

IAT EXA PLUS
I M P L A N T S Y S T E M

Platform Switching

IAT Implant System

Digital Dentistry



A New Chapter

Made in Japan

NIPPON PISTON RING CO.,LTD.



Made-in-Japan Implant System
with Sophisticated
Technology and Reliability

Evolutionary Implant System with Made-in-Japan Reliability to Meet Expectations for Digital Dentistry



We at Nippon Piston Ring Co., Ltd. offer a fully made-in-Japan dental implant system, the IAT EXA, which has been supported by many dentists. Our devotion for development of made-in-Japan dental implant systems is nothing but to utilize highly reliable Japanese technologies, quickly receive opinions of on-site dentists and patients, and provide feedback for new improvement. And now, an advanced implant system has emerged through great evolution. The “IAT EXA PLUS.”

This system enables not only carrier-less implant surgery with its uniquely developed implant driver but also responds to a trend of the times, digital dentistry. Operation tools are carefully improved to realize distinguished operability; and advanced technologies are fused to open up new potentials of implant surgery. This implant system is developed to be truly easy to use for dentists and further help patients. Please try the indubitable quality made possible only by this made-in-Japan implant system.

1
Biologic reactions that benefit osteogenesis are promoted by
ED Surface
(Machined surface by wire electrical discharging)

2
Unique design enables
Strong Initial Stability

3
Tighter fitting realized by
Morse Taper Connection

4
Responding to digital dentistry with
Systematic Lines of Treatment

Made in Japan

1

Biologic reactions that benefit osteogenesis are promoted by

ED Surface

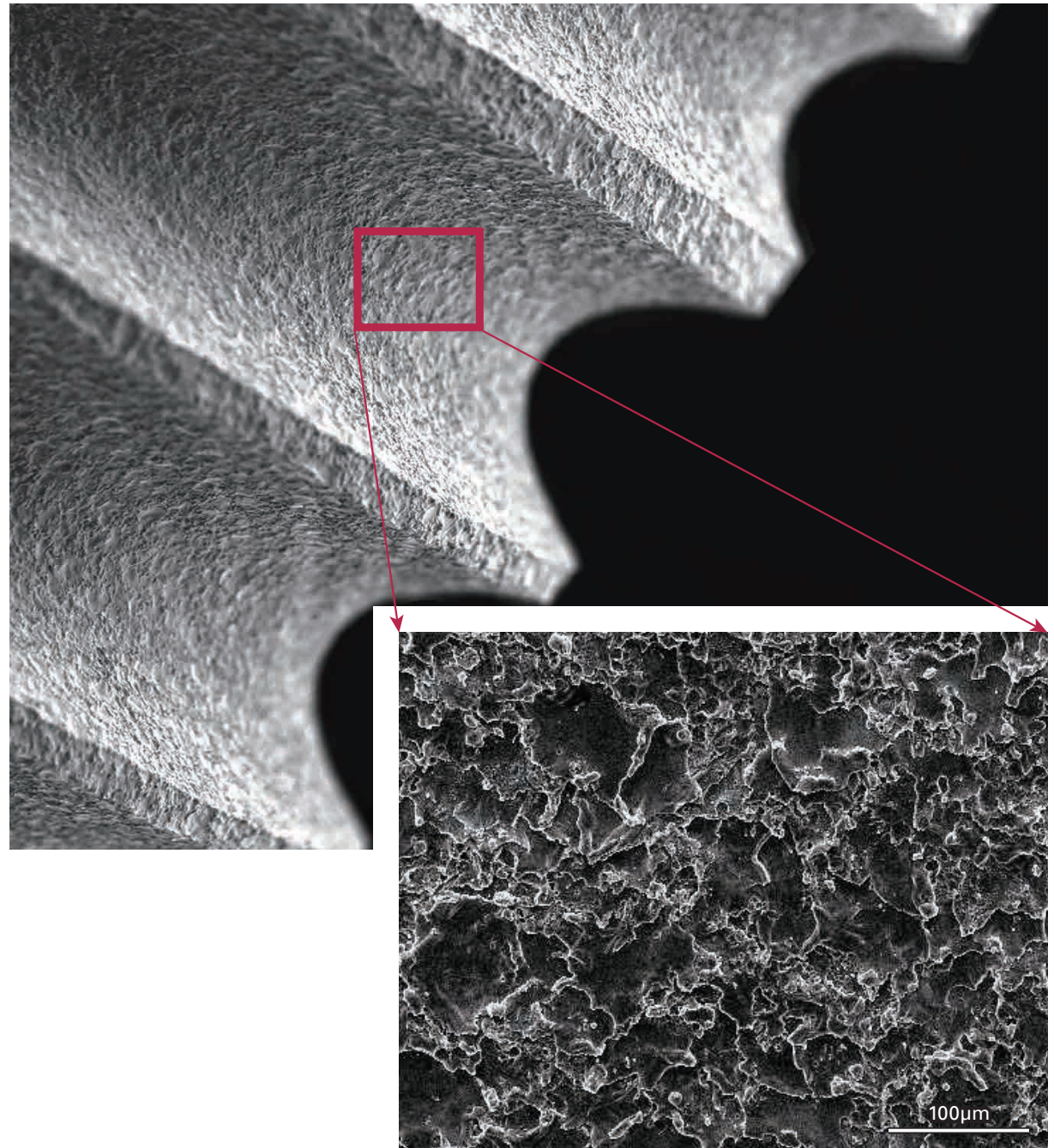
(Machined surface by wire electrical discharging)

