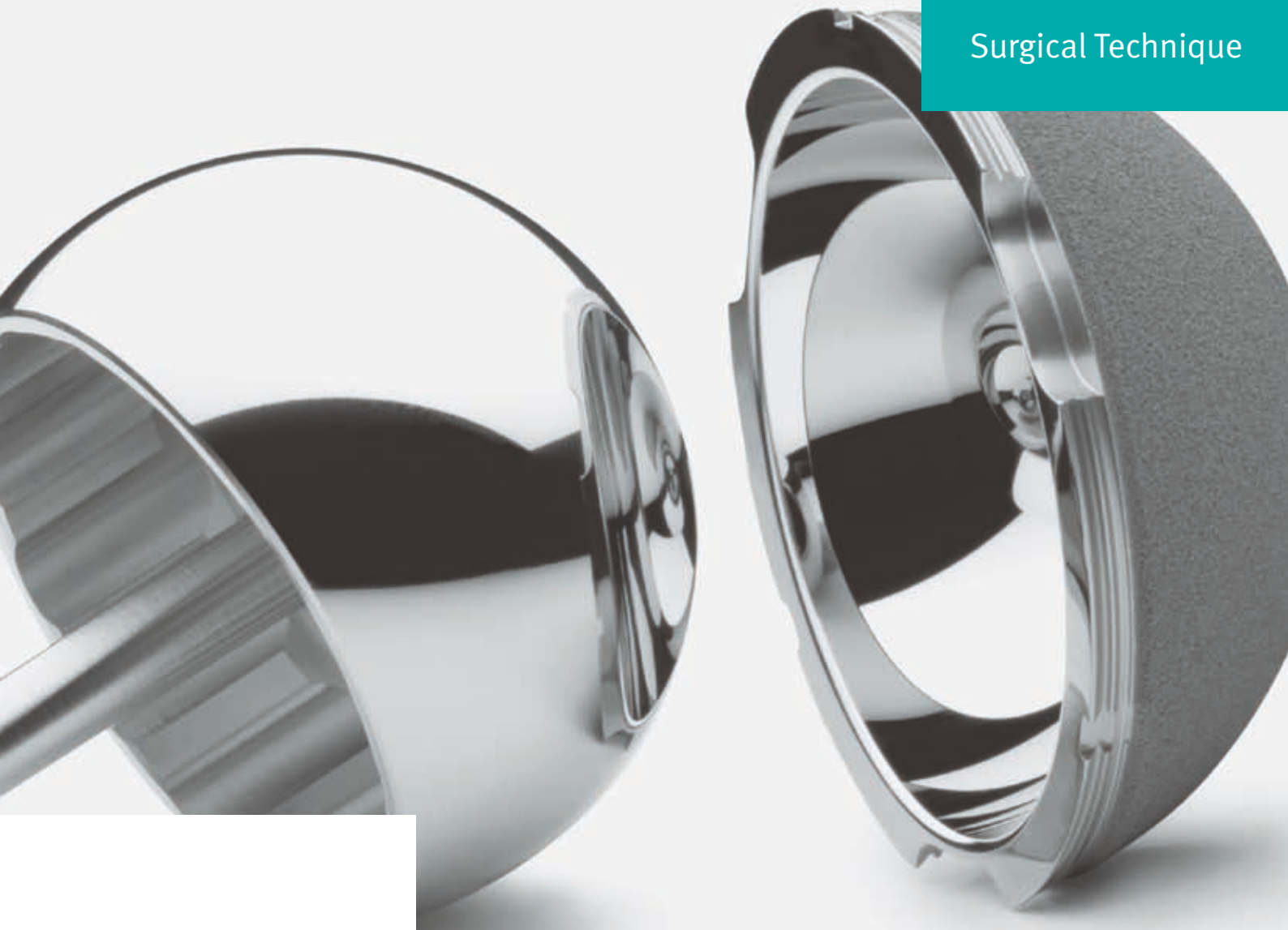
Durom®
Hip Resurfacing

Surgical Technique



For Young and Active Patients

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Surgical Technique Durom Hip Resurfacing

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Design Rationale

The *Durom* Hip Resurfacing System has been designed for use in patients who are fit and active.

Emphasis has been placed on providing a high-quality, large-diameter, metal-on-metal bearing, preservation of bone stock, and durable fixation of both the components to the skeleton.

The system is based on an uncemented acetabular component, with a size-matched cemented femoral component. The procedure requires the use of Zimmer dedicated high-quality instruments.

Bearing Surface

The *Durom* system utilizes a *Metasul*® metal-on-metal bearing. This is a proven low-wear, low-friction articulation[1], which has been implanted in over 350,000 patients since 1988[2]. No other metal-on-metal bearing has such a long and successful track record.

Preservation of Bone Stock

The *Durom* acetabular and femoral components have been designed to allow maximum preservation of bone stock. The 4 mm wall thickness of the acetabular component is as low as practically possible to resist deformation (CoCr is a stiffer material than titanium material) under load whilst allowing a low clearance (diametrical mismatch) of the articulation. The cup subtends an angle of 165°, which is similar to the natural acetabulum.

These features facilitate significant preservation of acetabular bone stock.

Instruments

Sophisticated, but easily used femoral instruments facilitate accurate and reproducible positioning of the femoral component. This allows the use of the most appropriate femoral component suitable for the individual patient, without femoral oversizing. The goal of preserving precious acetabular bone stock is thereby achieved by allowing insertion of the smallest possible acetabular component.

The *Durom* hip resurfacing components

Durable Fixation

The *Durom* acetabular component has been designed to be press-fit. It is a truncated hemisphere which derives initial fixation from a built-in 1-2 mm press-fit produced by under-reaming (Fig. 1). In addition, the presence of circumferential equatorial fins which lock into the acetabular rim result in an extra 1 mm press-fit at the rim only (Fig. 2).

The surface coating of the *Durom* acetabular component is vacuum plasma-sprayed pure titanium (*Porolock*® surface Ti-VPS). 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. Titanium vacuum plasma-sprayed coatings have been associated with reliable bone on-growth allowing durable secondary fixation.

The circumferential fins, high-surface roughness, and initial 2 mm press-fit allow initial implant stability while the *Porolock* plasma-sprayed material promotes reliable scratch fit.

The femoral component is designed for use with cement. The primary role of the stem is for alignment to maintain an even cement mantle and it should not be cemented. The femoral instruments produce an even cement mantle approximately 1 mm thick, reducing the risk of fatigue failure of the bone cement. Recesses within the femoral component allow controlled escape of cement which generates moderate pressurization, resulting in approximately 3-4 mm of cement penetration into the cancellous bone of the femoral head. When the cement cures, the recesses enhance the rotational stability of the implant.

Joint Stability

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 to obtain unrestricted walking and optimized functioning of the hip, while reducing the potential risks of prosthetic impingement. The *Durom* femoral components are available from 38 to 60 mm and must be used in combination with the *Durom* acetabular component.

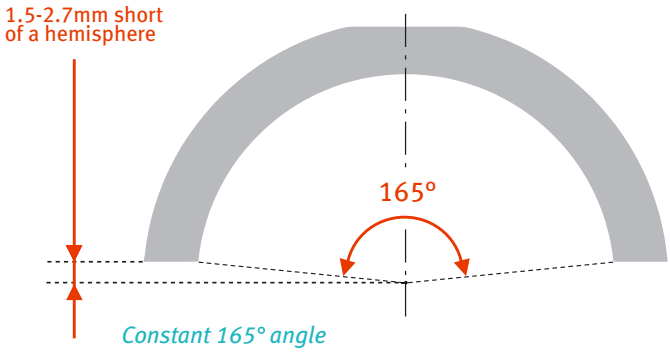


Fig. 1 The shape of the *Durom* cup is a flattened, truncated hemisphere which subtends an angle of 165°

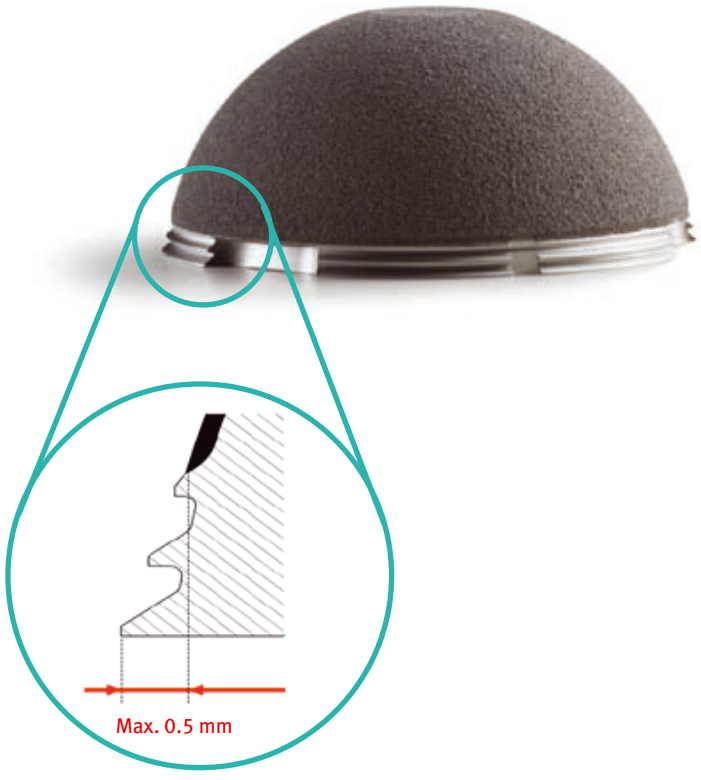


Fig. 2 Circumferential equatorial fins

Overview of Implant Sizing

The actual diameter of the *Durom* acetabular component is 2 mm greater than its labeled size. For example, a size 54 cup measures 56 mm on the outer diameter at the coated area. This results in a 2 mm press-fit when reaming to 54 mm and implanting a size 54 *Durom* cup. Trials are line to line and do not feature any press-fit (Fig. 3).

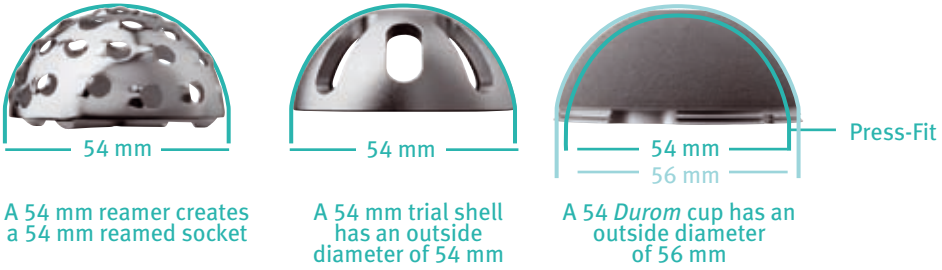


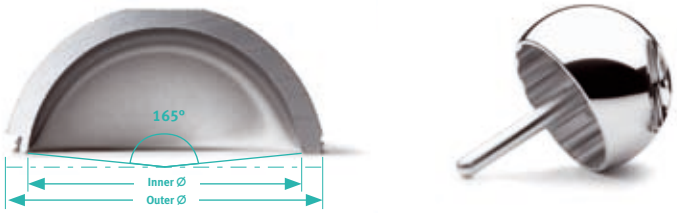
Fig. 3 Reamer, cup trial and implant outside diameters

The inner diameter of a *Durom* acetabular component mates with a corresponding *Durom* femoral component. A letter code confirms the appropriate combination. For example, a 54/N *Durom* cup must be used with a 48/N *Durom* femoral component.

Important Information Regarding Metasul Metal Pairings

Cup systems intended for *Metasul* pairings may only be paired with the corresponding *Metasul* ball heads provided for this purpose. The operating surgeon must always make sure that the chosen cup and ball head match each other in accordance with this requirement. *Metasul* femoral heads are designated with a groove in the area of the taper, which is evident on the x-rays.

