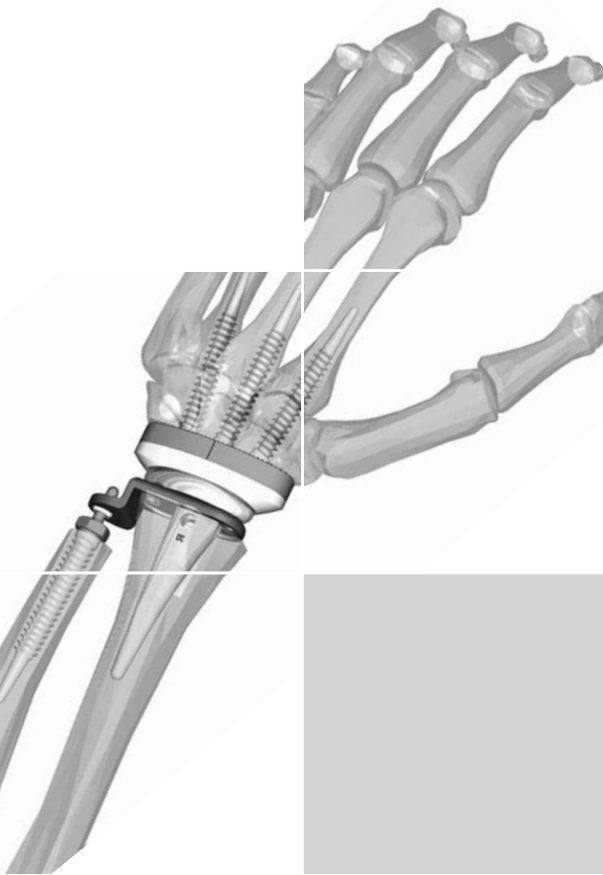




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OrthoCube Total Modular Wrist System TMW  
Surgical Technique and Product Description



Reliable Distal Fixation



Radial Part Cemented /  
Uncemented



Optional Stabilized Ulna by  
Replacement of the Dru Joint



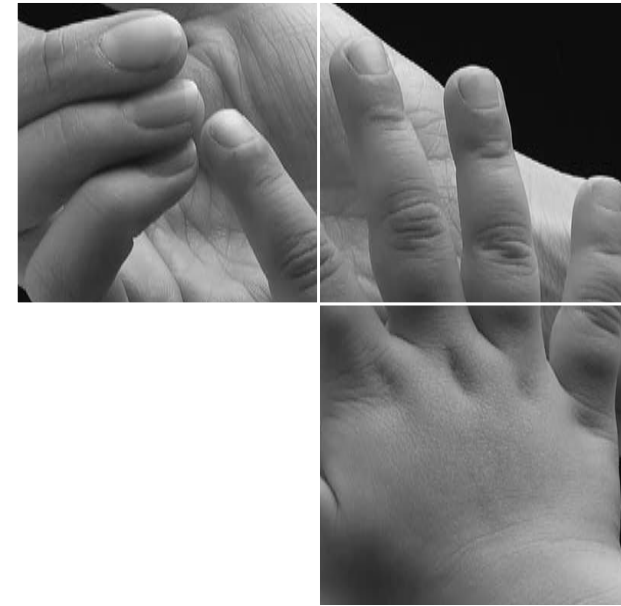
Unconstrained / Constrained



Long Radial Stems available  
Cemented / Uncemented



Suitable as Revision Prosthesis



## Features



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Figure 1

**Exposure:**

A dorsal incision over the distal radius and metacarpal III is made. Subsequent exposure of the dorsal retinaculum. Incision of the retinaculum over the ulnar head and dissection of the retinaculum as a whole to the medial insertion on the radius. Free the tendons of the extensor pollicis longus and abductor pollicis longus. Exposure of the dorsal capsule. Release the capsule from the distal radius and expose the wrist joint using an U-shaped incision. Maintain the retinaculum to the radial side; one part can be used to cover the extensor tendons to prevent bowstring effects (figure 1).

**1. Proximal Bonecuts:**

Exposure of the distal radius and distal ulna. Take the cutting Block (450-CB) and put it over the dorsal side of the radius (figure 2). Align the cutting block over the radius. Using the T-handle the block can be adjusted to 90° laterally viewed. Fix the cutting block with two K-wires of 1.3mm thickness. The cutting block can be shifted more distally or proximally in 2mm increments if necessary.