Wire electric discharge machining creates a surface property unique to ED Surfaces that benefit osteogenesis

ED Surface means a surface property created and shaped through electric discharge machining with pure titanium wire electrodes. ED Surfaces consist of satin-like micropits made by regularly arranged traces of electrical discharge so that, after embedding bodies into a jaw bone, they provide an easy environment for proteins and cells to congregate on, which is beneficial to osteogenesis.

Also, although titanium surfaces are generally covered by titanium oxide, ED Surfaces have a titanium oxide layer of approximately $1\mu\text{m}$, which is thick compared to mechanically machined surfaces which have a thickness of only 5-10 nm.

Furthermore, the main characteristic of this titanium oxide layer is its functionally graded structure in which the property of titanium shifts from titanium dioxide to titanium oxide, and then to main body titanium respectively from the outer surface to the interior part. This thick and strong titanium oxide layer provides significant corrosion resistance. Its surface has good wettability and provides high compatibility with body fluids and blood, promoting biologic reactions that benefit osteogenesis.



2

Unique design enables

**Strong
Initial Stability**

Excellent body design for initial stability after embedding and functional consistency

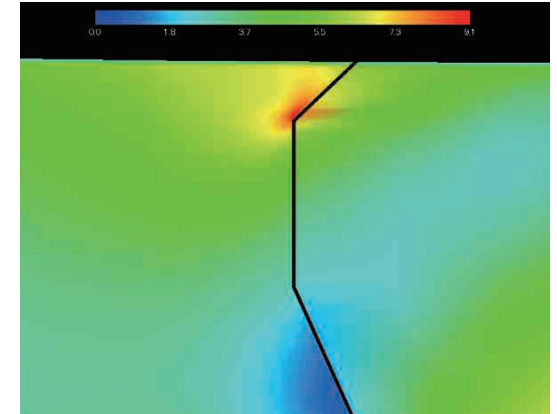
Implant body shapes affect initial stability after embedding and in-use stability.

The IAT EXA PLUS has a unique design with a shallow root of 3-mm screw thread under the platform for strong initial fixation after embedding.

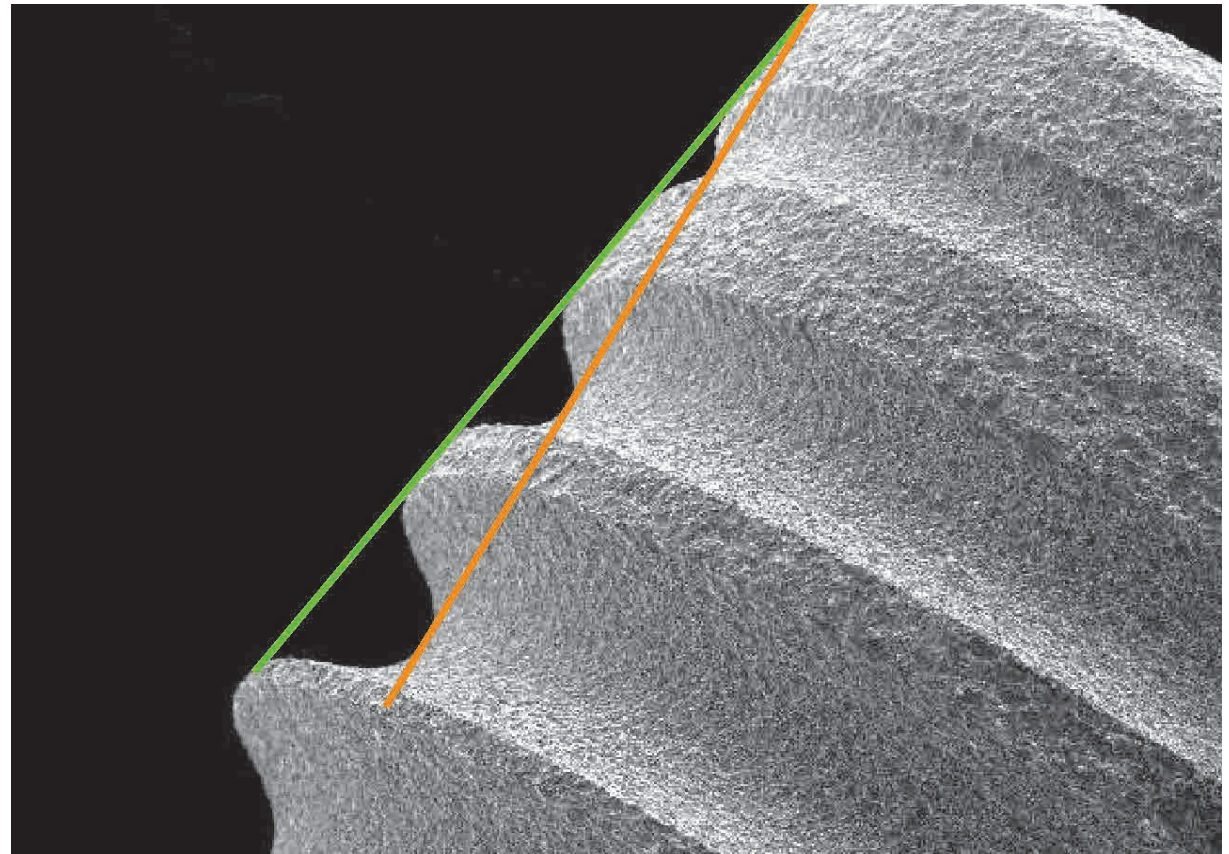
This system also enables sufficient osteoanagenesis up to the neck of the implant body by applying ED Surface up to the neck.

