, make sure the drill bit is fully seated within the drill guide as to prevent damage to the drill bit and/or drill guide.

Also make sure that the settings on power instruments are set for “DRILL” mode or be sure to utilize drill specific attachments for proper RPM and torque settings.

Utilizing the peg locating pin forceps, place a temporary locating peg into the freshly prepared anterior-inferior hole prior to drilling the posterior-inferior hole for two-point fixation of the drill guide.

Make sure the peg locating pin is fully seated within the drill guide prior to preparing the next (posterior-inferior) peg hole.
Pegged glenoid preparation

Take the variable angle glenoid drill and drill the posterior-inferior hole until the drill bit is completely seated within the drill guide and is in direct contact with the positive stop.

**Tech Tip:**
When drilling the posterior inferior peg hole, care must be taken to check the patient’s posterior glenoid bone quality. Adequate soft tissue retraction is also required in order to obtain proper exposure.

Once the posterior-inferior hole has been drilled to the proper depth, use the peg locating pin forceps and remove the peg locating pin.

Remove the drill guide and invert it, inserting the twin inferior posts into the two inferior drill holes.
Pegged glenoid preparation

Warning:
Once the two pegs are inserted into the two recently prepared inferior holes, care should be taken not to use the long handle of the drill guide as leverage to alter the position of the scapula as it could possibly compromise the hole preparation and/or fracture the glenoid.

After the two inferior posts are fully seated in the freshly prepared holes, re-drill the central hole.
Pegged glenoid preparation

Next, drill the superior peg hole and prepare to remove the drill guide.

The drill guide should be removed by pulling along the hole axis and not by rocking the handle, as this may compromise the peg hole preparation.

Full evaluation of the prepared holes should be performed to make sure there are no perforations, which could potentially lead to cement extrusion.

**Warning:**

*Do not ream the glenoid surface after the pegged and keeled glenoid holes have already been prepared as it may compromise the hole preparation and/or fracture the glenoid.*
Pegged glenoid preparation

Final bone preparation

Assemble the peg alignment sound to the 4-sided ratcheting handle and make sure the two parts are securely engaged prior to use.

The peg alignment sound and 4-sided handle assembly is introduced into the drill holes.
Pegged glenoid preparation

The peg alignment sound should be seated in place and lightly tapped into final position using a mallet.

**Warning:**
*Make sure to avoid excessive impaction as this may compromise the prepared drill holes.*

The body of the sound should bottom out flush to the glenoid bone.

Seating the sound assures that the holes are each deep enough to allow the implant to fully seat.

**Warning:**
*Once all the pegs are inserted into the recently prepared holes, care should be taken not to use the long handle of the peg alignment sound as leverage to alter the position of the scapula as it may compromise the hole preparation and/or fracture the glenoid.*
Pegged glenoid preparation

Pegged glenoid trial

A color coded translucent plastic pegged glenoid trial should be inserted to check for depth and fit of the component relative to the prepared bony void.

The selected pegged glenoid trial is secured with the glenoid trial clamp and placed into the prepared holes, fully seating the trial.

If trialing the entire total shoulder construct prior to cementing is preferred, the desired size single radius head trial can be placed on the humeral broach within the canal, and the fit of the construct can be assessed.

Cementing the pegged glenoid

In preparation for cementation, epinephrine-soaked pledget-sponges can be packed into each of the drill holes for hemostasis. Alternatively, gelfoam or thrombin can be used as well. These are subsequently removed and holes are dried prior to insertion of cement.

Cement is injected using a standard 10cc syringe into every prepared hole including the central peg. With the cement just slightly firmer than ‘runny’, it is easily injected into all of the prepared holes, filling each hole just below ‘full’. Introduce the cement to all prepared bone and cement the glenoid in standard fashion.
Pegged glenoid preparation

The implant pegs are centered over the respective peg holes. The leading tips of the pegs easily enter into the holes by ‘feel’, an important feature since visualization of the holes at this point is difficult.

