Implanting TissueCare

The true value of an implant system becomes apparent with time. For over 25 years, the ANKYLOS implant system stands for stable, long-term esthetics. The results from numerous publications and long-term clinical experience demonstrate that ANKYLOS maintains hard and soft tissue stability, ensuring natural and lasting esthetics.

The core to this success is the unique ANKYLOS TissueCare Concept, which is the sum of all the key features of the ANKYLOS system design.

Welcome to DENTSPLY Implants

We see a world where everyone eats, speaks and smiles with confidence; this vision permeates and inspires everything we do every day.

Likewise, we embrace the fundamental values of being open-minded, passionate in the support of our customers, and genuine in the products and services we provide and the way we do business.

Comprehensive and integrated solutions

Our solutions are unique in their support of the implant treatment process from beginning to end. They allow dental professionals the freedom to create predictable, lasting, patient-specific outcomes, and are designed to help make your job easier without compromising reliability, long-term function, and esthetics.

Our comprehensive product portfolio includes ANKYLOS, ASTRA TECH Implant System, and XIVE implant lines, digital technologies such as ATLANTIS patient-specific, CAD/CAM solutions, SIMPLANT computer guided treatment planning, SYMBIOS regenerative solutions, and professional development programs.

Research and development

Documentation is an essential part of our investment in the development of our products and services. Our research and development efforts focus on all aspects of implant treatment, including more demanding and advanced compromised cases and simplified treatment procedures. The commitment to quality is further supported by our extensive pre-clinical and clinical studies program.

Professional development

Through documentation updates, seminars, training, and hands-on workshops, we offer education on the latest developments in implant dentistry for all members of the treatment team.

As your partner of choice, we can help support your practice and business development efforts with patient awareness and education material, and advertising and co-marketing collateral.

Reliability and partnership for restoring quality of life and happiness—because it matters.
More than 25 years – connected with you

The ANKYLOS implant system was designed in 1985 by Prof. G.-H. Nentwig and Dr. W. Moser. Their premise: an implant that could act prosthetically like a stable natural tooth. In more than 25 years of clinical use, the ANKYLOS system has been recognized for hard and soft tissue maintenance and high-quality, long-term esthetics.

1987
The innovative implant system with its groundbreaking features, including tapered connection, significant horizontal offset and progressive thread design, is put to clinical use.

1993
ANKYLOS is launched.

2001
The unique ANKYLOS SymCone concept for prosthetic overdentures, developed together with Dr. Dittmar May (Lünen, Germany), is launched.

2005
ANKYLOS is provided with the FRIADENT plus implant surface and a micro-rough implant shoulder.

2008
ANKYLOS C/X, designed for use with both non-indexed (C) and indexed (X) prosthetic components, is launched.

2009
The ANKYLOS portfolio is further extended with computer-guided surgery capabilities, based on the market-leading SIMPLANT software.

2009
Going CAD/CAM – ISUS implant suprastructures are introduced for ANKYLOS.

2011
TitaniumBase: two-piece CAD-CAM abutments.

2012
ATLANTIS patient-specific CAD-CAM abutments.

2012
Introduction of the SmartFix Concept – the prosthetic solution for full arch restorations on implants placed at an angle.

2013
Launch of ANKYLOS 6.6 mm. May minimize the need for vertical bone augmentation procedures.

2014
The worldwide unique WeldOne concept is launched by facilitating stable and durable chairside solutions.
The ANKYLOS TissueCare Concept

Scientifically and clinically proven for maintaining hard and soft tissue over time, the ANKYLOS TissueCare Concept is the combination of unique features of the ANKYLOS implant system.

SoftTissue Chamber™

The TissueCare connection and the micro-rough implant shoulder allow for subcrestal placement. In combination with a horizontal offset and the concave abutment design, a chamber for soft tissue and bone is created, supporting tissue stability.

FRIADENT® plus surface

The grit-blasted and high temperature-etched FRIADENT plus microstructure excels by rapid bone formation on the implant surface. This results in early osseointegration and high bone-to-implant contact.

