



Fitmore® Hip Stem

Product Information



Inspired by individual anatomy

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Product Information The Fitmore Hip Stem

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Inspired by Individual Anatomy

Optimal reconstruction of offset is a crucial part of today's Total Hip Arthroplasty. Conventional stems often fail to match individual anatomy. In most cases offset is linked to stem sizing and as a result, one's ability to restore natural joint kinematics can be limited.

The *Fitmore* Hip Stem shape is the result of close observations of individual anatomy in a large patient population in Europe and the USA. In order to provide optimal reconstruction options one important step became obvious during development: offset must be **independent** from stem size. As a consequence, three different medial stem curvatures were designed.

Given today's younger and more active patients consideration was also devoted to preservation of muscle insertions and bone in the region of the greater trochanter and compatibility with less-invasive surgical techniques. The curved stem shape meets both requirements and eases implantation.

Primary stability is achieved by the press-fit fixation and by a triple-tapered design that allows even load distribution. Finally, a clinically proven* *Porolock*® Ti-VPS Coating in the proximal part was chosen to enhance bone ongrowth.

* i.e. Ingrowth surfaces: Plasma spray coating to titanium alloy hip replacements; RB Bourne, CH Rorabeck, BC Burkart, PG Kirk, Clinical orthopaedics and related research, Vol 298, 1994; p37–46

Design Rationale

Design Features at a Glance

1. 3 different Stem Families with 4 Offset Options

- Small stems with large offsets and vice versa
- Reduces the risk of inadequate reconstruction of length/offset
- Medial curvature that closely follows the natural cortex in order to enhance rotational stability

2. Curved Stem Design

- Preservation of bone in the region of the greater trochanter and of gluteal muscle insertions
- MIS enabled

3. Shortened and Flattened Stem

- Cancellous bone preservation
- Possibility to correct for a pathologic ante- or retroversion

4. Porolock TiVPS and Protasul® 64

- Clinically proven pure titanium coating supporting primary stability and secondary biological fixation

5. Optimized Neck Geometry

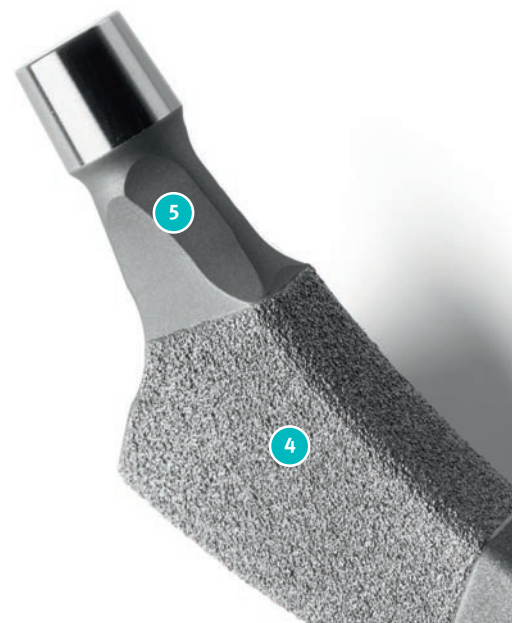
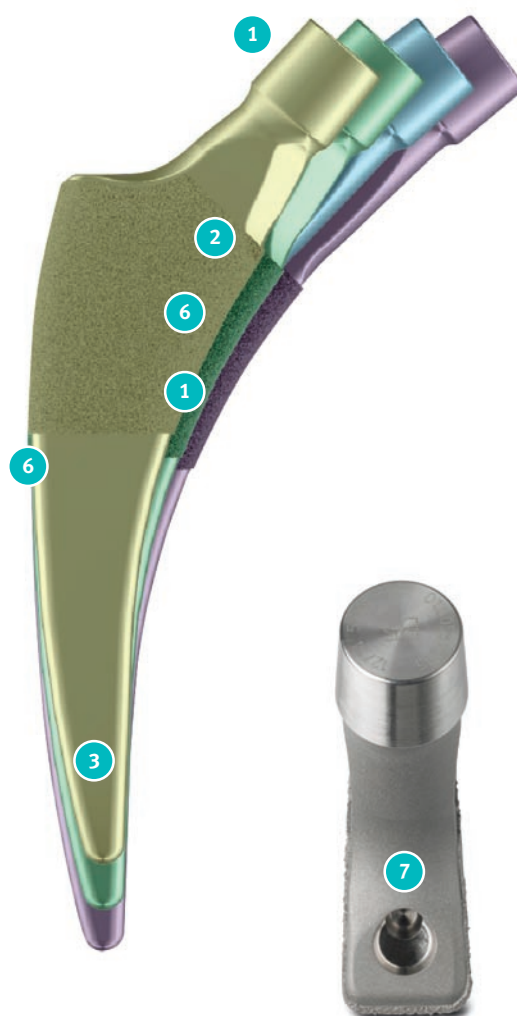
- V-shaped neck or slim neck/short cone geometry to optimize range of motion across all families

