



Design Rationale





Anatomic Primary

Anatomic Fracture

Reverse Fracture

Reverse Primary



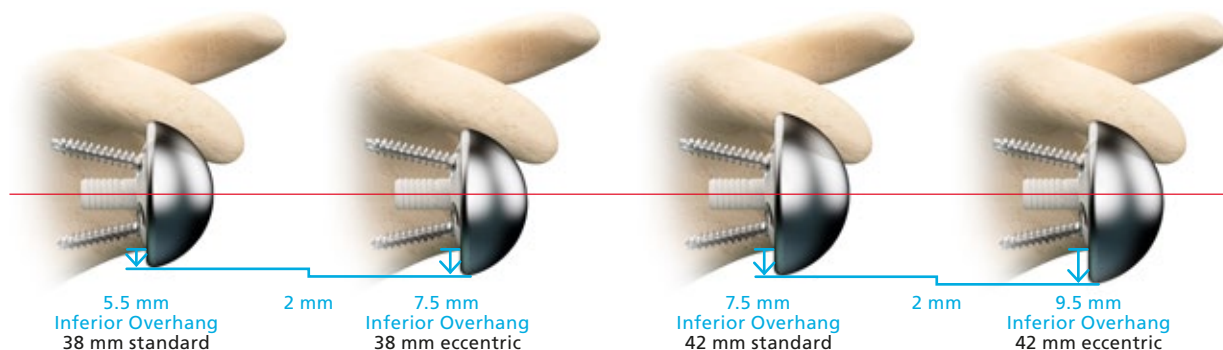
Providing solutions for the patient's continuum of care and intraoperative surgeon choice and flexibility

The DELTA XTEND™ Reverse Shoulder System and the GLOBAL UNITE™ Shoulder System come together to create a true platform system. This system is designed to address a wide variety of shoulder arthroplasty pathologies, while providing efficiencies in the surgical process. It provides treatment options for reverse and anatomic shoulder reconstruction, for primary, revision and fracture cases with grossly deficient rotator cuff. The system can either be used in a cemented or press-fit fashion. The modular system allows for conversion of a GLOBAL UNITE Anatomic or Fracture implant into a reverse implant – DELTA XTEND or GLOBAL UNITE Reverse Fracture – without the need to remove the stem.

ADDRESSING RANGE OF MOTION

Range of motion is important to the surgical outcome and the patient's return to daily activities. The system offers a small metaglene diameter, choice of glenosphere diameters and off-sets which have been shown in modeling to improve range of motion and help reduce the risk of interior scapular notching.¹

Glenosphere Overhang



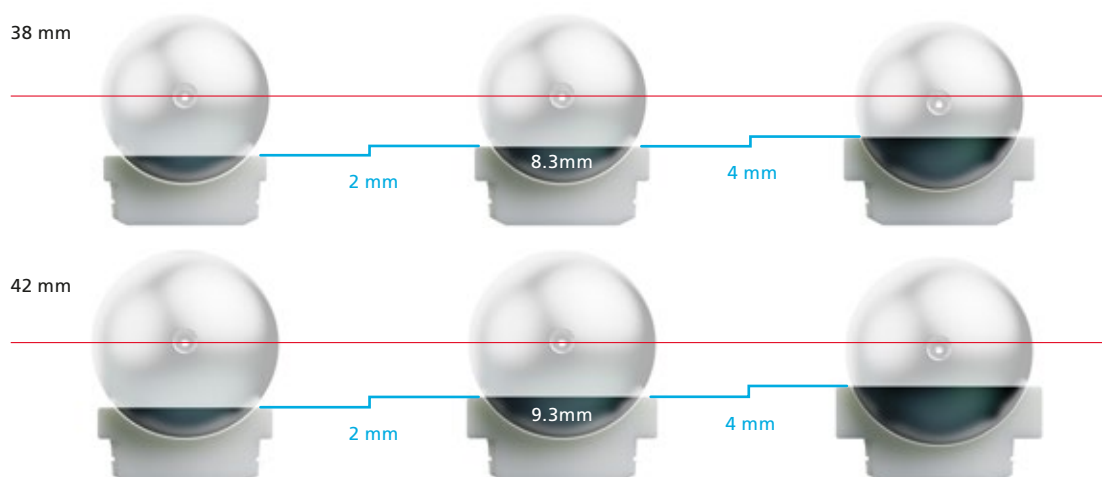
The metaglene diameter of 27mm, enables the surgeon to position the metaglene at the inferior border of the glenoid face. In biomechanical testing it has been shown that this position increases the allowable overhang of the glenosphere, therefore increasing the range of motion.^{1,2}