Durom Sizing Guide



Durom Acetabular Component			Code	Durom Femoral Component	
Size	Outer Ø	Inner Ø		Size	Outer Ø
44	46 mm	38 mm	D	38	38 mm
46	48 mm	40 mm	F	40	40 mm
48	50 mm	42 mm	H	42	42 mm
50	52 mm	44 mm	J	44	44 mm
52	54 mm	46 mm	L	46	46 mm
54	56 mm	48 mm	N	48	48 mm
56	58 mm	50 mm	P	50	50 mm
58	60 mm	52 mm	R	52	52 mm
60	62 mm	54 mm	T	54	54 mm
62	64 mm	56 mm	V	56	56 mm
64	66 mm	58 mm	X	58	58 mm
66	68 mm	60 mm	Z	60	60 mm

Each size pair is designated with a suffix letter which is also marked on all the instrumentation and implant packaging for safety and ease of use

Patient Selection

Hip resurfacing is most appropriate for physically active patients with good bone quality and adequate femoral and acetabular bone stock. Such patients will generally be under 65 years old.

Initial experience is ideally gained in patients with minimal deformity and minimal bone loss. As experience is gained, the surgeon may elect to undertake resurfacing on more complex cases of hip dysplasia, Perthes disease, SUFE, etc.

Indications

- Primary osteoarthritis
- Posttraumatic osteoarthritis
- Secondary osteoarthritis
- Avascular necrosis of the femoral head where remaining bone stock is adequate
- Inflammatory arthritis if bone quality is adequate

Contraindications

- Active infection
- Malignant tumors
- Insufficient acetabular or femoral bone stock
- Poor bone quality (e.g. significant osteoporosis, osteomalacia)
- Anticipated noncompliance of the patient, alcohol or drug abuse
- Renal insufficiency
- Known allergy to one of the constituents of the implant (cobalt, chromium, molybdenum, titanium)

Preoperative Planning

Templates are used to determine the approximate size of the appropriate components and to assess potential difficulty because of loss of femoral or acetabular bone stock. Key points include:

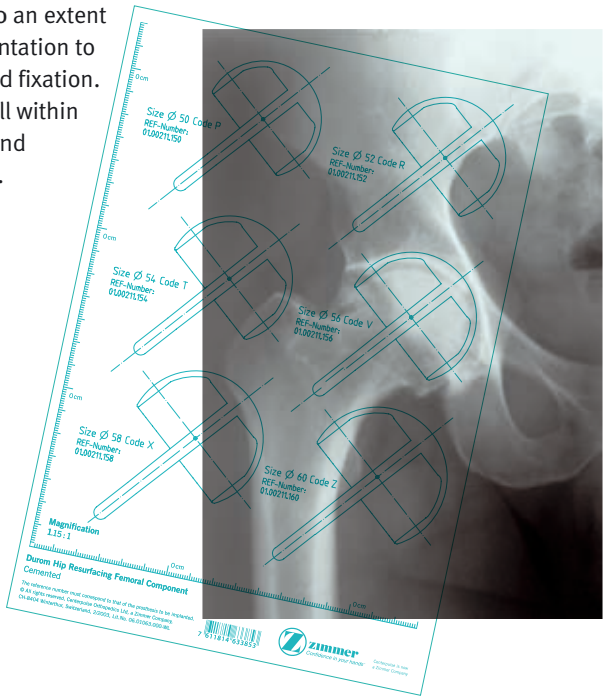
- identification of the hip center
- desired femoral offset
- optimal orientation and translation of the femoral component avoiding neck notching

With the *Durom* acetabular component templates, it is possible to determine the most important parameters for planning the procedure:

- the physiological center of rotation (from the opposite side)
- the optimal position of the acetabular component, in particular its depth, as well as its inclination angles
- the approximate size of the implant

Templates are available in 115% magnification for conventional radiographs and 100% magnification for use with digital x-rays. Magnification is greater in larger patients and less in thinner patients. The final determination of the prosthesis size is therefore made at the time of surgery.

Note: Because the risk of dislocation of the *Durom* femoral component is much lower than lesser diameter articulations (e.g., 28 and 32 mm), the acetabular component can be positioned to better fit the acetabulum to an extent from the conventional orientation to maximize bony support and fixation. Placement will generally fall within 40°-50° abduction angle and 10°-20° anteversion angle.



X-Ray Templates

Acetabular Component		Femoral Component	
1.15:1	Ref 06.01062.000x	1.15:1	Ref 06.01063.000x
1:1	Ref 06.01060.000x	1:1	Ref 06.01061.000x

Surgical Technique

The procedure may be undertaken using the posterior, direct lateral or transtrochanteric approach. However, it is recommended a posterior approach to the hip. This approach provides excellent exposure without disruption of the abductor muscles. Preservation of the abductor muscle insertion ensures normal hip function and may be important in reducing the risk of femoral neck fractures in the early postoperative period.

Whichever approach is selected, the blood supply to the femoral neck and remaining head should be preserved by avoiding unnecessary soft-tissue stripping from the femoral neck.

It is recommended adhering to the sequence shown on the diagram. Some surgeons may prefer to start with femoral preparation or complete acetabular implantation before turning attention to the femur. However, this introduces potential difficulty in matching component sizes on both sides of the joint.

Procedure Stages

1 Approach

2 Acetabular preparation

3 Femoral preparation

4 Acetabular implantation

5 Femoral implantation

6 Closure and postoperative care

The Surgical Approach

A standard posterior approach is used with the patient carefully and safely secured in the lateral position. This allows the entire limb to be draped independently, allowing complete access and free movement of the leg.

1. The Skin Incision

The incision is centered on the prominence of the greater trochanter. Distally it is in line with the femur. Proximally it is curved posteriorly. It approximates a straight line if made with the hip in 40° of flexion. In obese patients care must be taken to ensure that the incision extends sufficiently posteriorly to allow adequate access to the femoral head and neck later in the procedure **(Fig. 1).**

2. Fascia Lata and Gluteus Maximus

Following longitudinal incision of the fascia lata and splitting of the fibres of gluteus maximus, the tendinous insertion of gluteus maximus into the linea aspera is exposed. This insertion should be fully released from the femur to allow easier displacement of the femoral head and neck antero-superiorly during acetabular preparation.

3. Short External Rotators

A posterior capsular flap incision is used to fully release the short external rotators and the posterior joint capsule from the posterior aspect of the greater trochanter. If necessary, the whole of quadratus femoris may be released. The under surface of gluteus minimus is carefully elevated off the ilium as far anteriorly as the anterior rim of the acetabulum, using a Cobb elevator or similar instrument.

4. Capsulotomy and Dislocation

The superior capsule is completely divided along the superior rim of the acetabulum. The hip is dislocated and the circumferential capsulotomy is completed. The antero-superior capsule is best accessed by maximal internal rotation of the femur with the hip in flexion. The antero-inferior capsule can be most easily accessed by maximal internal rotation of the femur with the hip extended. The antero-inferior capsule is divided in line with the psoas tendon, taking care to avoid damaging the tendon.

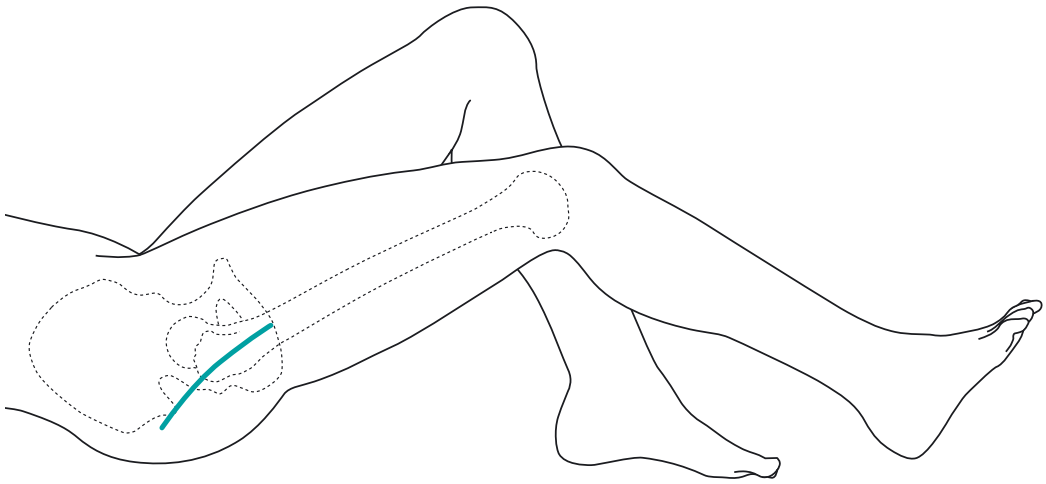


Fig. 1: The skin incision

5. Assessment of the Head-Neck Junction

Osteophytes around the head-neck junction are carefully assessed. Soft osteophytes, as commonly found on the anterior neck, can be safely removed. Mature corticated osteophytes, as commonly found on the posterior, inferior and superior neck, should be preserved if possible **(Fig. 2).**

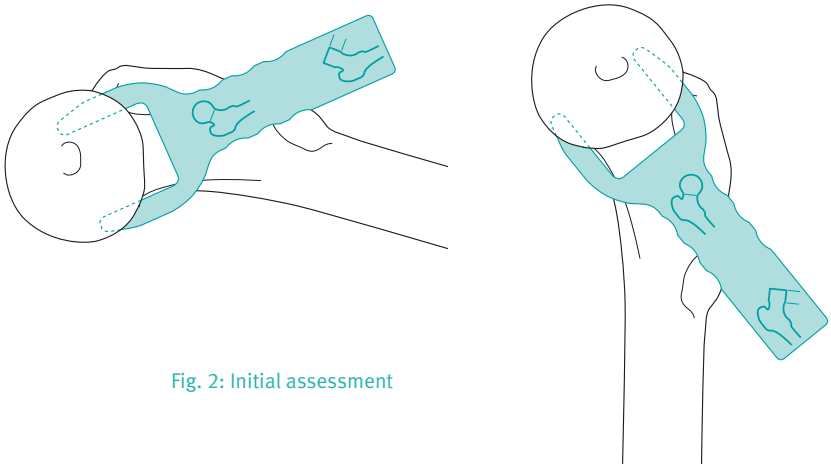


Fig. 2: Initial assessment

The diameter of the femoral neck at the head-neck junction in its widest plane (usually superior–inferior) is measured using the calliper or neck gauges. This will determine the smallest femoral component that can be used without the risk of notching the femoral neck. The smallest acetabular component that can then be used will be 6 mm larger.

Technique Tip
Record this measurement. Identify the corresponding acetabular reamer.

