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Turon™ Modular Shoulder System

Product Guide

Dial In

DJO GLOBAL

Notes

Humeral Head Osteotomy

- A well done humeral osteotomy requires that the surgeon make the osteotomy cut at or very near the patient's anatomic neck and avoids an aggressive cut which could destabilize the rotator cuff.
- Failure to remove the posterior osteophytes can result in a difficult glenoid exposure.

Glenoid Faceplate Preparation

- The Glenoid Drill Guide Handle (804-25-040) has a spring-loaded threaded tip. To ensure proper assembly, the "spring-loaded" tip must be flush against the Glenoid Sizing/Drill Guide, 38mm–54mm (804-25-101_105) prior to engaging the threads. The spring-loaded tip is designed to help prevent cross-threading and secure a tight fit.
- Correction of glenoid version should rarely exceed 10 degrees as this could compromise bone stock. If greater degrees of correction are necessary, it may be prudent to use a keeled component.

Pegged Glenoid Technique

- The inferior pegs of the 38mm Pegged Glenoid (520-01-238) are shorter than to the other Pegged Glenoid sizes. This is why there is a separate 38mm Peg Drill Guide (804-25-124).
- Ensure the 5.0mm Stop Drill (804-25-147) is in proper "in-line" alignment with the Glenoid Drill Guides and free from any soft tissue interference. Improper alignment can lead to stripping and/or binding of the drill against the drill guide.

Head/Neck/Stem Interferences

Depending upon whether a Straight or an Angled Neck is used, there are certain humeral head and stem configurations that are not compatible and may cause head/stem interferences. A listing of these head/stem interferences is provided to the right.

Humeral Head Trialing

- When trialing with the Angled Neck Trial in combination with an Offset Humeral Head Trial, be sure to note the position of the Angled Neck Trial and the Offset Humeral Head Trial relative to the osteotomy surface.
- It is recommended to dial in and record the desired position of the Angled Neck Trial prior to recording the determined position of the Offset Humeral Head Trial.
- If preferred, humeral head trialing may be performed off the final stem. After glenoid implantation, the surgeon may desire to proceed immediately to final humeral stem implantation and perform humeral head trialing off the final stem.
- For instances when the Trial Necks are difficult to remove, the Humeral Neck Extractor can be used.

Stem	Straight Neck	Angled Neck
Size 6		38 mm x 18 mm Offset Humeral Head
Size 8		38 mm x 18 mm Offset Humeral Head
Size 10		38 mm x 18 mm Offset Humeral Head
Size 12	38 mm x 18 mm Offset Humeral Head	38 mm x 18 mm Offset Humeral Head 42 mm x 16 mm Offset Humeral Head
Size 14	38 mm x 18 mm Offset Humeral Head 42 mm x 16 mm Offset Humeral Head	38 mm x 18 mm Offset Humeral Head 42 mm x 16 mm Offset Humeral Head
Size 16	38 mm x 18 mm Offset Humeral Head 42 mm x 16 mm Offset Humeral Head 42 mm x 20 mm Offset Humeral Head 46 mm x 16 mm Offset Humeral Head	38 mm x 14 mm Neutral Humeral Head 38 mm x 18 mm Offset Humeral Head 42 mm x 16 mm Offset Humeral Head 42 mm x 20 mm Offset Humeral Head 46 mm x 16 mm Offset Humeral Head

Humeral Head and Glenoid Radius of Curvature Mismatch

The Turon system is designed with a radius of curvature mismatch between the humeral heads and the glenoid components. The mismatch is different in the A/P and I/S planes to optimize stability while allowing translational articulation. Highlighted size pairings represent recommended mismatches (see matrices).

Proximal Humeral Preparation for Lesser Tuberosity or Subscapularis Repair

- It is preferred to stagger drill holes to avoid fracture of the greater tuberosity

Humeral Stem Press-fit Technique

- If desired, use cancellous bone from the resected humeral head to perform impaction bone grafting or to bone graft any small defects and ensure a secure press-fit.

Humeral Implant Assembly

- For instances when an Angled Humeral Neck is used in combination with an Offset Humeral Head, be sure to position or dial in the desired position of the Angled Humeral Neck relative to the Offset Humeral Head prior to initiating the Morse taper.

I/S Radius of Curvature Mismatch (mm)

Glenoids	Humeral Heads				
	Size 38	Size 42	Size 46	Size 50	Size 54
Size 38	8*	6	4	2	0
Size 42	10	8	6	4	2
Size 46	12	10	8	6	4
Size 50	14	12	10	8	6
Size 54	16	14	12	10	8

A/P Radius of Curvature Mismatch (mm)

Glenoids	Humeral Heads				
	Size 38	Size 42	Size 46	Size 50	Size 54
Size 38	12*	10	8	6	4
Size 42	14	12	10	8	6
Size 46	16	14	12	10	8
Size 50	18	16	14	12	10
Size 54	20	18	16	14	12

*Size pairing in gray represent recommended mismatch

Frequently Asked Questions (FAQ)

1 General

1. Will Turon replace Foundation? If so, what will happen to the Foundation Fracture System?

Yes, Turon will replace the Foundation Shoulder System. This will not happen overnight and there will be ample communications on the Foundation phase-out plan. The Foundation Fracture System will not be phased out and will continue to be supported.

