



Developed By P-I Brånemark

A decorative graphic on the left side of the slide features a large teal circle overlapping a smaller white circle, with several thin grey and orange circles of varying sizes overlapping each other and the teal circle.

# **SCA Scientific Content Analysis**



## Origin



Developed By P-I Brånemark

Founded by Professor P-I Brånemark in 1988, Gothenburg, Sweden, EXOPRO is the company responsible for developing, manufacturing and marketing P-I | Developed By P-I Brånemark products. The fundamental principle is to restore the life quality of patients.

### Worldwide recognition in Research and Development

The products and procedures of the P-I | Developed By P-I Brånemark line, researched and developed by the discoverer of Osseointegration, Professor P-I Brånemark and by scientists at world-renowned entities, meet the needs of modern implantology with simplification and efficiency.

### Solutions for Professionals and Patients

With international Private Equity investments, vast experience, and always guided by first-line scientific evidence, our mission is to provide professionals and patients with solutions that represent:

- high performance
- safety
- versatility
- simplification
- durability

### A success story from the beginning

With rapid growth in all countries where it operates, the new generation of P-I | Developed By Brånemark P-I solutions represents a simple way to think of Osseointegration.

Intelligent and easy to use, the products incorporate technological evolution and unique features that provide predictability of results and benefits to the daily lives of dental professionals.

### Evolution of Osseointegration

# Functional Implants

Developed by Professor P-I Brånemark and world renowned scientists,\* Functional Implants feature unique characteristics, documented in scientific and clinical studies.

## Connections

- External Hexagon
- Internal Conical Connection *Amplified*<sup>®</sup>

## Surfaces

- Nano
- Micro+Nano ( $\mu+n$ )

\* Patents registered by Professor P-I Brånemark and Exopro in Europe, USA, Latin America and Asia.

## Characteristics

### Hybrid Macrogeometry

- Conical Coronal Region | Parallel Body | Conical Apex

### Ideal Primary Stability

- Ideal primary stability with Cylindrical or Conical surgical preparation
- Installation in any bone tissue including areas reconstructed with grafts

### Mini-Threads

- Mini-threads in the conical coronal region provide better stress distribution to the bone tissue and aid in stabilization

### Special Threads - Torque Balance

- Special profile of Threads and Torque Balance provides balanced stability in all tissues and improves distribution of stresses

## Surfaces

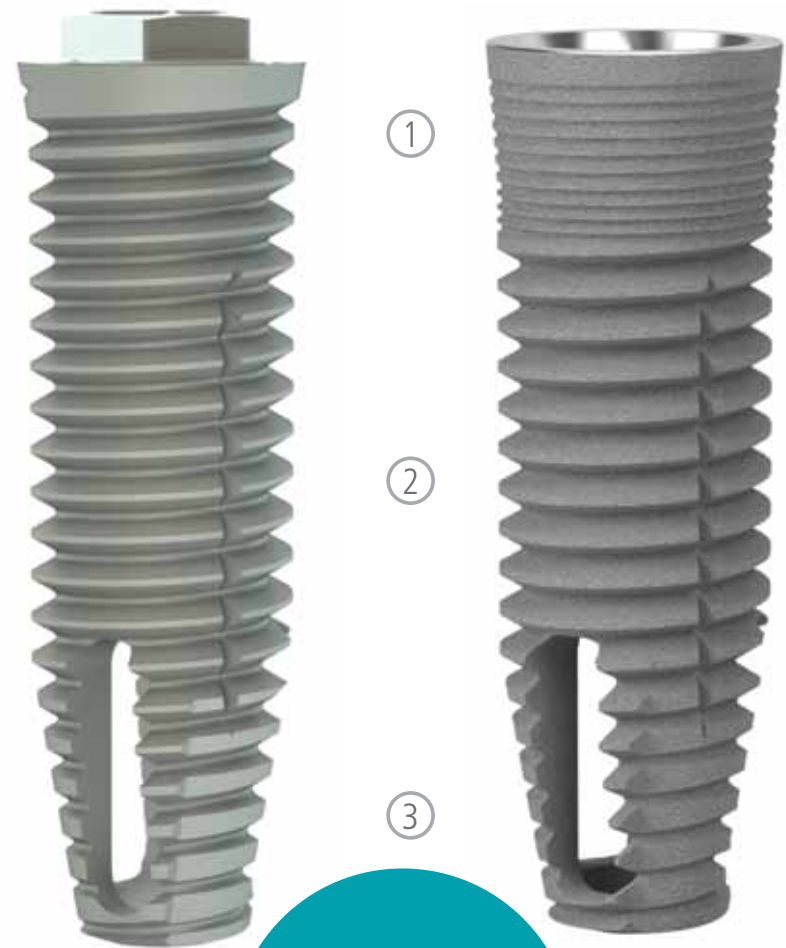
- Selection according to Risk Factors with better Osseointegration
- Modern Micro+Nano ( $\mu+n$ ) Surface and low-roughness Nano surface

## Conical apex

- Self-tapping with presence of threads along entire length

## Collecting Chambers

- Eccentric Functional Collecting Chambers improve the quality and quantity of bone-implant contact (BIC)



- ① Conical Coronal Region
- ② Parallel body
- ③ Conical Apex

## Versatility

### External Hexagon

- Conical Coronal Region
  - Presence of threads even on the side of the platform
  - Larger contact area and better stress distribution
- Same internal Grip Driver for  $\varnothing$  4.1 and 5.1 mm
- Switching Platform possible for seating  $\varnothing$  5.1
- Components with parallel emergence | Increased biological space
- Short implants with 6 mm
- Ideal for total and partial prostheses

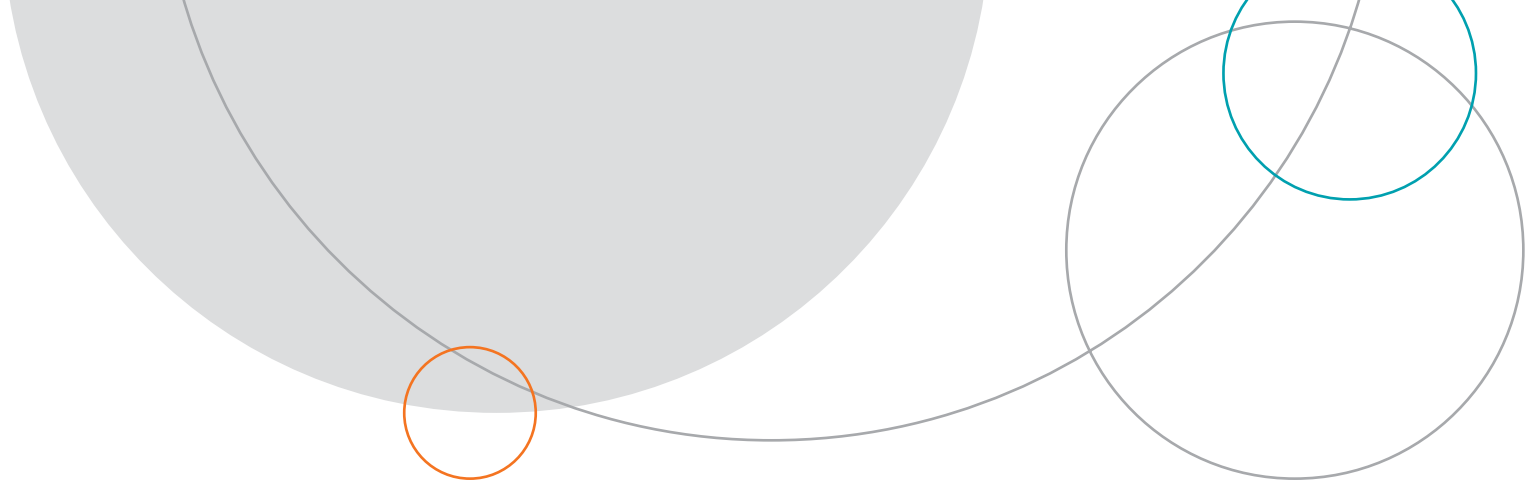




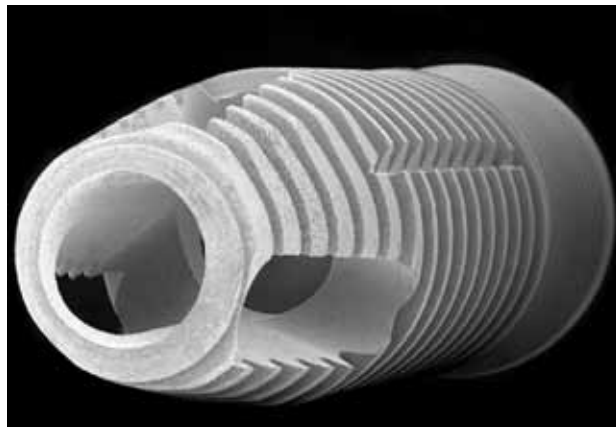
## Aesthetics

### Internal Conical Connection | *Amplified*<sup>®</sup>

- Preservation of cervical bone tissue and maintenance of gingival tissue
- Ideal for single and partial aesthetic cases
- Mini-threads in the conical coronal region provide the best stress distribution
- Switching platform and biological profile of components in all diameters
- Internal Connection with conical seating and hexagonal indexing
- Superior strength, stability and biomechanics at the Implant-Abutment interface
- Same Internal Grip driver for all platforms and diameters
- Short implants with 7 mm
- Installation at bone level or slightly below (0.5 - 1.0 mm)  
(no need to excessively submerge the implants to obtain the ideal emergence profile)