6. Initial Femoral Preparation

The femoral head is manipulated under the fibres of gluteus minimus to lie superior to the acetabulum. Care must be taken not to damage the fibres of gluteus minimus. This maneuver can be facilitated if the leg is slightly abducted and flexed by the assistant. Using a T-handle bone hook, the femoral head and neck are then translated anteriorly so that the head comes to lie close to the anterior-inferior iliac spine under the hip abductors **(Fig. 3).**

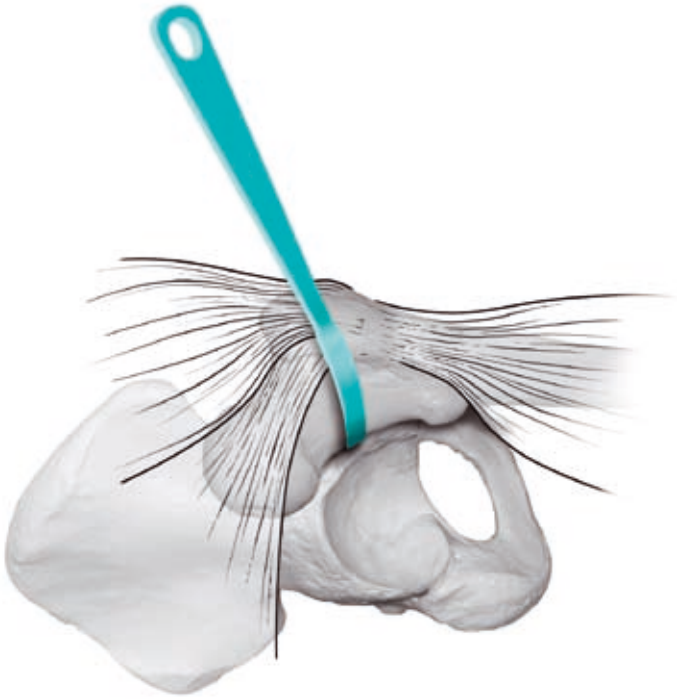


Fig. 3: Acetabular exposure

Under direct vision, a Hohmann retractor is inserted so that its tip is close to the base of the anterior-inferior iliac spine and is used to retract the femoral head and neck further anteriorly. The tip of the retractor should not be placed on the anterior rim of the acetabulum as this may result in fracture when force is applied. The leg is then externally rotated with the hip extended. The femoral head and neck should then be clear of the anterior-superior rim of the acetabulum. Further retractors are placed to expose the remaining posterior and inferior rims of the acetabulum.

Technique Tip
Placing the leg in 30° flexion and slight abduction relaxes the soft-tissue envelope.

Acetabular Preparation

1. Acetabular Preparation

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

Technique Tip: It is important to excise soft tissue to **visualize the entire rim** of the acetabulum. This will help when using trial cups to assess the depth reamed. It will also reduce the likelihood of soft tissue entrapment which may prevent the cup from seating during cup insertion.

2. Reaming

Note: This technique demonstrates the use of 180° hemispherical reamers to prepare the acetabulum. If using reamers other than 180° hemispherical reamers, visual cues to assess reaming should be adjusted **(Fig. 4)**.

Sequential reaming is carried out with hemispherical acetabular reamers. It is important to ream to a spherical socket. Hold the reamer steady and apply pressure in the same direction that the prosthesis will be implanted. **Orbital reaming should not be utilized.** Start with a reamer 2 sizes smaller than the templated implant size or if a small reamer is used to create a center of ream, care should be taken not to overmedialize.

One should not overdeepen the acetabulum. The reamers subtend an angle of 180° whereas the acetabular components and trials subtend an angle of 165°. This means that the acetabular trials are nominally 2.3–3.8 mm shallower than the corresponding reamer, depending on diameter **(Fig. 5)**. Consequently, the acetabulum should only be deepened until the edge of the hemispherical reamer is almost flush with the true bony rim of the acetabulum. The socket will then be deep enough to fully insert the corresponding *Durom* acetabular component taking into account the 2 mm diametrical (1 mm radial) oversizing of the implant compared to the reamer.

Note: Actual reaming depth should only be assessed using the trials and not the reamers.

Technique Tip: In hard bone it is advisable to use reamers in 1 mm increments when approaching the definitive acetabular size.

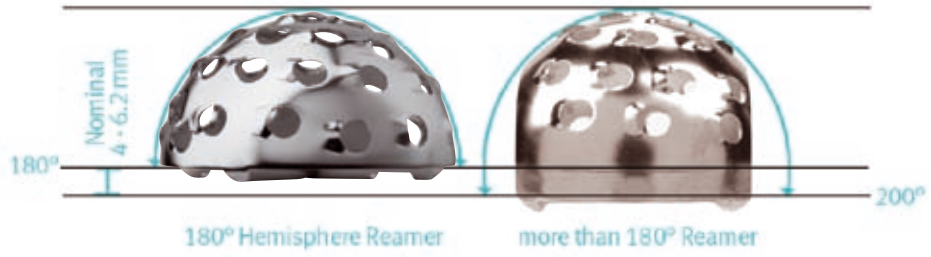


Fig. 4 180° hemispherical reamer versus a reamer that extends beyond 180°

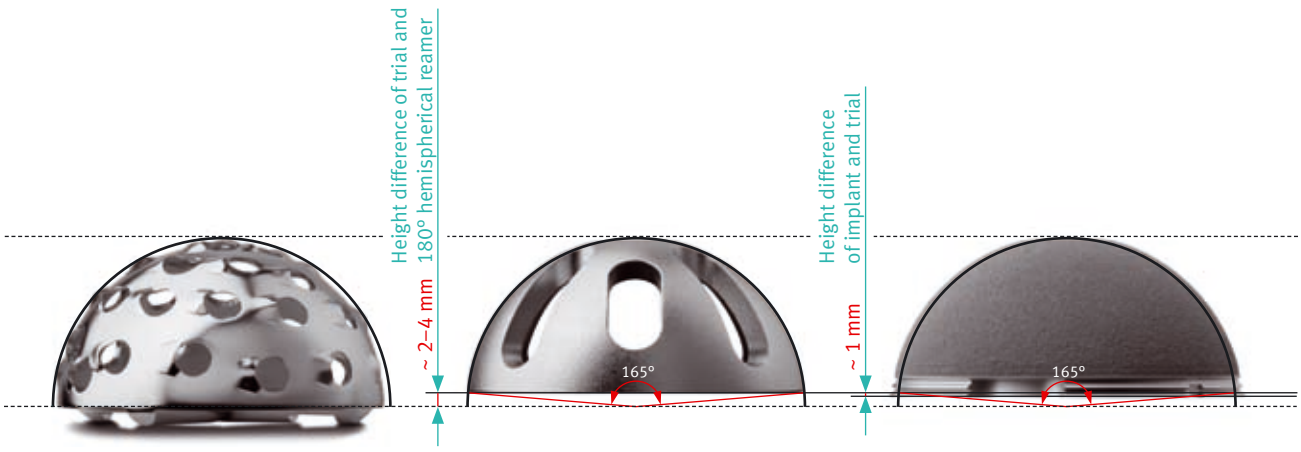


Fig. 5 Reamer to trial cup to implant depth comparison

3. The Use of the Acetabular Trial Implant

The accuracy of reaming and the optimal position of the implant are assessed using an acetabular trial the same size as the last used even numbered reamer. The acetabular trials are not used to test stability. They are line to line with the same-sized reamer and should seat within the prepared acetabulum. The diameter of the corresponding definitive acetabular component is 2 mm greater than the trial cup, generating the press-fit.

The trial cup should be placed parallel to the anatomical bony rim of the acetabulum following the anterior and posterior walls. Anteversion and inclination angles are noted for final implantation of the acetabular component.

Note: It is important to trim any rim osteophytes to within 2-4 mm of the true rim, as they can block the full insertion of the definitive implant.

Following the trimming of rim osteophytes it should be possible to reinsert the acetabular trial in the desired position with gentle tapping. If there is still resistance to fully seating and removing the acetabular trial, this indicates that the rim is too tight and that it will be difficult to insert the corresponding acetabular component.

Note: If the acetabulum is small or the bone is sclerotic, rereaming using a 1 mm larger reamer is appropriate, resulting in a nominal overall 1 mm press-fit. The amount of press-fit used should be determined at time of surgery and based upon bone quality.

Alternatively, focal reaming of the tight spots of the acetabular rim can be used: the trial cup is fully inserted and then rocked to determine the pivot points where the rim is overtight. These are usually the areas of sclerotic bone adjacent to the anterior-inferior iliac spine and the ischium **(Fig. 6)**. The tight spots are relieved by gently placing a small diameter reamer (e.g., 46 mm) against the sclerotic bone, removing just ½ to 1 mm of bone locally **(Fig. 7)**. **Attention: Care must be taken not to remove excess bone when focal reaming.**

At the completion of acetabular preparation, reassess with the trial cup. At this time, it should be possible to fully seat the trial in the desired orientation with light taps of the mallet. There should be 1–2 mm of peripheral bone protruding (anterior and posterior walls) for engagement of the equatorial fins of the implant.

Note: The acetabular implant is 1 mm taller than its corresponding trial.

Technique Tip: When final press-fit and cup position are determined with the trial cup, it is important to note landmarks of cup depth, abduction angle and anteversion. At this point it is helpful to leave the trial cup in final position until the *Durom* acetabular component impaction is imminent for a visual reference to cup placement.

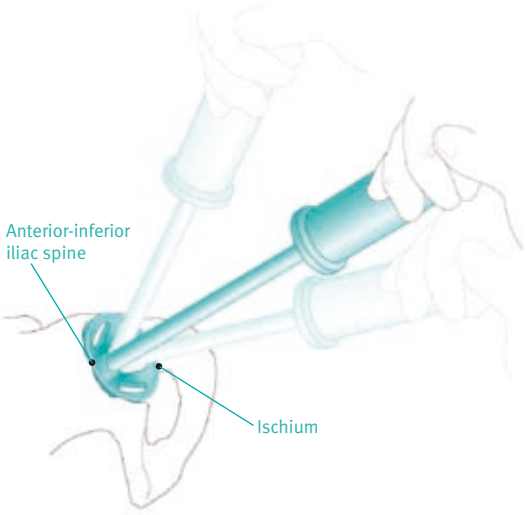


Fig. 6 Cup trial rocking on pivot points where rim is overtight

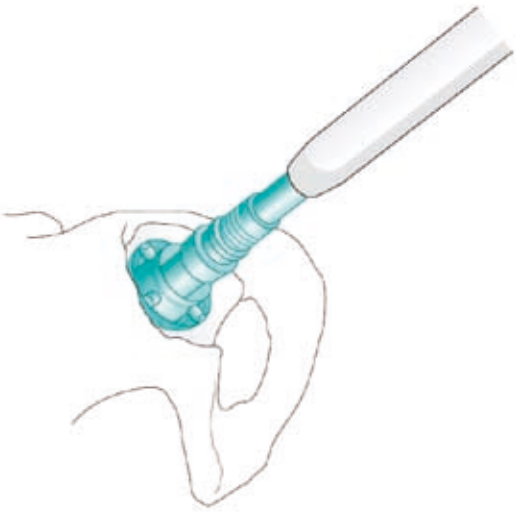


Fig. 7 Careful focal reaming of tight spots

Femoral Preparation

The femoral head and neck are most easily accessed by maximal internal rotation of the femur with the hip flexed to 90°. The femoral head can be delivered out of the wound by using the femoral head elevator (Fig. 8).

Reaming is based on the center of the femoral neck, not the center of the femoral head. Due to remodelling, the head is often eccentrically located on the femoral neck, with the bulk of the femoral head bone being inferior and posterior to the mid axis of the femoral neck.

A correct assessment of the femoral neck is an essential step in the procedure. The *Durom* hip resurfacing instrumentation offers two different approaches. The standard on is described in this technique. For the alternative procedure refer to the corresponding addendum.

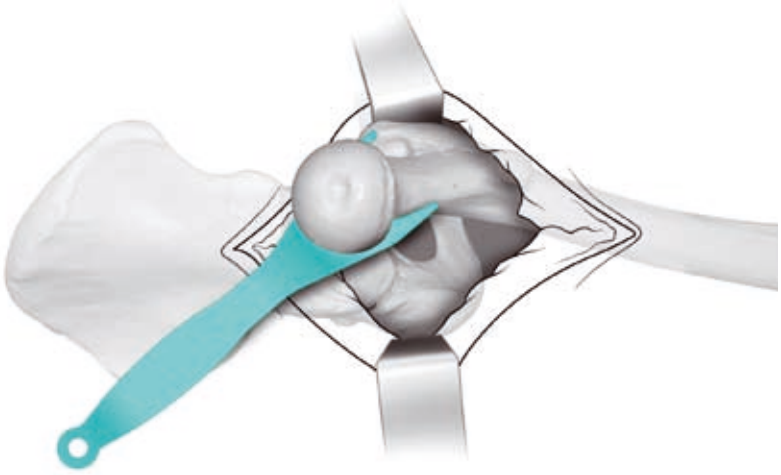


Fig. 8: Exposure of the femoral head

1. Insertion of the Preliminary Guide Wire

The short, preliminary guide wire is used for the initial preparation of the femoral head for the application of the centering jig and subsequent instruments. This guide wire does not determine the final position of the femoral component. However, it should be placed as accurately as possible to facilitate the later stages of the procedure.