One-fits-all TissueCare connection

All abutment sizes share one tapered connection simplifying the treatment protocol. A steep connection taper promotes friction lock without micro-movement, providing non-indexed prosthetics while offering an indexed option.

Progressive Thread

The thread design transfers the functional load to the apical part of the implant and creates primary stability allowing for immediate loading.

Where ANKYLOS® goes, hard and soft tissue follow...

Stable peri-implant hard and soft tissue after healing.

Final restoration in place.

2 years after prosthetic restoration.

4 years after prosthetic restoration.

The ANKYLOS TissueCare Concept provides long-term tissue stability and excellent aesthetic results.
The ANKYLOS SoftTissue Chamber provides a three-dimensional biological space that is created by the wide horizontal offset design in combination with the subcrestal placement of the implant. This biological space is filled by connective tissue with collagen fibres, creating a three-dimensional network around the abutment.

The ANKYLOS SoftTissue Chamber
- Maximizes biological space through the combination of a narrow, concave emergence profile shape of the abutment, wide horizontal offset and subcrestal placement
- In combination with the unique properties of the TissueCare connection with its friction-locked design for no micromovement, the SoftTissue Chamber promotes and optimizes an one-abutment-one-time treatment option

Positive gains in tissue response
The SoftTissue Chamber creates the space needed for bone formation over the implant shoulder, as well as connective tissue fibers supporting ample, healthy and natural looking soft tissues. Gain in interdental papilla height can be observed. The unique anatomical conditions in the SoftTissue Chamber provide long-term hard and soft tissue stability and long-lasting aesthetic results.

Key features of the SoftTissue Chamber:
- Horizontal offset (Platform Switching) The geometry of the ANKYLOS TissueCare connection moves the transition between implant and abutment to a central position. This integrated horizontal offset design establishes a broad basis for hard and soft tissue stability at the implant shoulder. In combination with the absence of micromovement and the prevention from bacterial ingrowth, this enables long-term tissue maintenance.
- Subcrestal placement The unique friction-locked and keyed TissueCare connection ensures such a precise fit of the two components that it allows for subcrestal placement of the implant and positive bone response, thus enabling the desired emergence profile, and transgingival healing. ANKYLOS is therefore able to provide the flexibility of a two-piece system while ensuring hard and soft tissue remain healthy and free of irritation.
- Micro-rough implant shoulder The patented microstructured implant shoulder allows for bone formation up to the abutment. This supports the overlying soft tissue and establishes optimized conditions for long-term tissue stability and health.
One-fits-all TissueCare connection

The ANKYLOS TissueCare connection offers friction-locked and keyed stability between the implant and abutment, similar to that of a one-piece implant design. This precision-fit design allows for optimized load bearing and eliminates micromovement between the implant and abutment and mechanical irritation that might lead to bone resorption.

The precision-manufactured TissueCare connection is designed for absolute tightness. This means that the peri-implant bone and gingival structures do not react to this connection as a gap. This reduces bacterial colonization and the risk of inflammation.

The TissueCare connection is the same dimension for all implant diameters – a proper “one-fits-all” connection simplifying the treatment protocol.

The ANKYLOS TissueCare connection
• Ensures outstanding tissue stability by absence of any micromovement
• Creates long-term healthy tissues resulting in esthetic outcomes over time

One-fits-all – full surgical and prosthetic flexibility with interchangeable prosthetic components
As a result of the identical tapered connection dimensions for all implant diameters, all abutments of the ANKYLOS implant system can be used for all ANKYLOS implants. This versatility brings simplicity to the treatment process by reducing the number of prosthetic components and allowing for the ideal abutment design to be used for achieving optimal prosthetic results, independent of the implant selected to meet the surgical requirements.

Tapered connection with indexing option
The tapered TissueCare connection allows for 360° alignment of the prosthetic abutments in any position as required by the prosthetic conditions. For those who prefer indexed prosthetics, abutments with an index as positioning aid are also available. In both cases, the keyed and friction-locked taper acts as the anti-rotation device.