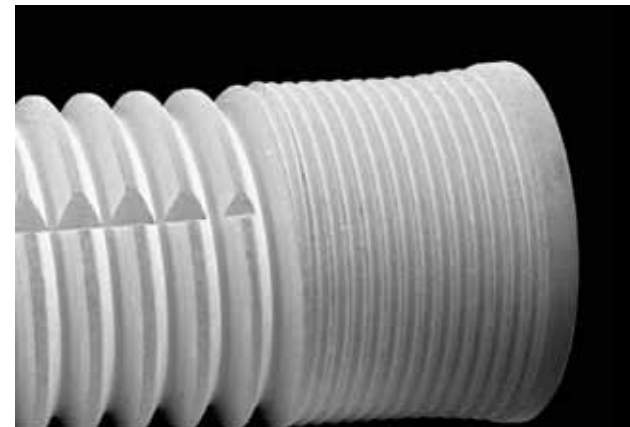
Overview of a Functional Implant | *Amplified*<sup>®</sup> highlighting the Conical Apex, presence of Collecting Chambers, and Torque Balance responsible for reducing torque in dense tissues without compromising stability in soft tissues.



Scanning Electron Microscopy (SEM) - 50x

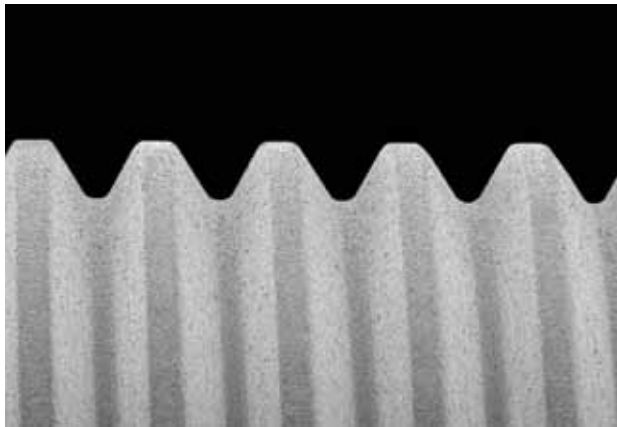
Transition between Threads and special Mini-Threads with conical side of the platform provides optimal primary stability.

This assembly results in better distribution of forces to the bone tissue including the cervical region.



MEV – 45x

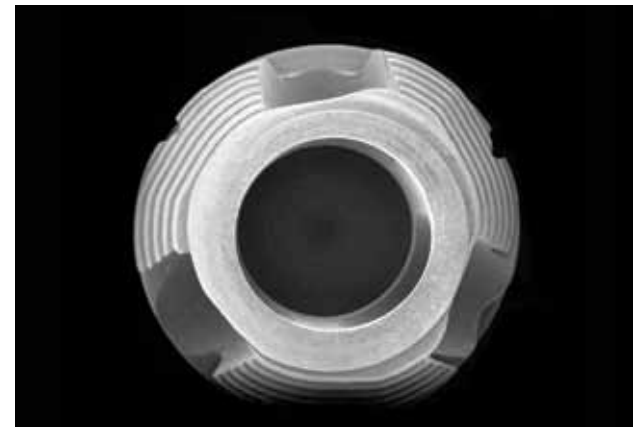
Special Thread profile combined with Conical Apex and Coronal Region result in ideal conditions of primary stability and subsequent dissipation of forces.



MEV – 100 x

Front image of the Conical Apex showing 3 Collecting Chambers for bone tissue, distal and eccentric, with apical opening.

Removal of trauma and improved Bone-Implant Contact (BIC) in the initial healing period.



MEV – 55 x

# Surfaces

## Research and Development

Developed by internationally recognized professionals and evaluated at some of the world's foremost institutions, the Surfaces are divided between:

- Nano
- Micro+Nano ( $\mu+n$ )

Suitable for all clinical cases, the Micro+Nano ( $\mu+n$ ) surface is modern and offers superior characteristics. Can be considered for use in patients and clinical cases that present Risk Factors (!) such as:

- Low bone density (Type IV)
- Slight change in the bone healing potential
- Advanced surgical techniques
- Consideration by the technique of Early Function (!)

The Nano surface, featuring low roughness, is indicated for controlled patients exhibiting normal bone healing potential.

(!) Some conditions, whether combined or not, represent contraindications, limitations and risks (relative and absolute) for treatment of patients with implants. See recommendation table in the Smart Guide.

## Material

Functional Implants are manufactured from commercially pure titanium ASTM F67, originally from the U.S.A., certified and continually evaluated for physical-chemical and mechanical properties by independent laboratories.



# Knowledge and Technology in Surface Treatment

## Microstructures

After the functional implants have been machined, the microstructures of the Micro+Nano ( $\mu+n$ ) Surface are obtained by deformation and subtraction during a highly controlled blasting process with special titanium particles presenting specific dimensions to obtain the ideal micro-roughness.

## Ultra-clean

Functional Implants are exposed to an ultra-vacuum atmosphere, 100% clean, and surface contaminants are completely removed by low-intensity ion bombardment assuring an ultra-clean surface.

This technology does not use chemical solutions, eliminating the typical surface-modifying residues and minimizing environmental impact (green technology).

## Nanostructures

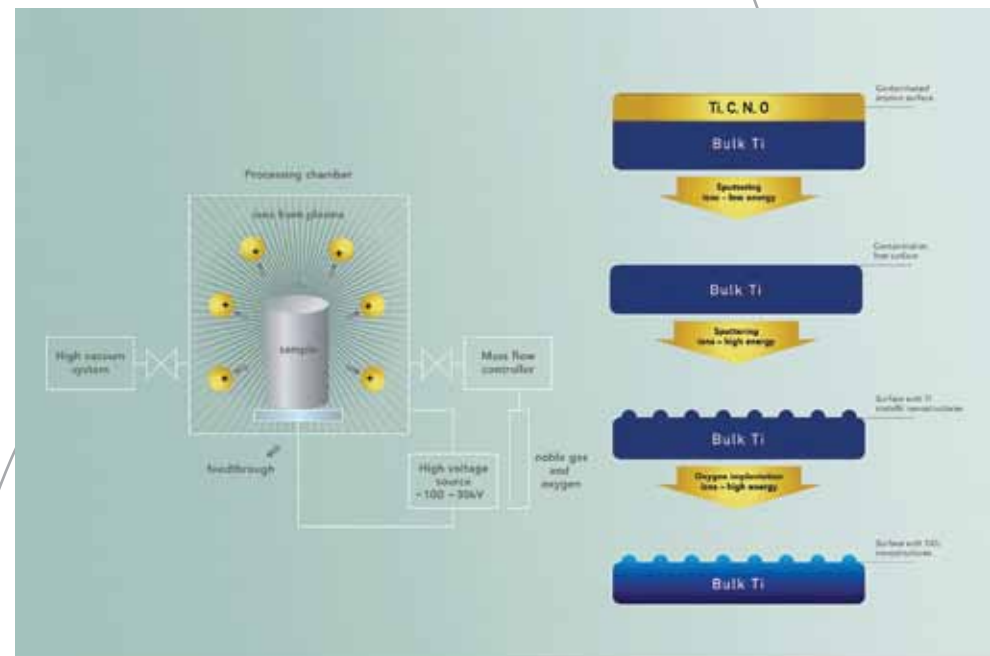
The nanostructures are the result of the deformation and subtraction and are present in high density with ideal dimensions and morphology.