The neck of the implant body with a bevel prevents stress concentration on surrounding periphery bones after application of implants and minimizes absorption of alveolar bones.

The results of finite element stress analysis on the neck of the implant body showed no stress concentration on surrounding periphery bones.



The screw form in which the groove becomes shallower towards the upper part



3

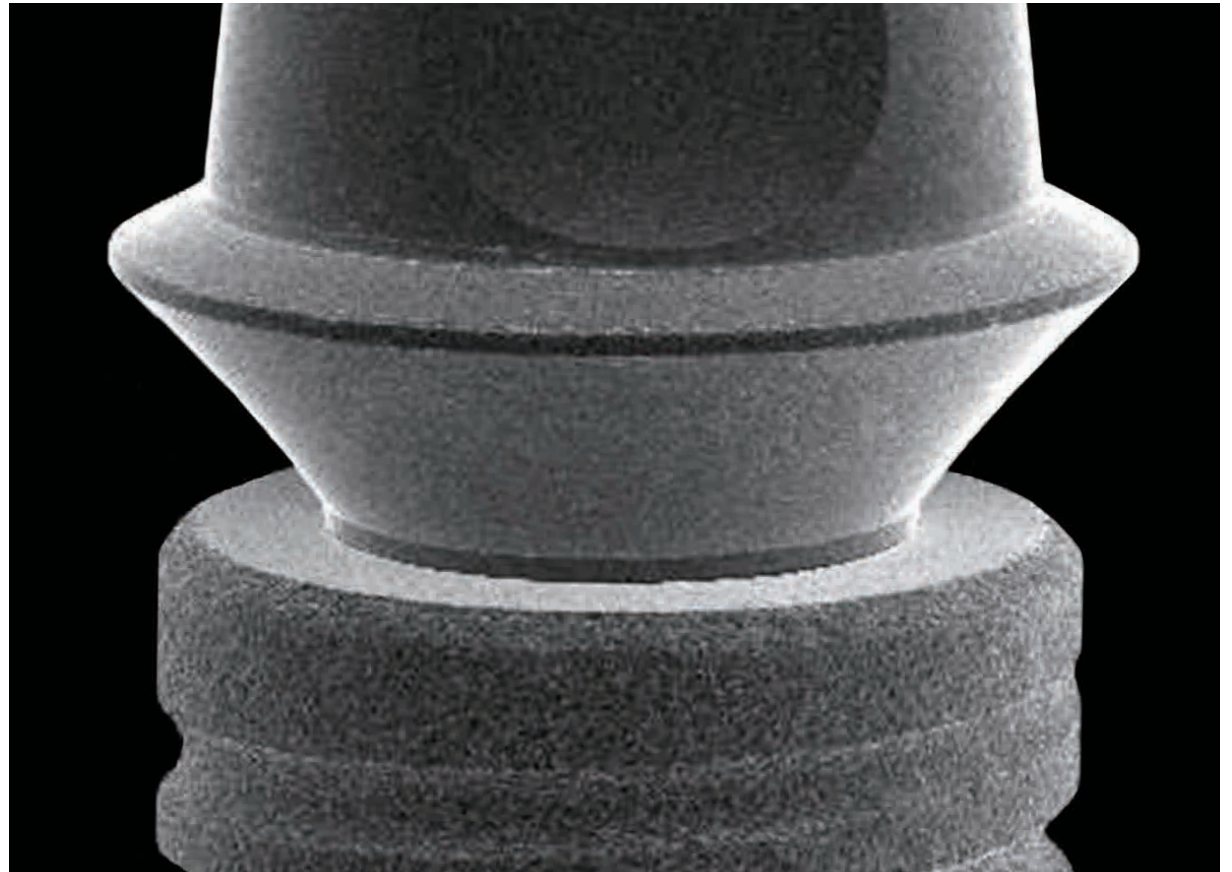
Tighter fitting realized by

Morse Taper Connection

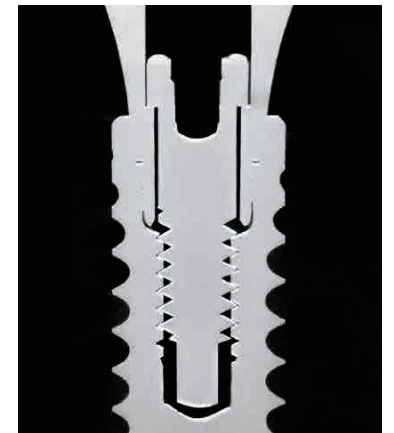
Excellent adhesiveness enough to inhibit intraoral bacterium propagation

Eight-degree Morse taper connection provides significantly tight fitting with almost no micro gaps between the implant body and the abutment.

This design reduces micro-movements during occlusion loading preventing peri-implantitis due to intraoral bacterium propagation and absorption of surrounding periphery bones. Moreover, platform switching ensures an ideal width at the boundary between an implant and an abutment to successfully minimize absorption of alveolar bones.



Surface property through application of ED Surface up to the top part and platform switching