2. What is the IMIN™ neck technology? What does IMIN stand for? Does any other company have a similar technology?

The IMIN™ neck technology is designed to help surgeons dial in to restore patient anatomy, optimize joint stability, and improve range of motion. IMIN is an acronym for Intrinsic Modular Indexable Neck. Turon is the first total shoulder system to incorporate this technology. No other company has this technology as it is patented and owned by DJO Surgical. The IMIN neck technology originates from our hip stems and is currently used in our R-120 and Alfa II hip stems.

3. What does Turon stand for?

The name Turon does not stand for anything. When the name Turon was conceived, it had no reference and/or bearing to any popular culture, theme or translations. Coincidentally, Turon does translate to "Polecat" in Spanish and is also a Philippine banana snack – which are pretty funny.

4. What is a "Ream-and-Run" technique? Do we have instruments for that?

The "Ream and Run" surgical technique was developed by Dr. Frederick A. Matsen, III, of UW Washington Medicine, Orthopedics and Sports Medicine, and involves using smooth-faced glenoid reamers to plane off and remove damaged cartilage, bony defects, and/or glenoid biconcavities during shoulder hemiarthroplasty, in which, no glenoid implant is used.

"...the "ream and run" approach may allow active patients to remain involved in fitness, recreational, and vocational pursuits that would risk premature failure if traditional total shoulder arthroplasty were to be performed."[1]

Currently, DJO Surgical does not offer dedicated instrumentation for this procedure.

[1] http://www.orthop.washington.edu/reamandrun

5. Are there any Turon sample sets, demo instrument sets and/or acrylic models?

There are currently 20+ Turon sample demo kits, of which, 7 are currently consigned and 13 are in circulation.

There are 4 marketing instrument sets, 3 of which are complete and 1 is incomplete, for demonstrations, lab and meeting support.

Rendered plastic implant acrylic models are available for order and demonstration purposes. Please contact Rae Pepper at Rae.Pepper@djoglobal.com to place an order.

6. Are there digital templates for Turon? How do I find out if my hospital or surgery center has access to digital templates for Turon?

Yes, digital templates are available for Turon. In order to learn whether your hospital or surgery center has access to the digital templates, you must first find out and communicate to DJO Surgical the Medical Imaging and PACS (Picture Archiving and Communication) system used at that facility.

In the event that your facility does not have access to Turon digital templates, it may take up to 3 months to process the request. We encourage you to ask your facility and begin the process as early as possible.

Alternatively, hardcopies of the Turon x-ray template (804-88-117) are available for order through Customer Service.

7. Is the angle of retroversion of the humerus (shoulder joint) always 30°? How is it referenced?

No, it is not. The normal angle of retroversion of the humerus is between 20° and 40°, with the average of 30° as the generally accepted standard.

"The angle of retroversion is the angle formed by a line drawn through the center of the longitudinal

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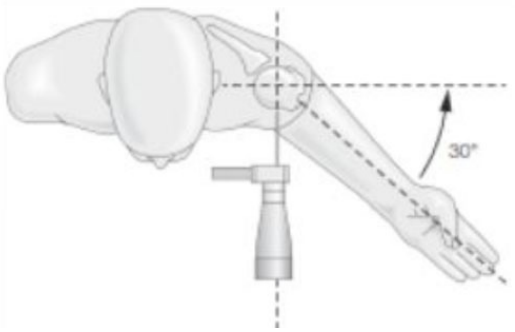
axis of the neck and head of the humerus meeting a line drawn along the transverse axis of the condyles, when the base is viewed from above, looking straight down from above the head of the humerus; the normal angle of retroversion of the humerus is between 20 and 40 degrees (see Figure below)."[2]



2. www.medilexicon.com

8. What is the correct amount of height difference between the superior aspect of the humeral head to the greater tuberosity?

"The articular head always lies above the greater tuberosity, but the difference can range from 3-20mm."[3]

Your surgeon will determine the correct amount of height difference within this range. The generally accepted difference is about 8mm.

[3] http://emedicine.medscape.com/article/1261320-overview#a04

9 . Who are the surgeon designers of the Turon?

Mark A. Frankle, MD – Florida Orthopedic Institute, Tampa, FL

Mark A. Mighell, MD – Florida Orthopedic Institute, Tampa, FL

Richard J. Hawkins, MD – Steadman Hawkins Clinic of the Carolinas, Greenville, SC

Keith C. Watson, MD – Orthopedic Specialty Associates, Fort Worth, TX

Spero G. Karas, MD – Emory Sports Medicine Center, Atlanta, GA

Theodore F. Schlegel, MD – Steadman Hawkins Clinic Denver, Denver, CO

2 Instrument

10. Does Turon instrument set have the same retractors, i.e. – plastic darrach (t-shaped), brown deltoid, two-prong glenoid, as in the RSP instrument set? What retractors are available?

No, there are no retractors in the Turon instrument trays. There are currently 3 dedicated Shoulder Retractor loaner sets available through Distribution Services.