Using a saw, the distal radius and ulna can be cut and the bone is removed. By traction of the fingers (dig-2 and 3) the wrist will set itself in the proper angle to make the distal cut (inside the rectangle, figure 2). The distal cutting plane should be about at the level of the capitate bone. Remove the cutting block and remove the bone carefully. Keep the volar capsule intact (figure 3). The volar osteophytes at the distal radius should be removed with great care in order to prevent possible impingement of the median nerve. In addition remove osteophytes between distal radius and ulna.

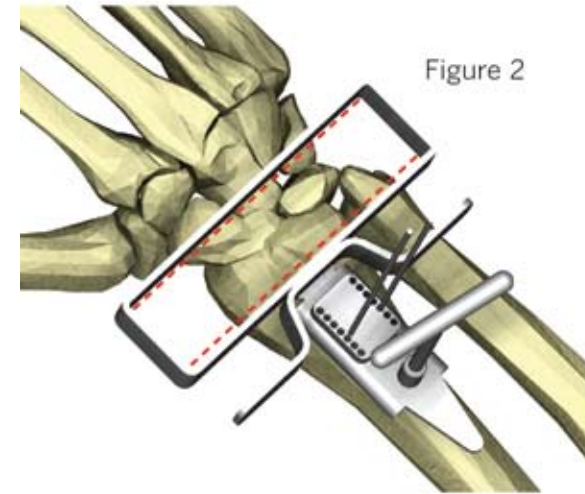


Figure 2

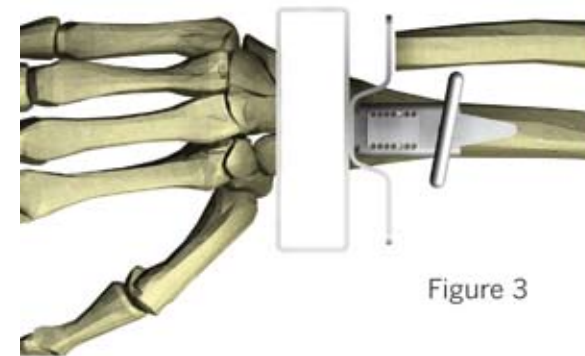


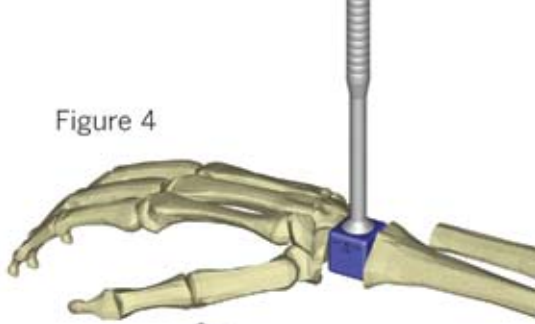
Figure 3

**Exposure**



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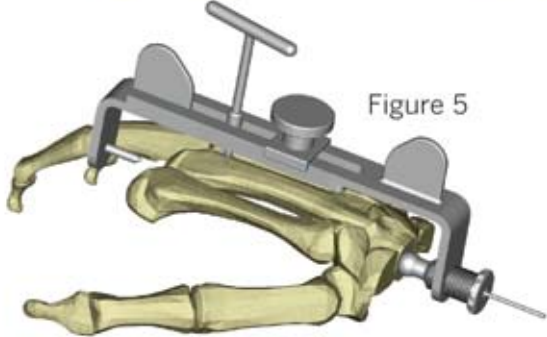
Figure 4



### 1. Bonecuts (cont.):

Determine the resected bone distance with the coloured spacer blocks, matching 19, 21 and 23mm resection (instruments 450-SB +0, +2 and +4), (figure 4). The hand position can also be determined by this method. Polyethylene inserts of 0, +2 or +4mm can be selected accordingly.

Figure 5



### 2. Distal Preparation:

Select the size of the carpal plate: small (36mm) or large (41mm). Always start with MC-III. Drill a 1,3 mm K-wire through the dissected capitatum in the marrow canal of MC-III and check the alignment with an image intensifier. The use of the wire guide instrument no. 450-WG, is also possible (figure 5). Use the 2.7mm cannulated drill to ream over the K-wire. If this can be performed with ease, drill with the 4.0mm drillbit again. Leave the drillbit in and put the guiding instrument over the drillbit to check the exact 90i-angle of the distal bonecut (figure 6). Remove drill and K-wire and select the size of the screw:

reaming 2,7mm, use a 4.5mm screw

reaming 4,0mm, use a 5.5mm or 6.5mm screw.