Whether non-indexed or indexed, once the prosthetic restoration has been fixed in place, implant and abutment form an extremely tight and rotation-free unit.

Prosthetic variety
The ANKYLOS system includes a variety of prosthetics ranges from which you can choose depending on the indication and your preferred approach. Each range includes abutments in various sizes and designs, with and without positioning aid (index) to achieve an optimized functional and esthetic solution for every implant patient.
**Progressive Thread**

The progressive thread is designed to match the bone structure and for easy insertion.

**Design considerations**
- The cervical geometry reduces load transfer to the cortical bone
- The continuously increasing thread depths transfer load to the cancellous bone

Controlled loading force is achieved in the regions that are significant for the maintenance of crestal bone. With the thread in final position, this creates primary stability allowing for immediate loading.

The design of the thread ensures an even load distribution in the bone crest and maintenance of the bone structure.

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**FRIADENT® plus surface**

All ANKYLOS C/X implants are produced with the grit-blasted and high temperature-etched FRIADENT plus implant surface. The excellent properties of this microstructure result in early osseointegration and high bone-to-implant contact as documented in numerous in-vitro and in-vivo studies.

**Key benefits:**
- Outstanding wetting properties for activation of the primary cell apposition
- Unique, three-dimensional microdesign that promotes the apposition of bone-forming cells and subsequently optimum osseointegration
- Intensive formation of new bone with increased bone maturation in the early stage for high stability at the interface

**Surface and macro design – the perfect match**

In combination with the advantages of the unique design features of the progressive thread, the FRIADENT plus surface creates high bone-to-implant contact and primary stability allowing for immediate loading.

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1. SEM (3000 x) of FRIADENT plus surface structure. Bimodal morphology with micropores (0.5 – 1 μm) in microstructure.
2. Initial contact and anchorage of an osteoblast by thread-like extensions (filopodia) on the FRIADENT plus surface.
3. Extracellular matrix on FRIADENT plus surface (fig. 1 – 3: R. Sammons et al., Birmingham, UK).
4. Histology (10 x): Bone-to-implant contact on FRIADENT plus surface between the implant threads (M. Weinländer et al., Graz, Austria).
Clinical experience

SoftTissue Chamber™ creates room for hard and soft tissue
The chamber created by the horizontal offset of the unique tapered ANKYLOS TissueCare connection in combination with subcrestal implant placement and the micro-rough implant shoulder provides excellent conditions for bone and soft tissue ingrowth and supports long-term tissue stability. The clinical effectiveness of this concept has been documented in thousands of cases.

<table>
<thead>
<tr>
<th>Long-term evaluation of peri-implant bone loss (after up to 204 months of follow-up)</th>
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<tbody>
<tr>
<td>Recall data: April 1991– May 2011:</td>
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<tr>
<td>Horizontal:</td>
</tr>
<tr>
<td>Vertical:</td>
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<tr>
<td>Conclusion: High implant survival rate and low rates of peri-implant bone loss observed after 17 years in 125 followed implants.</td>
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</table>

<table>
<thead>
<tr>
<th>Tapered connection Single implants replacing molars</th>
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<tbody>
<tr>
<td>Study centers 34</td>
</tr>
<tr>
<td>Dentists 80</td>
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<tr>
<td>Implants placed during 2.5 years 1,500</td>
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<tr>
<td>Patients 450</td>
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<tr>
<td>Study follow-up 3-5 Years</td>
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<tr>
<td>Implant survival 97.5%</td>
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<tr>
<td>Conclusion: Survival rate of 97.5% after 3 to 5 years in 1,300 followed implants.</td>
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</table>