6. Proximal Fixation

- m/l: medial curvature and lateral cortex
- a/p: 3-point fixation

7. Triple Taper and Trapezoidal Cross Section

- Supports axial and rotational stability
- Enhances even distribution of load within the metaphyseal region



Research Supporting the Design

When using conventional stems, surgeons are often forced to compromise offset in order to accommodate a narrow medullary canal. Offset should not be dictated by stem size. This was the starting point for the designers of the *Fitmore* Hip Stem. In the belief that this stem should derive rotational stability from contact in the calcar region, fit in this region was also a priority.

A study of 497 x-rays conducted in Switzerland¹ confirmed that the final design of the *Fitmore* Hip Stem covered nearly all measured patient offsets:

In addition, preoperative planning was performed for 100 out of the 497 patients x-rays:

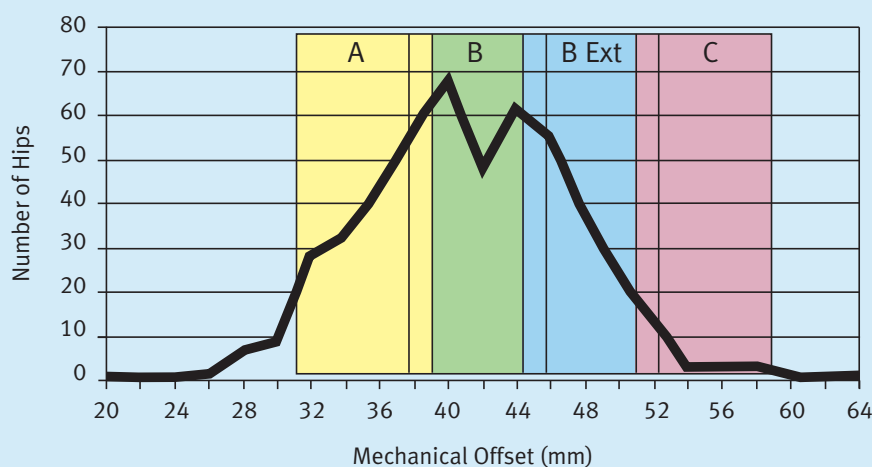
- 46% of patients were male and 54% were female, with an age range between 24 and 86 years
- The *Fitmore* Hip Stem fit all cases
- Families B and B Ext covered 69% of patient anatomies
- Families A, B, and B Ext covered 93% of patient anatomies
- Sizes 4 to 9 covered 75% of patient anatomies

In order to confirm the 3-D fit of the stem design 139 cases were virtually implanted in American cadaveric femurs:

- 47 females and 92 males
- The *Fitmore* Hip Stem fit in all investigated femurs
- Families B and B Ext covered 70% of all femurs
- Families A, B and B Ext covered 99% of all femurs
- Sizes 5 to 10 covered 79% of all femurs