**Note:**
While the ReUnion SP Glenoid is designed to have cement injected into the prepared bony voids, cement can be finger packed into the voids at the surgeon’s discretion.

Initially, the implant is manually placed with thumb pressure.

### Head/Glenoid mismatch example

<table>
<thead>
<tr>
<th>Sizing type</th>
<th>Glenoid size</th>
<th>Humeral head size</th>
<th>Diametrical mismatch (mm)</th>
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<tbody>
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<td>“One-down”</td>
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### Humeral head sizes

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All humeral head sizes are available in both Concentric and Eccentric options.

### Color-coded, head/glenoid trial compatibility table

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<td>56</td>
<td>19, 22, 25, 28</td>
<td>56</td>
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</tbody>
</table>
Pegged glenoid preparation

The implant is definitively seated and ‘bottomed-out’ with several blows of the mallet onto the 4-sided modular handle attached to the glenoid impactor tool.

If there is any peripheral cement that happens to extrude, it is cleared using a fine elevator.

Pressure should be maintained on the prosthesis until the cement has fully hardened.
Keeled
glenoid preparation
Keeled glenoid preparation

**Glenoid drilling**

The ReUnion Self-Pressurizing Pegged and Keeled Glenoids require precise void preparations in order to effectively be implanted. Care must be taken to utilize the proper drill guides.

The use of temporary peg locating pins is absolutely required and should not be ignored in order to properly prepare the bone voids.

With the glenoid face fully contoured and checked for congruency, insert the central stabilization post of the drill guide head into the central reamer pilot hole.

Rotate the guide around its central axis to properly orient the drill guide. The two (2) drill hole guides should now be directly superior and inferior to the central peg.

**Note:**

Drill guide pilot posts are designed for a precise fit to the prepared central holes in order to achieve and maintain precision in preparation of the glenoid drill holes.

The ReUnion TSA variable angle drills are convertible instruments allowing for both fixed angle and variable angle use.

To use the drill driver in variable angled mode, loosen the drill bit by tightly grasping the metal collar and slowly activating the drill in REVERSE mode. The cone shaped end of the drill bit will now be outside of the metal sleeve (Figure 87, top).

To use the drill driver in a straight or fixed angle mode, tighten the drill bit by tightly grasping the metal sleeve and slowly activating the drill in FORWARD mode. The cone shaped end of the drill bit will sit flush to the metal sleeve (Figure 87, bottom).

**Note:**

In those cases where the metal collar is difficult to grasp and use, the non-threaded end of the humeral version rod can be used as a breaker bar, when inserted into the hole on the collar (Figure 87 inset).
Keeled glenoid preparation

Take the variable angle glenoid drill and drill the inferior hole until the drill bit is fully engaged and the drill bit’s positive stop is in direct contact with the drill guide instrument.

**Caution:**
*Prior to drilling, make sure the drill bit is fully seated within the drill guide as to prevent damage to the drill bit and/or drill guide.*

*Also make sure that the settings on power instruments are set for “DRILL” mode or be sure to utilize drill specific attachments for proper RPM and torque settings.*

Place a temporary peg locating pin into the newly drilled inferior hole to stabilize the drill guide’s position while preparing the superior hole.

The peg locating pin should be placed so that it is fully engaged within the drill guide, preventing any unnecessary movement of the drill guide itself.
Keeled glenoid preparation

Take the variable angle glenoid drill and drill the superior hole until the drill bit is completely engaged and the drill bit’s positive stop is in direct contact with the drill guide instrument.

Utilizing the peg locating pin forceps, remove the temporary peg locating pin and then remove the drill guide.

The drill guide is inverted and the opposite end is now used to complete the drilling steps for keeled glenoid preparation.

Warning: Once the pegs are inserted into the prepared superior and inferior holes, care should be taken not to use the long handle of the drill guide as leverage to alter the position of the scapula as it may compromise the hole preparation and/or fracture the glenoid.
Keeled glenoid preparation

Insert the two posts into the superior and inferior holes drilled in the previous step until the guide bottoms out on the glenoid and sits flush to the bone.