Eight-degree Morse taper connection for tight fitting

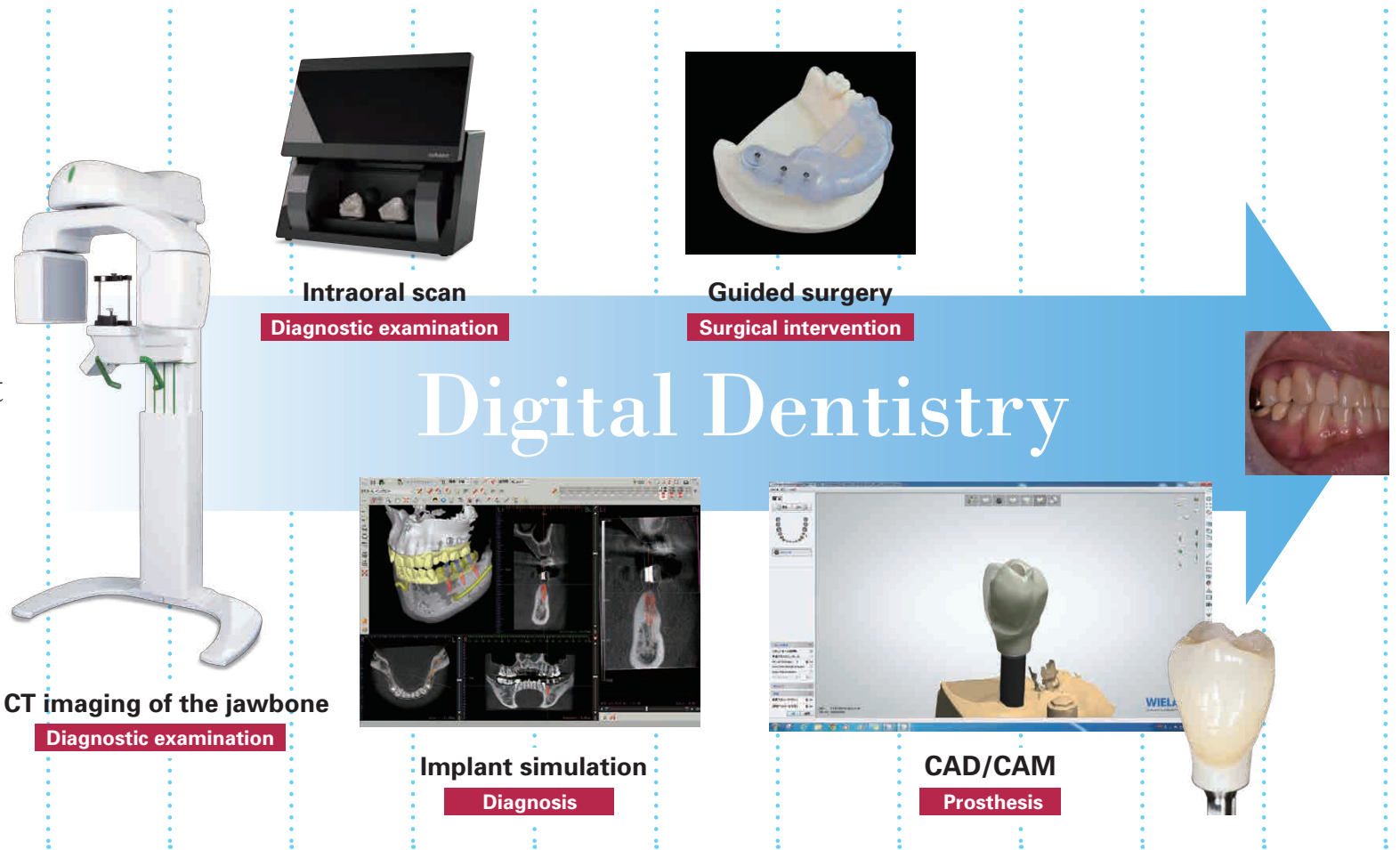
4

Responding to digital dentistry with
Systematic Lines of Treatment

Advanced IT system for realization of implant surgery following diagnostic design

An advanced IT system, digital dentistry, is introduced in response to the trend of implant surgery. This enables smart and systematic lines of treatment and realizes safe and secure implant surgery according to the diagnostic design. Also, this system enables CAD / CAM production of highly aesthetic and quality prosthesis meeting expectations of patients.

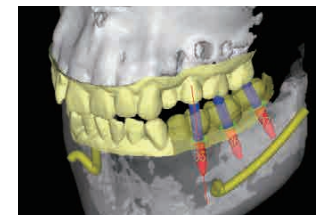
Digital Workflow



Support the surgery more safely and accurately

INTELLIGENT ARTIFICIAL TEETH Navi System

This system simulates implanting locations through reading of CT (DICOM) data. This system enables safer and securer implant surgery by recognizing the jawbone shape in three dimensions and being used together with a surgical guide.



Brand name: LANDmarker
Certification number: 227AHBZX00029000
Manufacturer: iLAND solutions Co. Ltd.

IAT EXA PLUS

Product lineup

Bone level

Procedure: Two stage technique
 Diameter: $\phi 3.3\text{mm}^*$, $\phi 4.0\text{mm}$, $\phi 5.0\text{mm}$
 Height: 8mm*, 10mm, 12mm, 14mm
 * $\phi 3.3\text{mm}$ diameter is not available in 8mm height.



Tissue level

Procedure: One stage technique
 Diameter: $\phi 3.3\text{mm}^*$, $\phi 4.0\text{mm}$, $\phi 5.0\text{mm}$
 Margin diameter: R: $\phi 4.5\text{mm}$, W: $\phi 5.5\text{mm}$
 Height: 8mm, 10mm, 12mm, 14mm
 * $\phi 3.3\text{mm}$ diameter is not available in 8mm height.
 Mucosa-penetrating depth: L: h1.5mm, H: h3mm



Implant Body

Evolutionary implant bodies in pursuance of further innovation of performance characteristics