**The *Fitmore* Hip Stem:
Inspired by individual anatomy**

Fitmore Stem and Mechanical Offset



¹ Unpublished, Zimmer internal data

Reconstruction of the Individual Anatomy

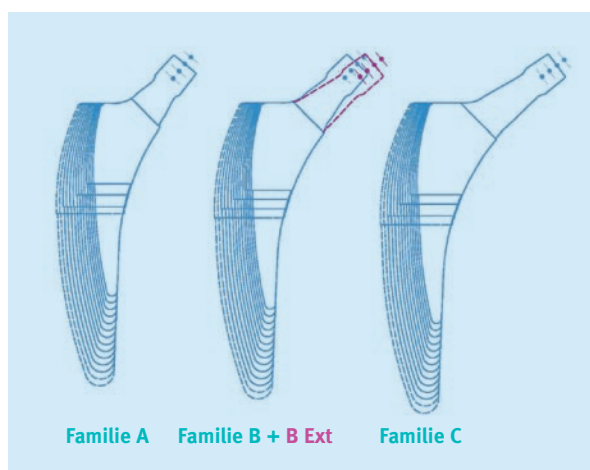
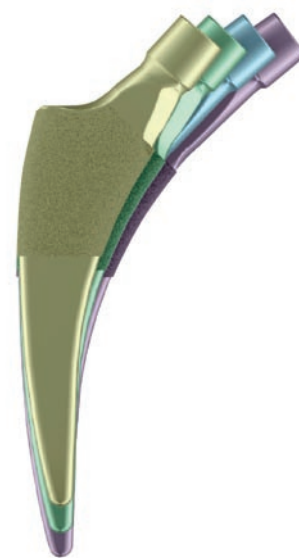
With conventional uncemented stems a surgeon may be forced to use a relatively small stem to fit a narrow canal and thus compromise neck length and total offset. Conversely, a relatively capacious canal may require a large stem with too much leg length and offset.

Inability to recreate offset can lead to bone–bone impingement. Resolving such a solution can require excessive resection of bone and the use of skirted heads.

The *Fitmore* Hip Stem offers the distinct advantage that the growth of the offset is independent from the growth of the stem body: a step closer to respecting the individual anatomy. As a result the portfolio consists of:

- Stems with larger offset that accommodate thinner medullary canals (small stem body)
- Stems with smaller offset that accommodate larger femoral canals (large stem body)

Moreover, as the stem size grows in the lateral direction within the same family, a change of offset can be done without affecting leg length.



	Offset Range
Family A:	31 mm–39 mm
Family B:	37 mm–45 mm
Family B Ext:	44 mm–52 mm
Family C:	51 mm–59 mm

The offset range is even wider considering the different head sizes.

The *Fitmore* Hip Stem Offers a Combination of Innovative Design Elements:

- Each stem family has a different offset and medial contour which allows for a more accurate reconstruction of the patient's femoral anatomy.
- The stem is available in four offset versions with three different stem bodies.
- A large offset range, from 31 to 59 mm, allows for a more precise reconstruction or optimization of patient's offset.

Bone-conserving and Muscle-sparing Design

The short curved stem design of *Fitmore* Prosthesis follows the anatomical pathway and therefore conserves bone and protects muscles during preparation of the implant bed. Bone conservation is an important part of total hip arthroplasty. By removing as little bone as possible during a primary operation, more options for any potential future revision are left.

The *Fitmore* Hip Stem's short length and curved design preserve the patient's bone in the trochanteric region.