The glenosphere diameters (38 and 42mm) and eccentric option designed for enhanced stability and further increased range of motion. Biomechanical studies have shown that up to 9.5 mm of inferior overhang can be achieved, resulting in improved adduction.²

Cup options for your patient's functional needs

By providing different cup options, the system offers tailored solutions to the patient's functional needs: Standard, High Mobility and Retentive cups.

With the cups creating the connection between the glenosphere and the humeral implant, the size choice of the glenosphere and humeral implant can be made independently.



The **high mobility cup** has been designed in cases where range of motion is of major importance, increasing the range of motion by 8° in adduction.³

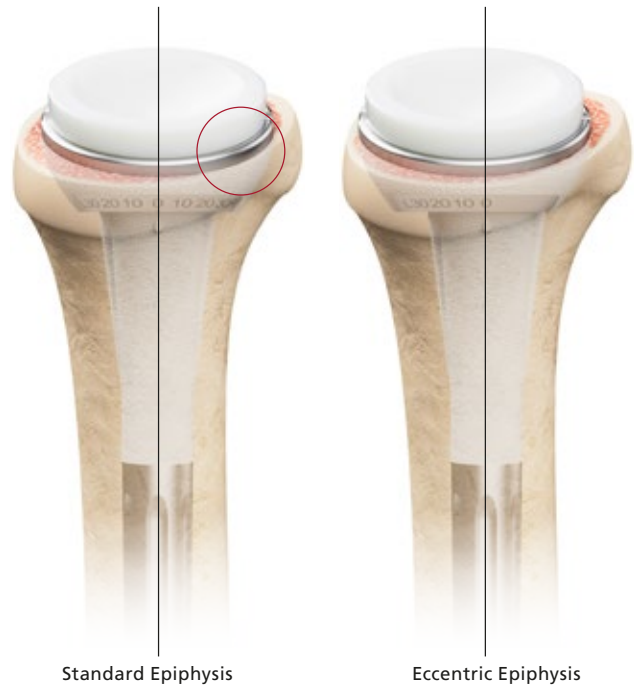
The **standard cup** is designed for a good balance between range of motion and stability.

In cases where stability is a major concern, the system also offers a **retentive cup** option.

If additional joint tensioning is required, a +9 mm humeral spacer is available. The spacer can be used with any DELTA XTEND humeral cup.

ADDRESSING RANGE OF MOTION

Retroversion Adjustment



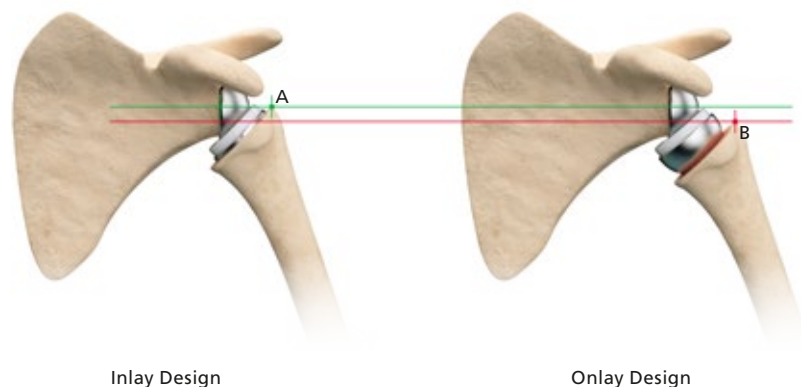
The DELTA XTEND epiphyseal implant offers the possibility to adjust the retroversion in the desired position, allowing for an adjustment of $\pm 30^\circ$, in 10° steps. This patented feature allows the surgeon to place the stem in natural retroversion, while being able to place the epiphysis based on the functional needs of the patient.

