Metasul® LDH™ Large Diameter Head

Surgical Technique

Enhancing Stability and Increasing Range of Motion

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Metasul LDH Large Diameter Head Surgical Technique

Table of Contents

Overview

The combination of a large range of motion and excellent articular stability, along with proven clinical results, make the *Metasul LDH* large diameter head system an ideal solution for THA patients.

The *Metasul* articulation provides excellent resistance to wear[1]. It has been implanted in more than 300,000 patients since 1988. No other metal-on-metal combination has achieved comparable long-term clinical results.

This experience forms the basis of the latest generation of metal-on-metal articulations, the *Metasul LDH* large-diameter head system.

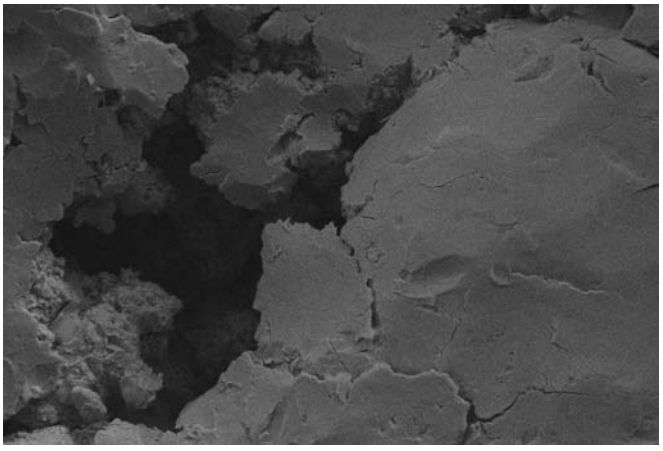
The *Durom*® Acetabular Component, which mates with the *Metasul LDH* large diameter head, was designed to preserve bone stock and optimize range of motion. The wall thickness of the acetabular component is reduced to a strict minimum, and the cup sustains an angle of 165 degrees, comparable to that of the natural acetabulum.

Range of motion varies from 144˚ to 168˚ based upon the determined size of the acetabular component and the mating large diameter head. Range of motion is essential in total hip replacements in order to obtain unrestricted walking and optimized functioning of the hip, while reducing the potential risks of prosthetic impingement. The *Metasul LDH* large diameter heads are available from 38 to 60 mm and must be used in combination with the *Durom* acetabular component.

The *Porolock*™ Ti VPS surface coating of the *Durom* acetabular component is pure titanium deposited using vacuum plasma spray technology. This process, carefully controlled, allows a very high adhesive strength between the cobalt chrome substrate and the *Porolock* Ti VPS coating, minimizing the potential risk of titanium particle generation. The circumferential fins, high surface roughness, and initial 2mm pressfit allow initial implant stability while the *Porolock* plasma sprayed material promotes reliable scratch fit.

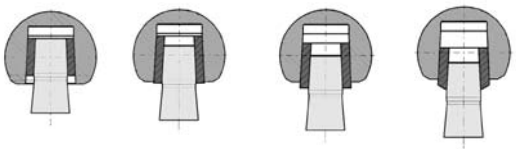
Durom acetabular component

CP-Ti (*Durom* component) Plasma Sprayed on Ti-6AI-4VT, Magnified 50x



CP-Ti (*Durom* component) Plasma Sprayed on Ti-6AI-4VT, Magnified 500x

In order to optimize restoration of joint kinematics, the *Metasul LDH* large diameter head system has been developed with 4 neck lengths (S, M, L and XL).



Adaptation of the neck length

Range of sizes

	Neck length (mm)			
Taper	**S**	**M**	**L**	**XL**
12/14	–4	0	+4	+8

The range of heads covers 12 sizes from 38 to 60 mm. From size 38 to size 48, the heads are solid, while from size 50 to 60 mm, they are partially hollowed out in order to reduce the overall weight of the implant.

Head size – approximate weight

Head size, mm	38	40	42	44	46	48
Approx. weight, g	146	174	206	240	276	316

Head size, mm	50	52	54	56	58	60
Approx. weight, g	254	277	299	326	351	382

Range of Implants

A *Durom* acetabular component is combined with a *Metasul LDH* large diameter head 6mm smaller.
A letter code confirms the appropriate combination, for example: a 54/N *Durom* acetabular component must be used with a 48/N *Metasul LDH* large diameter head.