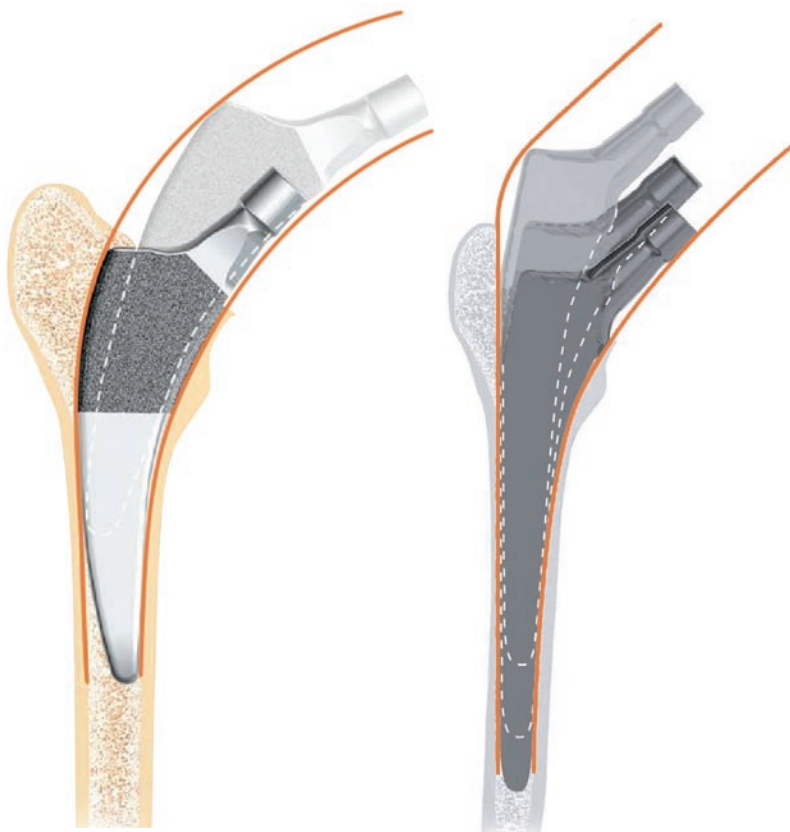
The *Fitmore* Rasps and Implants allow for a curved trajectory with insertion following the calcar arch. Therefore it is not necessary to interfere with the trochanteric bone and the muscle insertions.

Comparison *Fitmore* Hip Stem and *CLS® Spotorno®* Stem



Fitmore Stem: size 14 (L: 129 mm) – pink

CLS Spotorno 135° Stem: size 20 (L: 190 mm) – green



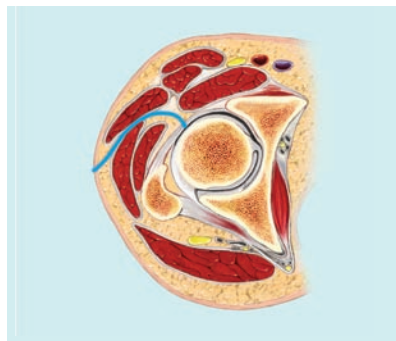
A Stem Adapted to MIS and not MIS Adapted to a Stem

As the *Fitmore* Hip Stem broaches follow the curvature of the femoral neck, it can be a less-invasive implant and therefore well suited for minimally invasive surgeries.

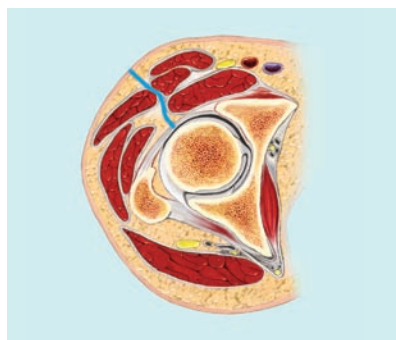
The stem is not linked to one approach but can be implanted by any of the less-invasive routes (with the exception of the MIS 2-incision technique).

Specially adapted rasp handles help the surgeon to perform his/her preferred approach.

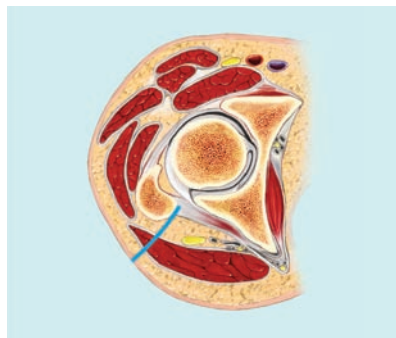
MIS anterolateral (supine and lateral)