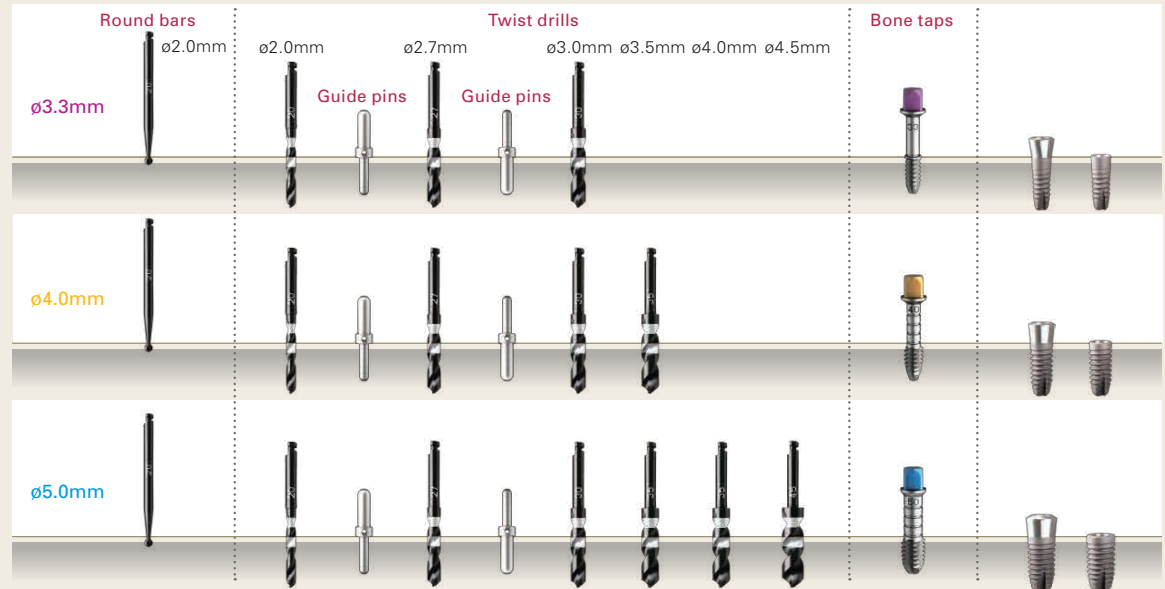
Implant Body



Abutment

Embedding flow

Embedding procedure variation depending on the diameter of screw type implants



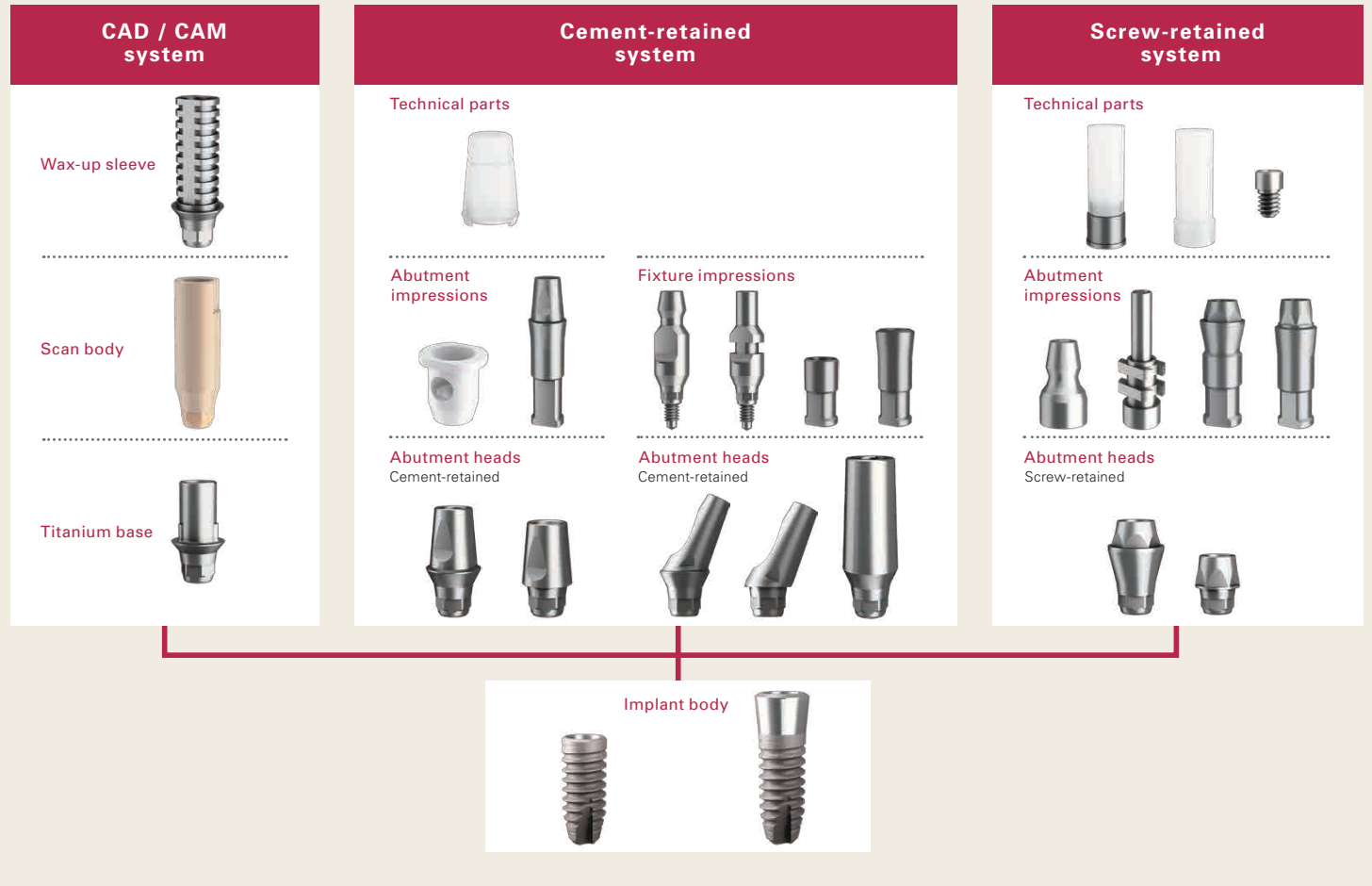
Improvement of visual recognition of embedding depth and reduction of stress during treatment

Implant Driver

We discontinued conventional implant carriers and independently developed implant drivers for improvement of visual recognition of the embedding depth and stress reduction during treatment. This improved cutting ability of the drill enables reduction of treatment damage in osteoanagenesis and surgery time.