Retractors and quantities in the Shoulder Retractor Sets are as follows:

Qty	Part No.	Description
1	804-00-097	Glenoid Protector
1	804-00-098	Deltoid Retractor
1	804-00-099	Humeral Retractor
1	804-00-200	Darrach, Small
1	804-00-201	Darrach, Large
2	804-00-202	Spiked Hohmann
1	804-00-203	Anterior Glenoid
1	804-00-204	Small Pectoral

11. The OR staff has a hard time attaching the Glenoid Drill Guide Handle (804-25-040) to the Glenoid Sizing/Drill Guide, 38mm – 54mm (804-25-142_146). What would you recommend? Is there an alternative handle we can use?

The Glenoid Drill Guide Handle has a spring-loaded threaded tip. To ensure proper assembly, the spring-loaded tip must be flush against the Glenoid Sizing/Drill Guide prior to engaging the threads. To facilitate attachment, it is recommended to thread the drill guide into the handle rather than the handle to the drill guide.

Alternatively, there are two Glenoid Pressurizer/Pusher Handles (804-25-037) available than can be used as substitutes. Please note that only the first thread or two of these handles are sufficient to engage the drill guide. Lastly, the Foundation Shoulder Glenoid Template Handle (804-01-013) can also be used as a substitute.

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12. Is the backside curvature or spherical radius the same for all the Turon Glenoid Reamers, 38mm – 54mm (804-25-142_146)? What about for Turon, Foundation, and RSP?

While the diameter sizes are different among the Turon glenoid reamers, the backside curvature or the spherical radius, which is 38mm, is the same for all glenoid reamers. This is also true for Turon, Foundation, and RSP.

13. The Proximal Humeral Protector, Small/Large (804-05-148_149)/Planer Guide, Straight/Angled Neck (804-05-052_053)/Neck Trial, Angled/Straight (804-15-005_006) is stuck on the Humeral Broach, 6mm – 16mm (804-05-106_116)/Humeral Stem, 6mm – 16mm (520-01-006_016) implant, what should I do?

The Humeral Neck Extractor (804-15-003) is available to extract any of the above mentioned instruments and implants.

14. What do the depth lines on the Humeral Reamers, 6mm – 16mm (804-05-086_091) represent?

Starting from top to bottom or proximal to distal, the depth lines on the humeral reamers are "REVISION" for revision or long stem, "CEMENT" for cemented application, and "PRESS FIT" for press-fit application.

15. Are the Turon humeral reamers the same as the RSP reamers? What about the broach handles?

No, both the RSP humeral reamers and broach handles are different from Turon.

16. Is there separate instrumentation for the revision/long humeral stems?

No, there is no dedicated revision/long humeral stem instrumentation. The same humeral reamers and broaches are used for revision/long stem applications. Please refer to the Revision/Long Stem section of the surgical technique.

17. How do I order revision/long humeral stems (520-01-106_116) should my surgeon request them?

Revision/long humeral stems can be ordered through Distribution Services as loaner banks.

18. Are there dedicated revision instruments?

Yes, there are dedicated revision instruments. Below is a listing of the revision and related instruments. Please refer to the "Revision" section of the Turon surgical technique.

- Head Distractor (804-05-046)
- Humeral Neck Extractor (804-15-003) and Ratcheting Handle (804-05-163)
- Stem Extractor (804-05-047)
- Humeral Broach Handle (804-05-007)

19. The plastic cap on the Glenoid Drill Guide Pusher (804-25-132) is damaged or missing, is there a replacement?

Yes, the part number for the Glenoid Drill Guide Pusher Replacement Cap is (804-25-232). Please contact Customer Service for a replacement.

20. The screw to the Back Table Fixture (804-15-102) is damaged or missing, is there a replacement screw?

Yes, the part number for the Back Table Fixture Screw Replacement is (804-15-202). Please contact Customer Service for a replacement.

3 Implant

21. What are the lengths of the primary and revision humeral stems? Are they offered in the same diameter sizes?

The tables below summarize the humeral stem lengths for both primary and revision/long stems. Both are offered in diameters 6, 8, 10, 12, 14 and 16 mm diameter sizes. Length is measured from the proximal apex to the distal tip of the humeral stem.

Frequently Asked Questions (FAQ)

PRIMARY HUMERAL STEMS		
Cat. No.	Size (mm)	Length (mm)
520-01-006	6	115
520-01-008	8	114
520-01-010	10	113
520-01-012	12	112
520-01-014	14	111
520-01-016	16	110

REVISION/LONG HUMERAL STEMS		
Cat. No.	Size (mm)	Length (mm)
520-01-106	6	200
520-01-108	8	199
520-01-110	10	198
520-01-112	12	197
520-01-114	14	196
520-01-116	16	195

22. Why is a reverse (a.k.a. – female) Morse taper important?

A reverse or female Morse taper provides for an unobstructed access and preparation of the glenoid face compared to a standard or male Morse taper, such as in the Foundation stems.

23. What is the advantage to a collared humeral stem design?

A collared stem helps to prevent subsidence during in situ (in the body) implant assembly.

24. Do the humeral heads sit flush on the humeral osteotomy? Is there any gapping between the humeral head and the osteotomy similar to Foundation?

The humeral heads are designed to seat on the humeral necks with some clearance between the underside of the head and the osteotomy. This is to prevent the risk of non-engagement of the Morse taper during in situ (in the body) implant assembly.

This clearance is minimal, up to 3.81mm (1.4mm visible gap between the top of the humeral stem collar and the humeral head) at its greatest, between the humeral head and osteotomy, and can be imperceptible on radiographs. This clearance is not to the extent of the gapping seen on Foundation, which is about 5mm.

