

Avenir® Femoral Hip System



ZIMMER BIOMET
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Avenir Hip System

Intuitive and Reproducible

During its decade of experience in the bone compaction stem market, the Avenir Hip System has helped surgeons experience flexible, and reproducible surgeries, reportedly even for first users. The specific broaches were designed to allow a precise, balanced and intuitive femoral preparation to help reduce the risk of subsidence and foster long-term stability while offering surgeons straightforward operative techniques.

- **Offers Intraoperative Flexibility**

Cementless and cemented options are included within a single instrumentation platform.

- **Designed to Avoid Subsidence and Provide Surgical Reproducibility**

Bone compaction philosophy subtly balanced in order to allow cortical contact where needed.

- **Intuitive Surgical Approach**

Broach only technique and intuitive femoral preparation help facilitate efficient OR experience.





Avenir Cementless Stem

Surface Finish and Macro Structure Meant To Last

Long-term stability being the primary objective, the Avenir stem design consists of a straight bone compaction body with a proprietary scheme of ridges in all planes and a double-layered coating.

Macro-structure designed to facilitate distribution of loads

Metaphysis - Medial and Frontal Planes

Angled ridges designed to ease proper seating of the stem on the calcar

Diaphysis - Frontal Plane Vertical Ridges

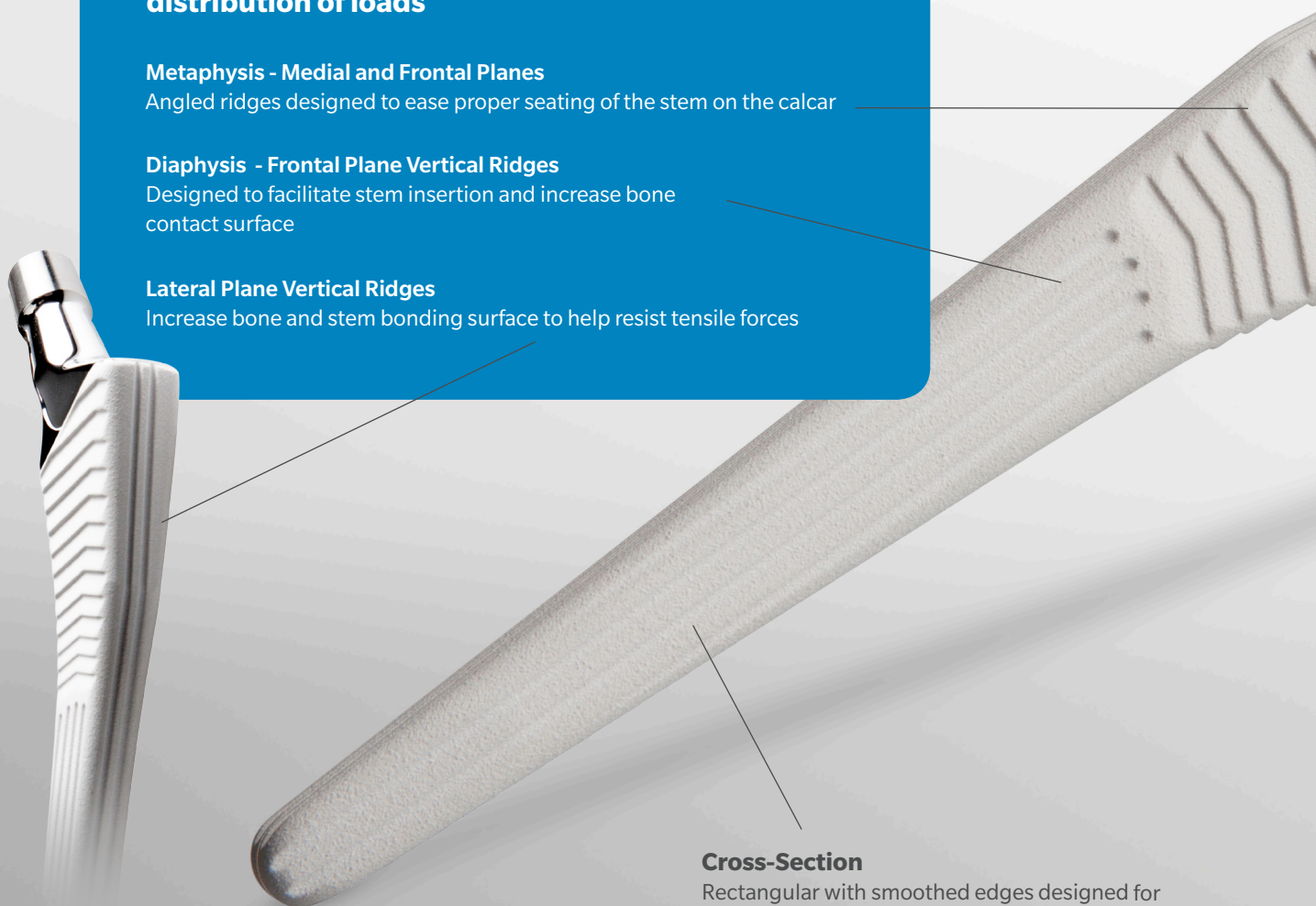
Designed to facilitate stem insertion and increase bone contact surface