Take the variable angle glenoid drill and drill the two central holes until the drill bit is completely engaged and the drill bit’s positive stop is in direct contact with the drill guide instrument.

The drill guide can now be removed.

Final bone preparation

The keeled glenoid punch is assembled to the 4-sided ratcheting handle and is introduced into the drill holes (Figure 96).
Keeled glenoid preparation

The keel punch is impacted with a mallet until firmly seated (Figure 97). The body of the punch should bottom out flush to the glenoid bone with a tight fit.

Seating the punch assures that the prepared void is deep enough to allow the implant to fully seat. A plastic trial glenoid implant is available to trial prior to cementing.

**Warning:**

*Avoid excessive impaction as it may compromise the hole preparation and/or fracture the glenoid.*

Once the keel punch is removed, a precisely prepared bone void should be left behind.

Full evaluation of the prepared keel void should be performed to make sure there are no perforations, which could potentially lead to cement extrusion.
Keeled glenoid preparation

Keeled glenoid trial

A color coded translucent plastic keeled glenoid trial should be inserted to check for depth and fit of the component relative to the prepared bony void.

If trialing the entire total shoulder construct prior to cementing is preferred, the desired size single radius head can be placed on the humeral broach within the canal, and the fit of the construct can be assessed.

Cementing the keeled glenoid

In preparation of bone cement, epinephrine-soaked pledget-sponges can be packed into the prepared bony void for hemostasis. Alternatively, gelfoam or thrombin can be used as well. These are subsequently removed and the void is dried prior to insertion of cement.

Cement is injected using a standard 10cc syringe. With the cement just slightly firmer than ‘runny’, it is easily injected into prepared void, filling the void just below ‘full’. Introduce the cement to all prepared bone and cement the glenoid in standard fashion.
Keeled glenoid preparation

The implant keel is centered over the prepared bone void. The leading tip of the keel easily enters into the void by ‘feel’. The implant is started with thumb pressure.

The implant is definitively seated and ‘bottomed-out’ with several blows of the mallet onto the 4 side modular handle attached to the glenoid impactor tool.

If there is any peripheral cement that happens to extrude, it is cleared using a fine elevator.

Pressure should be maintained on the prosthesis until the cement has fully hardened.

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### Head/Glenoid mismatch example

<table>
<thead>
<tr>
<th>Sizing type</th>
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### Humeral head sizes

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All humeral head sizes are available in both Concentric and Eccentric options.

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### Color-coded, head/glenoid trial compatibility table

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</table>
Keeled glenoid preparation

Fully cemented SP keel

If presented with poor bone quality in the central region of the glenoid, the larger diameter area of the implant keel will not be properly supported.

A burr can be used to remove approximately 1 mm of additional bone around the margins of the prepared void to cement the entire keeled construct, not utilizing the self-pressurizing features of the keel (Figure 103).

Cement is injected using a standard 10cc syringe. With the cement just slightly firmer than ‘runny’, it is easily injected into prepared hole, filling the hole just below ‘full’. Introduce the cement to all prepared bone and cement the glenoid in standard fashion.

By not utilizing the self-pressurizing features of the glenoid, the surgeon must make sure to manually pressurize the cement in the bony void prior to keeled glenoid insertion.

Tech Tip: While the ReUnion SP Glenoid is designed to have cement injected into the prepared bony void, cement can be finger packed into the void at the surgeon's discretion.

Once the cement has been manually pressurized, the implant keel is centered over the prepared bone void. The leading tip of the keel is easily entered into the void by ‘feel’.

The implant is started with thumb pressure and should be held in place until the cement has fully hardened.

Note: If there is any peripheral cement that happens to extrude, it is cleared using a fine elevator.
Humeral head trialing
Humeral head trialing

Optional utilization of humeral head trial adaptors

(Humeral Head Trial Adaptors are available in the US only)

Humeral Head Trials sit flush to the face of the Humeral Broaches and Cemented Humeral Stems [Figure 106 left]. In cemented applications, the Morse Taper adjoining the Humeral Head Implant with the Cemented Humeral Stem Implant adds a nominal thickness of approximately 1.5mm [Figure 106 right].