In a process subsequent to the Ultra-Cleaning, the nanostructures are obtained by noble gas ion bombardment, in this case, with high intensity and collision speed, a technology with many controlled parameters.

## Chemical Composition

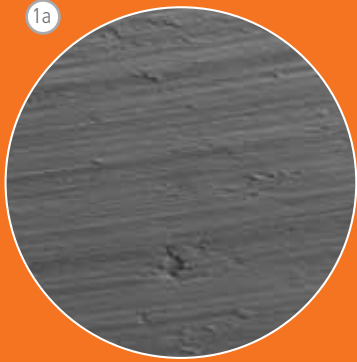
Exposed to a specific temperature in an exclusively Oxygen ( $O_2$ ) environment, there is formation of titanium dioxide ( $TiO_2$ ), which is homogeneous and the desired state of crystallinity.

Process for obtainment of Nanostructures and formation of Oxides:

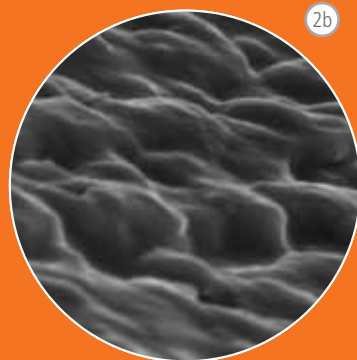
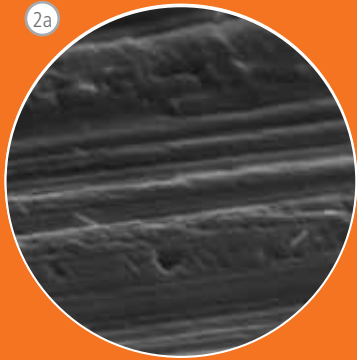


# Nano surface

Machined



Nano PIII



## Comparison between Machined and Nano-structured surfaces

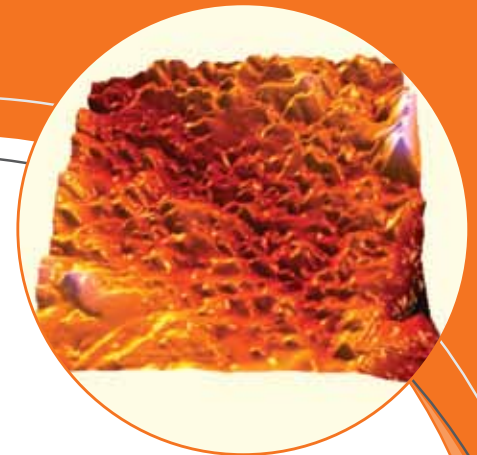
Scanning Electron Microscopy - large increases | FIB

Image 1a e 1b : 1.500 x

Image 2a e 2b : 200.000 x

Image 3 : 500.000 x

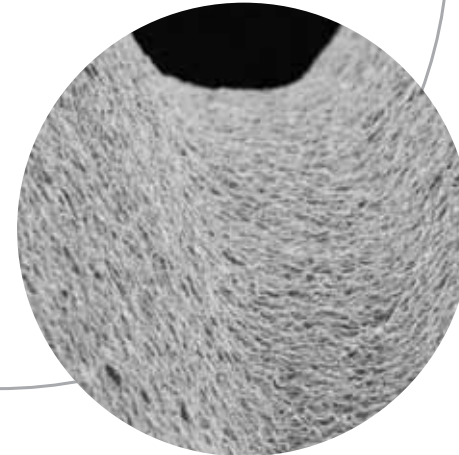
Atomic Force Microscopy (AFM).



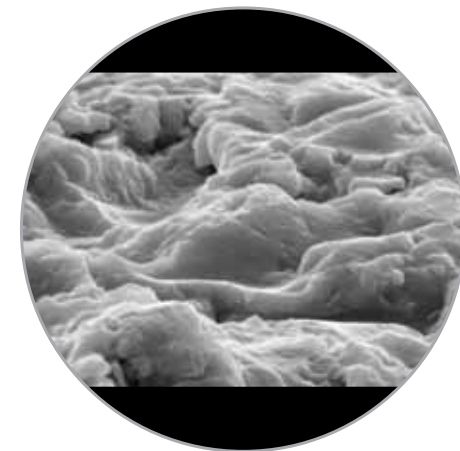
**Organized nanostructures, which are homogeneous, rounded and with ideal dimensions can be observed on devices with high magnification.**

## Micro+Nano ( $\mu+n$ ) Surface

The microstructures obtained by blasting provide the ideal micro-roughness, exhibiting the following microscopic appearance:



MEV – 1,000 x

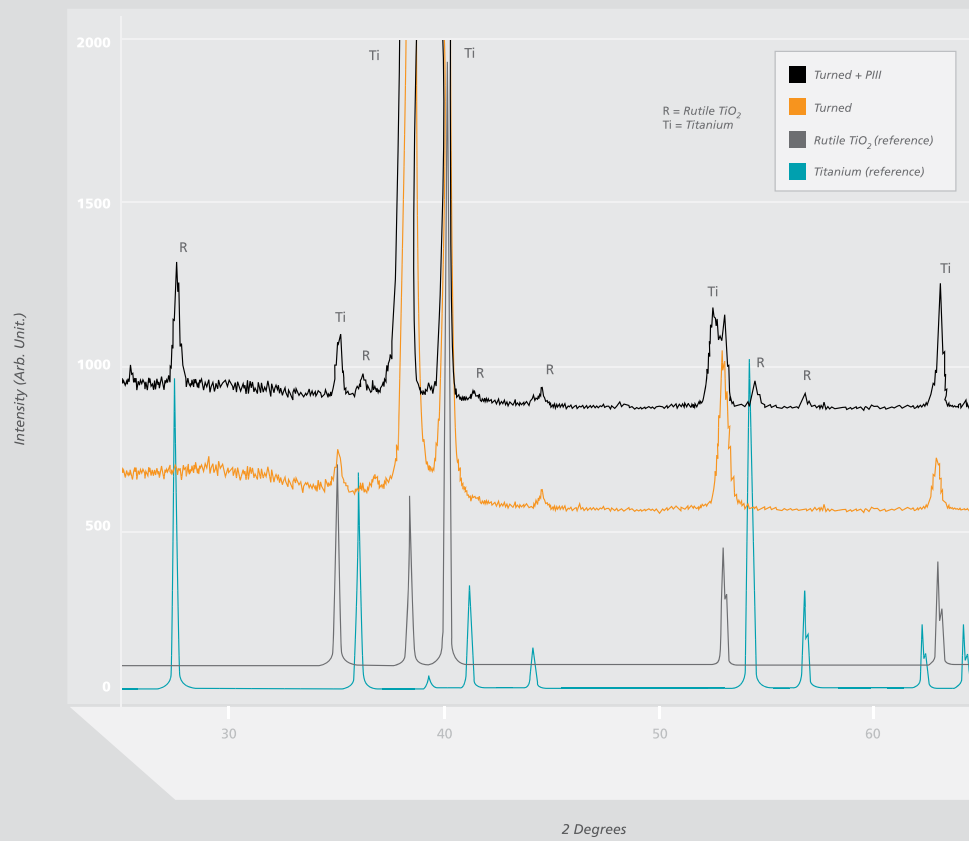


MEV Conventional – 20,000 x

**Micro+Nano ( $\mu+n$ ) Surface  
presents complexity and  
homogeneity of ideal  
microstructures.**

# Surfaces

Crystalline states are evidenced in x-ray diffraction (XRD) analyses.