25. Are the Foundation and Turon humeral heads compatible and interchangeable with each system's respective humeral stems?

Other than differences in humeral head height offerings, the Turon and Foundation humeral heads are equivalent and are compatible and interchangeable.

The Foundation humeral head heights are 17/22/27mm for all diameter sizes, i.e. – 38, 42, 46, 50, 54mm. Whereas, the Turon heights are 38mm x 14/16mm, 42/46mm x 14/16/20mm, and 50/54mm x 18/22/26mm.

Note: There are no humeral head trials to allow for interchangeable humeral head trialing between the two shoulder systems.

26. What is the amount of offset on the Offset Humeral Heads?

The offset for all humeral head sizes is 4mm.

27. Why is there not a 38mm x 14mm offset humeral head size?

It was not possible to design a 4mm offset into a size 38mm x 14mm humeral head.

28. In what situations would the Angled (7.5-degree) Humeral Neck (520-00-001) be used?

The angled humeral neck would help treat patients with variable neck-shaft angles that are not 135° to allow for proper biomechanics and the reproduction of the humeral center of rotation.

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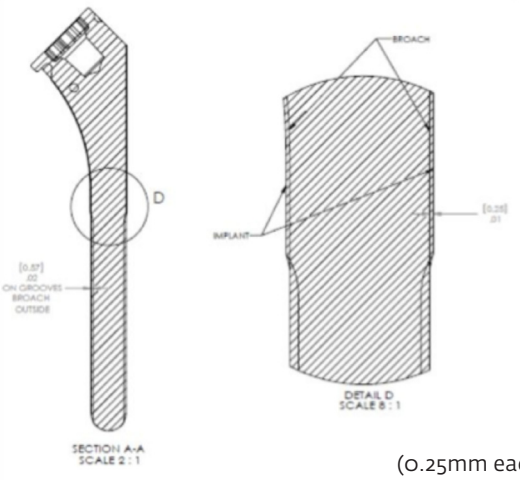
29. What is the amount of press-fit on the humeral stems?

The proximal plasma spray on the Turon humeral stems provides a 0.5mm overall press-fit.



(0.25mm each side)

30. In what situations would the medial hole and the anterior and posterior fin suture holes on the humeral stem be used?

These holes are all suture holes and are primarily used for tuberosity repair and fixation during 3 and 4-part proximal humeral fracture repair in hemiarthroplasty. They can also be used for adjunctive soft tissue repair and implant fixation for hemiarthroplasty and total shoulder arthroplasty.

31. What is the purpose of the recess (see below Figure with red arrow) at the medial aspect under the collar of the humeral stem?

The recess is designed for the tip of the Stem Extractor (804-05-047) to seat into during humeral stem removal.

32. What is the tiny metal wire that is embedded in the glenoids central keel and superior peg for?

It is a titanium wire that serves as a radiographic marker to assess and view glenoid placement and positioning.

33. Are the humeral stems similar between Turon and Foundation?

No. The Turon humeral stem is shorter and has a smaller proximal body compared to the Foundation humeral stem. It also has a reverse or female Morse taper design versus a standard or male Morse taper design. Additionally, the lateral aspect of the proximal body is reduced and there is no lateral fin. Lastly, the Turon humeral stems have the patented IMIN neck technology designed into them.

34. What is the purpose of humeral head and glenoid mismatch?

There is a natural anatomical mismatch in the radius of curvature between the humeral head and glenoid face that contributes to proper shoulder joint biomechanics. In simpler terms, the humeral head curvature is (generally) smaller than the glenoid face curvature.[4] This mismatch, specifically for shoulder implants, ranges from 0 to 10mm, with some studies showing an optimal mismatch range between 6 and 10mm.[5] Restoring proper glenohumeral mismatch in shoulder arthroplasty contributes to a successful surgical outcome.

[4]"The normal glenohumeral relationships. An anatomical study of one hundred and forty shoulders." Iannotti et al, J Bone Joint Surg Am. 1992 Apr; 74(4):491-500.

[5]"The influence of glenohumeral prosthetic mismatch on glenoid radiolucent lines: results of a multicenter study." Walch et al, J Bone Joint Surg Am. 2002 Dec;84-A(12):2186-91.

35. Can my surgeon upsize or downsize the humeral head and glenoid size pairing?

We cannot advise surgeons how to upsize or downsize humeral head and glenoid size pairings as it is an OFF-LABEL use. However, we can inform surgeons what the humeral head and glenoid mismatch values are among different size pairings by referring them to the "Humeral Head and Glenoid Radius of Curvature Mismatch Chart". Only the

Frequently Asked Questions (FAQ)

surgeon can decide or opt to mismatch humeral head and glenoid size pairings.

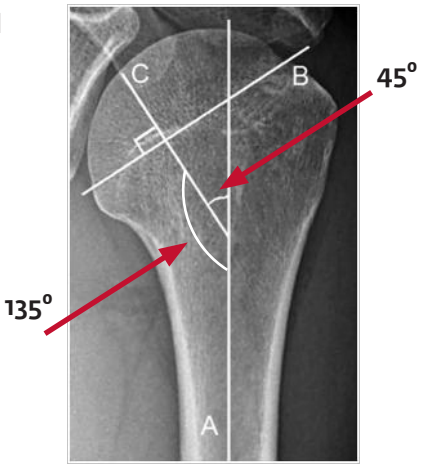
36. The pegs are too long on the glenoid, can we cut them down?

