Revitan® Curved Revision Hip System

Proven technology for customized solutions

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Revitan Curved Revision Stem: Based on Clinically Proven[1,2,3] Implant Technologies

The modular *Revitan* System incorporates the knowledge gained from clinical experience with cementless revision surgery during the last 20 years*. The forged cobalt-chromium connection taper was introduced in 1990 and has been used successfully during[1,2] the past 15 years.

The modularity of the *Revitan* Curved Revision Stem allows the surgeon to treat a wide range of indications. *Revitan* Curved offers a flexible and customized solution for demanding revisions. The precision-manufactured forged CoCr connection taper provides strength and reliability to the *Revitan* Revision System.

The radius of the distal component is designed to fit the antecurvation of the femur and contributes to the good clinical results[4] achieved with *Revitan* Curved since its market introduction in 2002. There is an option to use locking screws to provide additional distal fixation.

The intraoperative flexibility of the system is supported by a totally modular instrument set. This set facilitates efficient fixation, control of component anchorage and leg length at each step of the surgery.

The *Revitan* Revision System has an optimized range of implants leading to a lean portfolio of only 33 implant components.

***Revitan* Curved allows the surgeon to take optimal advantage of the modular revision stem concept and to achieve reproducible results.**

* based on the *Wagner SL Revision*® (since 1987), PFM-R (since 1996) and Revisal-M (since 1996) systems

The Revitan Curved Implant System: The Distal Components

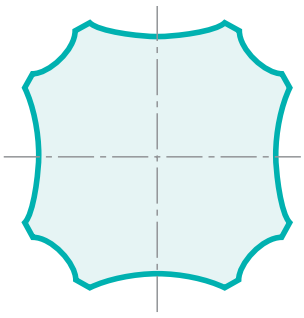
The distal components of the *Revitan* Curved are based on the Revisal M stem, which has shown excellent clinical outcomes[5] since its introduction in 1994.

The radius of the distal component is equal to that of the Revisal M stem and is designed to optimally fit the antecurvation of the femur. The benefits of this design feature have been confirmed through clinical experience with the Revisal M stem.[6]

The *Revitan* Curved distal components are available in three different lengths: 140, 200 and 260 mm. Their diameters are between 14 and 28 mm, provided in 2 mm increments.

The cross-section is octagonal with a rib on each edge providing high rotational stability. The stem has a 2° taper, which assures good primary anchorage and even distribution of the axial load. Furthermore, in the case of secondary subsidence, the movement of the component is reblocked due to the taper design.

All stems with diameter ≥ 18 mm and length ≥ 200 mm have holes for locking screws, with the possibility of static and dynamic fixation. Locking screws can be used to further improve stability of distally fixed implants in specific cases such as in osteoporotic bone or a deficient isthmus.



The octagonal cross section with ribs on each edge provides high rotational stability, and favors osseointegration.

The Proximal Components

The proximal components of the *Revitan* Revision System are available in two different designs: cylindrical and conical. Both are provided in six different lengths from 55 to 105 mm (in 10 mm increments). The distal and proximal components can be selected and combined to achieve the best anchorage and optimal leg length.

The slim neck and the short taper of the proximal *Revitan* Component enable large range of motion and reduce the risk of impingement.

The CCD angle is constant at 135° and the offset is 44 mm, allowing for good function of the gluteal muscles. There are two holes in the medial part for nonmetallic sutures.

Dorsal and ventral ribs allow a press-fit in the tensile and compressive stress-free zone of the proximal femur.

The conical component contributes significantly more to efficient primary anchorage than a cylindrical component in the case of a metadiaphyseal anchorage with the endofemoral approach. This is due to the additional and larger ribs and the shape and volume of the conical component.