- The *Durom* acetabular component has been designed to be implanted without cement. The *Metasul LDH* large diameter heads may be used with a wide range of Zimmer hip stems.
- The actual equatorial diameter of an acetabular component is greater than its nominal diameter by 2mm. **For example a 54N acetabular component has an actual outer diameter of 56mm.** If the last reamer used is 54mm, the 54mm trial implant will be used (the trial implant is line to line with the reamer), and the stated size of the acetabular implant is 54/N. As a result, there is a press-fit of 2mm.

Durom acetabular component combined with *Metasul* head

Durom acetabular component			*Metasul LDH* large diameter head		
Size mm	Inner Diameter mm	Code	Size mm	Diameter mm	Code
Ø 44	38	D	Ø 38	38	D
Ø 46	40	F	Ø 40	40	F
Ø 48	42	H	Ø 42	42	H
Ø 50	44	J	Ø 44	44	J
Ø 52	46	L	Ø 46	46	L
Ø 54	48	N	Ø 48	48	N
Ø 56	50	P	Ø 50	50	P
Ø 58	52	R	Ø 52	52	R
Ø 60	54	T	Ø 54	54	T
Ø 62	56	V	Ø 56	56	V
Ø 64	58	X	Ø 58	58	X
Ø 66	60	Z	Ø 60	60	Z

Preoperative Planning

Templates of the *Durom* acetabular component are available for preoperative planning. They are available in 120% magnification for conventional radiographs and 100% magnification for digital x-rays (Fig. 1a & 1b).

Magnification is greater in obese patients and less in thinner patients. It is necessary to combine these templates with that of the stem used by making the centers of rotation correspond. The final size of the prosthesis is determined during the surgical procedure.

With the *Durom* acetabular component templates, it is possible to observe several key criteria, when planning the procedure:

- the physiological center of rotation (from the opposite side)
- the ideal position and depth of the acetabular component as well as its inclination, which should be between 40 and 45° depending upon specific patient anatomy
- the approximate size of the implant

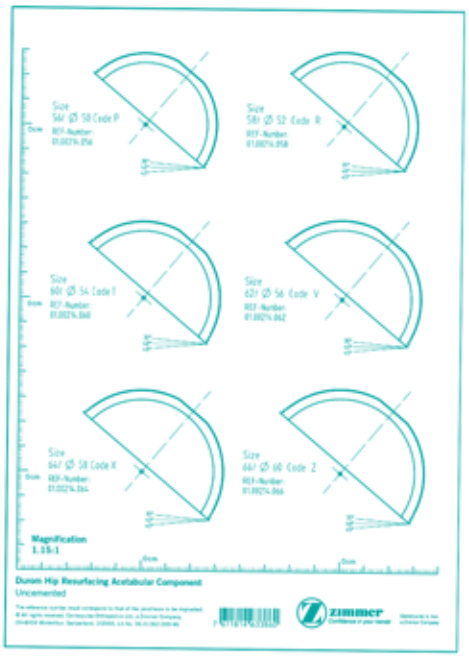


Fig. 1a
Durom acetabular component template

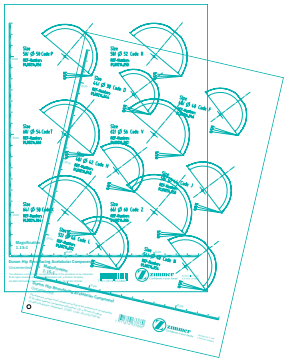


Fig. 1b
Planning templates
Durom Acetabular component

Surgical Technique

Surgeon preference will dictate the choice of surgical approach used to implant the *Durom* Acetabular Component.

Acetabular preparation

The acetabular labrum is excised and significant peripheral osteophytes are removed. The stump of the ligamentum teres is excised and the true floor of the acetabulum identified.

Reaming

Sequential reaming is carried out with the hemispherical acetabular reamers (Fig. 2). The *Durom* acetabular component has a truncated hemisphere of 165°. It is, therefore, not necessary to over deepen the acetabulum. In hard bone, it is advisable to use reamers in 1mm increments when approaching the definitive acetabular size. Assuming that a near hemispherical cavity has been created and adequate cancellous bone has been exposed, reaming is stopped. In case of sclerotic acetabular bone, a 1mm press-fit should allow the acetabular component to seat properly with sufficient primary stability.

Note: During the acetabular preparation, one must be particularly careful in order to prevent excessive reaming of the bone and to maintain a hemispherical cavity (Fig. 3).