Yes.

37. What is the neck shaft-angle on the humeral stem?

The humeral neck-shaft angle is 135°. Depending on reference point, it can also be referred to as 45°.

38. How is the humeral neck-shaft angle determined?



Using an anteroposterior (A/P) radiograph, the humeral neck-shaft angle is determined by the intersection of a line drawn on the central axis of the humeral shaft (A) with a line C drawn perpendicular to the anatomical neck (B) of the humerus.[6]

[6] http://www.springerimages.com/ImagesMedicineAndPublicHealth/1-10.1007_s10195-008-0019-1-1

39. What is the difference in length between the superior peg and the inferior pegs of the pegged glenoid? Why the difference?

For the size 38mm glenoid only, the difference between the longer superior peg and shorter inferior pegs is 3.6mm. All other sizes, i.e. – 42 to 54mm, the difference is 1.7mm.

The difference in lengths is attributed to the anatomy of the glenoid, where the glenoid vault is generally larger superiorly.

40. What is the backside curvature for the Turon and Foundation glenoids?

The backside curvature for all Turon glenoids is 38mm.

4 Conversion: Turon-RSP

41. Will my surgeon be able to convert the Turon to an RSP?

Yes, the Turon-RSP conversion adaptors are available. The Turon to RSP Conversion Module Trials, Offset (804-02-074) and Neutral (804-02-073), will be backfilled with the Turon instrument sets and will be housed in miscellaneous box in the Turon Humeral Head Case. The Turon to RSP Conversion Module Implants, Offset (508-02-001) and Neutral (508-02-000), are available through Distributor Services.

42. Can we promote the Turon humeral stem combined with the Turon-RSP conversion adaptor to our surgeons as a "press-fit" reverse shoulder?

No, the promotion and use of the Turon humeral stem with the Turon-RSP conversion adaptor as a "press-fit" reverse shoulder is strictly OFF-LABEL.

43. Can we use Turon humeral heads with the hemi adaptors for the RSP when converting to a hemiarthroplasty?

Yes. Dedicated Modular RSP to Turon Conversion Module Trials have been backfilled to existing Turon instrument sets and are housed in the miscellaneous box in the Turon Humeral Head Case. The trials come in two sizes, 6mm (804-02-076) and 12mm (804-02-077).

5 Surgical Technique/Procedure

44. The humeral shaft fractured during humeral broaching/reaming, what should we do?

Regardless of experience, situations like these are often tough and very unpredictable. However, there are certain surgical cases that provide information to help preempt and prepare for these tough situations, such as, a revision of a press-fit or cemented humeral stem, humeral shaft deformities and malunions, short and/or narrow humeral canals – are just a few examples.

To prepare for or in the midst of these situations, be sure that the OR staff has access to any of the

Frequently Asked Questions (FAQ)

following listed to help with fracture repair and completing the surgical procedure.

- Revision/long humeral stem
- C-arm or fluoroscope
- Cable set
- Bone cement removal device (if revising/ removing a cemented stem)
- Small Fragment Set
- Allograft/grafting agent

Note: This is just an example list and should not be viewed as standard list for all fracture situations.

45. When using an offset humeral head, how does a surgeon mark or reference the determined humeral head offset position on the humeral osteotomy?

Each surgeon will have their own method to mark or reference the position of the humeral head offset. A common practice is to use an electrocautery or surgical pen to mark the offset position on the humeral osteotomy surface via a determined landmark, such as the bicipital groove.

46. After the surgeon planed the humeral osteotomy with the planer disk and guide, there is some residual bone. What should we do?

Remove any residual bone with a small burr or other preferred methodology to assure there are no bony impediments.

47. What should we do when we are in between sizes among humeral stems? Humeral heads? Glenoids?

In the event that your surgeon is in between sizes among humeral stems, heads or glenoids, it is prudent to go smaller versus larger to prevent the risks of stress fracture, joint overstuff, implant overhang, or impingement.

48. My surgeon is experiencing difficulty dislocating the humeral head, what should I advise?

In order to dislocate the humeral head, the dissection should be directed to the medial humeral neck. To accomplish this requires that the arm is externally rotated and the capsule is released from anterior to posterior along the medial humeral neck.

Dislocate the head anteriorly by carefully externally rotating and extending the arm. Gentle leverage from a Darrach or Hohmann retractor facilitates humeral head dislocation and helps retract the medial soft tissues of the subscapularis, pectoralis major, and conjoined tendon. To reduce the incidence of intra-operative humeral shaft fracture, gentle external rotation and humeral extension should be used to deliver the humeral head. A Darrach or Hohmann retractor at the posterior surface of the humeral head can be used as a skid to lever the head out of the joint.