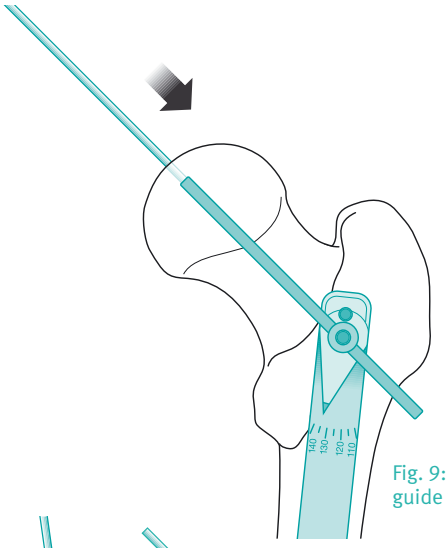


Fig. 9: Insertion of the preliminary guide wire

The short guide wire is inserted to a depth of approximately 5 cm, in line with the midpoint of the femoral neck in both antero-posterior and lateral planes **(Fig. 9).** The guide wire should be neutral or in slight valgus to the patient's neck-shaft angle and in neutral version to the femoral neck **(Fig. 10).** Version is based on the antero-inferior cortex of the femoral neck viewed from below.

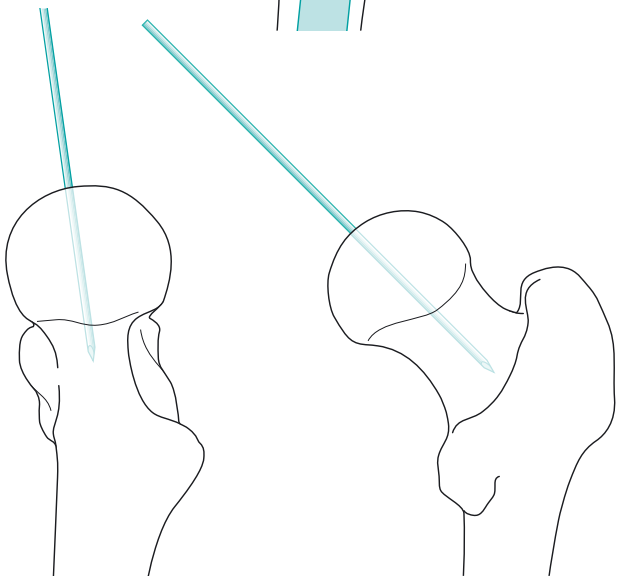


Fig. 10: Position of the preliminary guide wire

In primary osteoarthritis the anterior and superior quadrants of the femoral head are usually deficient. It is therefore generally the case that the guide wire appears to be placed eccentrically on the femoral head in a superior and anterior direction. In cases of slipped upper femoral epiphysis this apparent eccentric placement of the guide wire can be extreme.

Technique Tip
The protractor can be used to help set the neck-shaft angle

2. Femoral Head Planing

The plane cutter is passed over the short guide wire and a flat surface on the femoral head is prepared by removing approximately 6 mm of bone from the dome of the femoral head **(Fig. 11).** The dome of the femoral component is 9 mm thick. However, at this stage it is advisable to remove less bone, leaving behind some bone for final adjustment of neck length later in the procedure. The short guide wire is removed.

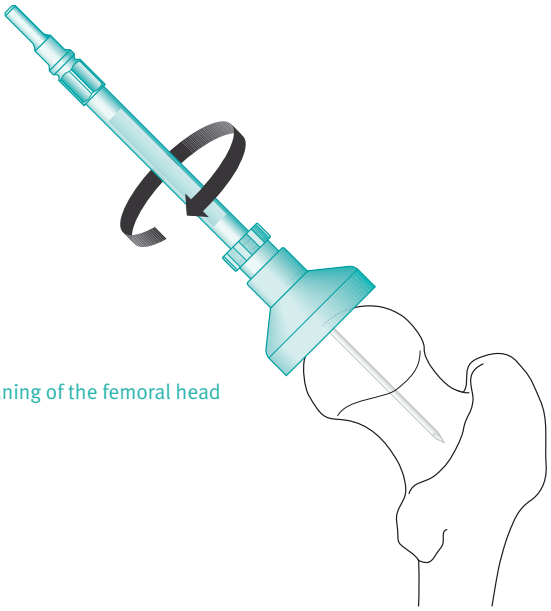


Fig. 11: Planing of the femoral head

3. Attachment of the Base Plate

The base plate allows the centering jig to be accurately positioned by fine-tuning antero-posterior and superior-inferior translation. It is available in two sizes. The base plate size is not linked definitively to the implant size. The standard base plate can be used on most femoral heads. The small base plate may need to be used when the planed area is not large enough to contain the four fixation pins on the standard base plate. This generally occurs when a 46 mm or smaller femoral component will be used. The small base plate offers slightly less scope for adjustment of position.

The base plate is attached to the baseplate impactor/extractor. The baseplate should be orientated so that the laser-etched markings are positioned anteriorly and posteriorly. It is gently impacted on the flat surface on the femoral head until it is fully seated **(Fig. 12).**

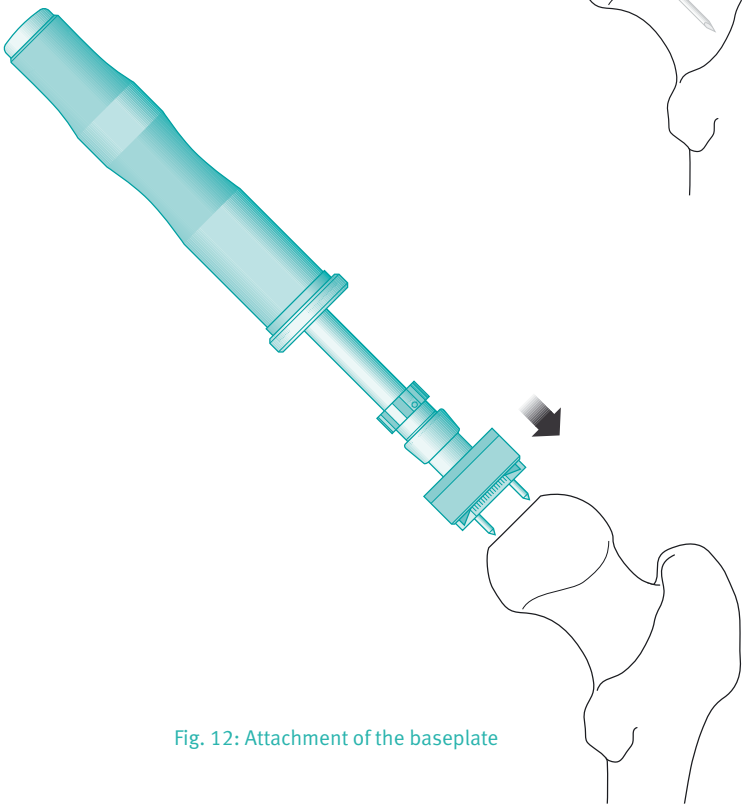


Fig. 12: Attachment of the baseplate

4. Attachment of the Centering Jig

Instructions for assembly are included as an appendix at the end of this document. The assembled centering jig is slid onto the base plate **(Fig. 13).** The small locking ring is loosened to allow this to be done. At this stage the large locking ring is fully tightened to control anterior-posterior and superior-inferior translation of the jig.

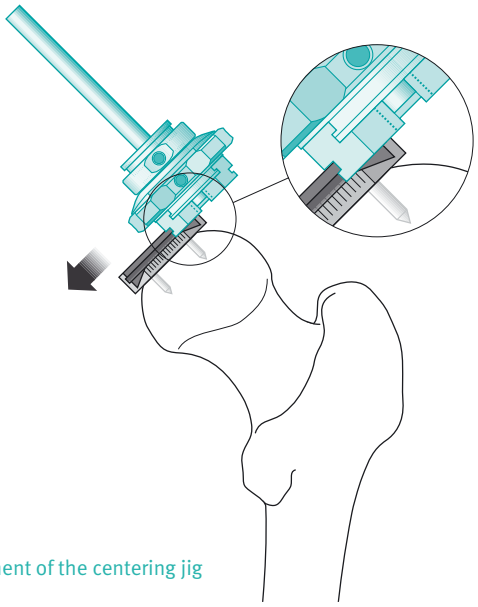


Fig. 13: Attachment of the centering jig

5. Setting the Neck-Shaft Angle and Anteversion Angle

The small locking ring is semitightened to allow the cannulated rod to be moved to set the definitive neck-shaft angle and anteversion angle but to resist gravity. The protractor or the antenna apparatus can be used to identify the appropriate neck-shaft angle and anteversion angle **(Fig. 14).**

The authors recommend 3°–5° valgus angulation and neutral version compared to the patient's femoral neck. Varus angulation should be avoided as this will increase the shear stress across the femoral neck. Excessive valgus angulation should also be avoided as this will reduce the offset of the hip and may result in notching of the superior neck.

Once the appropriate angulation has been achieved, the small locking ring is fully tightened with the tightening bar to lock the cannulated rod in position **(Fig. 15).**

Technique Tip

Identify sequentially the correct neck-shaft angle and anteversion angle and the correct translation.

6. Translation of the Centering Jig

The sliding plates of the centering jig set the position of the femoral component on the femoral head.

The large tightening ring is loosened. When the ring is fully loose, the jig can be moved in both the anterior-posterior and superior-inferior directions. When the ring is partially tightened, movement in the anterior-posterior direction is lost first. With further tightening, all movement of the sliding plates is abolished. It is possible therefore to precisely position the jig by using this sequential technique.