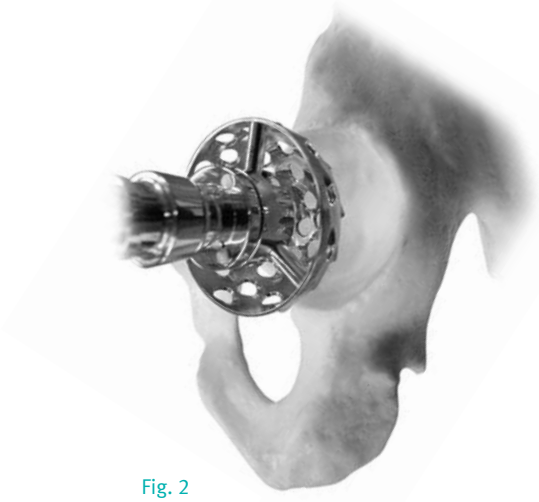


Fig. 2

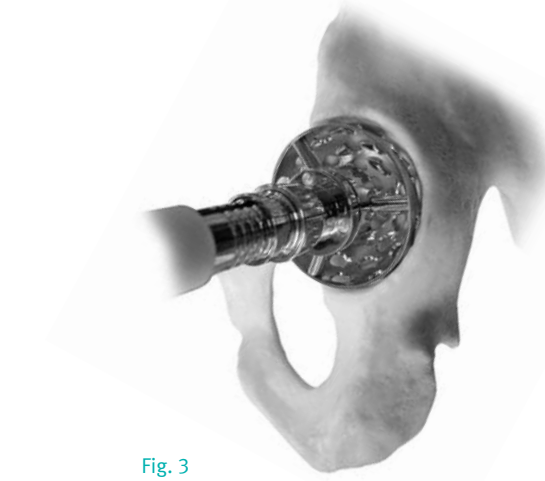


Fig. 3

Positioning of the trial acetabular implant

The accuracy of the reaming is checked using an acetabular trial of the same size as the last reamer used (Fig. 4). Any remaining protruding rim osteophytes are removed and acetabular cysts are grafted appropriately.

The acetabular trials have the same dimensions as the reamers. They are not used to test stability. The trials are used to evaluate the quality of acetabular preparation. The nominal size of the *Durom* acetabular component is the same as the acetabular trial: e.g. a 54mm acetabular trial component will be used with implant size 54/N. The outer diameter of the implanted acetabular component is larger than the acetabular trial allowing for a 2mm press fit.

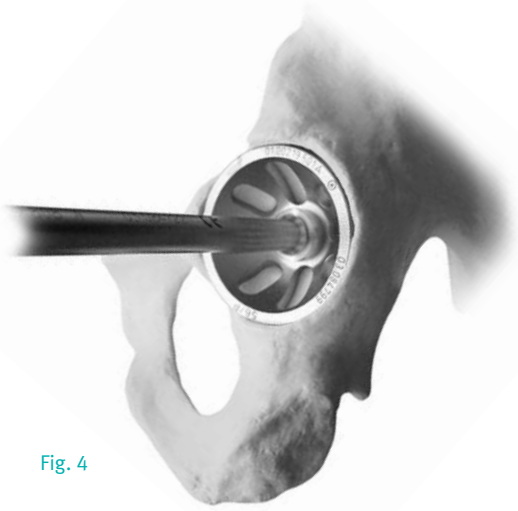


Fig. 4

Impaction of the acetabular component

The definitive acetabular component is attached to the appropriate cup inserter and the threaded rod is tightened securely with the large tightening bar. The impactor head is then screwed on to the cup-coupling handle. The acetabular component is impacted into the prepared acetabulum in approximately 10 to 15° of anteversion and a 45° of inclination or abduction (Fig. 5).

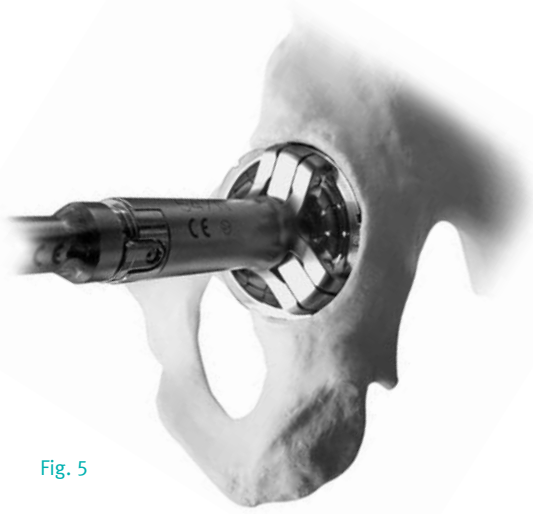


Fig. 5

Final impaction of the acetabular component

When the acetabular component is fully seated, (Fig. 6) the cup inserter is removed by unscrewing the impactor head and loosening the threaded rod (Fig. 7a & 7b). If necessary, the appropriately sized cup impactor can be used to complete the insertion of the acetabular component.