Fixate the selected carpal plate with the selftapping screw into MC-III through the central hole of the plate (figure 7). Drill the K-Wires for MC-II and MC-IV and determine alignment again with the image intensifier (figure 9 and 10). Ream over the K-wires and insert the proper screws. Always check the screw positions with the image intensifier after insertion.

Figure 6



Figure 7

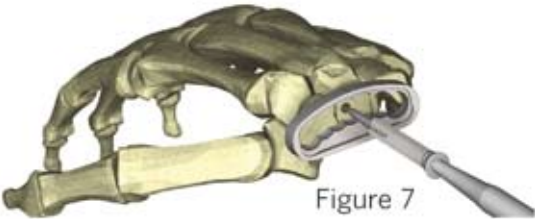


Figure 8

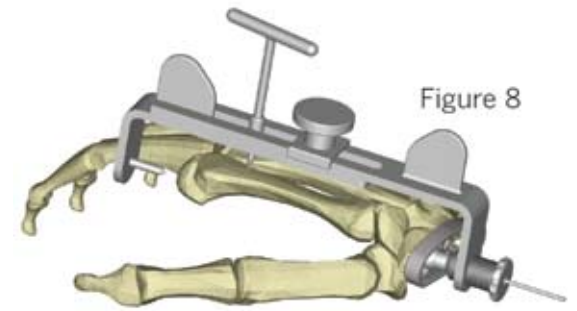


Figure 9



Figure 10

## Bonecuts



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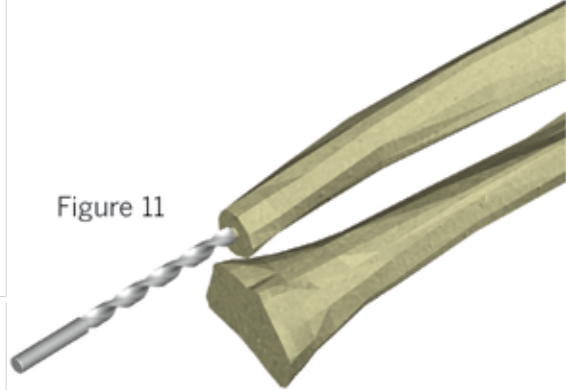


Figure 11

### 3. Ulna Preparation

If an ulnar plate is to be used, take the 2,7mm first and thereafter the 4,0mm cannulated reamer for preparing the canal (figure 11). Make the selection for the screw size (5.5mm or 6.5mm). Insert the ulnar screw with instrument 450-USD (figure 12).

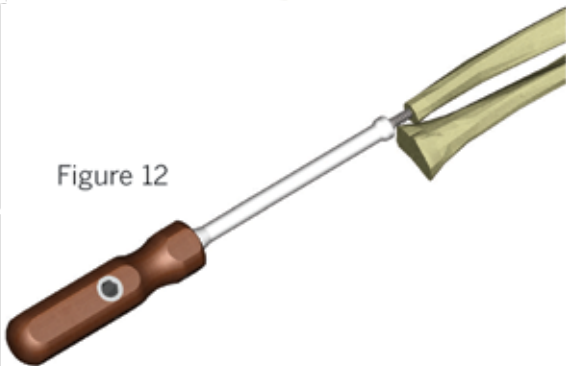


Figure 12

### 4. Radius Preparation

Open the canal with the 4.0mm reamer no. 450-RR, following the ulnar cortex of the radius, 90° on distal resection plane (figure 13), using the guiding instrument no. 450-RG. Then use the desired broach: 450-R for a cemented stem and 450-R-HA for the uncemented, HA-coated stem. Insert the broach with the impaction/extraction instrument 450-BI (figure 14).



Figure 13



depht marking for standard stem  
depht marking for long (revision) stem

### 5. Trial Reduction and Selection of the PE-Insert.

Make a full trial reduction using a trial stem and trial inserts (figure 15). Trial inserts are available in 3 thicknesses: 0 (blue), +2mm (green) and +4mm (red).