Lateral Plane Vertical Ridges

Increase bone and stem bonding surface to help resist tensile forces

Cross-Section

Rectangular with smoothed edges designed for rotational stability while helping reduce the risk of bone cracking



Ti-6Al-4V

Forged titanium alloy, Protasul® - 64 WF supporting a double layered coating of vacuum plasma sprayed commercially pure titanium under a thin layer of hydroxyapatite

Fully Polished Neck

Designed to help reduce wear debris

12/14 Taper

Compatible with most of the Zimmer Biomet heads*

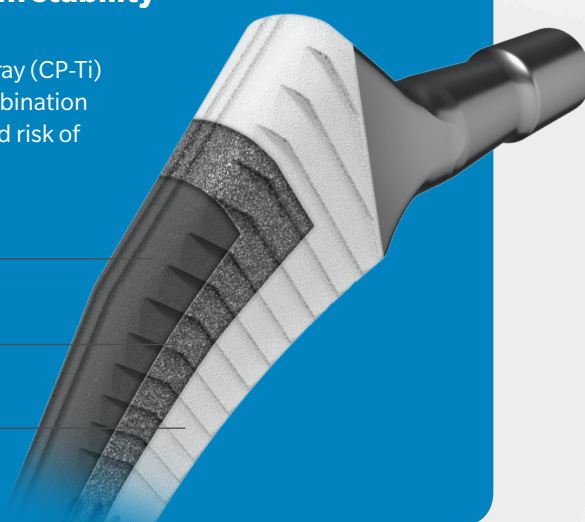
Double-layered coating designed for long-term stability

The undercoat of commercially pure titanium vacuum plasma spray (CP-Ti) allows the application of a thin hydroxyapatite top coat. This combination may help reduce the release of third body particles and associated risk of aseptic loosening.

Forged titanium alloy with sandblasted finish

Vacuum plasma spray of commercially pure titanium (50µm)

Hydroxyapatite coating (110µm)



* See Zimmer Biomet Compatibility website for more information www.zimmer.com/medical-professionals/support/product-compatibility.html

Avenir Cemented Stem

Line-to-Line Broaching & Cementing Techniques

The Avenir cemented stem offers a consistent combination of a line-to-line broaching technique with a line-to-line cementing technique.

Sizing Rationale

The Avenir brand includes cementless and cemented stems in standard and lateral versions with a constant CCD angle of 135°.

Each range includes 9 sizes, from 129 to 177 mm stem length.

In the frontal plane, the size increment is smaller for small sizes than between larger sizes allowing fine adjustment in small femoral canals.