<table>
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<th>6-year multicentered clinical study</th>
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<tbody>
<tr>
<td>Implants 233</td>
</tr>
<tr>
<td>Minimum years 5</td>
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<tr>
<td>Maximum years 7.37</td>
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<tr>
<td>Mean years 6.3</td>
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<tr>
<td>Failures (1) 0.5%</td>
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<tr>
<td>Loosening of abutment (3) 1.3%</td>
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<tr>
<td>Abutment fracture (0) 0%</td>
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<tr>
<td>Conclusion: High prosthetic reliability observed in 233 implants followed for at least 5 years.</td>
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</table>


6-year multicentered clinical study

Study centers
Dentists
Implants placed during 2.5 years
Patients
Study follow-up
Implant survival
Conclusion: Survival rate of 97.5% after 3 to 5 years in 1,300 followed implants.

Restoration of maxillary lateral incisor, five-years follow-up

Two cases from a long-term study of the University of Frankfurt on over 4,000 patients with 12,000 placed implants in the period of 1991 to 2011

<table>
<thead>
<tr>
<th>Mandibular restoration with the SynCone® concept, thirteen years post-operative</th>
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</thead>
<tbody>
<tr>
<td>1. Control image after delivery of final restoration of tooth 12 shows excellent bone apposition</td>
</tr>
<tr>
<td>2. The situation after about one year (March 2006)</td>
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<tr>
<td>3. Abnormal peri-implant bone five years after injury</td>
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<tr>
<td>4. Clinical situation another year later (February 2007)</td>
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<tr>
<td>5. Maintained peri-implant bone five years after insertion</td>
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<td>6. Radiographic controls with stable crestal bone level on top of the implant shoulder</td>
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<td>7. During the provisionalization phase</td>
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<td>8. After delivery of the final restoration</td>
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<td>9. After two years</td>
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<td>10. Four years</td>
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<td>11. Six years and</td>
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<td>12. Eight years in function</td>
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</tbody>
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Behind the results

Key references

Recent studies confirm observations from the early years of the ANKYLOS implant system, providing long-term evidence for the positive impact of the TissueCare Concept on the peri-implant hard- and soft tissues.

Ramonos clinical observation of 58 ANKYLOS implants showed no horizontal bone loss in 51 patients and no vertical bone loss in 48 patients during a 20 month loading period. These findings indicate that the ANKYLOS offset tapered abutment-connection provides hard tissue stability.


ANKYLOS offset tapered-abutment connection provides long-term hard and soft tissue stability over a mean period of 36 months as demonstrated by Nentwig’s clinical observation of no progressive bone or peri-implant mucosal loss in 95.8% and 98.7% of 539 cases respectively.


Chou observed 1500 ANKYLOS implants over 35 months and found that mean bone loss per year was well within the guidelines of 0.2 mm per year indicating that the ANKYLOS offset tapered connection provides hard tissue stability.


For 90 ANKYLOS implants placed in the maxilla of 15 patients following an immediate functional loading protocol with and without simultaneous augmentations, Romans reported a survival rate of 96.6% after a mean loading period of 42.4 months.


Koutouzis observed 30 ANKYLOS single-tooth implants in 30 patients. After 12 months, implants placed in 2 mm subcrestally exhibited a statistically significantly higher percentage of implant survival than implants on the bone platform compared to implants placed at the bone level (90% versus 35%).


The three-dimensional biologic space between ANKYLOS implant platform and abutment, called the chamber, showed favorable results with regard to hard tissue volume as observed by Degidi 18 months after immediate implant placement and restoration with definitive abutments in fresh extraction sockets in 10 patients.

ANKYLOS® at a glance

Indications
- The ANKYLOS C/X implant system is for single-stage or two-stage surgical procedures and cemented, removable or screw-retained restorations.
- The ANKYLOS C/X implant system may be used for immediate placement and function on single tooth and/or multiple tooth applications when adequate primary stability is achievable, with appropriate occlusal loading, in order to restore chewing function. Multiple tooth applications may be splinted.

Surgical instrument set
The ANKYLOS surgical kits of plastic with modular structure include all instruments required for the standardized surgical protocol. Three types of surgical kits are available for ANKYLOS: one for the machine-driven protocol (A and B implants only), one for the manual protocol and one for guided surgery.