Note: Humeral Head Trial Adaptors are only applicable to Cemented Humeral Stem Applications.

For this reason, single-use/sterile Humeral Head Trial Adaptors are available for optional utilization with ReUnion TSA Humeral Head Trials. Utilization of the Trial Adaptors will account for the additional nominal 1.5mm gap introduced by the Morse Taper.

Humeral Head Trial Adaptors mate with ReUnion TSA Humeral Head Trials. To determine the size of the Humeral Head Trial, please refer to the “Humeral Head Trialing” section.

Place the flat side of the Humeral Head Trial Adaptor on the bottom face of the selected Humeral Head Trial. The protrusion/post on the Humeral Head Trial should be pushed through the center hole in the Humeral Head Trial Adaptor.

Note: There should be no gap between the bottom face of the Humeral Head Trial and the top side of the Humeral Head Trial Adaptor.
Humeral head trialing

With the angled protrusion on the Humeral Head Trial Adaptor oriented superiorly and the pegged protrusion oriented inferiorly, place the Humeral Head Trial on the Humeral Broach or Cemented Humeral Stem.

Continue trialing the Humeral Head, as described in the “Humeral Head Trialing” section.

If an alternate Humeral Head Trial is desired, remove the Humeral Head Trial Adaptor from the previous Humeral Head Trial and assemble it to the new one as previously described.

**Tech Tip:**
The Forked Removal Tool can aid in Humeral Head Trial Adaptor removal. See the “Humeral Head Trial Adaptor disassembly” section.

**Note:**
In Cemented Humeral Stem applications, if utilization of the optional Humeral Head Trial Adaptor is desired, follow instructions for attachment to Humeral Head Trial prior to placement on the Humeral Broach/Cemented Humeral Stem.

**Single radius (SR) heads**
The sizing of the modular head is important for success of this procedure. The previously resected head is compared with the modular trial head to determine both diameter and thickness and to help achieve the best soft tissue balance.

When a glenoid is used, the joint line is laterialized so this additional space should be accounted for when selecting the humeral head implant’s thickness (Figure 110).

Consideration must also be given to head deformity and rotator cuff tensioning.
Humeral head trialing

With the proper modular head in place, it should be possible to achieve proper tensioning of the rotator cuff tendons, have a good match to anterior/posterior humeral width, and have the top of the modular head be equal to or slightly superior to the greater tuberosity.

It should also enable 50% translation of the humeral head on the glenoid both anteriorly and posteriorly, enable internal rotation with the forearm across the abdomen, and also enable 30° – 40° external rotation.

Place the selected humeral head trial into the mating feature of the broach or stem.

The height of the modular head should be at or greater than that of the greater tuberosity.

Additionally, inspect the glenoid to see if the degree of retroversion requires adjustment.
Humeral head trialing

Eccentric single radius (SR) heads

If a standard humeral head does not adequately cover the resected surface of the humerus, an eccentric head, with its 4mm offset, should allow the head to be rotated into the correct position to allow for maximum coverage.

### Head/Glenoid mismatch example

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Final

implant insertion
Final implant insertion

Final humeral stem insertion
A decision is made regarding cementation once both humeral component and modular head implant sizes have been determined. In most cases, a press-fit of the humeral component will be possible. If there is a question of the adequacy of the fit or the quality of the cortical or medullary bone, cementation is an option.

Press-fit Humeral Stem
For press-fit application, a stem size that matches the last broach used should be selected. The substrate of the humeral stem provides a line to line press-fit with the corresponding broach, while the Ti plasma spray and HA coating provide an additional .5mm (1mm circumferential) press-fit proximally.

Attach the correctly sized humeral stem to the broach handle/stem inserter.