The modular epiphysis also offers a posterior offset option, allowing the implant to be placed in the center of the humeral cut, thereby protecting the anterior cortex of the humerus.⁴

Inlay Epiphyseal Design

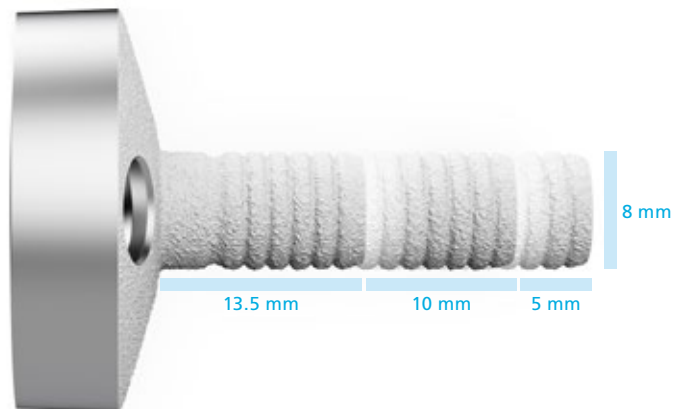
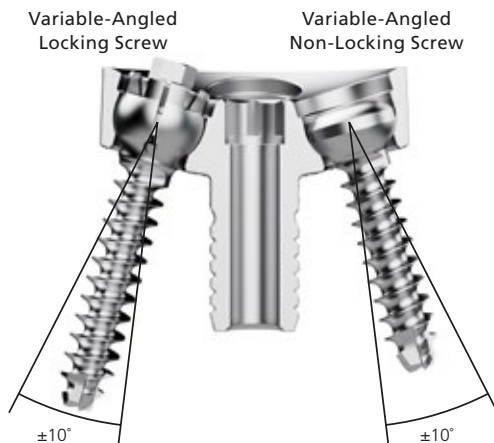
The DELTA XTEND Reverse Shoulder is an inlay design based on the Grammont principle with the epiphysis seated inside the humeral cortex. This design helps to avoid overstressing the deltoid muscle. It also helps reduce the shear forces on the glenoid component and the risk of metaglene loosening and scapular fractures.⁵

Furthermore, it medializes the humerus, thus avoiding potential conflict between the humerus and the acromion or coracoid during elevation. Challenges are avoided by maintaining humeral height, version, offset, and joint volume.⁵



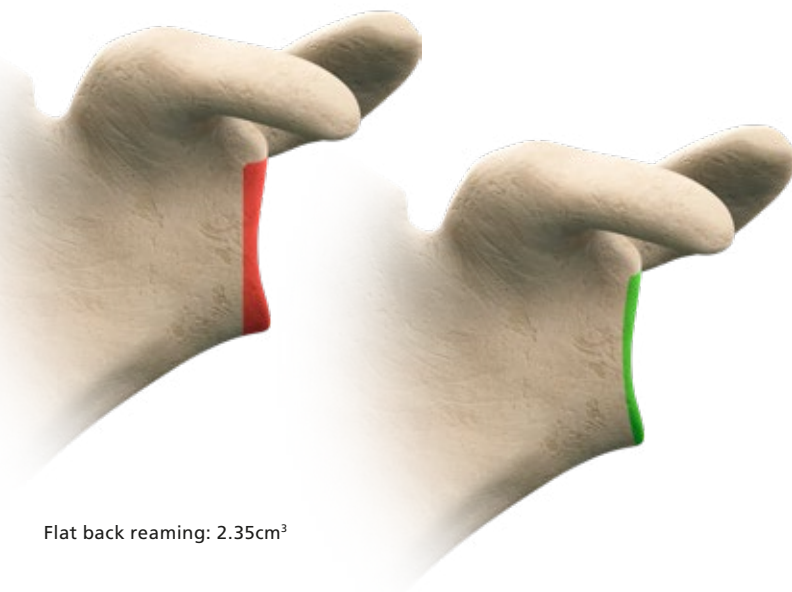
ADDRESSING GLENOID FIXATION

Biomechanical Stability



Metaglens fixation is achieved by **cancellous variable-angled locking** and non-locking screws. The proprietary locking screw design allows **controlled compression** of the metaglens before final locking of the screw. All screws are cannulated, allowing guided screw insertion.

The metaglens peg has an 8 mm diameter, and is available in a standard peg length (13.5 mm) and long pegs (+10 mm and +15 mm) in case of **revision or bone graft techniques**.