6 Fractures

49. What are the critical factors in addressing 3 and 4-part proximal humeral fractures with a hemiarthroplasty?

The critical factors to a successful outcome in 3 and 4-part proximal humeral fractures using hemiarthroplasty are:

- Proper stem height
- Proper stem retroversion
- Proper tuberosities (lesser and greater tuberosity) repair
- Joint stability

Preoperative assessment of the proximal humeral comminution is critical to allow the surgeon to place the humeral component at the proper height. Comminution of the medial humeral neck should be assessed and pieces measured to help identify the position in which the humeral stem component must be placed.[7] 4-part fractures typically fracture at the humeral neck preserving the medial calcar, which is a good reference for height and version restoration when aligning with the medial aspect of the humeral stem component.

The stem size is usually determined on preoperative radiographs and evaluated inatraoperatively with humeral trial broaches which best fit the canal. The largest stem which will allow adequate seating and stability and cementing is

Frequently Asked Questions (FAQ)

chosen.[8] An alternative method is to template the unaffected/uninjured humerus with a ruler to assist with determining proper length and restoration of proximal humeral anatomy.

Version and height can be determined through trial reduction. Version is determined by flexing the elbow to 90° and the transverse epicondylar axis of the elbow to 0°. The arm is externally rotated to a point where the humeral head would point directly to the glenoid. This is usually between 30° and 45° of retroversion.[9] A broach handle with alignment rod attachment can also assist with determining proper humeral stem component version. A sponge or lap pad can be placed around the broach trial or prosthesis and it can be impacted into the canal, allowing for enough stability to determine the appropriate height of the stem component prior to cementing.[10]

Non absorbable sutures are placed at the bone tendon interface for retraction, reduction and repair. Alternatively, tuberosities can be pinned. Reduce the tuberosities to their near anatomic positions before cementing in the humeral stem component. Proper humeral head and stem component placement should allow A/P translation of approximately 50%, and when the arm is pulled down the humeral head should not fall below the midpoint of the glenoid.[11]

7-11 "Hemiarthroplasty for Complex Four-Part Fracture of the Proximal Humerus: Technical Considerations and Surgical Technique." Dines et al, The University of Pennsylvania Orthopaedic Journal 15: 29-36, 2002.

50. Is there any dedicated fracture instrumentation for Turon?

There currently is not any dedicated fracture instrumentation for Turon. However, there is dedicated fracture instrumentation through the Foundation Fracture System.

51. Can I use the Foundation Fracture trials with Turon for fracture cases?

No. The Foundation Fracture trials are not compatible with the Turon humeral stems. The proximal body of the Foundation is larger and the distal humeral stem is longer compared to the Turon.

52. Should I bring the RSP system as a back-up to Turon for 3 and 4-part proximal humeral fracture cases?

Yes, for instances where cuff tear arthropathy or an irreparable rotator cuff is suspected and under the direction of the surgeon.

Chemical Composition of Turon Implants

Chemical Composition of Turon Implants

Shoulder Components	Common Name	Composition	ASTM Spec
Humeral Heads	Cobalt Chrome	CoCrMo	F799/F1537
Humeral Necks	Titanium Alloy	Ti-6Al-V4	F136
Humeral Stems	Titanium Alloy	Ti-6Al-V4	F136
Glenoids	Polyethylene	UHMWPE	F648
Porous Coating on Proximal Stem Radiographic Marker in Glenoids	Unalloyed Commercially Pure Titanium	CPTi	F67

ASTM F136 — Titanium Alloy Chemical Requirements

Element	Composition, % (mass/mass)
Nitrogen, max	0.05
Carbon, max.	0.08
Hydrogen, max	0.012[A]
Iron, max.	0.25
Oxygen, max	0.13
Aluminum	5.5 —6.50
Vanadium	3.5—4.5
Titanium[B]	balance

[A] Material 0.032 in. (0.813 mm) and under may have hydrogen content up to 0.0150%.

[B] The percentage of titanium is determined by the difference and need not be determined or certified.

Chemical Composition of Turon Implants

ASTM F799/F1537 — Cobalt Chrome Chemical Composition

Element	Composition % (mass/mass)					
	Alloy 1 UNS R31537 (Low Carbon)		Alloy 2 UNS R31538 (High Carbon)		Alloy3 UNS R31539 (Dispersion Strengthened)	
	min	max	min	max	min	max
Carbon	.....	0.14	0.15	0.35	.....	0.14
Aluminum	.....	.....	.....	.....	0.30	1.00
Lanthanum	.....	.....	.....	.....	0.03	0.20
Chromium	26.0	30.0	26.0	30.0	26.0	30.0
Molybdenum	5.0	7.0	5.0	7.0	5.0	7.0
Nickel	.....	1.0	.....	1.0	.....	1.0
Iron	.....	0.75	.....	0.75	.....	0.75
Silicon	.....	1.0	.....	1.0	.....	1.0
Manganese	.....	1.0	.....	1.0	.....	1.0
Nitrogen	.....	0.25	.....	0.25	.....	0.25
Cobalt[A]	Balance		Balance		Balance	

[A] Approximately equal to the difference of 100% and the sum percentage of the other specified elements. The percentage of cobalt difference is not required to be reported.