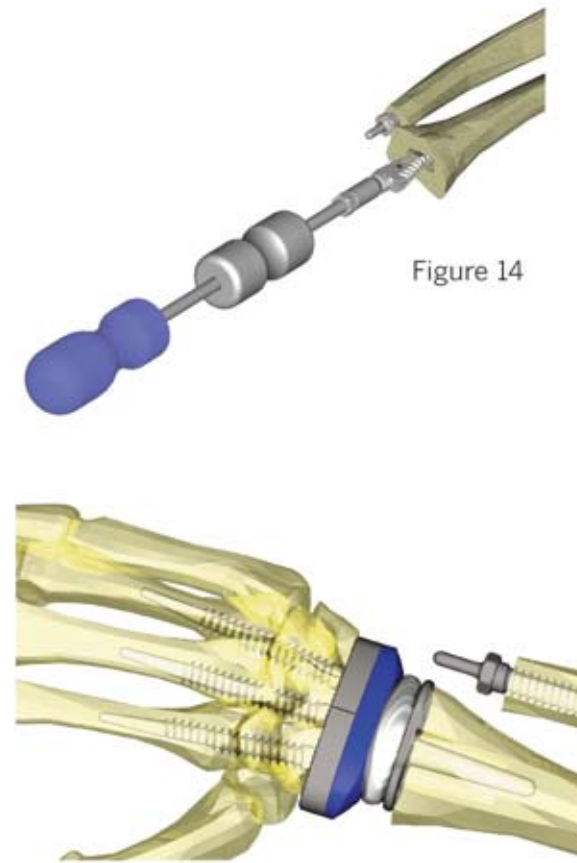


Figure 14

Figure 15

## Ulna Preparation



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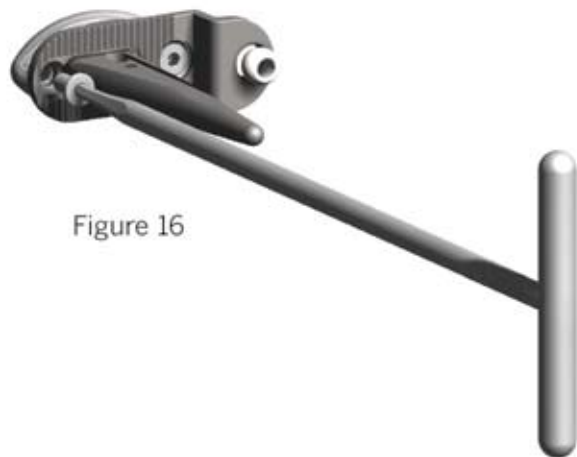


Figure 16

## 6. Implantation Radial Part

Attach the ulnar plate or radial plate under the stem and head using 2 counterscrews (figure 16). When using the ulnar plate, take the PE-ball joint insert (425-UJ) and snap it in transversely from proximal into the round hole in the plate (figure 16). Insert the assembled stem into the radius with the instrument 450-SI (figures 17 and 18). During insertion beware to slide the ball joint insert over the tip of the ulnar screw. Take care that no tendons slip between radius and ulna!

## 7. Apply the Carpal Insert

Slide the insert of the selected thickness into the plate at one side (figure 19) and firmly press the insert on the opposite site to click it in. It is recommended to keep the insert in a very cold refrigerator or very chilled saline solution. This will reduce the force needed to snap the insert in. Apply the insert immediately after it has been taken out of the refrigerator or the chilled saline solution. Reduction (figure 20 and 21).



Figure 17



Figure 18



Figure 19



Figure 20

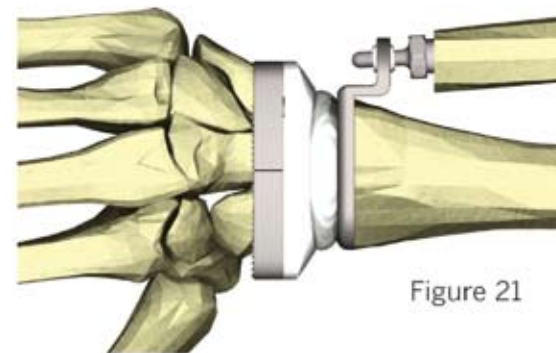


Figure 21

# Implantation



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Figure 22

### 8. Closure: Try to close the dorsal Capsule to completely cover the wrist implant.

In severe rheumatoid arthritis this will be difficult because of poor quality of the capsule. The distal 3/4 of the retinaculum can be used as an addition to the capsule by suturing it from radius to the ulna under the extensor tendons. The remaining 1/4 of the retinaculum is used as a band over the extensor tendons to prevent bowstrings effects (figure 22). Use part of the dorsal Retinaculum to close the

### 9. Post-Operative Treatment: Maintain the wrist in a functional position

with no ulnar deviation in a volar splint for 3 to 5 days. Fingerpacking is advised to prevent swelling. Exchange for a removable wrist splint after approximately 5 days. Physical therapy can be started 7 to 10 days postoperatively. The splint should be worn nightly until 6 weeks after surgery.