MIS anterior supine



MIS posterior

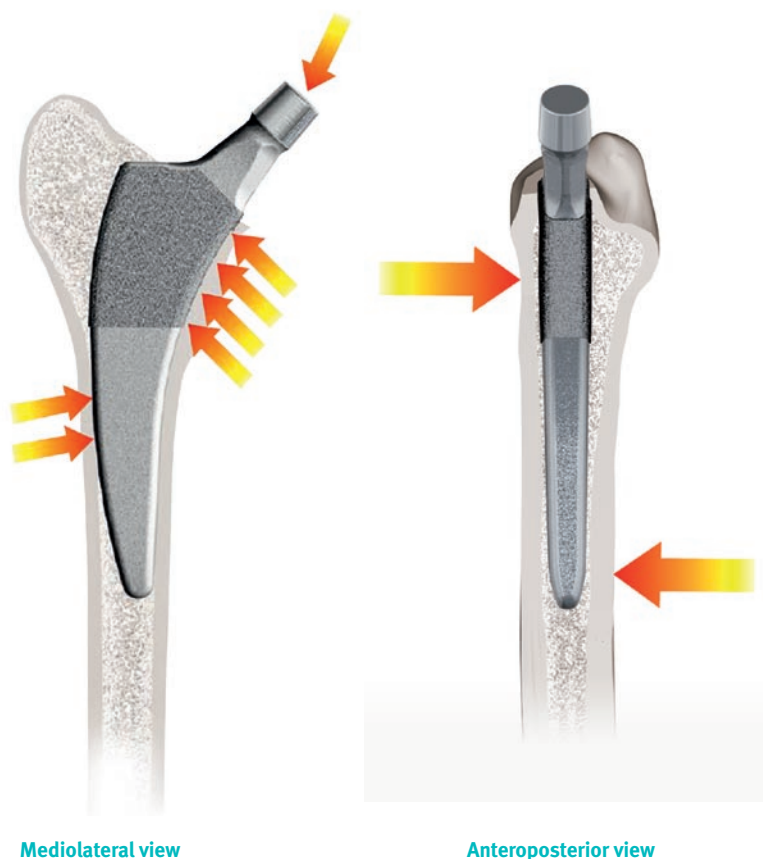


Primary and Secondary Fixation Elements

The Primary Fixation

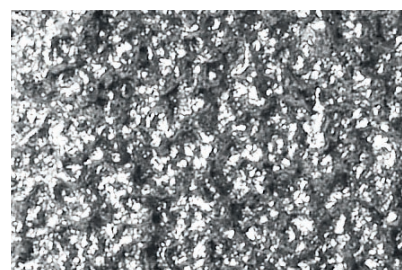
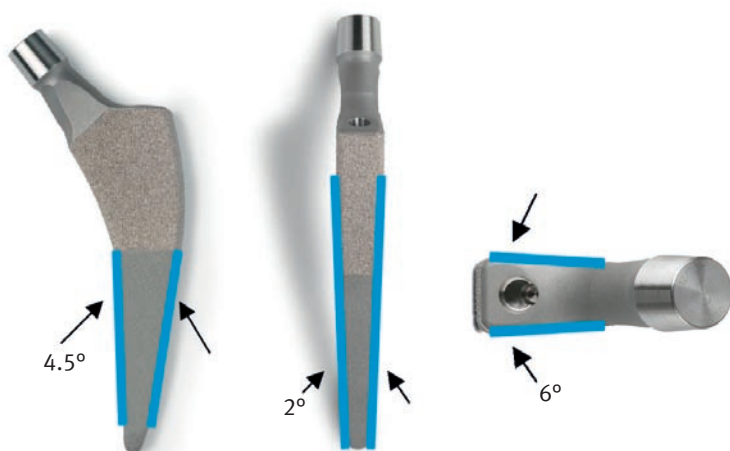
In order to provide durable fixation an excellent primary stability is mandatory. The *Fitmore* Hip Stem anchorage concept is based upon an apposition to the calcar, which is supported by the three different medial stem curvature options. This medial contact is facilitated by contact against the lateral cortex with axial loads. In the anteroposterior plane self-locking within the natural curvature of the femur occurs. A slightly oversized Ti-VPS coating enhances primary stability and proximal fixation. A stable implant position is thus achieved by four contact zones.

In addition fixation and rotational stability is enhanced by a triple-tapered stem design.