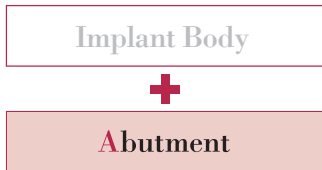


The IAT EXA PLUS implant prosthetic system largely consists of the following three systems.



Abutment flow chart

Prosthetic-related flow of the IAT EXA PLUS implant system



Provision of more natural color reproduction

Aesthetic CAD / CAM Abutments

The IAT EXA PLUS offers titanium-base abutments customized with titanium-zirconia hybrid base material manufactured by CAD / CAM. This provides more natural color reproduction optimal for patients who need delicate and aesthetic response.



Our Recommendation

Reasons why I chose IAT EXA PLUS

Promotion of Osseointegration by ED Surfaces and Quality of Regenerated Bones around Implant

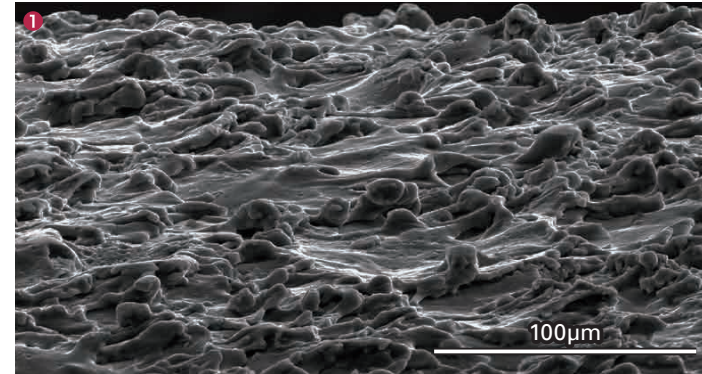
Takashi Miyazaki, DDS, PhD

Vice President, Dean of the School of Dentistry, Showa University



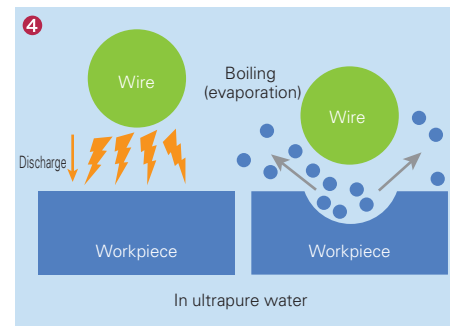
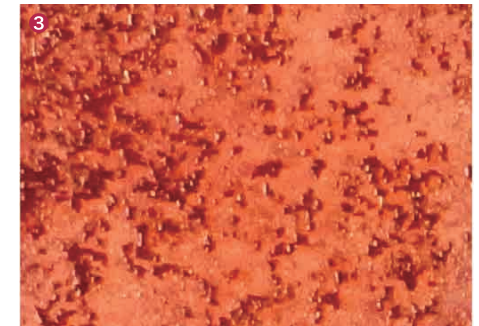
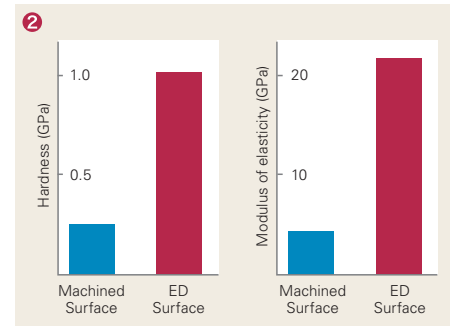
Implant treatments based on a concept of osseointegration has spread, requiring early start of functions and improvement in bone quality. The IAT implant system is the only one in the world which is processed by wire electric discharge machining. Wire electric discharge machining uses titanium wires as electrodes to generate spark discharging between titanium blocks in ultrapure water in order to use the energy not only for shaping the main body of titanium but also for provision of a distinct surface, i.e. ED Surface. ED Surfaces are uniquely rough with accumulated traces of electrical discharge, and it has a thick titanium oxide layer with a large amount of surface energy on the order of μm , which is integrated with titanium metal in a graded manner. Since discharge locally generates high-energy plasma, the titanium oxide layer richly contains the hydroxyl group, providing

ultrahydrophilicity and also forming radicals. It is recognized that ED Surfaces benefit protein absorption and cell adhesion, and also promotes early differentiation of osteoblasts in an early stage. Osteogenesis has been evaluated based on cell behaviors and animal tissue specimens so far without directly evaluating the quality of regenerated bones. We have been making efforts to clarify the structure and strength of regenerated bones using a Raman microspectroscopic system and a nanoindentation technique. Regenerated bones on ED Surfaces have better bone quality with a high modulus of elasticity and hardness of bones through crosslinking of collagen matrix due to the action of radicals. The IAT implant system uniquely created by wire electric discharge machining technology in Japan is expected to contribute to implant treatments in Japan as well as around the world in the future.



