IAT
IMPLANT SYSTEM

IAT EXA

IMPLANT SYSTEM

Platform Switching

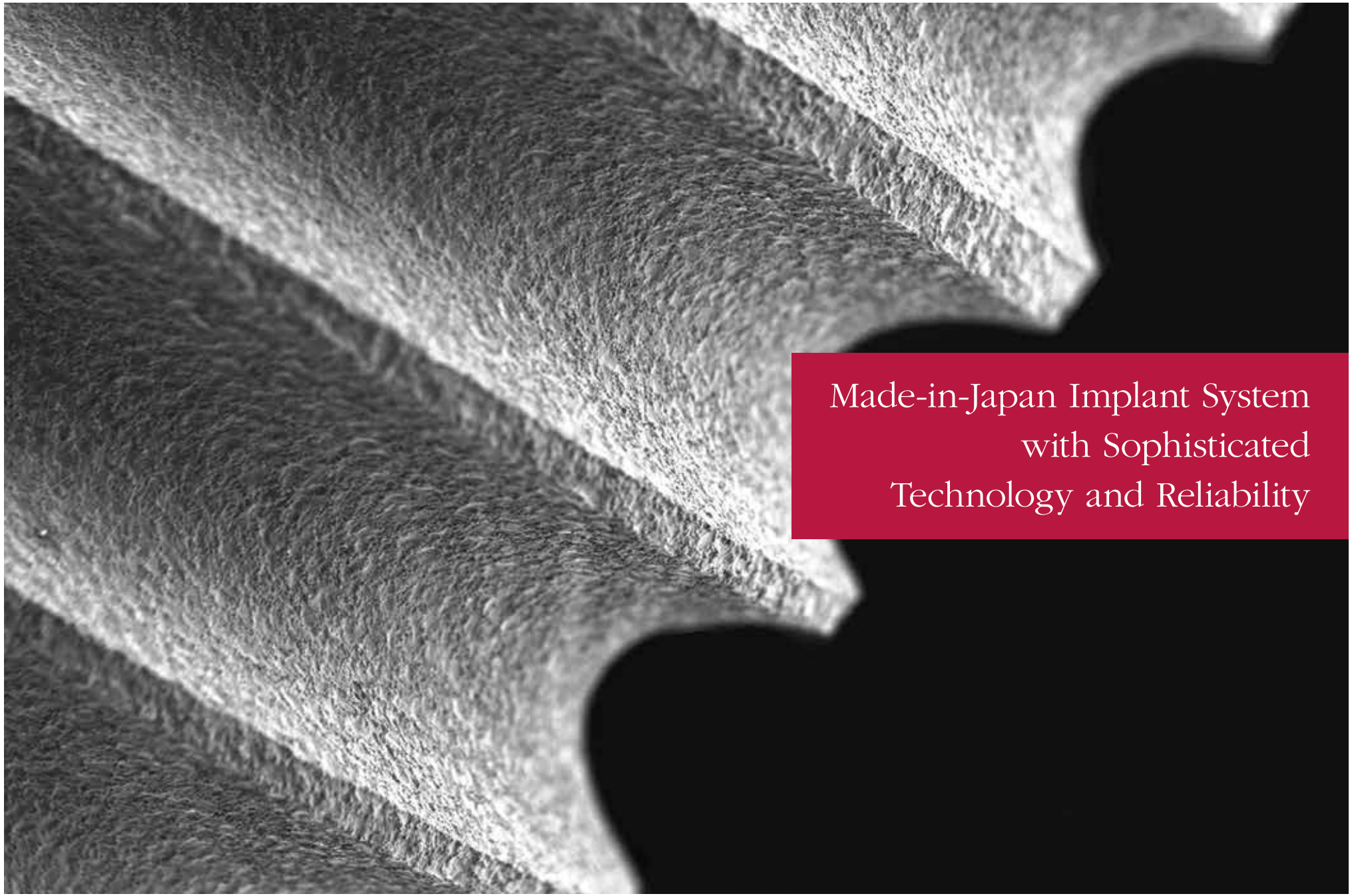
IAT Implant System

Twin-Hex Taper Connection

Sandblasted Surface

Made in Japan

NIPPON PISTON RING CO., LTD.


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

Nippon Piston Ring Presents
A Fully Made-in-Japan Implant Brand

IAT EXA

We at Nippon Piston Ring Co., Ltd. are pleased to offer you the IAT EXA,
a fully made-in-Japan dental implant system.
As a manufacturer of automotive components such as piston rings,
we are a global company with a high level of technology that is world-widely recognized,
and our philosophy is to produce the IAT EXA with same challenging spirit
and to meet the world-wide standards of quality at all times.
IAT is an abbreviation of "Intelligent Artificial Teeth,"
which is the general name for an implant system made of pure titanium
with our unique surface processed by wire electric discharge machining called, "ED Surface."
The study of surface processing with wire electric discharge machining started in 1984
by the Division of Biomaterials and Engineering under the School of Dentistry at Showa University.
The study continued for twenty years to carry out the processes of basic research,
clinical testing and development.
These efforts resulted in the creation of the IAT EXA implant system.
We are confident that this implant system is positioned to become one of the effective implant
treatment options in the world in the future, providing not only excellent osteogenesis,
strong initial stability and great operability during procedures,
but also high cost performance based on its use of sophisticated purely made-in-Japan
manufacturing method.