2.3
2.2
1.8
1.5
1.4
1.1
1.0
0.9

6 mm
Lateralization

Constant
CCD angle
135°

Cross-Section

Rectangular with smoothed edges designed for rotational stability while helping reduce the risk of bone cracking

Highly Polished, forged Stainless Steel (Protasul® S-30)

Helps limit the release of wear debris, while the flexural strength of stainless steel helps prevent early debonding of the cement-stem interface and subsequent stem loosening.^{1,2}

Fully Polished Neck

Designed to help reduce wear debris

Taper 12/14

Compatible with most of the Zimmer Biomet heads*

Cementing Technique: Line-to-Line or French Paradox

A femoral canal filling stem induces a thin cement mantle sometimes incomplete with direct cortical contact in particular areas. This technique has shown good long-term results by protecting the cement mantle from three major factors:¹⁻⁴

- **Cracks:** A canal filling stem with rectangular cross-sections remains stable and minimizes solicitation in weakening of the cement mantle¹
- **Stress:** Thin cement mantle allows the transfer of loads from the stem to the bone²
- **Wear debris:** Polished stem prevents wear particles from being released into the femoral canal and cement mantle^{3,4}

- Cortical Bone
- Cement
- Stem

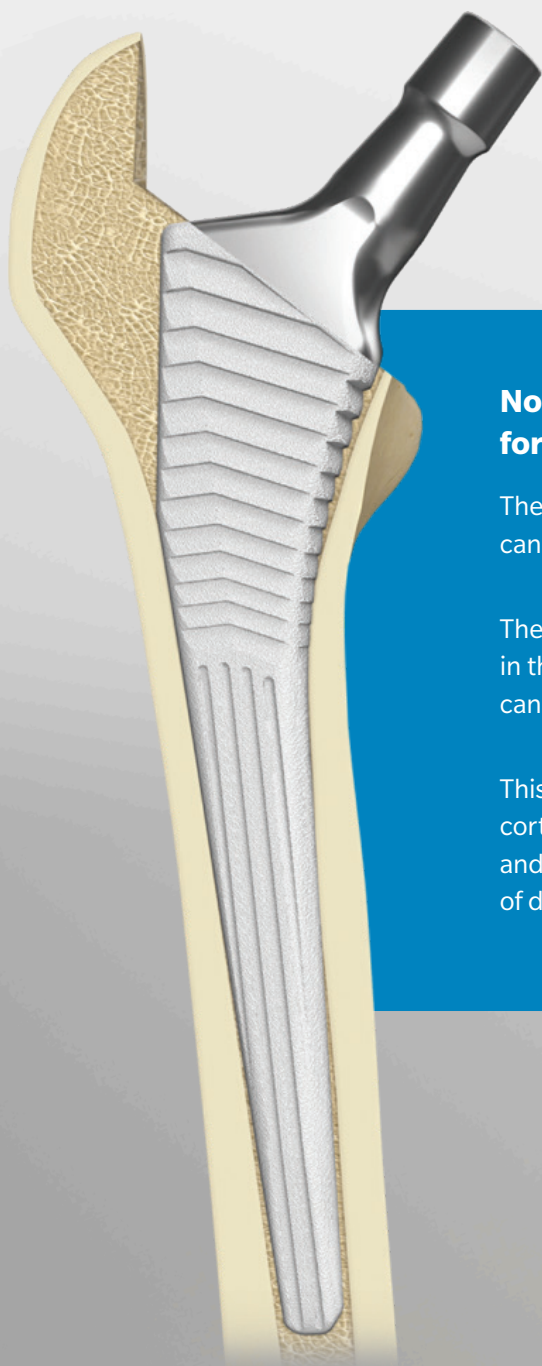


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Instrumentation

Bone Compaction System with a Unique Broach Design

The precise size match between Avenir Hip System rasps and final implant combined with its instrumentation platform including both cemented and cementless options, help surgeons experience straightforward, intuitive and reproducible surgeries.



Not a 100% Bone Compaction stem, for good reasons!