ASTM F648 — Polyethylene Requirements for UHMWPE Powders

Property	Test Method	Requirement		
Resin Type		Type 1	Type 2	Type 3
Viscosity Number, mL/g,	ASTM D4020 (0.02%)	2000-3200	>3200	>3200
Elongation Stress, (Minimum)†	ASTM D4020	0.20	0.42	0.42
Ash, mg/kg, (Maximum)	ISO3451-1	125	125	300
Extraneous Matter, No. Particles, (Maximum)	4.2.1	3	3	25
Titanium, mg/kg, (Maximum)	7.1.3.1	40	40	150
Aluminum, mg/kg, (Maximum)	7.1.3.1	20	20	100
Calcium, mg/kg, (Maximum)	7.1.3.1	5	5	50
Chlorine, mg/kg, (Maximum)	7.1.3.2	30	30	90

† Editorially corrected.

Chemical Composition of Turon Implants

ASTM - Unalloyed Titanium
TABLE 1 Chemical Requirements

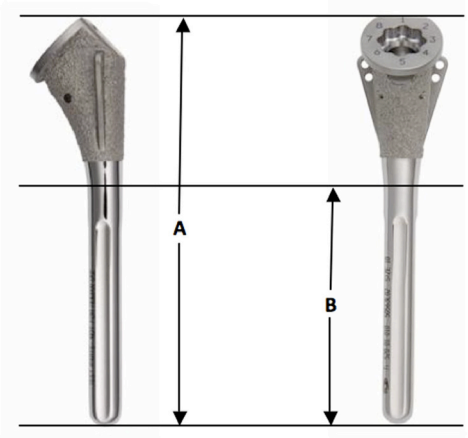
Composition, % (mass/mass)				
Element	Grade 1 UNS R50250	Grade 2 UNS R50400	Grade 3 UNS R50550	Grade 4 UNS R50700
Nitrogen, max	0.03	0.03	0.05	0.05
Carbon, max	0.08	0.08	0.08	0.08
Hydrogen, max[B]	0.015	0.015	0.015	0.015
Iron, max	0.20	0.30	0.30	0.50
Oxygen, max	0.18	0.25	0.35	0.40
Titanium	balance	balance	balance	balance

[A] Forgings are designated Grade F-1, F-2, F-3, or F-4 respectively. Forging compositions are as specified in Table 1.

[B] Maximum hydrogen content for billet is 0.0100 wt%.

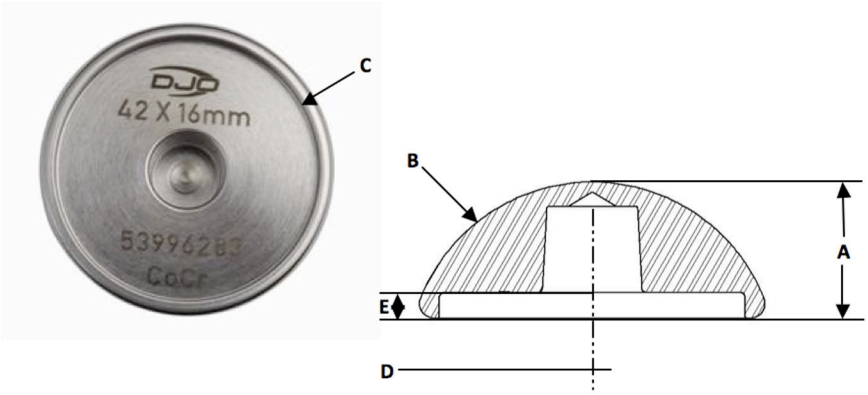
Key Dimensions

PRIMARY HUMERAL STEMS				REVISION/LONG HUMERAL STEMS			
Cat. Number	Size (mm)	"A" Prosthesis Length (mm)	"B" Stem Length (mm)	Cat. Number	Size (mm)	"A" Prosthesis Length (mm)	"B" Stem Length (mm)
520-01-006	6	115	77	520-01-106	6	200	162
520-01-008	8	114	71	520-01-108	8	199	156
520-01-010	10	113	65	520-01-110	10	198	150
520-01-012	12	112	59	520-01-112	12	197	144
520-01-014	14	111	52	520-01-114	14	196	137
520-01-016	16	110	45	520-01-116	16	195	130