Implants
- **Implant diameters and lengths**
  - **Diameters:** 3.5 mm (A), 4.5 mm (B), 5.5 mm (C), 7.0 mm (D)
  - **Lengths:** 6.6 mm, 6.6 mm, 6.6 mm, 7.0 mm, 8 mm, 8 mm, 8 mm, 8 mm, 9.5 mm, 9.5 mm, 9.5 mm, 9.5 mm, 11 mm, 11 mm, 11 mm, 11 mm, 14 mm, 14 mm, 14 mm, 14 mm, 17 mm, 17 mm, 17 mm, –

- **Implant material**
  - Pure titanium grade 2 (ISO 5832-2)

- **Implant surface**
  - FRIADENT plus microstructure (grit-blasted and high-temperature etched)

- **Implant-abutment connection**
  - Keyed and friction-locked tapered connection (TissueCare connection) with optional index

Drill preparation
- Internally irrigated drills with diameter and length markers.

Prosthetic restorations

<table>
<thead>
<tr>
<th>Single-tooth crowns</th>
<th>Fixed bridges</th>
<th>Removable dentures</th>
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</thead>
<tbody>
<tr>
<td>Balance Anterior C/ or /X</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>CERCON Balance C/</td>
<td>x</td>
<td>–</td>
</tr>
<tr>
<td>TitaniumBase C/ or /X</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>ATLANTIS CAD/CAM abutments</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Regular C/ or /X</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Balance Posterior C/</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Standard C/ Abutment</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

Single-tooth restorations in front-tooth region only (regions 13–23 and 33–43)

Esthetic solutions
- **Balance Anterior C/ or /X abutment**
  - CERCON Balance C/ abutment for demanding esthetic indications
- **TitaniumBase C/ or /X**
  - Titanium base for metal reinforced individual ceramic abutments
- **ATLANTIS patient-specific abutments for ANKYLOS**
  - Patient-specific abutments
  - Available in titanium, gold-shaded titanium and zirconia
- **Crown and bridge abutments**
  - **Regular C/ or /X abutment**
    - For fixed prosthetics in various cases
  - **Balance Posterior C/**
    - For fixed prosthetics in various cases
  - **Standard C/ abutment**
    - One-abutment-one-time concept
    - Transfer on abutment level

Full arch restorations
- **Balance Base Abutment C/ and SmartFix concept**
- **Snap Attachment C/**
- **ATLANTIS™ ISUS**
- **WeldOne**

Implants
- **Implant geometry**
  - Cylinder screws

Implant-abutment connection
- **Keyed and friction-locked tapered connection (TissueCare connection) with optional index**

Drill preparation
- **Internally irrigated drills with diameter and length markers.**

**FRIOS Unit S/i**
- Induction drive unit with present programming for augmentation and implant placement.

**Conical Reamers**
- **Round Drill**
- **Twist Drill**
- **Tri-Spade-Drill** with depth marks

**FRIOS Unit S/i**
- Induction drive unit with present programming for augmentation and implant placement.
About DENTSPLY Implants

DENTSPLY Implants offers comprehensive solutions for all phases of implant therapy, including ANKYLOS®, Astra Tech Implant System™ and XIVE® implant lines, digital technologies, such as ATLANTIS® patient-specific CAD/CAM solutions and SIMPLANT® guided surgery, SYMBIOS® regenerative solutions, and professional and business development programs, such as STEPPS™. DENTSPLY Implants creates value for dental professionals and allows for predictable and lasting implant treatment outcomes, resulting in enhanced quality of life for patients.

About DENTSPLY International

DENTSPLY International Inc. is a leading manufacturer and distributor of dental and other healthcare products. For over 115 years, DENTSPLY’s commitment to innovation and professional collaboration has enhanced its portfolio of branded consumables and small equipment. Headquartered in the United States, the Company has global operations with sales in more than 120 countries.