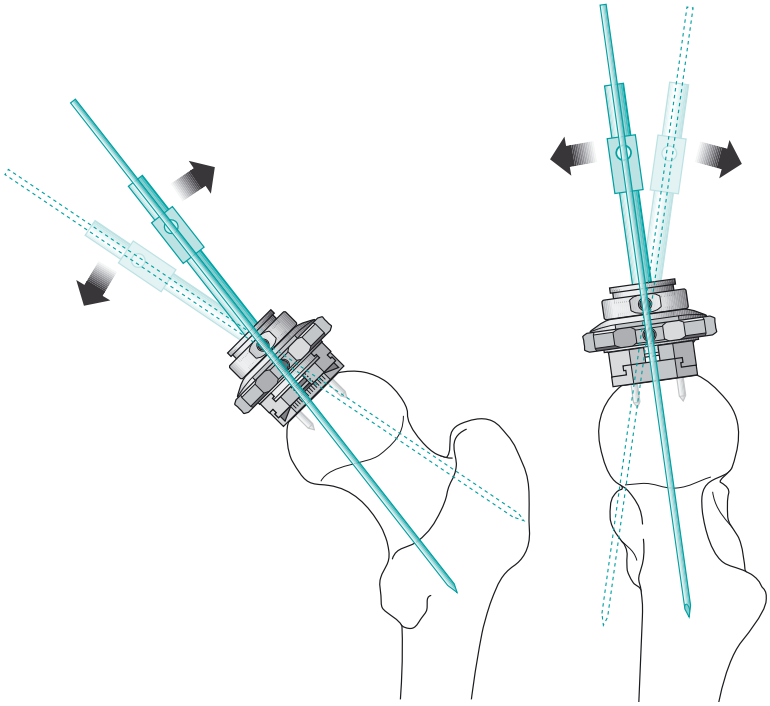


Fig. 14: Setting the neckshaft angle and anteversion angle

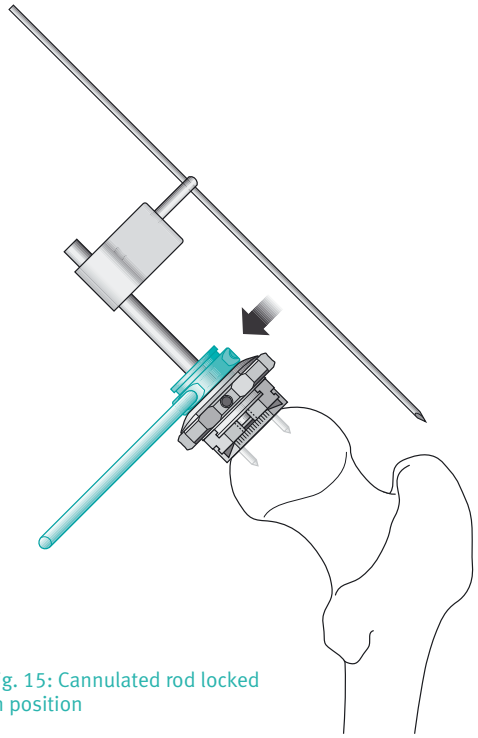


Fig. 15: Cannulated rod locked in position

The stylus 6 mm smaller than the last used acetabular reamer is attached to the cannulated rod using the connector **(Fig. 16).** The tip of the stylus corresponds to the exit point of the same-sized femoral cylinder reamer. The stylus is first set in the antero-posterior plane. The tip of the stylus is positioned with appropriate clearance of the posterior cortex at the level of the head and neck junction. The large tightening ring is partially tightened to block movement in the antero-posterior plane.

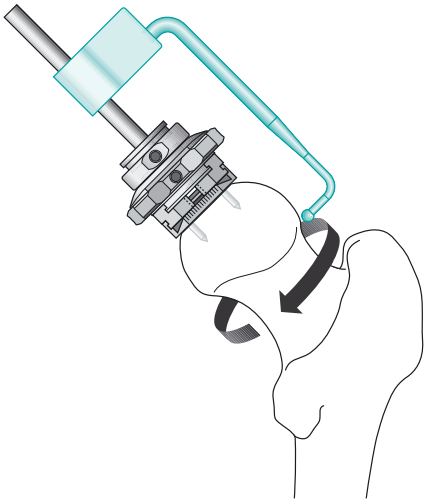


Fig. 16: Attachment of the stylus

The stylus is then rotated around the superior and inferior cortex at the level of head-neck junction. The position of the sliding plates is adjusted to ensure adequate clearance of the tip of the stylus around the superior and inferior neck **(Fig. 17).** The large tightening ring is then fully tightened, completely locking the jig in place. With the jig fully locked, it is easy to rotate the stylus circumferentially around the head-neck junction to ensure appropriate clearance in all areas. If necessary, the large tightening ring can be loosened and the jig repositioned. The stylus is then placed on the femoral head and rotated to demonstrate where the head will be cut and the resulting support for the femoral component.

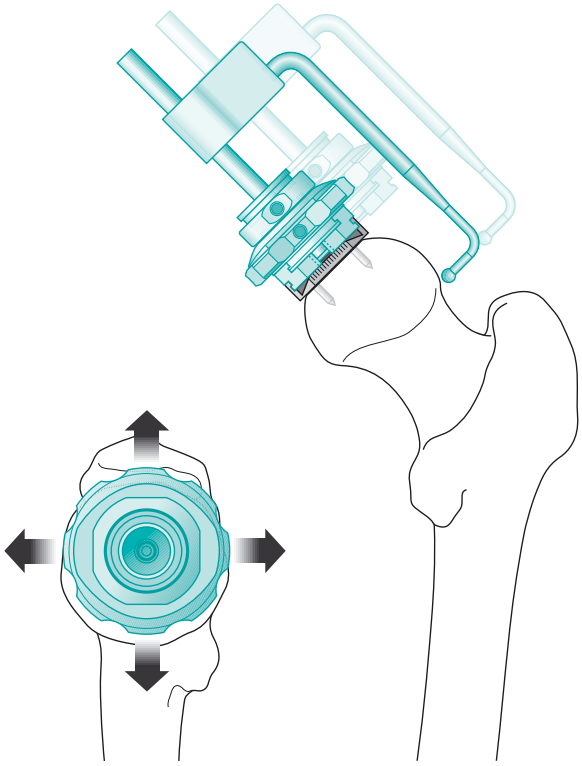


Fig. 17: Translation of the centering jig

Because the jig is fixed to the femoral head, very accurate positioning can be achieved (< 1 mm). With fine adjustments of the jig it is possible to ensure that the cylinder cut is flush with the head-neck junction, thereby avoiding the risk of oversizing. It is also possible to determine which neck osteophytes will be cut into and which will be preserved.

Technique Tip

When there is marked deficiency of the femoral head bone stock it is maybe necessary to maximize bony support but without notching the femoral neck.

7. Insertion of the Definitive Guide Wire

The long guide wire is inserted into the cannulated rod and drilled down the femoral neck until it abuts the lateral cortex of the proximal femur **(Fig. 18).**

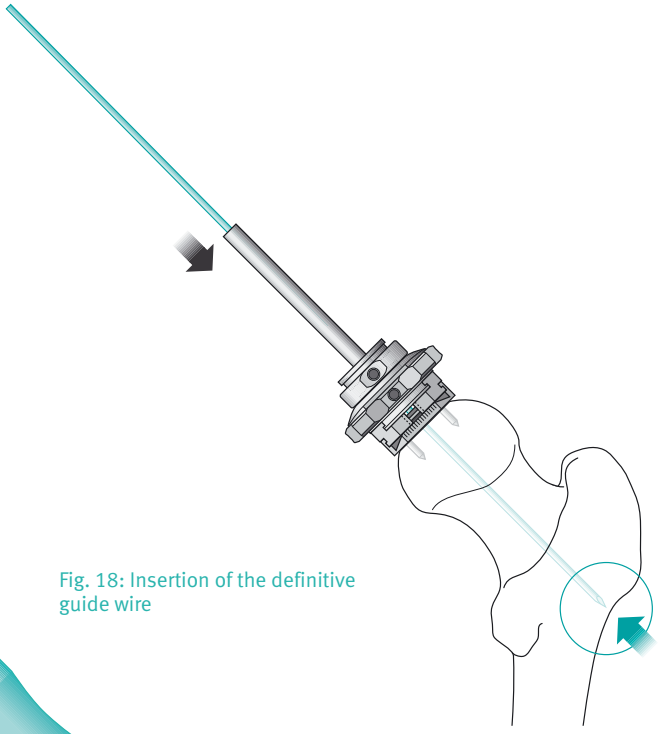


Fig. 18: Insertion of the definitive guide wire

8. Removal of the Centering Jig

The centering jig and baseplate are then removed from the femoral head with the base plate impactor/extractor **(Fig. 19).**

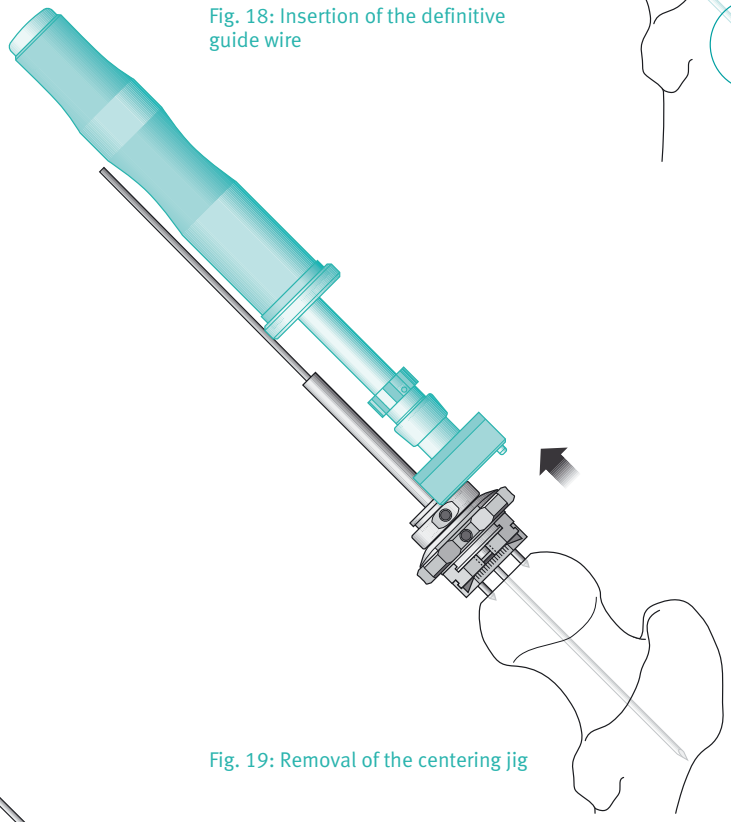


Fig. 19: Removal of the centering jig

9. Insertion of the Guide Rod

The guide wire is overdrilled to the appropriate depth for the chosen implant based on the markings on the drill. The guide wire is removed and the guide rod is then inserted and tapped home **(Fig. 20)**.

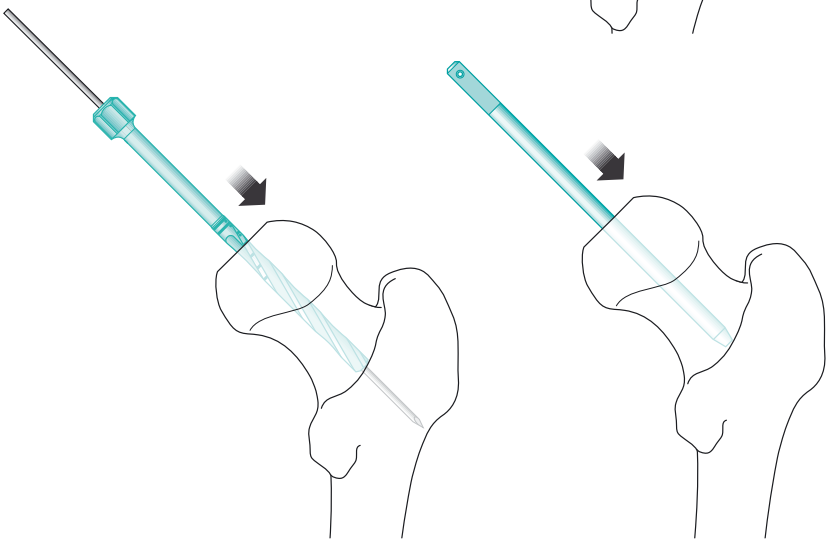


Fig. 20: Overdrilling and insertion of the guide rod

9. Cylinder Reaming

The femoral head is prepared first with cylinder reamers, starting two sizes larger than the chosen femoral implant, based on the size of the previously prepared acetabulum **(Fig. 21).** The reamer should be gently advanced down the femoral head, maintaining a normal rate of revolutions to prevent jamming and to minimize the torque across the femoral head and neck. The cylinder reamer has a depth stop, but care must be taken when approaching the head-neck junction to avoid notching. Because an eccentric amount of the peripheral femoral head is removed, it may be necessary to complete the posterior-inferior bone resection with an osteotome or rongeur.