Note:
Local bone graft morsels obtained from the resected head can be utilized to fill voids, cysts, and augment a press-fit.

After removal of the final humeral broach, the canal should be thoroughly cleansed and dried.

Insert the humeral stem implant into the void left by the broach and seat the implant into place.

Note:
The stem should not be fully seated as to allow space for a sufficient taper lock of the head to the stem.

Warning:
Excessive impaction on a properly seated humeral stem may potentially cause a fracture of the medial calcar or humeral shaft.

Notes:
Attention must be paid to version of the implant. The version rod can be used at 20°, 30°, or 40° increments in alignment with the forearm to ensure the desired degree of retroversion during implant placement.

As with either cemented or press-fit application, trial heads may again be used to evaluate range of motion adequacy, soft tissue tensioning, and to check for impingement.
Final implant insertion

Cemented humeral stem

After removal of the final humeral broach, the canal should be thoroughly cleansed and dried.

A humeral stem 2mm smaller in distal diameter than the last size humeral broach should be utilized to allow for the desired 1mm (2mm circumferential) cement mantle.

Varying cement techniques can be utilized per patient indications. The component is introduced into the canal using the broach handle/stem inserter. Continue to sink the stem into the cement until final placement is achieved.

Verify the stem does not seat too low, to allow for humeral head impaction.

An optional fixed height adapter may be used to ensure a proper seating level of the humeral stem into the cement.

The fixed height adapter should be attached onto the medial side of the stem inserter/broach handle and can easily be removed by squeezing the 2 handles together and pulling.

Long stem sizes are also available for especially difficult primaries and revision cases.

Caution:
When using the Fixed Height Adapter, care should be taken not to excessively impact or counter sink the stem with the Fixed Height Adapter attached past the level of the humeral resection.

Care should be taken to remove any excess cement from the fixed height adapter and broach handle/stem inserter attachment features after use.
Final implant insertion

**Humeral head implantation**

**Single radius (SR) heads**

Thoroughly clean, dry and inspect the reverse Morse taper on the implanted ReUnion TSA stem.

**Note:**
It is critical to ensure that all tapers are clean, dry and clear of any debris or damage prior to assembling the humeral head to the stem.

**Note:**
If optional Humeral Head Trial Adaptor is being utilized, ensure that it is properly detached from the Humeral Head Trial/Cemented Humeral Stem and is not left in the wound.

**Caution:**
If optional Humeral Head Trial Adaptor is being utilized, ensure that it is disassembled and removed prior to impacting the Humeral Head Implant.
Final implant insertion

Select the correct sized head as previously trialed and place the humeral head on the humeral stem.

Several mallet blows are used to definitively seat the humeral head. Be sure that the angle of the ratcheting handle and impactor tool is in line with the axis of the tapers (90° to collar face).

**Tech Tip:**
*Internal rotation of the arm with the elbow flexed 90° to the abdomen without undue tension on the posterior capsule.*

*External rotation to 40°–45° while being able to bring the anterior capsular structures back to their original site of release.*

*External rotation to 90° without dislocation of the humeral head on the glenoid.*

*50% translation of the humeral head on the glenoid both anteriorly and posteriorly with a slight inferior translation.*

*The height of the modular head should be at or greater than that of the greater tuberosity.*

*Additionally, inspect the glenoid to see if the degree of retroversion requires adjustment.*
Implant removal

**Humeral stem removal**

**Warning:**
Do not use the Broach handle/Stem Inserter for removal of a well fixed or cemented humeral stem.

Utilize the Humeral Stem Removal Tool and McReynolds Slap Hammer to remove the humeral stem from the humeral canal.

Attach the humeral stem extractor to the humeral stem by inserting the guide post into proximal hole of the stem. Engage the clamping arm into trunnion, then tighten the knob.

Depending on the integrity of the cement mantle or degree of humeral stem ingrowth, humeral shaft osteotomies and other techniques described in the peer reviewed literature may be justified.

Thread the McReynolds slap hammer attachment to the humeral stem extractor and apply upward thrusts in line with the long axis of the humerus and well fixed humeral stem.