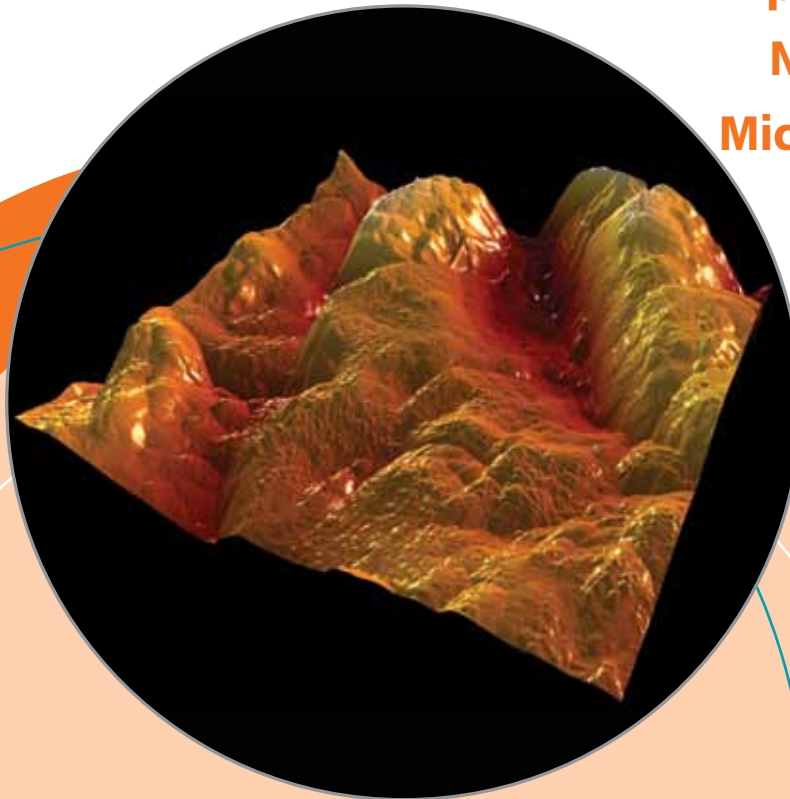


**The Micro+Nano Surface is the best possible combination between microstructures, nanostructures, and oxides, resulting in increased bone formation in the early stages of healing and potentially benefiting the distribution of forces around the implant.**



Scanning Electron Microscopy | FIB - 100,000 x

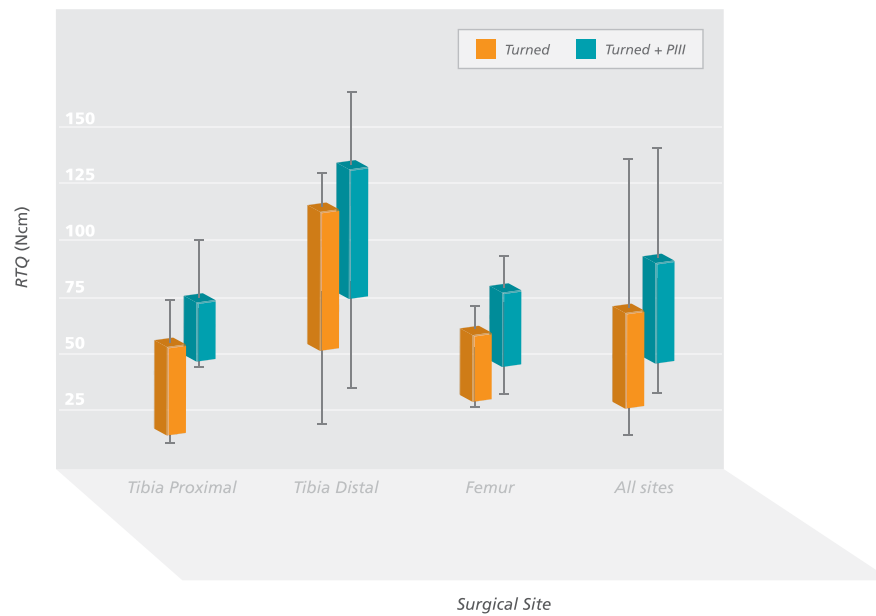
**Evidence of the presence of Micro and Nanostructures of the Micro+Nano ( $\mu+n$ ) Surface.**



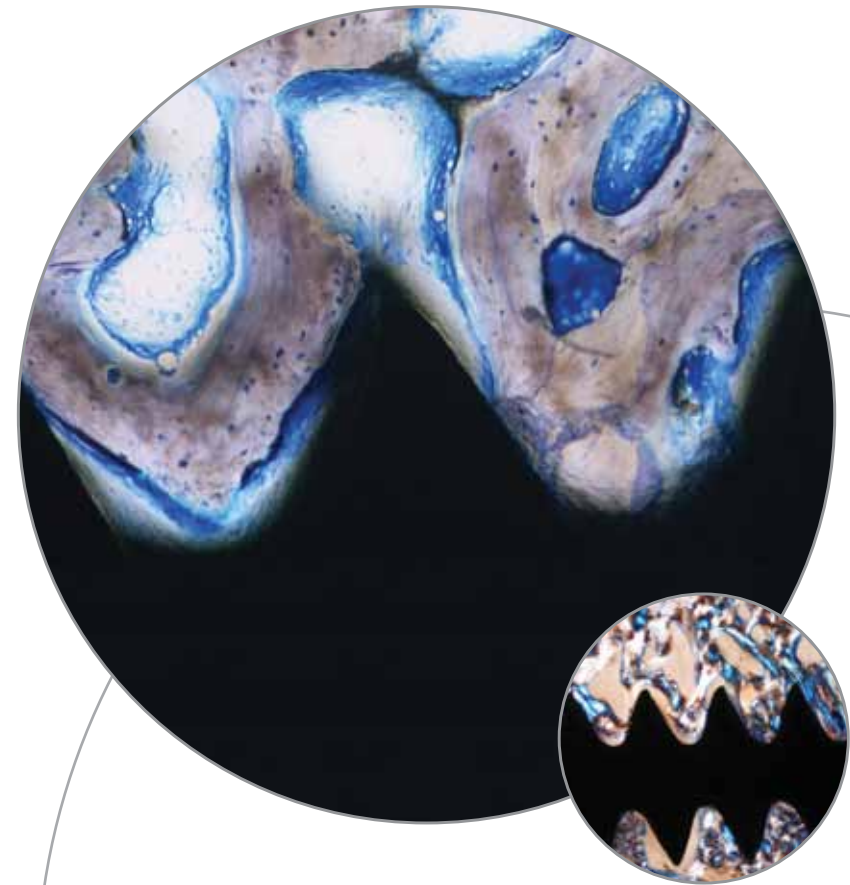
High-definition Atomic Force Microscopy (AFM)

## Benefits of Nanostructures

Box plot with removal torque values (Ncm) showing significantly higher values for implants with nanostructures in just 4 weeks.



**Up to 66% more removal torque.**



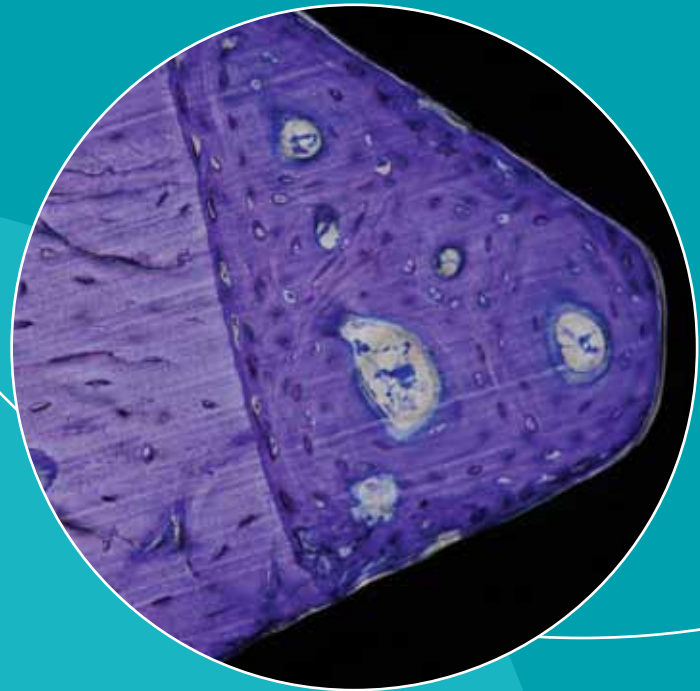
Evaluation in humans, with biomaterials and in native bone, shows superior bone-implant contact (BIC) area for implants with surface treatment.

## Better Osseointegration

The high Bone-Implant Contact (BIC) index in the short term indicates a great affinity of pre-osteoblastic cells for the innovative Micro+Nano ( $\mu+n$ ) surface.

In just 4 weeks, the newly formed bone already shows an organized structure in lamellae around the Haversian canals in close contact with the implant surface.

Intense new bone formation can be observed in the region close to the thread valley (dark blue-violet tissue) from the original bone (lighter blue).