1 Surface properties of ED Surfaces

ED Surfaces are distinctively rough with accumulated spark discharge. They are also ultrahydrophilic due to its surface modification by electric discharge.



2 Bone quality evaluation of regenerated bones using a nanoindentation technique

Evaluation of quality of regenerated bones on ED Surfaces and machined surfaces using a nanoindentation technique indicated good bone quality on ED Surfaces with significantly high bone hardness and elasticity coefficient.

3 Stained photo of bones regenerated on an ED Surface

In *in vitro* testing, an ED Surface can provide a condition for bones to generate from cultured osteoblasts.

4 Mechanism of wire electric discharge machining

Titanium wires are used as electrodes to use the energy of spark discharge in ultrapure water for shape work of IAT implants.

Our Recommendation

Reasons why I chose IAT EXA PLUS

Reliable Made-In-Japan System for Higher Cost Performance

Daisuke Higuchi

Lecturer, Department of Prosthodontics, School of Dentistry, Showa University Vice Director, Implant Center, Showa University Dental Hospital

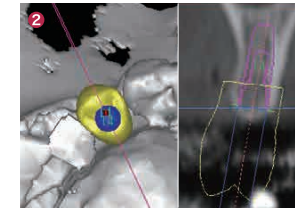


The current market has many implant systems. However, almost no domestic companies are capable of comprehensive in-house operations of design, manufacturing and sales. In this situation, the IAT EXA PLUS implant system is a highly reliable one, produced through comprehensive in-house operations by Nippon Piston Ring Co., Ltd. The greatest feature of the IAT EXA PLUS is its surface property, ED Surface, created and shaped through wire electric discharge machining. ED Surface can provide excellent osteoconduction, good bone quality and great bone strength. Furthermore, this system has (ultrahydrophilic and superoxide radical) photocatalytic effects analyzed in various studies to prevent adhesion of contaminants indicating promising benefits

for anti-aging and inhibitability to bacteria. Also, the IAT EXA PLUS implant system is safe and secure since it employs the IAT Navi System which can deliver a series of digital work flow from examination / diagnosis to guided surgery. This system has become familiar not only to us, dentists, and also to patients. Nevertheless, the rate of implant users in any age group has not reached 5% according to the Survey of Dental Diseases in 2016. So, this system is not yet widely known. In addition, surveys of the patients after implant treatment found that about a half of the patients are not satisfied about the treatment cost (Kubota, 2005). Considering this background, once the problem of cost is solved, the needs for highly reliable made-in-Japan implants are expected to increase more and more in the future.



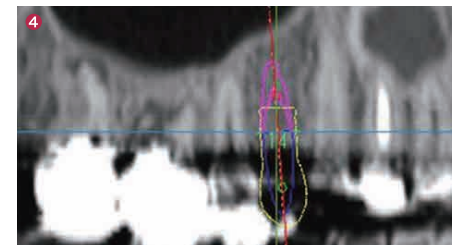
1 Intraoral photo before operation



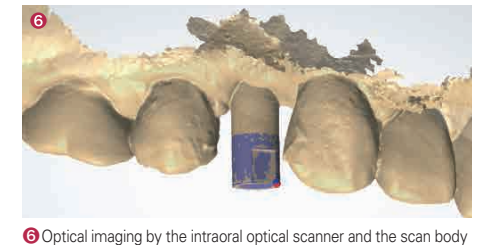
2 IAT 3D NAVI embedding simulation
This data is used for manufacturing of surgical stents (IAT Guide).



3 Intraoral fixation of a surgical stent
Generation of an implant cavity using the guide drill



4 5 Embedding simulation and X-ray photo after embedding
The embedding location conforms with the simulation.



6 Optical imaging by the intraoral optical scanner and the scan body



7 Design of the abutment and the upper structure using the abutment design software



8 Abutment and the upper structure manufactured with CAD / CAM



9 Intraoral photo after attachment of the upper structure

Manufacturer

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Brand name	General name	Classification	Medical device approval/ certification/registration number
Dental Implant Operation Tool Set (Sterilized)	Dental implant systems	Specially controlled medical devices	20700BZZ00172000
Dental Implant Operation Technical Component	Upper structure materials for dental implant operation	Controlled medical devices	20900BZZ00940000
Dental Implant Operation Screwdriver	Operation drill bits	General medical devices	09B1X10003000001
Dental Impression Taking Tool	Dental implant operation tools	General medical devices	09B1X10003000002
Drill Extension	Operation drill attachments	General medical devices	09B1X10003000003
Dental Implant Operation Tool Set	Dental impression taking instruments	General medical devices	09B1X10003000004
Dental Implant Operation Drill Set	Operation screwdrivers	General medical devices	09B1X10003000005
Gold Cylinder	Technical instruments for dental implant	General medical devices	09B1X10003000006
IAT FIT II	Dental implant operation tools	General medical devices	09B1X10003000007