Mediolateral view

Anteroposterior view



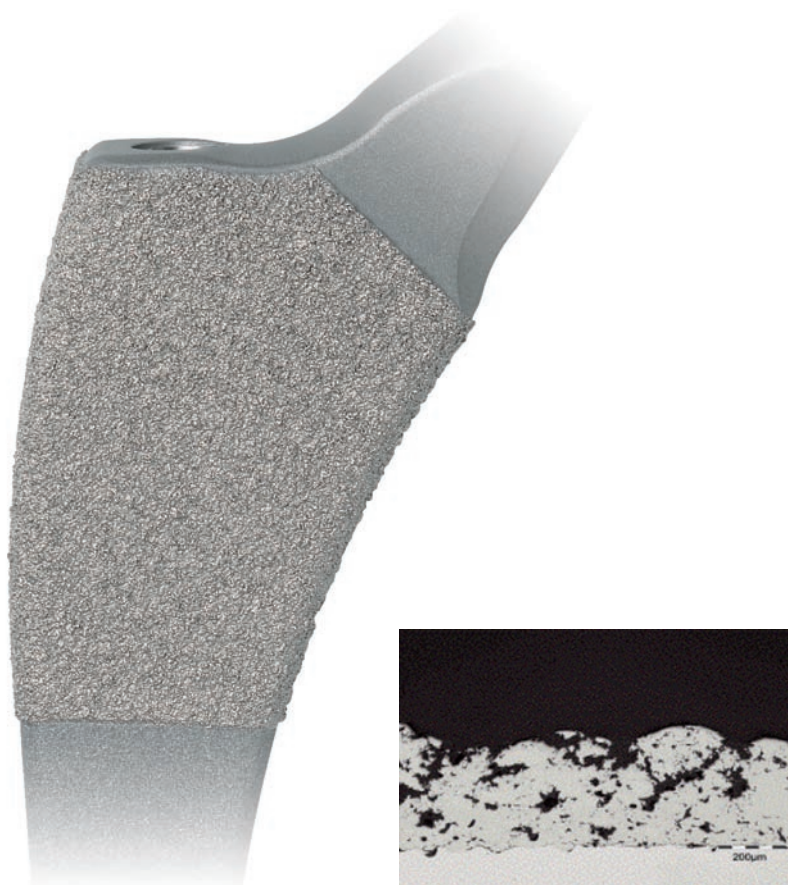
Coating

Secondary Fixation

The *Fitmore* Hip Stem is made of *Protasul* 64WF (TiAl6V4), an osteophilic titanium alloy, which has proven its clinical effectiveness² with many modern total hip stems.

In addition, Ti-VPS, a coating of pure titanium, is applied to the proximal surface of the stem using an advanced vacuum plasma spray technology. Laboratory tests have demonstrated an adhesive strength significantly exceeding the FDA requirements of 22 MPa.³ Ti-VPS has been a standard coating for biological fixation in the orthopaedic industry for decades.

The optimal pore size, porosity and biocompatibility of the Ti-VPS surface supports bone ongrowth and enhanced osseointegration needed for long-term stability.



² i.e. Ingrowth surfaces: Plasma spray coating to titanium alloy hip replacements; RB Bourne, CH Rorabeck, BC Burkart, PG Kirk, Clinical orthopaedics and related research, Vol 298, 1994; p 37–46

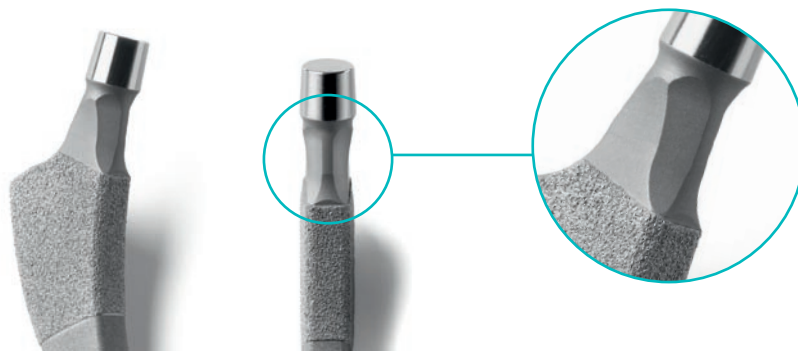
³ Guidance for Industry on the Testing of Metallic Plasma Sprayed Coatings on Orthopedic Implants to Support Reconsideration of Postmarket Surveillance Requirements. FDA, February 2000.