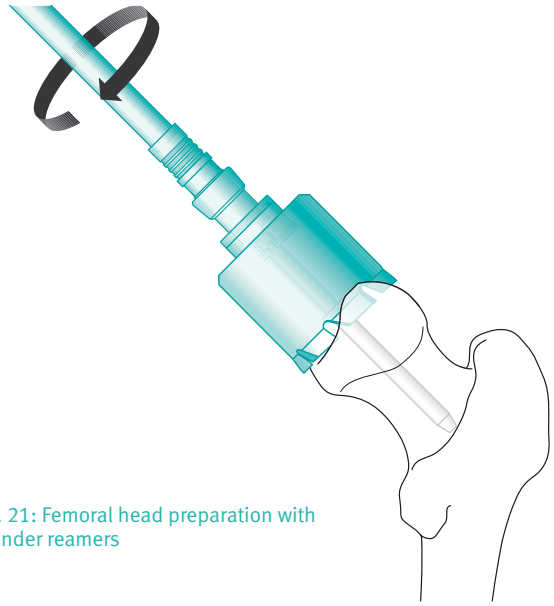


Fig. 21: Femoral head preparation with cylinder reamers

The next-size-smaller cylinder reamer followed by the cylinder reamer corresponding to the chosen implant size are then used sequentially to recut the femoral head to the definitive size. Again, care should be taken when approaching the head-neck junction to ensure that notching of the femoral neck does not occur.

In cases where there is a marked mismatch between the size of the head-neck and the acetabulum, it may not be possible to use the cylinder reamer corresponding to the chosen femoral implant without notching the femoral neck. In this situation the acetabulum should be reexamined. If the anterior and posterior walls are thick, then it should be safe to reream the acetabulum by a further 2 mm to allow the use of a femoral component 2 mm larger than originally planned.

However, if a further 2 mm of reaming will lead to unacceptable thinning of the anterior and/or posterior walls, then it may be preferable to abandon the resurfacing procedure and instead use a stemmed implant with a *Metasul LDH*® large diameter head and the appropriately sized *Durom* socket.

10. Final Head Planing

The depth markings on the calliper or the appropriate neck gauge are used to determine the appropriate positioning of the femoral component on the head **(Fig. 22).** In general, the mouth of the femoral component should be at the level of the head-neck junction, covering the exposed cancellous bone of the cut head. The appropriate length is marked on the femoral head and the head is replaned using the femoral head planer over the guide rod.

Technique Tip
Often, very little further bone is removed at this stage (2–3 mm).

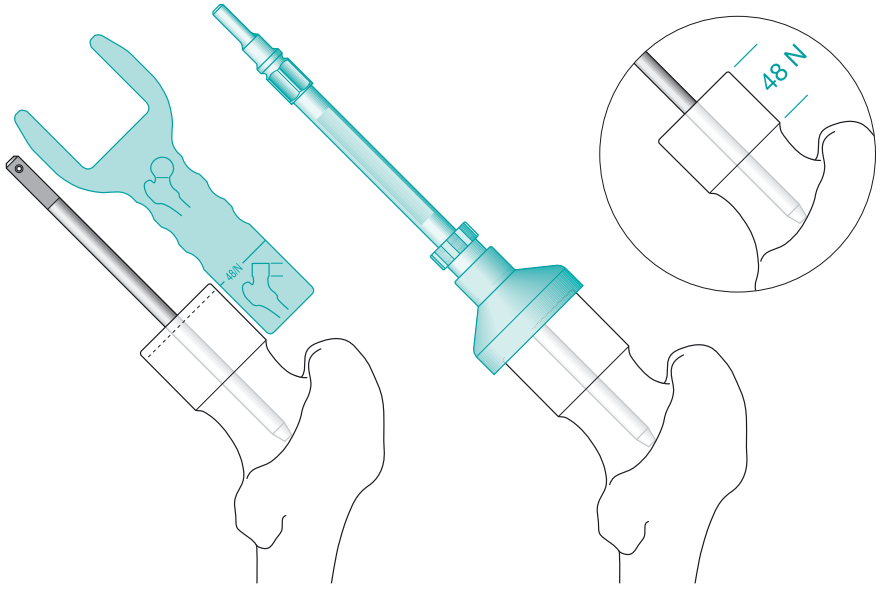


Fig. 22: Final head planing

11. Chamfer Cut

The chamfer is cut with the appropriately sized chamfer reamer over the guide rod. It is advisable to gently advance the chamfer reamer onto the femoral head to prevent jamming and to minimize the torque across the femoral head and neck **(Fig. 23).**

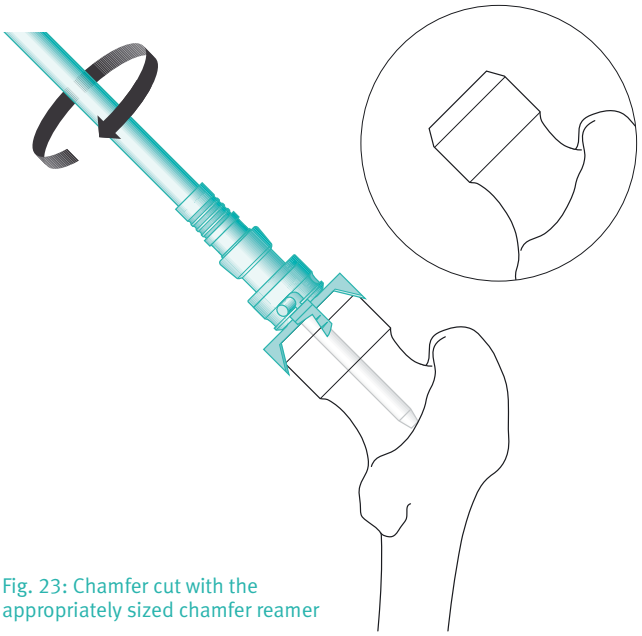


Fig. 23: Chamfer cut with the appropriately sized chamfer reamer

12. Femoral Trial

The appropriate femoral trial is advanced over the guide rod **(Fig. 24).** The cement thickness is included in the femoral trial which should therefore be a tight fit. The support for the femoral component can be assessed through the window in the femoral trial (~15% of the circumference). The position of the mouth of the femoral trial is marked on the femoral head-neck junction with a marker pen or diathermy.

The guide rod is removed using the guide-rod extractor. At this stage the femoral trial can be usefully left on the femoral head to protect it during exposure of the acetabulum for the definitive insertion of the acetabular component.

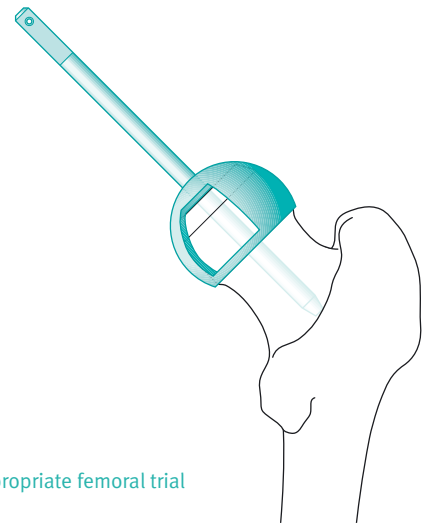


Fig. 24: Appropriate femoral trial

Acetabular Implantation

1. Mounting the Acetabular Component

The definitive acetabular component is placed on the disposable cup holder, which is provided with the packaging. The appropriately sized cup inserter is then mounted on to the acetabular component. The threaded rod is tightened securely with the tightening bar and the inserter cap is then screwed onto the cup introducer handle **(Fig. 25)**.

2. Insertion of the Acetabular Component

Any remaining soft tissue which may prevent the acetabular component from seating during insertion should be excised.

The acetabular component is impacted into the prepared acetabulum using a heavy mallet. As much of the circumferential equatorial fins as possible should engage in the bony rim to ensure primary stability.

Because the risk of dislocation of *Metasul LDH* large diameter head is much lower than traditional diameter articulations, the acetabular component can be positioned to better fit the acetabulum to an extent from the conventional orientation to maximize bony support and fixation. Placement will generally fall within 40°–50° abduction angle and 10°–20° anteversion angle.

It is important to note that the CoCr is a stiffer material than titanium, and more force may be required to fully seat the acetabular component during final cup impaction.

Attention: It is critical that the fins fully engage in the anterior and posterior walls, not only to maximize primary stability but also to reduce the risk of psoas tendon irritation anteriorly. On occasion, particularly in cases of developmental hip dysplasia, the rim of the implant will be exposed in the posterosuperior quadrant of the acetabulum. This is acceptable (Fig. 26).

3. Final Impaction of the Acetabular Component

When the acetabular component is seated and stable, the cup inserter is removed by unscrewing the inserter cap and loosening the threaded rod with the tightening bar. The appropriately sized final cup impactor should be used to complete the insertion of the acetabular component. The key to final implant placement is to engage as much of the equatorial fins as possible and to fully seat the cup to the level previously identified using the trial **(Fig. 27)**.

Note: Only the cup impactor should be used for final impaction of the acetabular component.

Warning: The *Durom* acetabular component should not be adjusted in the acetabulum after impaction. Moving the cup will dislodge the circumferential equatorial fins, disrupt the prepared bed of the acetabulum, and will make it difficult to reengage the fins in the rim of the acetabulum. This can compromise fixation of the cup.

4. Reduction with Femoral Trial

Following reduction the circumference of the acetabular component is checked to make sure there is no entrapment of soft tissues. The hip is then checked for range of movement, impingement, stability, and leg length.

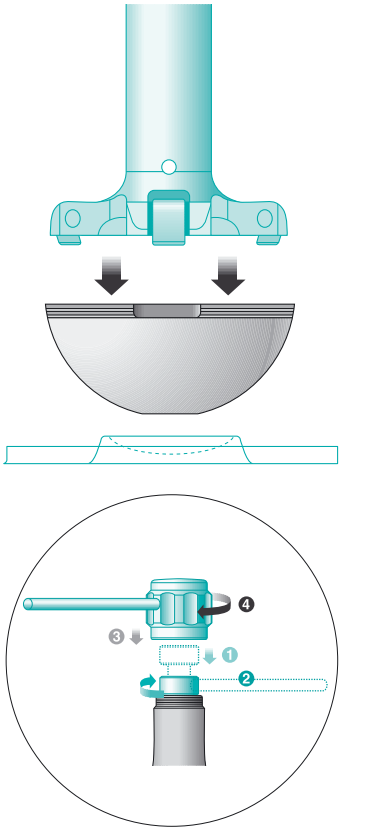


Fig. 25: Mounting the acetabular component

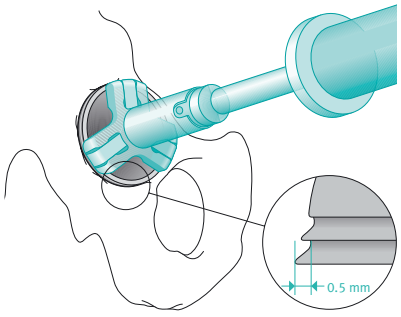


Fig. 26: Insertion of the acetabular component

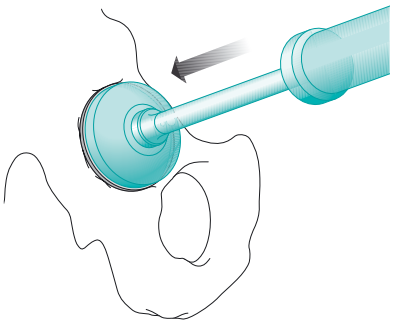


Fig. 27: Final impaction of the acetabular component

Femoral Implantation

1. Final Preparation of the Femoral Head

Cement keyholes are prepared in areas of sclerotic bone of the femoral head. Cysts in the femoral head should be meticulously curetted clear of soft tissue. Large cysts should be grafted with the acetabular reamings. Small cysts can be used as cement keyholes.

The femoral head is then cleaned using pulsed lavage. The guide-rod hole may be suctioned just prior to cementation, to ensure that the femoral head is free from blood.