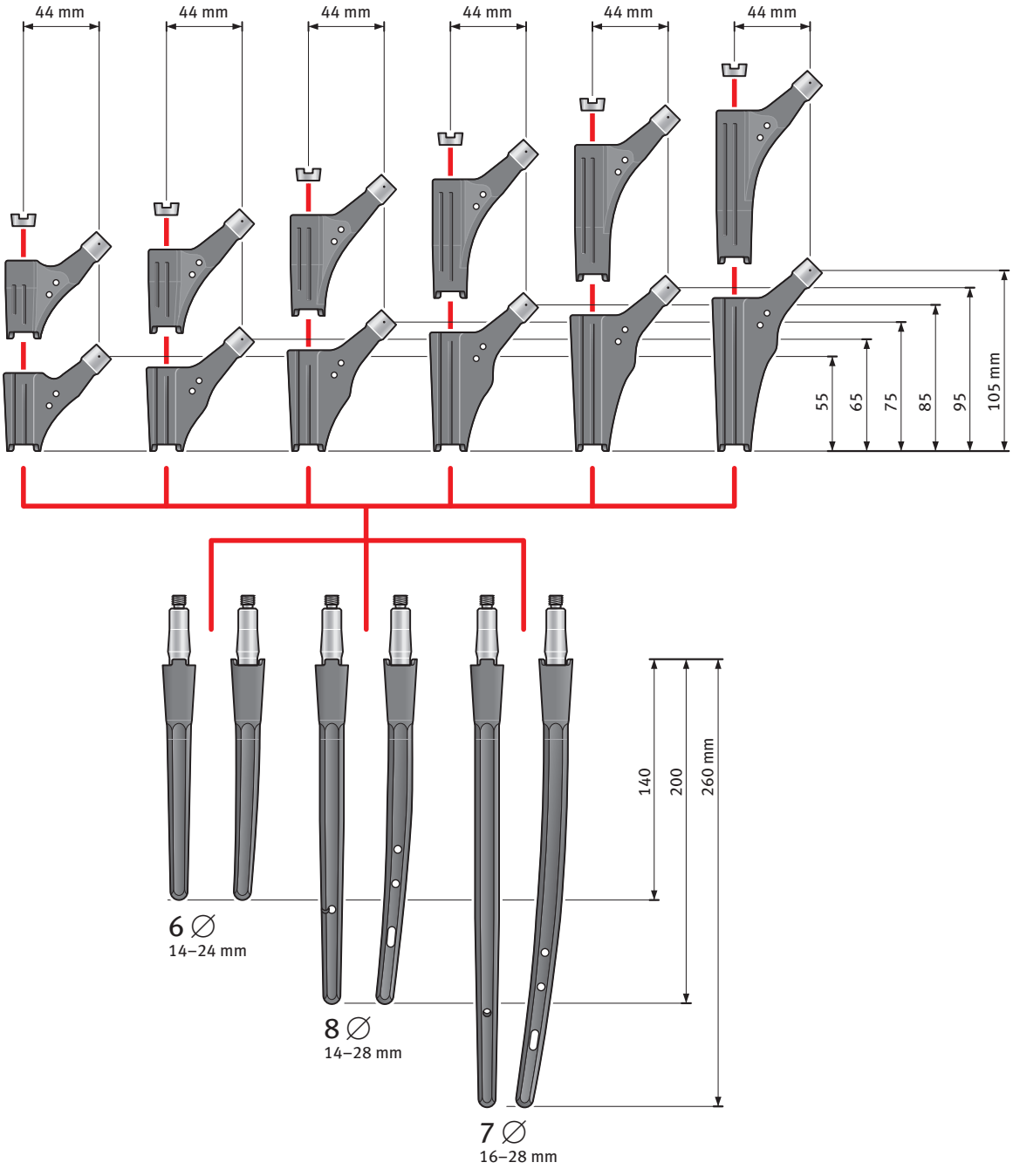
Cylindrical Component
Less prominent ribs in the sagittal plane. Slim design to prevent proximal jamming.

Conical Component
Conical design with additional lateral ribs enabling anchorage in the metadiaphyseal region of the femur.

Revitan Curved Implant System: A Customized Solution

The overall length of the *Revitan* Curved System (proximal plus distal components) ranges from 195 mm to 365 mm, available in 10 mm increments.

The modularity and the different combinations enable the surgeon to ensure the optimal leg length without compromising anchorage.



Revitan Connection Taper: Flexibility- and Safety-based on Proven Technology

The modular *Revitan* Revision System is based on the concept of distal press-fit anchorage introduced by Prof. H. Wagner. This concept demands reliable connection technology and intraoperative flexibility when assembling the components. The stem does not need proximal support to withstand forces exerted on it.

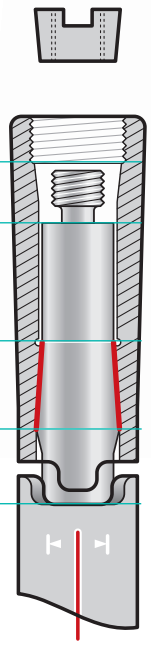
The *Revitan* Connection Taper was introduced in 1990 and has been used in more than 20,000 cases. The taper is made with highest precision of a forged Cobalt-Chromium (CoCr) alloy (*Protasul*® 21WF), which has a higher strength than other materials (e.g. titanium alloys).

With this geometry of four zones, the maximal stress of the bending forces is concentrated on the section with the smallest diameter. This feature prevents formation of metallic debris as there is no contact between the proximal and distal implant components in this section.

User-friendly instruments make it easy to assemble the components in situ.

In case of secondary revision, the connection allows for intraoperative dismantling of the components. This assures easy and optimal adjustment of leg length and antetorsion. Both adjustments can be done in two independent steps.