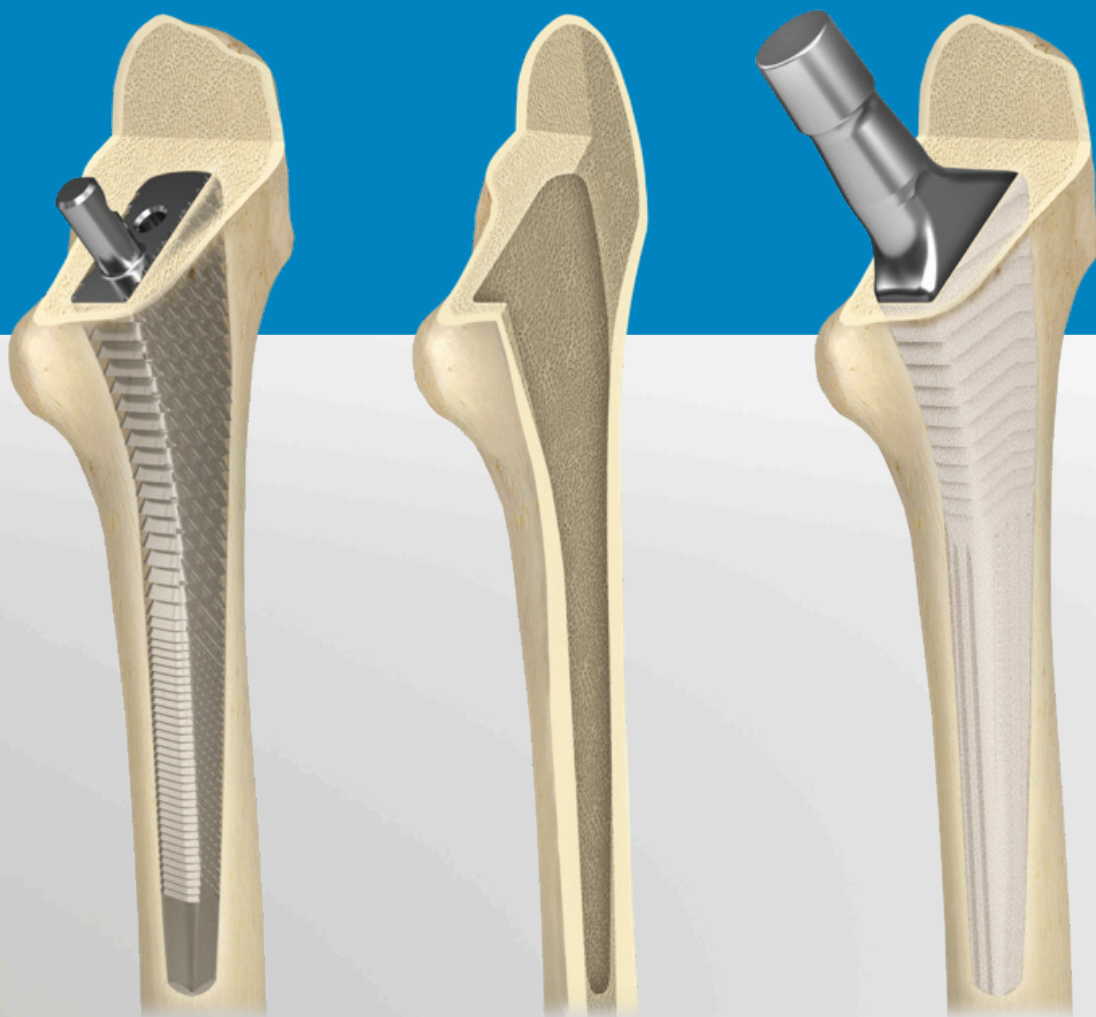
The Avenir Hip System offers a balance between cancellous and cortical bone contacts.

The rasp design favors compacted cancellous bone in the proximal and distal portions of the femoral canal and cortical contact in the metaphysis.

This concept of balanced bone compaction with cortical support where needed helps foster primary and rotational stability, while helping reduce the risks of distal locking, stress shielding and subsidence.

Accurate line-to-line sizing between rasp and implant allows reproducible surgery and helps reduce the risk of subsidence.

The size match between the rasp and the final implant is so precise that all resection lines on the bone, rasp and implant should be aligned. This technical feature helps reduce the risk of subsidence and allows for good management of leg length.



References

1. Janssen *et al.* Finite element analysis of the effect of cementing concepts on implant stability and cement fatigue failure. *Acta Orthopaedica*. 80 (3): 319–324. 2009.
2. Langlais *et al.* Annotation – the « French Paradox » - *The Journal of Bone & Joint Surgery*. 85B. 17-20. 2003
3. Martin Clauss *et al.* -Risk factors for aseptic loosening of Müller-type straight stems *Acta Orthopaedica* 2013; 84 (4): 353–359
4. Comba F. *et al.* The role of surface finish on the Survivorship of Cemented Femoral Stems for THA. *Minerva Orthopedic Traumatology* 56.65-75. 2005.

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