### 10. Other Implant Parts

A) Stabilized prosthesis Instead of the shown biaxial prosthesis, an uniaxial (stabilized) version is available (figure 23).

The indications are: !

After correction of severe ulnar deviation of the hand with release of the flexor and extensor carpi ulnaris tendons. ! In difficult revisions a long revision stem is recommended.

B) Ulnar head prosthesis After previous ulnar head resection with shortening of the ulna, replacement of the ulnar head can be an option with capsule plasty. In this case the simple radial plate will be mounted (figure 24).

C) Long radial stems Instead of the standard 55mm radial stem, the 75mm long radial stem can be used (figure 25).

The indications are: !

Poor bonestock of the distal radius in primary operations. Bonegrafting with the resected bone is recommended with an uncemented (pressfit) stem. ! Revision arthroplasty. In almost all cases bonegrafting is necessary (autograft or allograft). The surgeon can choose between cemented and uncemented radial stems.



Figure 23



Figure 24



Figure 25



Carpal Plates:



425-CP-36HA



425-CP-41HA

Carpal Inserts:



425-CIS+0



425-CIL+0



425-CISS+0



425-CILS+0



425-CIS+2



425-CIL+2



425-CISS+2



425-CILS+2



425-CIS+4



425-CIL+4



425-CISS+4



425-CILS+4

Ulna Screws:



425-US-5550-HA



425-US-6550-HA



425-UES-5550-HA



425-UES-6550-HA

Carpal Screws:



425-CS-4535-HA



425-CS-4550-HA



425-CS-5535-HA



425-CS-5550-HA



425-CS-6535-HA



425-CS-6550-HA

Ulna Screw Distance Washers:



425-DW5502



425-DW5503



425-DW6502



425-DW6503

TMW Implants



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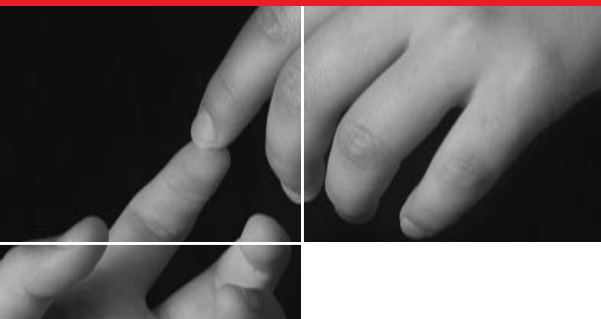
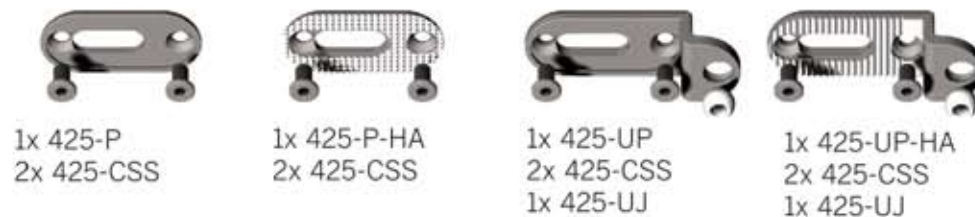
Stems:



Plates, Ulna-Plates and related items:



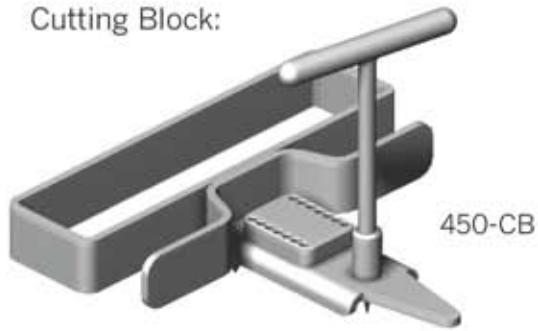
Order these parts as shown:



TMW Implants



Cutting Block:



450-CB

Wire Guide:



450-WG

Trial Stems:



450-TS

450-TSS

450-TSL

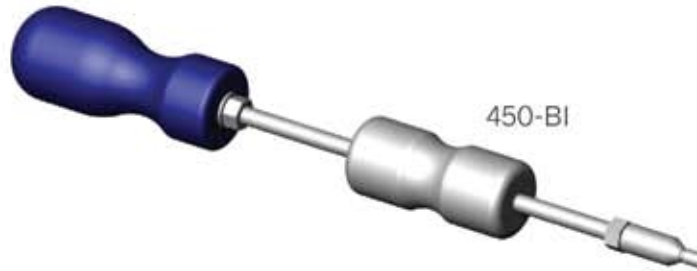
450-TSLS

Angle Check:



450-AC

Broach Impactor / Extractor:



450-BI

Ulna Screw Driver:



450-USD with Handle 250-103

2mm Hex-Driver:



450-HD20

Broaches:



450-R-HA

450-R

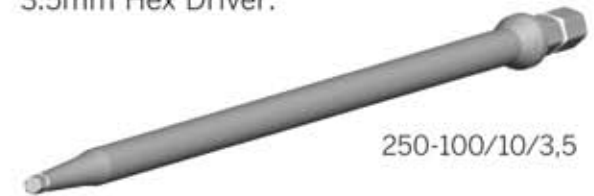
4mm Reamer and Guide:



450-RG

450-RR

3.5mm Hex Driver:



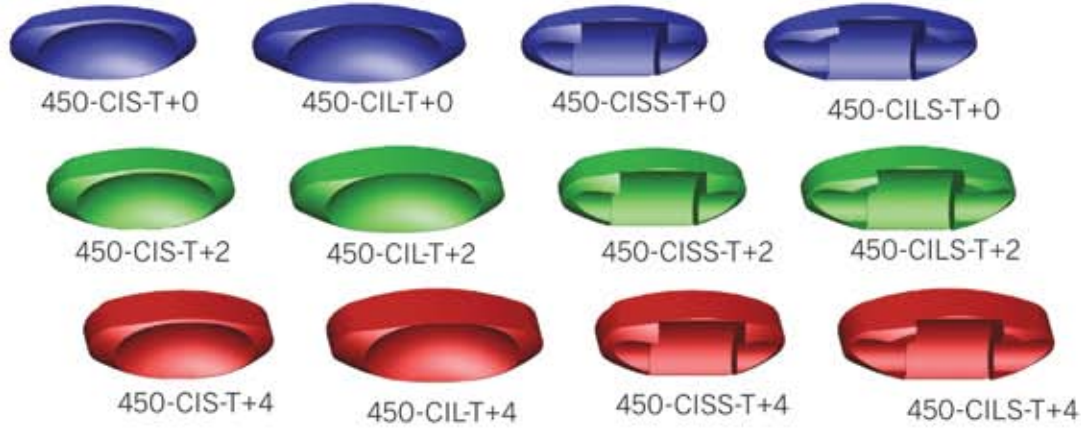
250-100/10/3,5

TMW Instruments

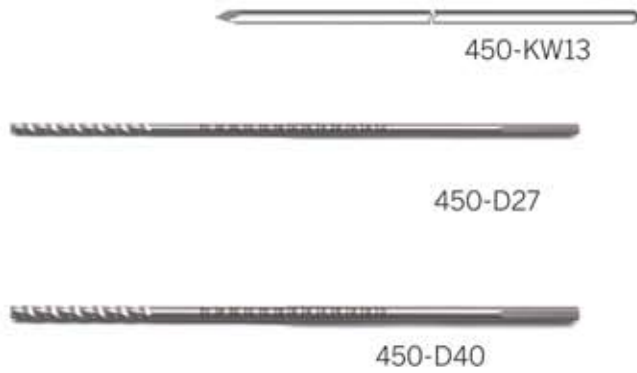


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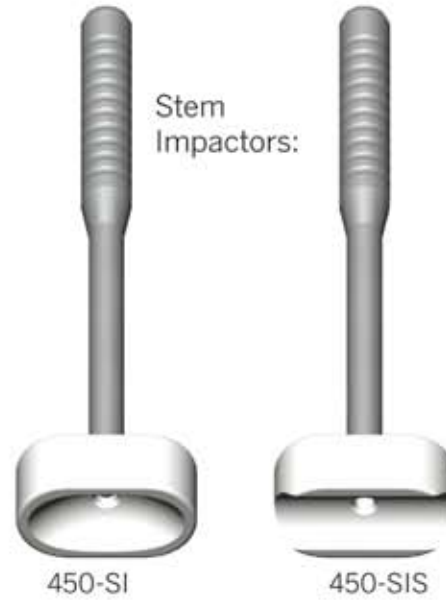
Trial Inserts:



Broaches:



Stem Impactors:



Spacer Blocks:



TMW Instruments



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