Fig. 6

Fig. 7a

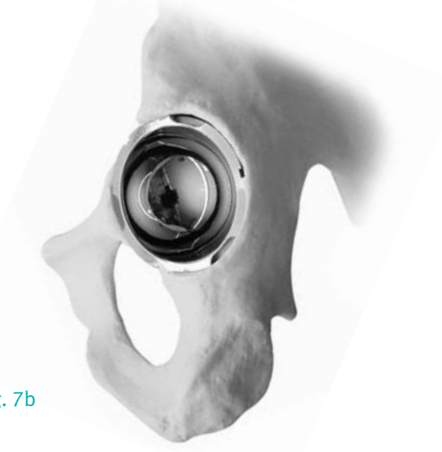


Fig. 7b

Assembly of the Metasul LDH large diameter head and adapter

Use of the trial head and adapter

Assemble the appropriately sized trial head adapter on the femoral stem, ensuring it is sitting flush on the taper.

The femoral head trial corresponding to the inner diameter of the *Durom* acetabular component is then attached to the adapter (Fig. 8).

The hip is reduced and neck length, ligament tension and range of motion are checked. If the results are insufficient, the same procedure must be repeated with different sizes of head adapters.

Fig. 8

Assembly of the Head Adapter

Assembly of the head adapter on the *Metasul LDH* large diameter head is performed outside the operative field after having carried out the trial reduction with the large trial head attached to the trial head adapter.

Fig. 9

The metal base plate (Fig. 9) and its plastic assembly inlay are positioned on a stable support. Make sure the inlay sits firmly within the base plate (Fig. 10).

Fig. 10

Position the femoral head on the inlay (Fig. 11) as shown in the illustration.

Fig. 11

Place the appropriately sized head adapter into the female taper of the femoral head (Fig. 12).

Fig. 12

Note: properly check the position of the appropriate head adaptor before final impaction into *Metasul LDH* large diameter head (Fig. 13).

Fig. 13

With the impactor handle and its 12/14 assembly attachment, (Fig. 14) the head adapter is impacted into the femoral head by means of a firm and strong strike with a heavy mallet, preferably heavier than 500g (Fig. 15).

Clean and dry the stem taper, removing any residue.

Place the selected femoral head on the stem taper and secure it by twisting firmly. With the plastic impactor attachment, (Fig. 16) strike the *Metasul LDH* large diameter head to ensure full seating of the stem taper.

Fig. 14

Fig. 15

Fig. 16

In Situ Extraction of the Head

In cases where the large diameter head must be removed, the following procedure is recommended:

Mount the head disassembly attachment on the impactor handle (Fig. 17) and position the instrument on the lower edge of the femoral head (Fig. 18).

Fig. 17

Loosening of the head and the stem taper is done with small successive blows. The use of this device prevents unintended stem taper damage.

Note: To separate the head from the taper intraoperatively, use the plastic disassembly attachment. For revision cases, use the metal disassembly attachment.

Fig. 18

In the case where the head comes off of the stem taper without the head adapter, the adapter must be removed from the stem separately. Carefully slide the adapter extractor under the neck of the stem and turn the threaded crank at the same time to pull the head adapter off of the taper (Fig. 19). The taper should not be damaged by this procedure (Fig. 20).

Fig. 19

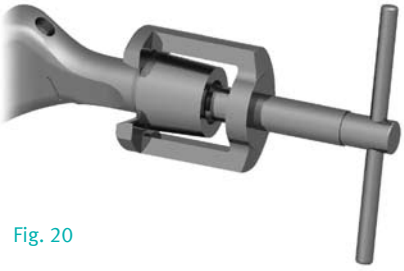


Fig. 20

Disassembly of the head adapter and the large diameter head

In cases where the head adapter cannot be extracted and remains attached to the head, use the adapter extractor for a 12/14 taper (Fig. 21) and proceed as follows:

Slide the sleeve into the head adapter (Fig. 22) until you feel or hear that its end is completely docked.