## References

*A novel technique for tailored surface modification of dental implants. A step wise approach based on plasma immersion ion implantation*

(COIR - Clinical Oral Implants Research - Submitted)

Luiz Meirelles                      Tomas Albrektsson  
E. Uzumaki                        Ann Wennerberg  
J. H. Cavalcanti Lima            C. Lambert  
C. A. Muller

*Maxillary sinus floor augmentation using a nano-crystalline hydroxyapatite silica gel: case series and 3-month preliminary histological results*

*(Annals of Anatomy – in press).*

Luigi Canullo                      Friedhelm Heinemann  
Claudia Dellavia

Nanostructures and bone response

*(Implant News V7, n2, 2010)*

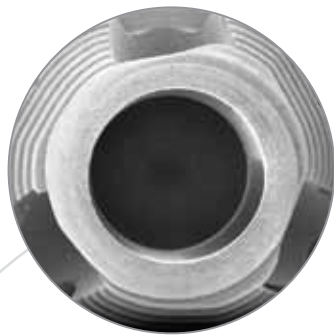
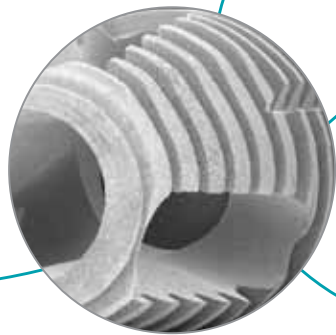
Luiz Meirelles

## Research and Development | Surfaces



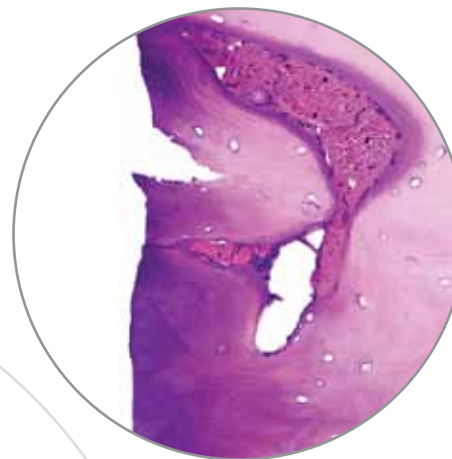
## Collecting Chambers

The new eccentric Collecting Chambers improve the quality and quantity of bone-implant contact in the initial healing period and bone formation that begins after the installation of the Functional Implants.



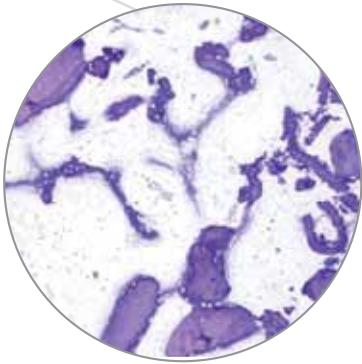
**Efficient in removing trauma associated with surgical preparation.**

**Before**

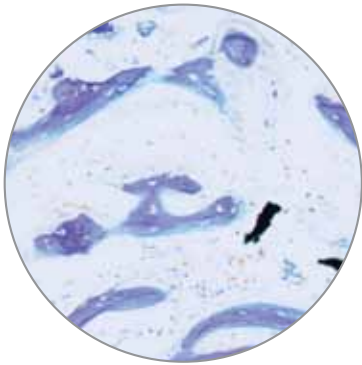


**After**





Slides of bone removed from the interface with intense new bone formation after 1 (one) week inside the Collecting Chamber.

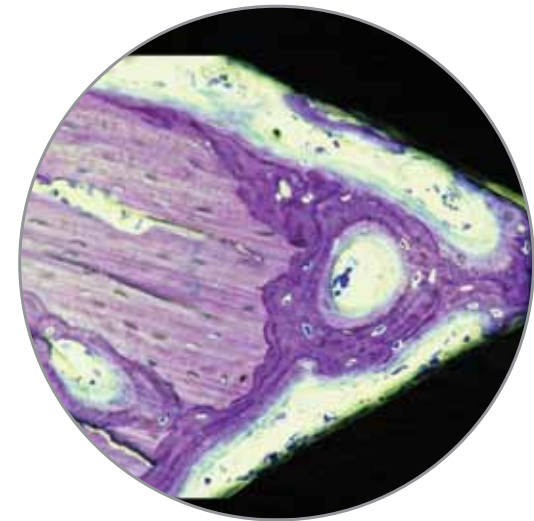
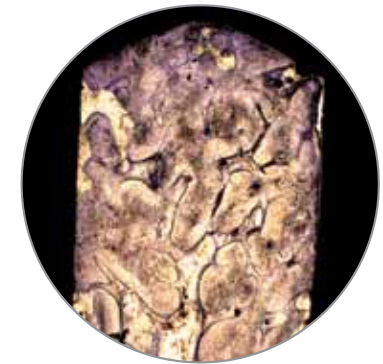


The mix of vital and traumatized tissue collected will be completely remodeled inside the Collecting Chamber.

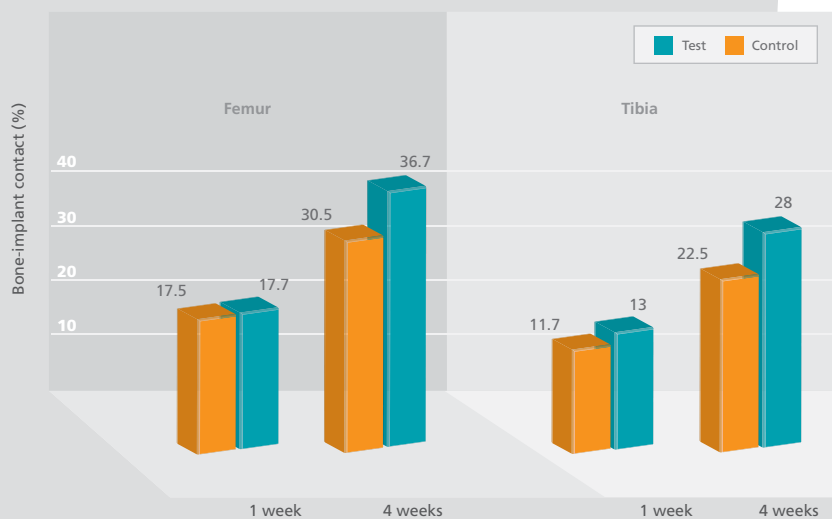
### **Increased quality and bone contact**

Newly formed bone at the interface with lamellar structure surrounding a primary osteon. Intense bone activity can be seen.

Complete bone remodeling inside the Collecting Chambers of the Functional Implant at 4 weeks with increased Bone-Implant Contact (BIC) area.



Increased quality and quantity of new bone formation at the Bone-Implant (BIC) interface resulting from the action of the eccentric Collecting Chambers.



## References

*Histological evaluation of bone formation adjacent to dental implants with a novel apical chamber design*

(CIDRR – Clinical Implant Dentistry & Related Research – CIDRR – Submitted)

Luiz Meirelles

P-I Brånemark

Carina Johansson

Tomas Albrektsson

*The role of bone collecting chamber: histological and histomorphometric study in minipigs*

(Scientific Report – presented at Gothenburg University Nov. 2010)

Francischone CE et al

Efeitos microscópicos da ação da câmara coletora do implante no tecido ósseo – mecanismo para favorecer a Osseointegração

(ImplantNews V6, N4, 2009)

Barbosa BA

Consolaro A

Taveira LA

Francischone CE

## Research and Development | Collecting Chambers

Department of Biomaterials,  
Sahlgrenska Academy



UNIVERSITY OF  
GOTHENBURG



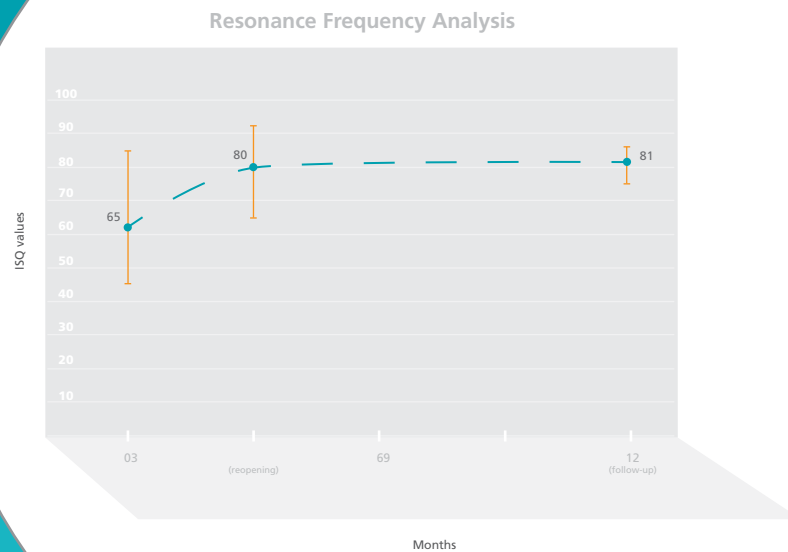
UNIVERSITY OF  
ROCHESTER



# Clinical Results | Functional Implants

## Excellent Stability

Combining the exclusive features of macro-, micro- and nano-geometry, Functional Implants provide excellent primary and secondary stability.