Optimized Range of Motion

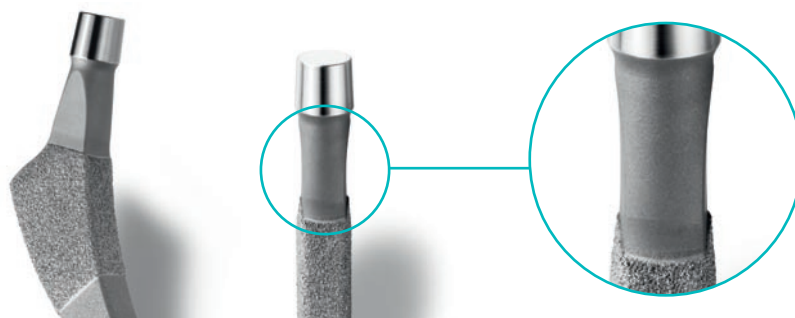
By optimizing muscle force and providing adequate clearance between trochanter and pelvis, restoration of physiologic offset is an important concept in today's total hip arthroplasty.

Beside the improvement of the patient's quality of life, its bio-mechanical aspects play an important role in regard to a long-term survival of the implant. Smaller offset usually impacts the range of motion and the risk of impingement may be increased.

In order to achieve an optimized and consistent range of motion even in anatomies requiring shorter neck lengths and resulting offsets, the neck design of the *Fitmore* Hip Stem has been adapted for families A and B. Zimmer's engineers developed the V-shaped neck.



Family A and B: V-shaped neck



Family B EXT and C: Round-shaped neck

Product Portfolio

Four Families to Fit the Patient's Individual Anatomy

The *Fitmore* Hip Stem family consists of 4 stem bodies with 3 different medial curvature designs: A, B, B Ext and C with 14 sizes⁴ each. Furthermore, the B family offers the advantage of two different offset options (B Extended).



Family A

Offset range: 31 mm–39 mm
 CCD angle: 140°
 14 sizes (sizes 1–14)



Family B

Offset range: 37 mm–45 mm
 CCD angle: 137°
 14 sizes (sizes 1–14)



Family B Extended Offset

Offset range: 44 mm – 52 mm
 CCD angle: 129°
 14 sizes (sizes 1–14)



Family C

Offset range: 51 mm – 59 mm
 CCD angle: 127°
 14 sizes (sizes 1–14)

Intraoperative Flexibility

As a result of the patient's individual anatomy, surgeons are often confronted to situations where they need to adapt their planning intraoperatively. Although proper and systematic preoperative planning should avoid such an occurrence – and is strongly recommended – the system still offers the flexibility to switch intraoperatively to a stem with more offset.

Please refer to the surgical technique for detailed explanations of the principles to be followed during templating.

⁴ Sizes 13 and 14 available upon request

Instruments

Adequate and precise instruments play an important role in today's total hip arthroplasty. Latest know-how was implemented during the development of the *Fitmore* Hip Stem instruments.

Rasps

The *Fitmore* Rasps were designed with a completely machined, diamond-cut surface structure, providing high accuracy for the subsequent implant insertion.

The rasp design features four different work areas:

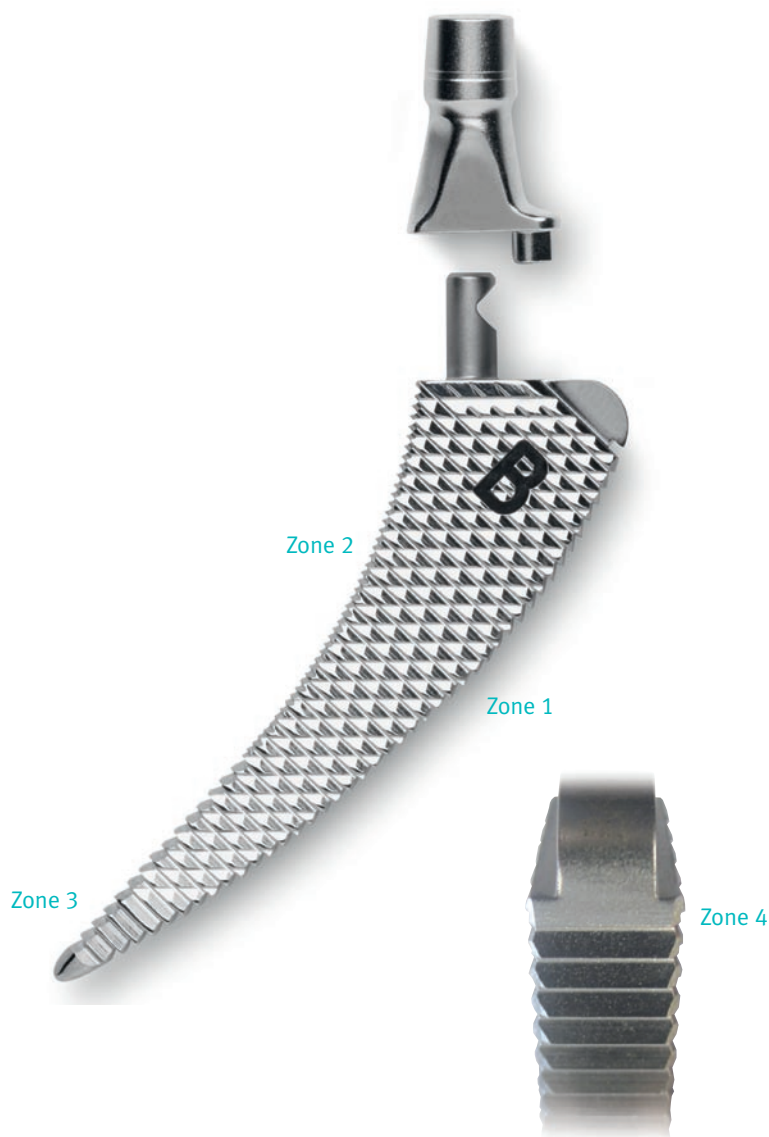
Zone 1: diamond-like macro-structure with smoothened teeth to compress rather than remove the cancellous bone on the anterior and posterior sides in order to obtain a better press-fit in the proximal femur.

Zone 2: medial area for preparation of the calcar – cutting teeth for an exact preparation of the cortical bone in the calcar region where the implant rests.

Zone 3: the rasp is longer than the implant in order to provide a better guidance into the distal canal.

Zone 4: cutting teeth to prepare the lateral cortex.

Each rasp is also marked by a letter identifying the family used and by a slot at its shoulder visualizing the shoulder of the corresponding implant during surgery.

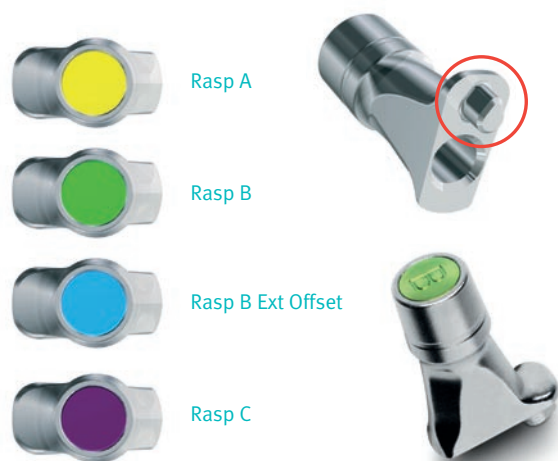


Trial Necks

All rasps have a modular neck enabling surgeons to perform trial reductions and precisely assess the mechanics of the hip.

During development Zimmer's engineers carefully listened to both surgeons and operating nurses when expressing their needs and expectations. The trial necks therefore facilitate the use of the instruments by providing:

- A connection to the rasp specific to each family
- A color coding specific by family
- The name of the family written on top of the neck



Rasp Handles

Various rasp handles are available to adapt the procedure to the surgeon's preferred approach.

All Mini approaches



Straight Rasp Handle
00-7712-050-60

MIS Anterolateral approach



MIS Double Offset
Rasp Handle
Left: 00-7712-035-01
Right: 00-7712-035-02

MIS Anterior approaches



MIS Rasp Handle
for Anterior Approach
(according to Judet)
00-7806-045-00



MIS Anterior Offset
Rasp Handle
00-7806-050-00



MIS Double Offset
Rasp Handle
Left: 00-7712-035-01
Right: 00-7712-035-02

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