The Revitan Connection Taper is Divided into Four Zones

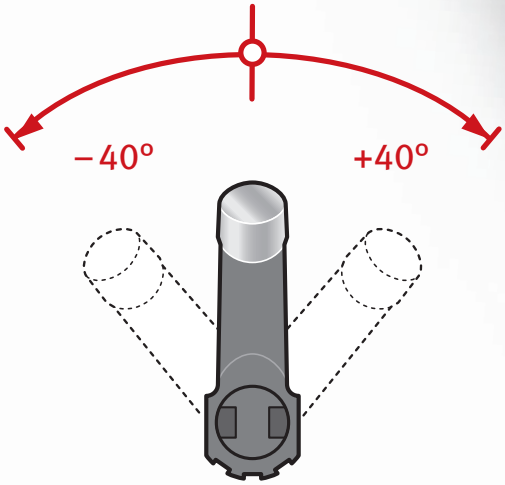


Screw thread for the conical nut

Cylindrical zone for centering both components during assembly

Conical zone with structured surface to assure mechanical connection between the components

Zone with smaller diameter to concentrate the flexion forces and to prevent metal abrasion during micromovement



Antetorsion of the proximal component can be set freely in the range of ±40°.

The Anchorage: As Physiological as Possible

The *Revitan* Curved Implant is designed to achieve primary stability irrespective of the surgical approach (endofemoral or transfemoral). This gives the surgeon the possibility to choose the optimal strategy depending on the amount of bone loss. The versatility of the modular instrument set helps the surgeon to reach this goal. Good physiological anchorage is possible for many different bone defects.

Optimal Condition for Efficient Anchorage

A precisely prepared, conically shaped anchorage bed is crucial for an efficient press-fit with the double-cone principle.[7] For each stem size the instrument set includes a matching rasp enabling the optimal preparation of the anchorage zone. The stable initial fixation is crucial for osseointegration and long-term fixation. The 2° taper design of the distal component reblocks the movement of the implant in case of secondary subsidence.

The Concept is Histologically Proven

Histological examinations based on the *Wagner SL Revision* Stem prove that the biomechanical anchorage principle works.[8] This principle is also used in the *Revitan* Curved with its 2° taper design, longitudinal ribs and material composition. The Wagner concept of distal fixation is valid for the *Revitan* Curved when using the transfemoral approach.[7] This fixation can be achieved through circular surface fixation.[7]

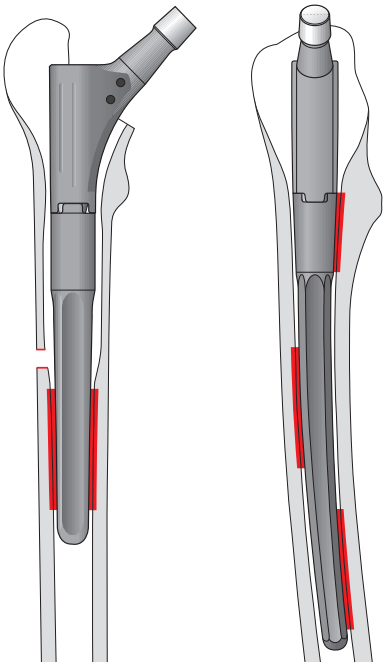
Reduced Risk for Stress-Shielding

The design, material and instruments interplay in a complementary manner. This reduces the risk of stress-shielding:

- Due to the characteristic cross-section and tapered design of the *Revitan* Stem, the medullary canal is not fully occluded. Together with the favorable properties of the titanium alloy *Protasul*-100 this assures the necessary elasticity even after implantation of stems with larger diameters.
- The application of precise rasps enables the controlled anchorage by press-fit in well defined and limited contact zones between bone and implant in order to prevent excessive stiffening of the femur.

Additional Fixation Options

There is an option to use locking screws to provide additional distal fixation. This option is especially important in osteoporotic bone where the medullary canal has expanded and no isthmus exists. Additional distal fixation is also useful in periprosthetic fractures with long spiral fractures in or above the isthmus region.



With the transfemoral approach a circular press-fit fixation equivalent to the fixation of the Wagner concept is achieved.

The endofemoral approach leads to a three-surface fixation with contact zones of approximately 5 cm length which is sufficient to ensure rotational stability.

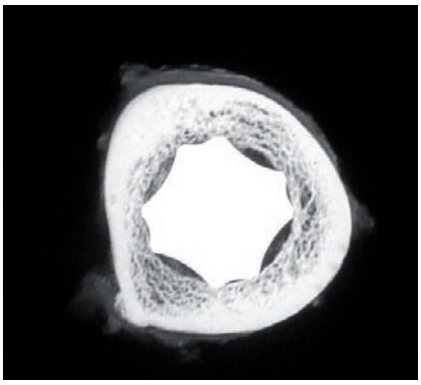


Foto: B. Fink et al.[7] © Springer Medizin Verlag

The ribs along the edges of the Revitan Stem cut into the cortical bone, ensures rotational stability and favors osseointegration. The grooves and ribs are crucial elements for physiological anchorage.