Measurements with Osstell® Mentor (Internal Conical Connection Amplified®) –  
3 clinics – 180 Implants (not published).

Smart Peg Type 51

## Multicentric Retrospective 4 - 6 years

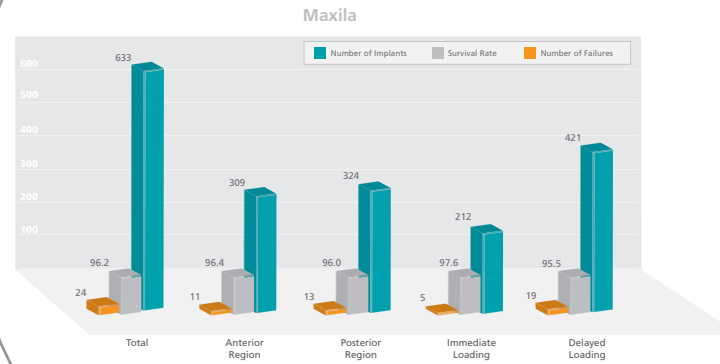


The results of Functional Implants are predictable and have high success rates, consistent with world literature.

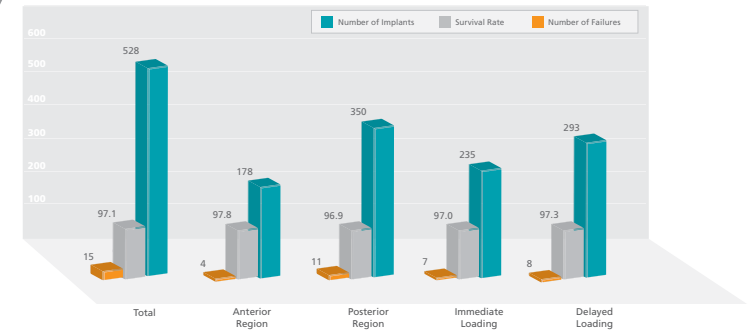
The combination of all the characteristics of the Functional Implants, observing recommended clinical procedures, allow for installation in:

- Maxilla or Mandible
- Anterior and Posterior Region
- Conventional and Immediate Function

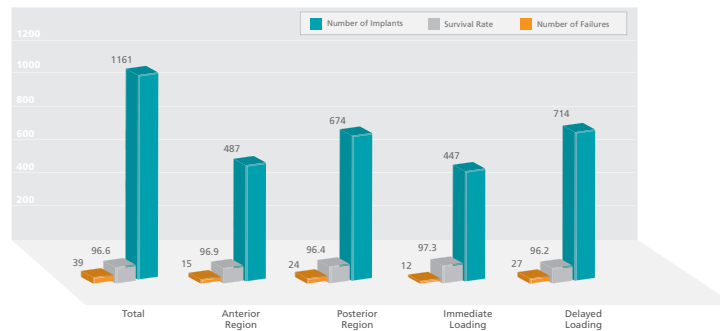
Demographic distribution of implants and survival rate



Mandible



Total



High success rates

95.5 – 97.8%

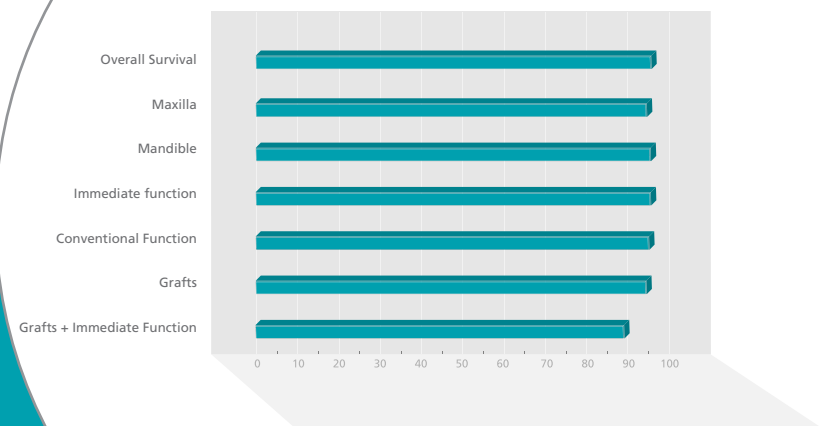
# Clinical Analysis | Non-Interventional

In addition to Controlled Retrospective and Prospective Multicentric studies, there is constant monitoring and assessment of the performance of Functional Implants (survival) in private clinics through Non-Interventional surveys.

Information received from participating clinics indicates the following results:

Period	2008-2011 (1st triennium)
Average Period	26 months
Implants Assessed	3,258
Participating Clinics	26
Lost Implants	143

<b>Overall Survival</b>	<b>95.6%</b>
Maxilla	94.6%
Mandible	96.5%
Immediate function	96.5%
Conventional Function	95.9%
Grafts	94.2%
Grafts + Immediate Function	88.6%



The main reasons for losses associated with the Risk

Factors included:

- Smoking
- Immediate graft function
- Low bone density
- Wide implants
- Grafts
- Short implants (single)
- Extraction and immediate installation
- Autoimmune diseases

#### Notes

- For 2.6% of the losses, no risk factors were identified.
- The Non-Interventional Survey includes all of the results detailed and informed by private clinics with a volume of rehabilitated implants of no less than 50 fixations. In more than 50% of the cases, improvement potential was identified (training, understanding of Risk Factors and compliance with Surgical | Prosthetic Protocol).
- The survey is always performed with the same clinics, located in different geographic regions, and carried out independently from the patient selection criteria, clinical protocol and risk factors, and is not intended to determine survival or success rates, serving merely as a reference.

Independent Consultant: Dr. Paulo Rossetti

#### References

A Retrospective Clinical Analysis (4-6 years) of P-I  
Brånemark Philosophy™ Implants  
(Implant News - Sept/Oct 2009)

Canullo L

Cicchese P

Francischone CE

Vasconcelos LW

Francischone CE

Heinemann F

# Connections

## External Hexagon

### Versatility

- World's most versatile and documented connection
- Same internal Grip Driver for  $\varnothing$  4.1 and 5.1 mm
- Switching Platform possible for seating  $\varnothing$  5.1
- Components with parallel emergence | Increased biological space
- Ease of maintenance and manufacturing of prostheses



## Internal Conical Connection | *Amplified*<sup>®</sup>

### Aesthetics and Performance

The modern *Amplified*<sup>®</sup> connection was developed to provide a solution for cases with high esthetic demands and offers superior results.