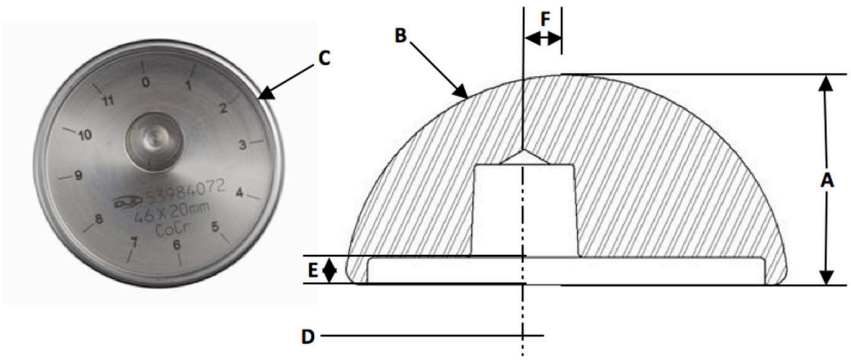
Key Dimensions

NEUTRAL HUMERAL HEADS						
Cat. Number	Siz (mm)	"A" Height (mm)	"B" Spherical Diameter (mm)	"C" Ø Inner Diameter (mm)	"D" Spherical Offset (mm)	"E" Skirt (mm)
520-38-014	38 x 14	14.0	19.0	31.4	7.6	2.6
520-38-018	38 x 18	18.0	19.0	33.6	3.7	2.6
520-42-016	42 x 16	16.0	21.0	35.7	7.6	2.6
520-42-020	42 x 20	20.0	21.0	37.6	3.7	2.6
520-46-016	46 x 16	16.0	23.0	38.4	9.7	2.6
520-46-020	46 x 20	20.0	23.0	41.0	5.7	2.6
520-46-024	46 x 24	24.0	23.0	42.0	1.7	2.6
520-50-018	50 x 18	18.0	25.0	42.7	9.7	2.6
520-50-022	50 x 22	22.0	25.0	45.1	5.6	2.6
520-50-026	50 x 26	26.0	25.0	45.9	1.7	2.6
520-54-018	54 x 18	18.0	27.0	45.4	11.7	2.6
520-54-022	54 x 22	22.0	27.0	48.3	7.6	2.6
520-54-026	54 x 26	26.0	27.0	49.7	3.7	2.6



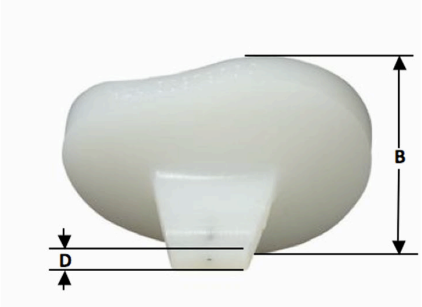
Key Dimensions

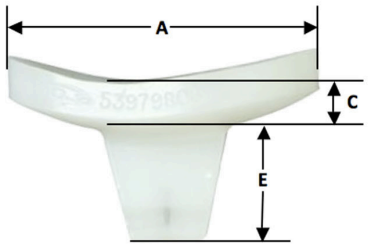
OFFSET HUMERAL HEADS							
Cat. Number	Size (mm)	"A" Height (mm)	"B" Spherical Diameter (mm)	"C" Ø Inner Diameter (mm)	"D" Spherical Offset (mm)	"E" Skirt (mm)	"F" Offset (mm)
520-38-114	38 x 14	14.0	19.0	31.4	7.6	2.6	4.0
520-42-116	38 x 18	18.0	19.0	33.6	3.7	2.6	4.0
520-42-120	42 x 16	16.0	21.0	35.7	7.6	2.6	4.0
520-46-116	42 x 20	20.0	21.0	37.6	3.7	2.6	4.0
520-46-120	46 x 16	16.0	23.0	38.4	9.7	2.6	4.0
520-46-124	46 x 20	20.0	23.0	41.0	5.7	2.6	4.0
520-50-118	46 x 24	24.0	23.0	42.0	1.7	2.6	4.0
520-50-122	50 x 18	18.0	25.0	42.7	9.7	2.6	4.0
520-50-126	50 x 22	22.0	25.0	45.1	5.6	2.6	4.0
520-54-118	50 x 26	26.0	25.0	45.9	1.7	2.6	4.0
520-54-122	54 x 18	18.0	27.0	45.4	11.7	2.6	4.0
520-54-126	54 x 22	22.0	27.0	48.3	7.6	2.6	4.0



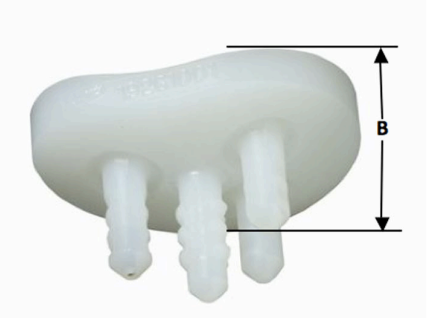
Key Dimensions

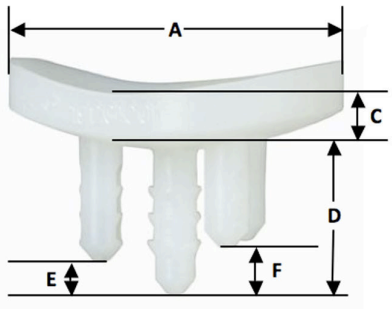
KEELED GLENOIDS						
Cat. Number	Size (mm)	"A" Length (mm)	"B" Width (mm)	"C" Thickness (mm)	"D" Keel Width (mm)	"E" Keel Length (mm)
520-01-138	38	29.7	23.9	4.2	3.8	12.8
520-01-142	42	32.3	25.4	4.2	3.8	12.8
520-01-146	46	34.8	26.9	4.2	3.8	12.8
520-01-150	50	37.3	28.4	4.2	3.8	12.8
520-01-154	54	39.9	30.0	4.2	3.8	12.8





PEGGED GLENOIDS							
Cat. Number	Size (mm)	"A"Length (mm)	"B"Width (mm)	"C" Thickness (mm)	"D" Center Peg Length (mm)	"E" Δ Between Center Peg and Superior Peg (mm)	"F" Δ Between Center Peg and Inferior Pegs (mm)
520-01-238	38	29.7	23.9	4.2	15.0	3.2	7.4
520-01-242	42	32.3	25.4	4.2	15.0	3.2	5.3
520-01-246	46	34.8	26.9	4.2	15.0	3.2	5.3
520-01-250	50	37.3	28.4	4.2	15.0	3.2	5.3
520-01-254	54	39.9	30.0	4.2	15.0	3.2	5.3





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