Instruments:
A Requirement for Reproducible Results

One advantage of the *Revitan* Curved system is the fully modular and easy-to-use instrument set. It is composed of modular rasps, modular trial prostheses and a targeting device for interlocking screws. The modularity offers total intraoperative flexibility.

A separate modular rasp is available for each implant size. The rasps allow for controlled and stepwise preparation of the medullar canal. This ensures an optimal anchoring bed even in difficult bone situation. These steps facilitate an efficient press-fit to achieve primary stability.

Trial reposition can be performed at each step during surgery. This facilitates optimal adjustment of leg length and antetorsion setting.

A targeting device locates the exact position of the locking holes without the need of the C-arm. Thanks to this, patients and operation room staff have no exposure to radiation and operating time is reduced.

The *Revitan* Instrument System meets the requirements of modular implant surgery: anchorage of the stem and adaptation of leg length are performed in two fully independent steps. All this is done without compromising quality and safety of surgery.

In the case of intraoperative correction or secondary revision, the instruments permit easy replacement of the proximal component.

The small number of easy-to-use instruments allow for controlled and efficient implantation. The *Revitan* instrument set comes in four trays assuring good overview of all components.

Targeting device

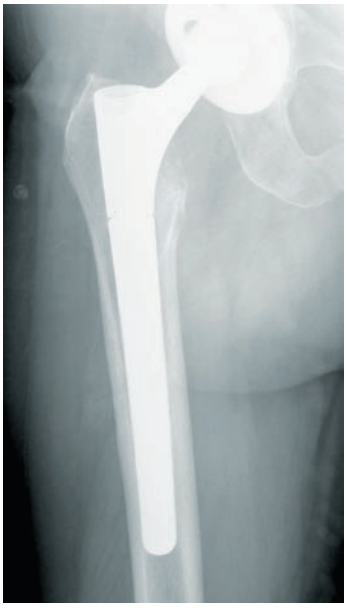
Modular rasp

Case Reports

Case 1: Endofemoral Approach

77-year-old patient with aseptic loosening of cemented cup and stem, 12 years after implantation.

Postoperative X-ray; noncemented revision via endofemoral approach of a Revitan Curved Stem and an Allofit-S Cup.



Stable situation after 2 years.

Case 2: Transfemoral Approach

65-year-old patient with hip pain and a partially loosen, rough-textured, non-cemented stem.

Postoperative X-ray: revision with a Revitan Curved stem via a transfemoral approach. A transfemoral procedure was chosen to ease the extraction of the only partially loosened stem with its rough structured surface. Three cerclage-wires were placed distally to prevent extension of a small shaft fissure.

Stable situation after 2 years with complete consolidation of the bone flap.

Case 3: Periprosthetic Fracture

84-year-old man with periprosthetic fracture after cup revision.

X-ray 1 year postoperative after revision with a Revitan Curved Stem. Two locking screws in medial-lateral direction placed below the isthmus provide additional stability.

Case materials have kindly been provided by Professor B. Fink (Germany) and Professor K. Knahr (Austria).

1 Mc Innis D. et al.: "Femoral Revision with a Fluted, Tapered, Modular Stem (Seventy patients followed for a mean of 3.9 years); The Journal of Arthroplasty, Vol. 21, No. 3, 2006.
2 Vendittoli P.A. et al.: "Performance of Modular Tapered Fluted Titanium Stems for Femoral Revision"; Abstract 0-118 from the European Hip Society 2006 Domestic Meeting.
3 Böhm P. et al.: "The Use of Tapered Stems for Femoral Revision Surgery"; Clinical Orthopedics and Related Research, No. 420, March 2004.
4 Fink B. et al.: "Modified transfemoral approach to revision arthroplasty with uncemented modular revision stems."; Operative Orthopädie und Traumatologie 1/07.
5 Schüler M. (2003): "Der Revisal-M-Schaft, Entwicklung und erste Ergebnisse eines neuen, modularen und zementfreien Revisionsschaftes bei Hüfttotalendoprothesenwechseln und pertrochantären Femurfrakturen", Dissertation, Technische Universität München.
6 Knahr K. et al.: "Der Revisionsschaft Revitan Kurviert: Konstruktionsmerkmale und Implantationstechnik", ÖGO Kongress 2003, Graz.
7 Fink B., Fuerst M., et al. (2005): "Principles of fixation of the cementless modular revision stem *Revitan*." Unfallchirurg 108(12): 1029–1032, 1034–1037.
8 Schenk R. K., Wehrli U. (1989): "Reaction of the bone to a cement-free SL femur revision prosthesis. Histologic findings in an autopsy specimen 5 ½ months after surgery."; Orthopäde 18(5): 454–462.

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