**Warning:**
Do not apply cantilever loads while sliding the hammer to remove the stem as this may cause a fracture of the humerus.
Implant removal

Humeral head removal

Attach the forked removal tool to the 4-sided ratcheting handle and slide the forked humeral head removal tool under the humeral head.

Align the forked removal tool to the neck of the head and lightly tap the forked tool in with a mallet to mechanically disassociate the humeral head from the humeral stem.

If the head is in direct contact with the bone, the surgeon may need to create a small window along the edge of the resection to obtain access for insertion of the fork.

Warning:
Be careful not to pry or lever off the cortical rim to remove head as this may cause a fracture.

Excessive impaction of the forked removal tool should be avoided as this may damage the cortical rim of the humerus.

Caution:
The ReUnion TSA forked removal tool should only be used with the ReUnion TSA Universal Neck Adapter or ReUnion SR heads.
Dual radius (DR) humeral heads

Humeral head trialing

The sizing of the modular head is important for success of this procedure. The previously resected head is compared with the modular trial head to determine both diameter and thickness.

When a glenoid is used, this lateralizes the joint line so the humeral head thickness will be 4mm less than the resected head.

With the proper modular head in place, it should be possible to achieve proper tensioning of the rotator cuff tendons, have a good match to anterior/posterior humeral width, and have the top of the modular head be equal to or slightly superior to the great tuberosity.

It should also enable 50% translation of the humeral head on the glenoid both anteriorly and posteriorly, enable internal rotation with the forearm across the abdomen, and also enable 30° – 40° external rotation.

Additionally, inspect glenoid to see if you need to alter degree of retroversion.

Thoroughly clean and inspect the broach taper, making sure it is clear of any debris. Select a Modular Neck Trial and insert the smaller taper into the negative taper of the broach.

Now select a Dual Radius Head Trial and place it onto the larger exposed taper.

Reduce the joint and evaluate range of motion and stability to confirm component sizes.

Remove Head Trial and Modular Neck Trial using the Forked Removal Tool.

Note:
The Dual Radius Heads, Adaptor and associated instruments are not CE marked.
Dual radius (DR) humeral heads

**Back-table humeral head assembly**

After completion of humeral head trialing. Select a Modular Neck Adapter implant and appropriate DR head for implantation.

Place the selected DR humeral head into the head/neck assembly block and then place the modular neck adapter implant into the humeral head.

Attach the universal impactor tool to the ratcheting 4-sided handle and definitively impact the neck adapter into the DR head with several blows.

Place the constructed DR Head/Modular Neck assembly into humeral stem.

Several mallet blows are used to definitely seat the humeral head/neck construct. Be sure that the angle of the ratcheting handle and impactor tool is in line with the axis of the tapers (90° to collar face).
Instrument disassembly

**Disassembly of spherical glenoid reamers**

The recommended method to disassemble the Spherical Glenoid Reamers from the Straight Reamer Driver is by utilizing the Glenoid Holder instrument to grasp around the circumference of the reamer.

By holding the reamer face as shown (Figure 128), pull the reamer face away from Straight Reamer Driver in an axial direction to disengage the quick connect feature.

**Warning:**
Be careful not to toggle the reamer during disassembly as this has the potential to compromise the quick connect mechanism.
Instrument disassembly

If attempting to remove the Spherical Glenoid Reamer without use of the Glenoid Holder instrument, it is recommended the user utilize gauze or another material to protect their hands from blades of the reamer.

Humeral head trial adaptor disassembly

Attach the forked removal tool to the 4-sided ratcheting handle.

Slide the Forked Removal Tool between the Humeral Head Trial and the Humeral Head Trial Adaptor. Ensure that the flat side of the Forked Removal Tool faces the bottom side of the Humeral Head Trial and the ramped side faces the Humeral Head Trial Adaptor.

Carefully disassemble the Humeral Head Trial Adaptor from the Humeral Head Trial.
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