DELTA XTEND curved back reaming: 0.79cm³



Bone Preservation

The metaglens has a **curved posterior surface** which requires **minimal bone reaming** and is thus more bone preserving compared to a flat surface.⁶

Bony On-growth

The metaglens is made of Titanium with **Hydroxyapatite (HA) coating**.

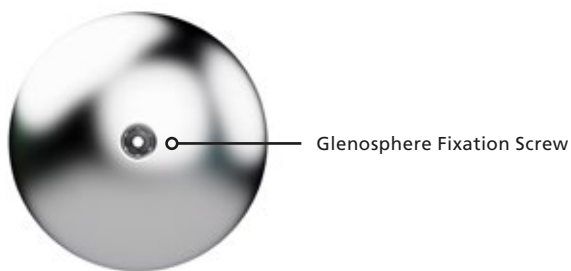
ADDRESSING REVISION CASES

The DELTA XTEND and GLOBAL UNITE platform systems work in unison to allow conversion from an anatomic to reverse prosthesis.

Revising the Glenoid

The metaglens's posterior surface has the same radius of curvature as the ANCHOR PEG GLENOID (APG) implant, which allows for **one-step glenoid revision**. Given the same curvature, reaming is minimized, helping to obtain a biomechanically solid construct.

Facilitating Extraction



The glenosphere has a **patented screw system**, which disconnects it from the metaglens by unscrewing the glenosphere screw. It does not require the use of a slap hammer for the disassembly of the glenosphere and designed to help to reduce the risk of a glenoid vault fracture.

Dedicated Extraction Set



This set of instruments helps address obstacles encountered during revision shoulder arthroplasty including implant and cement removal.

Revising the Epiphysis

Retroversion Adjustability

The system allows for **version adjustment** to achieve accurate humeral implant placement from anatomic to reverse, **without the need to remove the well-fixed stem** or change its retroversion. While leaving the stem in the natural 30° retroversion, the epiphysis may be placed in a version based on the functional needs of the patient.

Inlay Design

The inlay design **facilitates the conversion from anatomic to reverse** shoulder arthroplasty. As the humeral component is seated inside the proximal humerus, the joint space needed to implant the device is reduced.

Revising the Stem

The system also offers long stems in cases of periprosthetic fractures or humeral stem loosening.