Push the handle through the sleeve and turn clockwise (Fig. 23).

After several turns, the handle reaches the bottom of the female taper of the large diameter head (Fig. 24). You will notice an increase in resistance at that time. Continue to turn and the handle will then separate the adapter from the head.

Carefully remove the head adapter to prevent the head from falling (Fig. 25).

Fig. 21

Fig. 22

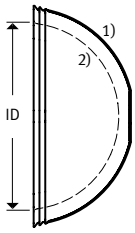
Fig. 23

Fig. 24

Fig. 25

Implants

Durom Acetabular Component



Size	ID mm	Code	Product No.
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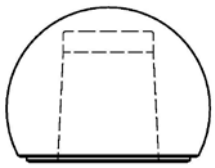
46	40	F	01.00214.146
48	42	H	01.00214.148
50	44	J	01.00214.150
52	46	L	01.00214.152
54	48	N	01.00214.154
56	50	P	01.00214.156
58	52	R	01.00214.158
60	54	T	01.00214.160
62	56	V	01.00214.162
64	58	X	01.00214.164
66	60	Z	01.00214.166

Metasul LDH Head



Size	Code	Product No.
38	D	01.00181.380
40	F	01.00181.400
42	H	01.00181.420
44	J	01.00181.440
46	L	01.00181.460
48	N	01.00181.480
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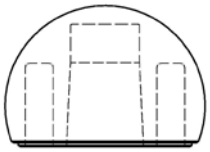
Metasul LDH Head



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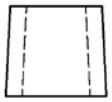
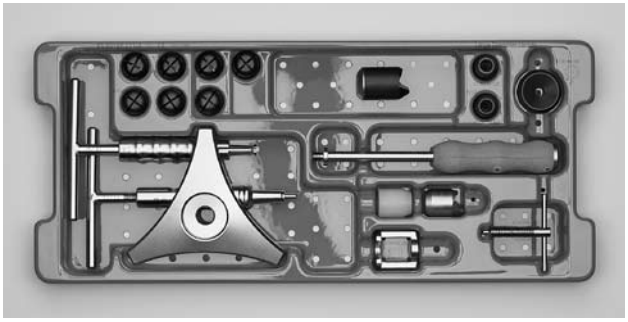
60	Z	01.00181.600

Head Adapter



Size	Taper	Product No.
S	12/14	01.00185.145
M	12/14	01.00185.146
L	12/14	01.00185.147
XL	12/14	01.00185.148

Instruments



Description	Product No.
Base tray (empty)	01.00189.210
Insert for tray (empty)	01.00189.211
Standard container cover, gray	01.00029.031

Description	Taper	Product No.
Extractor	12/14	01.00189.151

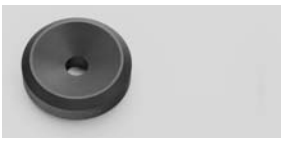
Description	Product No.
Insert remover pusher	75.10.01

Description	Product No.
Ball-head impactor attachment	78.00.38

Description	Product No.
Handle reduction and impaction	75.11.00-02

Description	Product No.
Assembly base plate	01.00189.100

Description	Product No.
Assembly attachment	01.00189.102



Description	Product No.
Assembly inlay	01.00189.104

Description	Product No.
Adapter extractor	01.00189.150

Description	Product No.
Head disassembly attachment metal	01.00189.103

Description	Product No.
Head disassembly attachment plastic	01.00189.110

Size	Product No.
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Ø38mm	01.00189.420
Ø38mm	01.00189.440
Ø38mm	01.00189.460
Ø38mm	01.00189.480
Ø38mm	01.00189.500
Ø38mm	01.00189.520
Ø38mm	01.00189.540
Ø38mm	01.00189.560
Ø38mm	01.00189.580
Ø38mm	01.00189.600

Size	Taper	Product No.
S	12/14	01.00189.145
M	12/14	01.00189.146
L	12/14	01.00189.147
XL	12/14	01.00189.148

1. Tipper JL, Firkins PJ, Ingham E, Fisher J, Stone MH, Farrar R, Quantitative analysis of the wear and wear debris from low and high carbon content cobolt chrome alloys used in metal on metal total hip replacements. *Journal of Materials Science: Materials in Medicine* 10 (1999) 353-362

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