2. Cementation

The femoral component is filled to the level of the internal recesses with bone cement **(Fig. 28).** When there are large defects in the femoral head, more bone cement may be required. Either normal-viscosity or low-viscosity cement can be used.

Caution

The slim femoral stem is an alignment device and is not designed to transmit force. Cement should therefore not be placed around the stem or down the guide rod hole.

3. Implanting the Femoral Component

The recesses around the mouth of the implant allow egress of cement and consequently controlled pressurization. The femoral component should be introduced onto the prepared femoral head when the cement is at the early doughy stage. The time taken to reach this stage is dependent upon a wide range of factors including operating room temperature, cement storage conditions and cement type, but in general is ~2 min. for normal-viscosity cement and ~4 min. for low-viscosity cement.

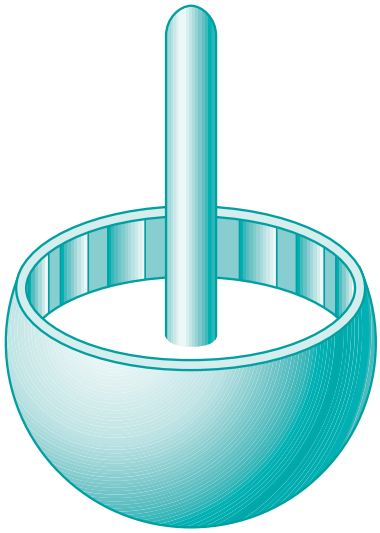


Fig. 28: Bone cement in *Durom* hip resurfacing femoral component

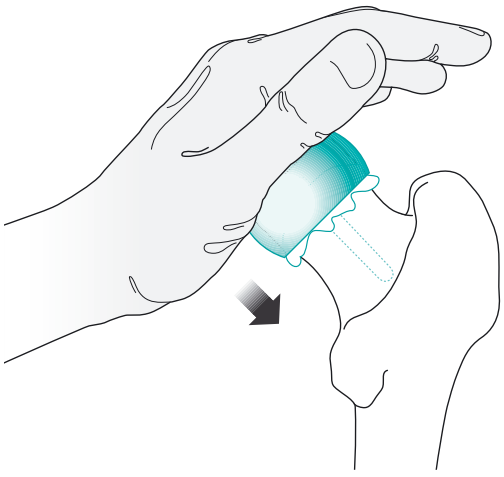


Fig. 29: Femoral component pushed onto the femoral head manually

The femoral component is pushed onto the femoral head manually or using the femoral pusher **(Fig. 29, 30).** Forceful impaction should not be required to fully seat the component, as excess cement can escape under pressure through the cement recesses. All extruded cement around the periphery of the femoral component is removed. The femoral head is thoroughly cleaned with pulsed lavage and wet swabs.

Attention!
The cement must be allowed to set fully before reduction.

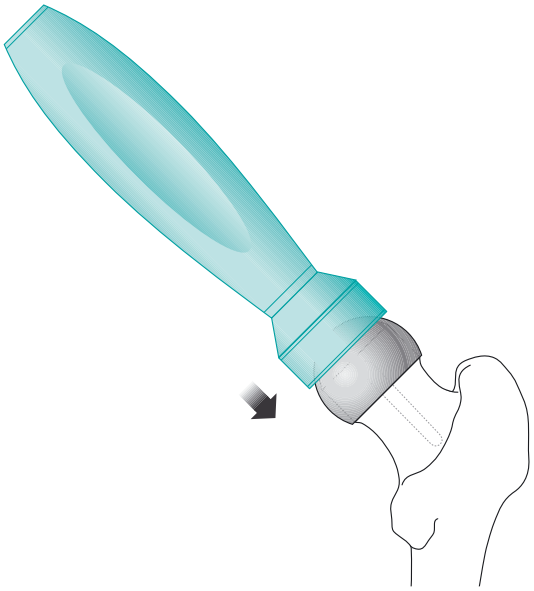


Fig. 30: Femoral component pushed using the femoral pusher

4. Reduction

The acetabular component is exposed by retraction of the posterior capsular flap. The assistant then reduces the femoral component by longitudinal traction and external rotation of the leg **(Fig. 31).** It is important to ensure that the femoral component does not make contact with the edge of the acetabular component, as this could result in scratching. Following reduction the circumference of the acetabular component is checked to make sure there is no entrapment of soft tissue. The hip is then checked for range of movement, impingement, stability, and leg length.

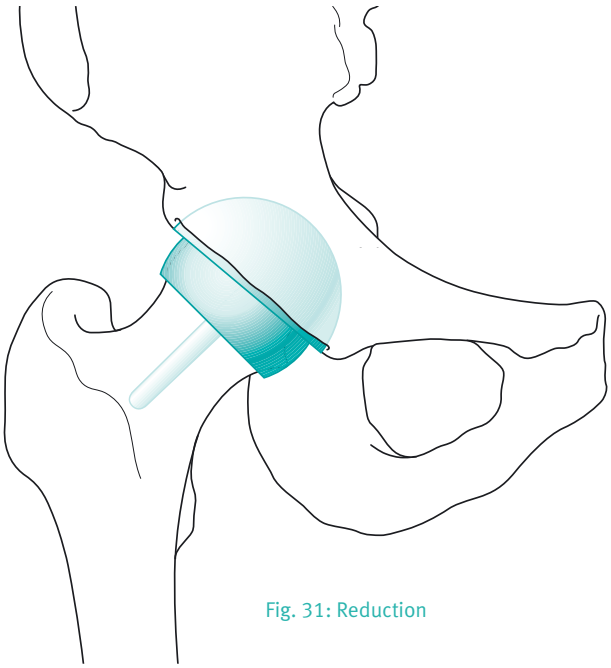


Fig. 31: Reduction

Closure and Aftercare

The capsule and short external rotators are meticulously repaired to the posterior edge of the greater trochanter. The wound is then closed in layers. Wound drains are placed at the discretion of the surgeon.

Patients are generally mobilized the day after surgery, light partial weight-bearing on their operated leg. Progression to full weight-bearing is dependent on the individual surgeon's protocol, but need not be different from stemmed hybrid hip replacements.

Centering Jig

Part Description

The *Durom* centering jig is composed of 6 parts which are assembled sequentially. To facilitate the assembly the parts are marked with Roman numerals.

I baseplates, small and large

II connection slide

III large locking ring

IV oval ring

V cannulated rod

VI small locking ring

VII baseplate holders, small and large

Jig Assembling

1. Place the baseplate (I) onto the corresponding black baseplate holder.

2. Slide the connection slide (II) onto the baseplate (I).

3. Assemble the oval ring (IV) and the large locking ring (III) by screwing the large locking ring onto the oval ring. Mount the assembled part on the connection slide (II).

4. Place the cannulated rod (V) into the top opening of the oval ring (IV) and secure the jig by screwing the small locking ring (VI) into the oval ring.

Finally, slightly loosen the small ring (VI) so that the baseplate can be removed from the jig and attached to the baseplate impactor/extractor.

Durom® Hip Resurfacing System

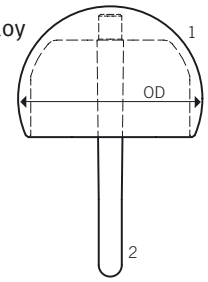
Implants

Durom® Femoral Component

Durom® Acetabular Component

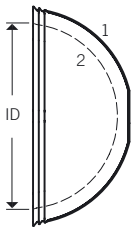
[1] Protasul®-21 WF Alloy
[2] Protasul®-20 Alloy
cemented

STERILE R



[1] Porolock® Surface (Ti-VPS)
[2] Protasul®-21 WF Alloy
uncemented

STERILE R



Size = OD* [mm]	Code	REF
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42	H	01.00211.142
44	J	01.00211.144
46	L	01.00211.146
48	N	01.00211.148
50	P	01.00211.150
52	R	01.00211.152
54	T	01.00211.154
56	V	01.00211.156
58	X	01.00211.158
60	Z	01.00211.160

Size	ID** [mm]	Code	REF
44	38	D	01.00214.044
46	40	F	01.00214.046
48	42	H	01.00214.048
50	44	J	01.00214.050
52	46	L	01.00214.052
54	48	N	01.00214.054
56	50	P	01.00214.056
58	52	R	01.00214.058
60	54	T	01.00214.060
62	56	V	01.00214.062
64	58	X	01.00214.064
66	60	Z	01.00214.066

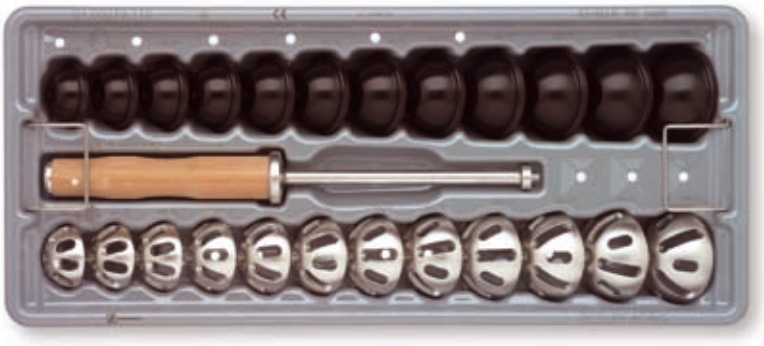
* OD = Outer Diameter
** ID = Inner Diameter

Instruments

Set for Durom Acetabular Component

Base tray acetabulum straight (complete)
REF
ZS01.00219.100

Base tray acetabulum straight (empty)
REF
01.00219.100



Insert for tray cup (empty)
REF
01.00219.110

Tray cover
REF
01.00029.031

All instruments not sterile

Base Tray Acetabulum Straight

Cup-coupling handle

REF
01.00219.815

Threaded rod for cup-coupling handle

REF
01.00219.816

Impactor head for handle

REF
01.00219.817

Cup inserters

Size	REF
44/D	01.00219.382
46/F	01.00219.402
48/H	01.00219.422
50/J	01.00219.442
52/L	01.00219.462
54/N	01.00219.482
56/P	01.00219.502
58/R	01.00219.522
60/T	01.00219.542
62/V	01.00219.562
64/X	01.00219.582
66/Z	01.00219.602

Tightening bar

REF
01.00219.820

On Request

Positioning guide 40°

REF
75.85.19

Positioning guide 45°

REF
01.00219.845

Positioning bar

REF
75.85.00

Insert for Tray Cup

Cup impactors

Size	REF
44/D	01.00219.384
46/F	01.00219.404
48/H	01.00219.424
50/J	01.00219.444
52/L	01.00219.464
54/N	01.00219.484
56/P	01.00219.504
58/R	01.00219.524
60/T	01.00219.544
62/V	01.00219.564
64/X	01.00219.584
66/Z	01.00219.604

Trial cups

Size	REF
44/D	01.00219.381
46/F	01.00219.401
48/H	01.00219.421
50/J	01.00219.441
52/L	01.00219.461
54/N	01.00219.481
56/P	01.00219.501
58/R	01.00219.521
60/T	01.00219.541
62/V	01.00219.561
64/X	01.00219.581
66/Z	01.00219.601

Handle for trial cup/cup impactor

REF
01.00219.808

Instruments

Set for Durom Femoral Component

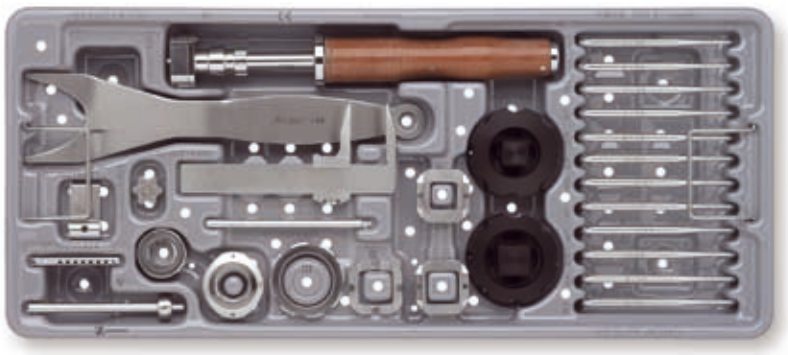
Tray femur I (complete)
REF
ZS01.00219.121