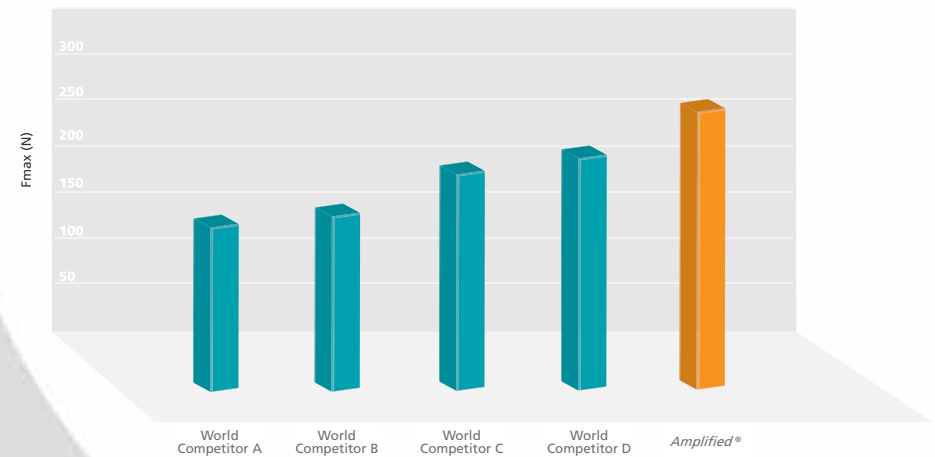




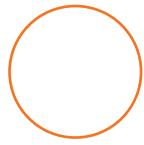
- Superior aesthetic results:
  - Preservation of cervical bone tissue
  - Conservation of gingival tissue
- Switching platform and biological profile of components in all diameters
- Internal Connection with conical seating and hexagonal indexing
- Conical coronal region with Mini Threads
- Superior strength, stability and biomechanics at the Implant-Abutment interface
- Same Internal Grip driver for all platforms and diameters
- Multi-platform (use of  $\varnothing$  4.3 mm components on the  $\varnothing$  5.1 mm platform, and vice versa)
- Components with through-bolt (25 Nm)
- Installation at bone level, or slightly below (0.5 - 1.0 mm)  
(No need to excessively submerge the implants to obtain the ideal emergence profile)

## Distribution of Forces and High Strength

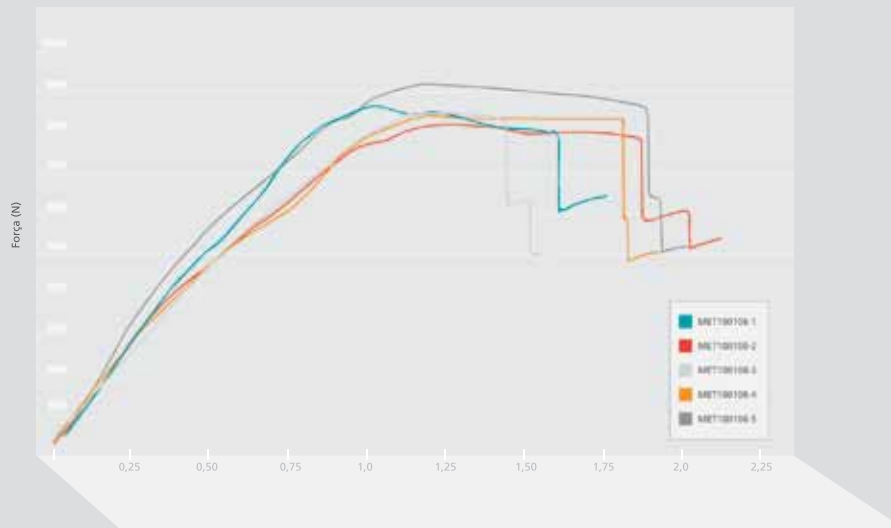
Results greater than the *Amplified*<sup>®</sup> connection



Maximum strength values after 5 million cycles without failure.



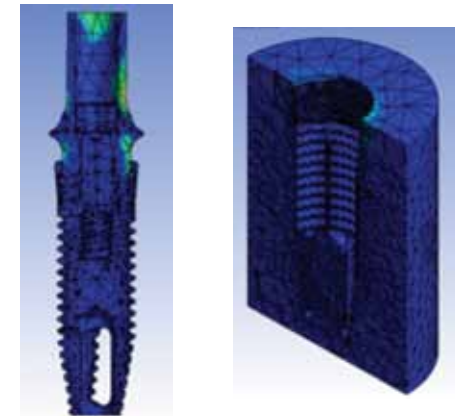
<b>Amplified®</b>	<b>ø 3.3</b>	<b>620 N</b>
<i>World Competitor A</i>	ø 3.3	519 N
<i>World Competitor B</i>	ø 3.3	572 N
<i>World Competitor D</i>	ø 4.0	552 N



ISO 14801

Valores médios de resistência à compressão

High-definition simulations of static and dynamic stresses demonstrate minimal transfer of forces from the conical coronal region of the platform with Mini-threads to the coronal bone tissue with homogeneity in the implant-abutment interface of the *Amplified*® connection.

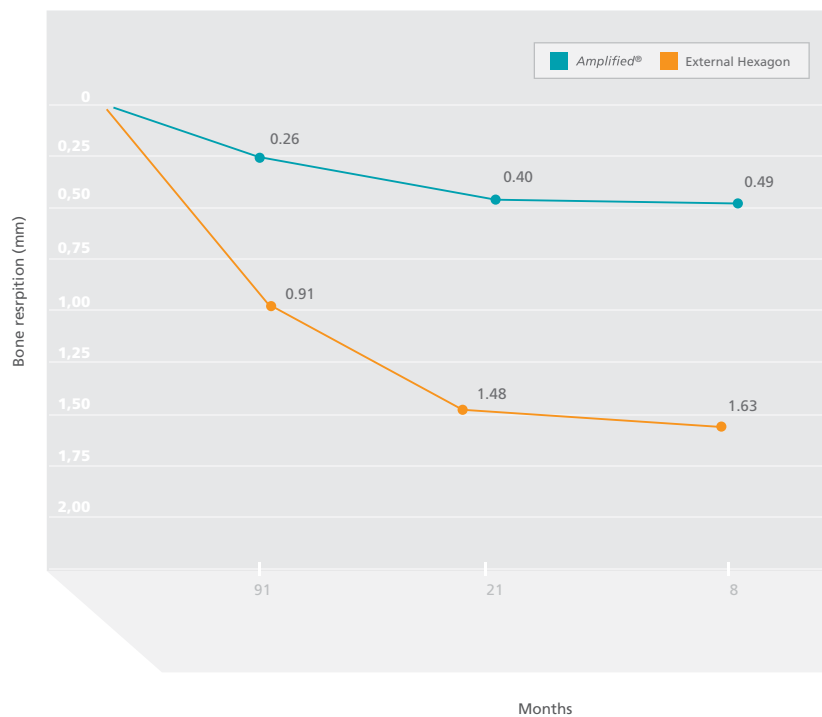


*Finite Elements Analysis | High Definition (>100k nodes)*


## Clinical Results | Longitudinal Prospective Studies

The preservation and stability of coronal bone tissue and conservation of gingival tissue is essential for aesthetic longevity.

In the region most prone to bone remodeling, after 18 months with prosthesis in masticatory function, the marginal bone loss for the Internal Conical Connection with Switching Platform | *Amplified*<sup>®</sup> is minimal and comparable only to the best results worldwide.



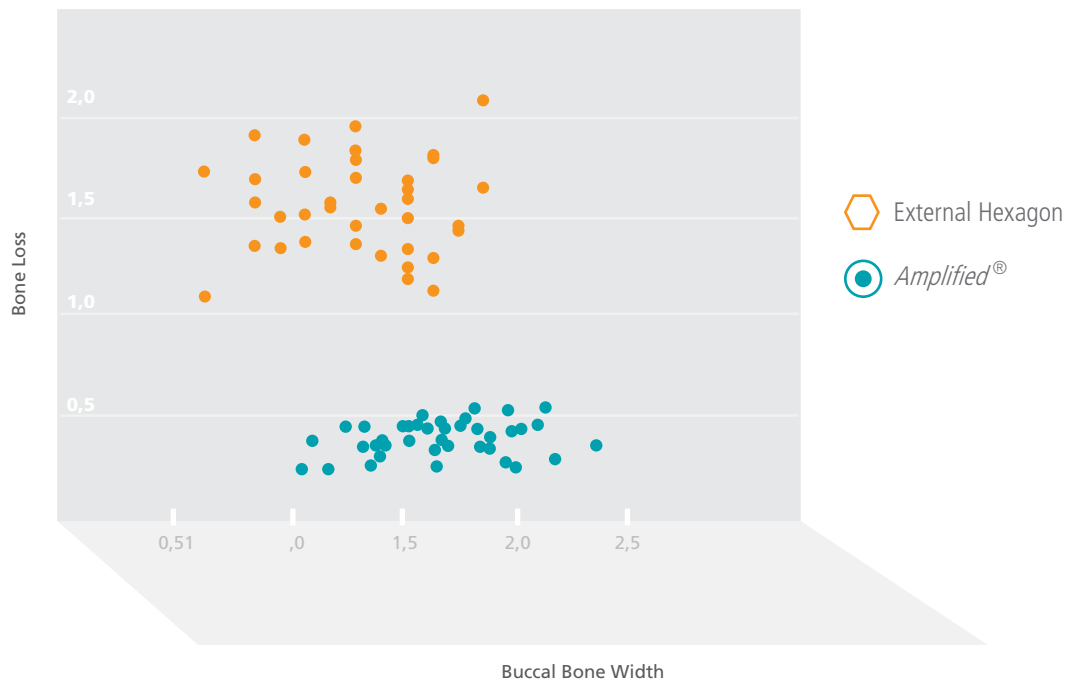
 *Amplified*<sup>®</sup>  
(Switching Platform ø 0.8 mm)