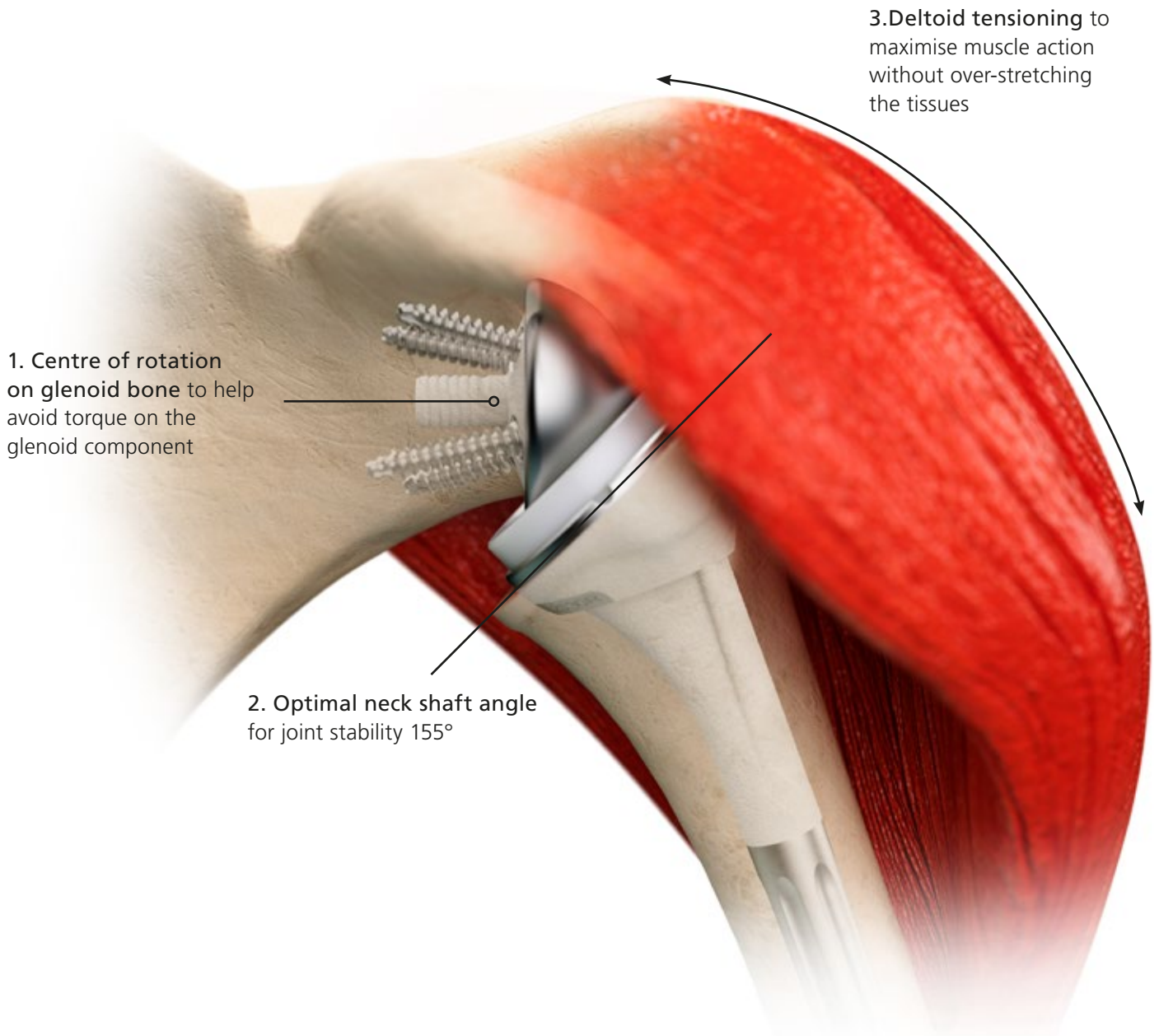
Option for Salvage Cases

The system offers anatomic CTA heads which are available in 48 and 52 mm diameter and in 21 and 26 mm thicknesses. This hemiarthroplasty is designed with a longer articular surface than a standard humeral head implant.



30 YEARS OF REVERSE SHOULDER HERITAGE

The DELTA XTEND Reverse Shoulder is based on the Grammont biomechanical principles.⁵



1. Avoids torque on glenoid component

The joint center of rotation is on the glenoid bone surface to avoid the creation of torque on the glenoid component and therefore helps reduce the risk of glenoid loosening.⁵

2. Optimal joint stability

The 155° neck-shaft angle provides optimal joint stability.⁵

3. Maximizing muscle action without over-stretching the tissues

Optimal deltoid tension is a balance between increased muscle power and respecting natural joint tensioning to avoid creation of non-anatomic shoulder load, risk of nerve injuries or scapular fracture.⁵

References:

1. Wilde LFD, Poncet D, Middernacht B, Ekelund A. Prosthetic overhang is the most effective way to prevent scapular conflict in a reverse total shoulder prosthesis. *Acta Orthopaedica*. 2010;81(6):719-726.
2. Nyffeler RW, Werner CM, Gerber C. Biomechanical relevance of glenoid component positioning in the reverse Delta III total shoulder prosthesis. *Journal of Shoulder and Elbow Surgery*. 2005;14(5):524-528.
3. Poncet D. Calculations for Delta Xtend Design Rationale. 2016. Data on File DePuy Synthes.
4. Poncet D, Van Tongel A, De Wilde L. DePuy Synthes Delta Xtend. In: *Reverse Shoulder Arthroplasty*. Springer International; 2016:337-342.
5. Boileau P, Watkinson DJ, Hatzidakis AM, Balg F. Grammont reverse prosthesis: Design, rationale, and biomechanics. *Journal of Shoulder and Elbow Surgery*. 2005;14(1S):147S-161S.
6. Middernacht B, De Roos P-J, Van Maele G, De Wilde L. Consequences of Scapular Anatomy for Reversed Total Shoulder Arthroplasty. *Clinical Orthopaedics and Related Research*. 2008;(466):1410-1418.

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