Tray femur I (empty)
REF
01.00219.121

Tray cover
REF
01.00029.031

Base tray femur II (complete)
REF
ZS01.00219.141

Base tray femur II (empty)
REF
01.00219.141



Insert tray femur II (empty)
REF
01.00219.150

Tray cover
REF
01.00029.031

All instruments not sterile

Tray Femur I

Cylinder cutters modular

Size	REF
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40/F	01.00219.240
42/H	01.00219.242
44/J	01.00219.244
46/L	01.00219.246
48/N	01.00219.248
50/P	01.00219.250
52/R	01.00219.252
54/T	01.00219.254
56/V	01.00219.256
58/X	01.00219.258
60/Z	01.00219.260

Chamfer cutters modular

Size	REF
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42/H	01.00219.429
44/J	01.00219.449
46/L	01.00219.469
48/N	01.00219.489
50/P	01.00219.509
52/R	01.00219.529
54/T	01.00219.549
56/V	01.00219.569
58/X	01.00219.589
60/Z	01.00219.609

Driver shaft for modular cutter

REF
01.00219.823

Modular femoral head planer*

REF
01.00219.850

Guide rod

REF
01.00219.803

Guide rod extractor

REF
01.00219.821

Drill

REF
01.00219.804

Guide wire extractor (k-wire)

REF
01.00219.825

Retaining screw

REF
01.00219.826

Kirschner wire

Size	REF	Quantity
150 mm x 2.5 mm	290.25.150	2
310 mm x 2.5 mm	290.25.310	2

* New instead of 01.00219.827

Base Tray Femur II

Femoral pusher

REF
01.00219.819

Femoral trials

Size	REF
38/D	01.00219.387
40/F	01.00219.407
42/H	01.00219.427
44/J	01.00219.447
46/L	01.00219.467
48/N	01.00219.487
50/P	01.00219.507
52/R	01.00219.527
54/T	01.00219.547
56/V	01.00219.567
58/X	01.00219.587
60/Z	01.00219.607

Sizing gauge

Size	REF
38/D	01.00219.838
40/F	01.00219.840
42/H	01.00219.842
44/J	01.00219.844
46/L	01.00219.846
48/N	01.00219.848
50/P	01.00219.851
52/R	01.00219.852
54/T	01.00219.854
56/V	01.00219.856
58/X	01.00219.858
60/Z	01.00219.860

On Request

Protractor

REF
5885

All instruments not sterile

Insert Tray Femur II

Stylus

Size	REF
38/D	01.00219.383
40/F	01.00219.403
42/H	01.00219.423
44/J	01.00219.443
46/L	01.00219.463
48/N	01.00219.483
50/P	01.00219.503
52/R	01.00219.523
54/T	01.00219.543
56/V	01.00219.563
58/X	01.00219.583
60/Z	01.00219.603

Stylus connector

REF
01.00219.811

Centering jig (consists of 5 parts)

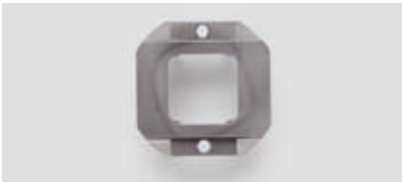
REF
01.00219.800

Baseplate impactor/extractor

REF
01.00219.801

Baseplate holder

Size	REF
Standard	01.00219.802
Small	01.00219.818



Baseplate

Size	REF
Small	01.00219.812
Sandard	01.00219.814

Calliper

REF
01.00219.807

Tightening bar

REF
01.00219.820

Femoral head elevator

REF
01.00219.822

Antenna adaptor

REF
01.00219.824

Retaining screw

REF
01.00219.826

Optional Instrumentation

Curved Instrument Set for Durom Acetabular Component

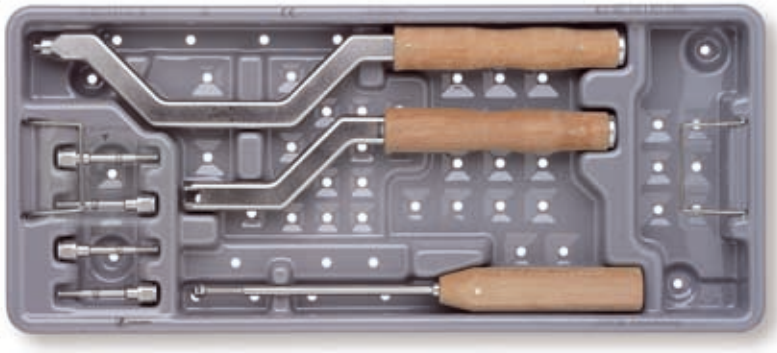
Base tray I acetabulum curved (complete)
REF
ZS01.00219.105

Base tray I acetabulum curved (empty)
REF
01.00219.103

Tray cover
REF
01.00029.031

Base tray II acetabulum curved (complete)
REF
ZS01.00219.110

Base tray II acetabulum curved (empty)
REF
01.00219.101



Inlay tray II acetabulum curved (empty)
REF
01.00219.102

Tray cover
REF
01.00029.031

All instruments not sterile

Base Tray I Acetabulum Curved

Cup impactors

Size	REF
44/D	01.00219.384
46/F	01.00219.404
48/H	01.00219.424
50/J	01.00219.444
52/L	01.00219.464
54/N	01.00219.484
56/P	01.00219.504
58/R	01.00219.524
60/T	01.00219.544
62/V	01.00219.564
64/X	01.00219.584
66/Z	01.00219.604

Trial cups

Size	REF
44/D	01.00219.381
46/F	01.00219.401
48/H	01.00219.421
50/J	01.00219.441
52/L	01.00219.461
54/N	01.00219.481
56/P	01.00219.501
58/R	01.00219.521
60/T	01.00219.541
62/V	01.00219.561
64/X	01.00219.581
66/Z	01.00219.601

On Request

Positioning guide 40°

REF 75.85.19

Positioning guide 45°

REF 01.00219.845

Positioning bar

REF 75.85.00

Base Tray II Acetabulum Curved

Cup inserter curved

Size	REF
44/D	01.00219.644
46/F	01.00219.646
48/H	01.00219.648
50/J	01.00219.650
52/L	01.00219.652
54/N	01.00219.654
56/P	01.00219.656
58/R	01.00219.658
60/T	01.00219.660
62/V	01.00219.662
64/X	01.00219.664
66/Z	01.00219.666

Insert Tray II Acetabulum Curved

Handle for trial cup/cup impactor

REF 01.00219.835

Screwdriver for extraction

REF 01.00529.101

Screws (2 needed per handle)

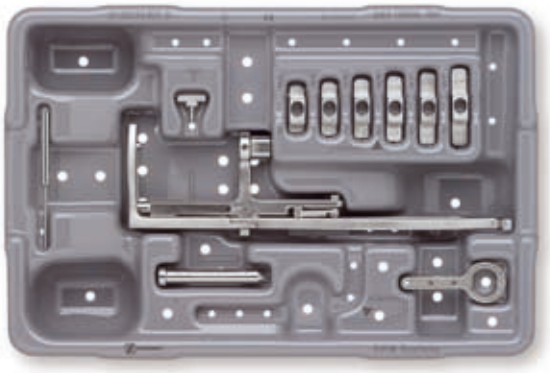
REF 01.00219.834

Inserter handle curved

REF 01.00219.833

Optional Instrumentation

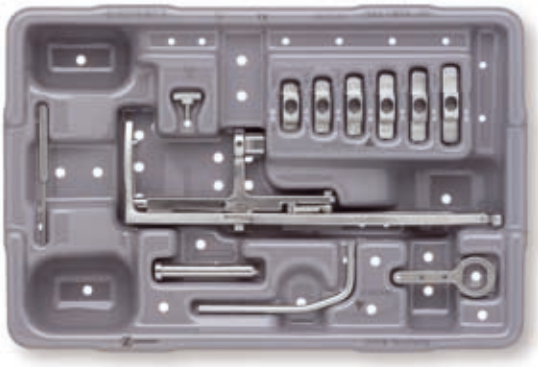
Alternative Centering Device Tray



Alternative centering device tray (without arc)
REF
ZS01.00219.150

Alternative centering device tray (empty)
REF
01.00219.903

Tray cover
REF
01.00029.033



Alternative centering device tray (with arc)
REF
ZS01.00219.151

Alternative centering device tray (empty)
REF
01.00219.903

Tray cover
REF
01.00029.033

Alternative centering device
REF
01.00219.900

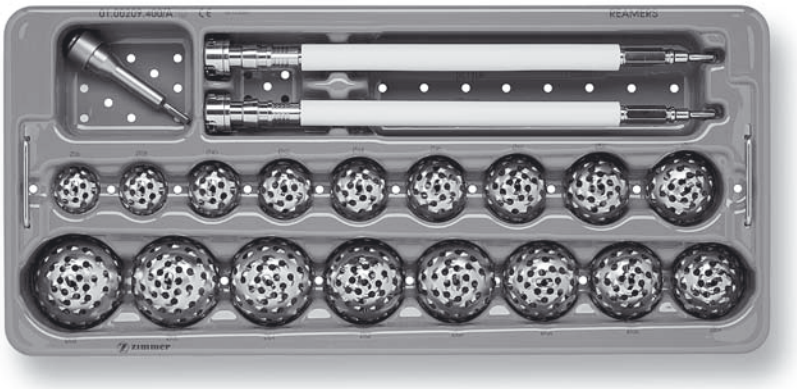
Stopper
REF
01.00219.901

Arc
REF
01.00219.902

All instruments not sterile

Optional Instrumentation

Spherical Reamers



Tray for spherical reamers (complete)
REF
ZS01.00209.400

Tray for spherical reamers (empty)
REF
01.00209.400

Tray cover
REF
01.00029.031

Adapter AO-3 jaw chuck
REF
5637*

Adapter AO-Zimmer-Hudson
REF
840.5015*

Drive shafts for 4-strut reamers, EZ clean

Size	REF
260 mm (short)	01.00209.401*
360 mm (long)	01.00209.402

4-strut spherical reamer

∅ mm	REF
36	01.00209.436*
38	01.00209.438*
40	01.00209.440
42	01.00209.442
44	01.00209.444
46	01.00209.446
48	01.00209.448
50	01.00209.450
52	01.00209.452
54	01.00209.454
56	01.00209.456
58	01.00209.458
60	01.00209.460
62	01.00209.462
64	01.00209.464
66	01.00209.466
68	01.00209.468

* On request

Optional Instrumentation

Odd Reamers

Tray acetabulum sizes 41–67 (complete)

REF
ZS01.00209.200

Tray acetabulum sizes 41–67 (empty)

REF
01.00209.074

Tray cover

REF
01.00029.031

Spherical reamers

Size	REF
41	01.00209.441
43	01.00209.443
45	01.00209.445
47	01.00209.447
49	01.00209.449
51	01.00209.451
53	01.00209.453
55	01.00209.455
57	01.00209.457
59	01.00209.459
61	01.00209.461
63	01.00209.463
65	01.00209.465
67	01.00209.467

All instruments not sterile

References

1 Rieker CB, Schön R, Köttig P. Development and validation of a second-generation metal-on-metal bearing. J Arthrop 2004; Vol 19 No. 8 & Suppl. 3; 5–11
2 Data on file at Zimmer

Contact your Zimmer representative or visit us at www.zimmer.com

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