 External Hexagon  
(Biological Profile of Components)

**Success:  
Conservation of  
Bone Level.**

## Repeatability and consistency of results

### Bone Loss and Buccal Bone Width



## References

*Inclined inward platform for amplified platform switching concept: 18 months follow-up of a prospective randomized match-paired controlled trial*

*(IJOMI – The International Journal of Oral & Maxillofacial Implants - Accepted)*

Luigi Canullo

Vicente Souza Pinto

Jose Carlo Rosa

Francischone CE

Werner Götz

*ISO 14801. Dentistry. Implants. Dynamic fatigue test for endosseous dental implants. Geneva, Switzerland: International Organization for Standardization, 2007.*

*Influence of an inward inclined implant platform on stress distribution: A 3-D finite element analysis*

*(In progress)*

Luigi Canullo

Francesco Pace

Paulo Rossetti



UNIVERSITÀ DEGLI STUDI  
DI MILANO



Rheinische  
Friedrich-Wilhelms-  
Universität Bonn

**Versatility and Aesthetics  
with Quality**  
Prosthesis Components



# Soluções em Prótese



**NOTE:**

- All prosthetic components are available for External Hexagon Connection and Internal Conical | *Amplified*® Connection, except Link® CAD / CAM (screw-retained prosthesis).
- CAD/CAM systems can be used for the manufacture of customized components.



**Platforms ø**

	3.5	4.1	4.3	5.1
<i>Amplified</i> ®				
External Hexagon				

## Instruments

Innovation, simplification and the best technologies for high-performance instruments.



# Internal Grip Drivers

## Safety and Simplification

- Only one driver for contra-angle and torque wrench
- Metal rings | Safe Lock®
- Stability and safety
- Hexagon adapter for torque wrench
- Color coding

**The best technologies**



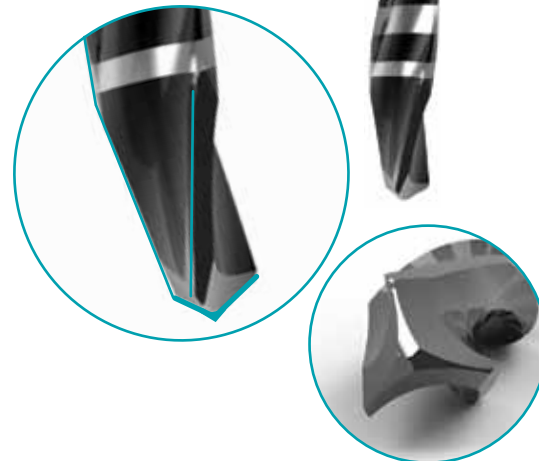
# Conical Drills

## Control and Performance

- Simplified protocol - easy and fast
- High control throughout surgical preparation
- Stainless Steel Body and DLC (Diamond Like Carbon) coating
- Conical apexes with three edges and three special cut phases
- First Drill combines the function of marking and initial preparation



**High performance with the best technology**



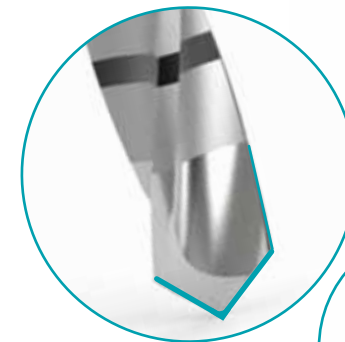
# Cylindrical Drills

## Classic and Versatile

- Universal, with a wide range in the preparation and staging of alveoli
- Body in heat-treated stainless steel and Micro Laser anti-reflection finishing
- 3 special cutting edges with micro-polished apex



**High  
performance  
cutting**



## Dense Drills®

- New concept, simple, fast, and safe
- Careful management of cervical bone tissue
- 5 edges with high cutting power at low speed (50 rpm)



## Prosthesis Instruments

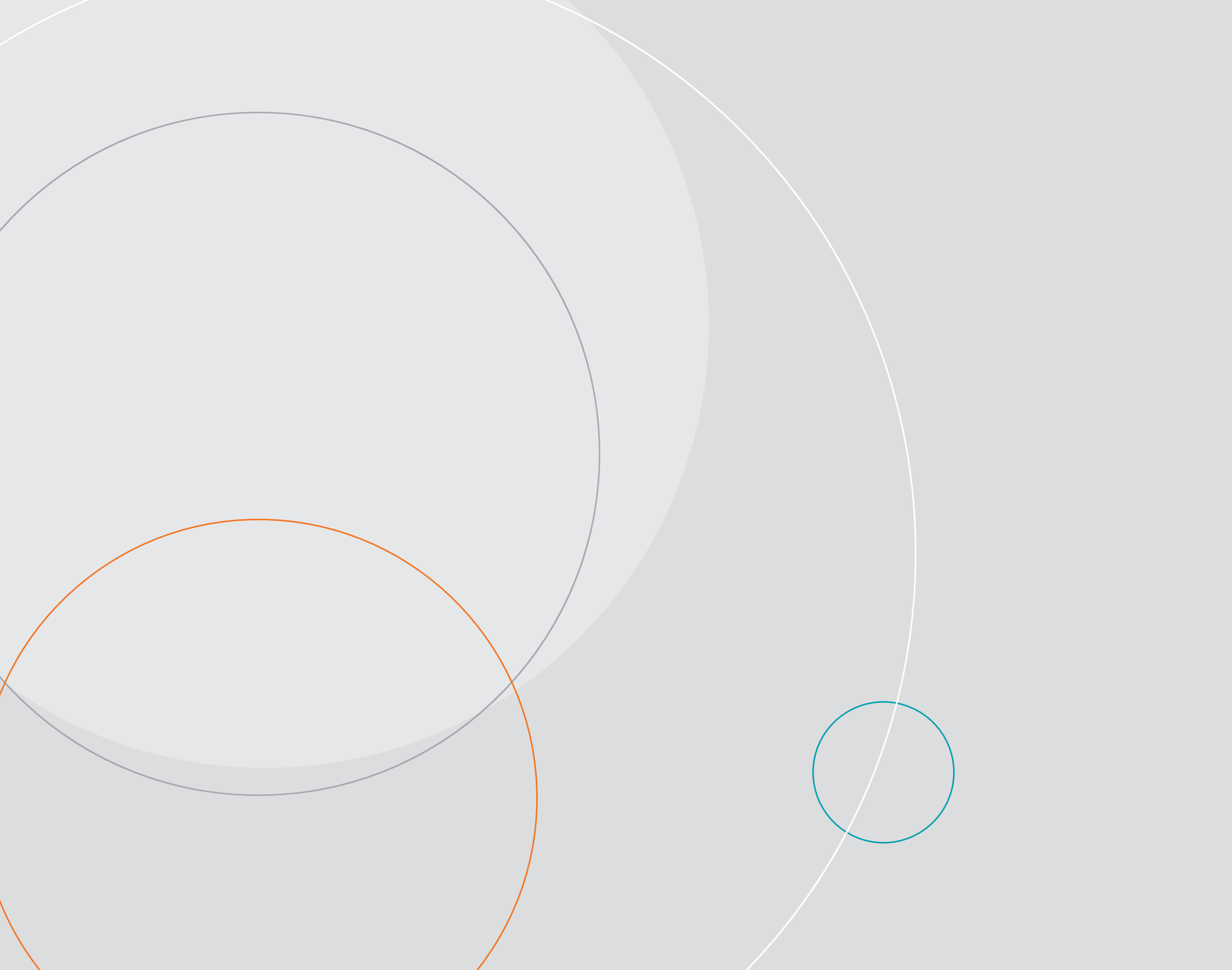
### One driver: simplification

Simple - entire prosthetic system is installed with a single Prosthetic Driver \* and a Torque Wrench, surgical and prosthetic.



\* Except for the Straight Conical Abutment







Developed By P-I Brånemark

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