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
Good operability enabled by
Twin Hex Tapered Structure

4
Simple procedures for each patient with
Systematized Product Line

Made in Japan

1

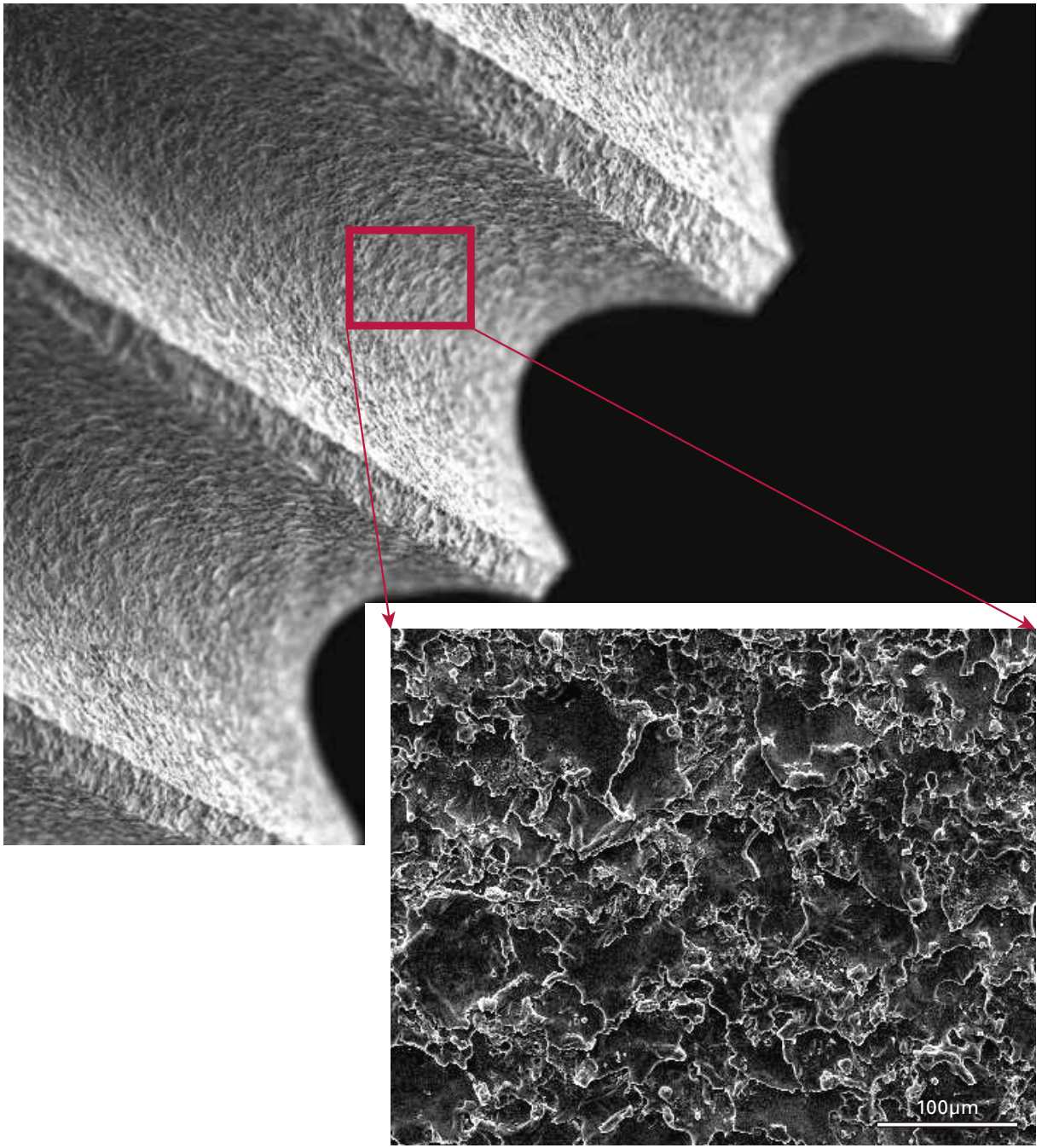
Biologic reactions that benefit osteoanagenesis are promoted by

ED Surface

(Machined surface by wire electrical discharge)

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

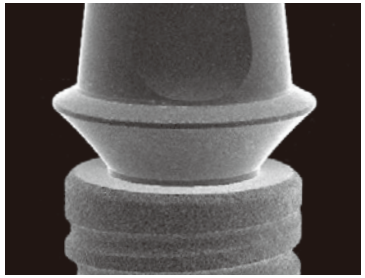
ED Surface means a surface property created and shaped through electric discharge machining with pure titanium wire electrodes. ED Surfaces consist of satin-like micropits made by regularly arranged traces of electrical discharge so that, after embedding bodies into a jaw bone, they provide an easy environment 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 1μm, 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.



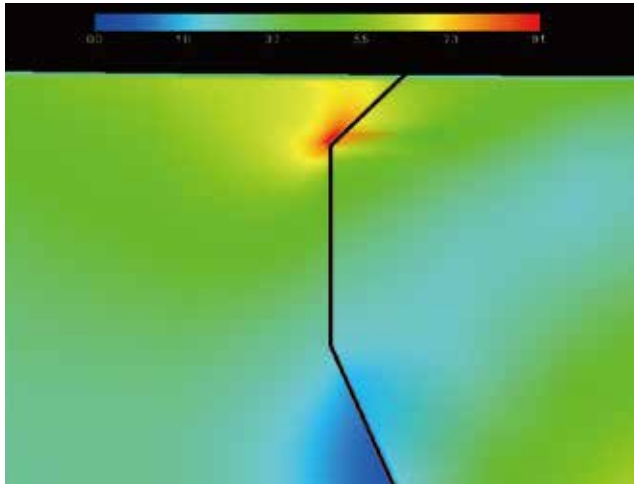
2

Unique design enables

Strong Initial Stability



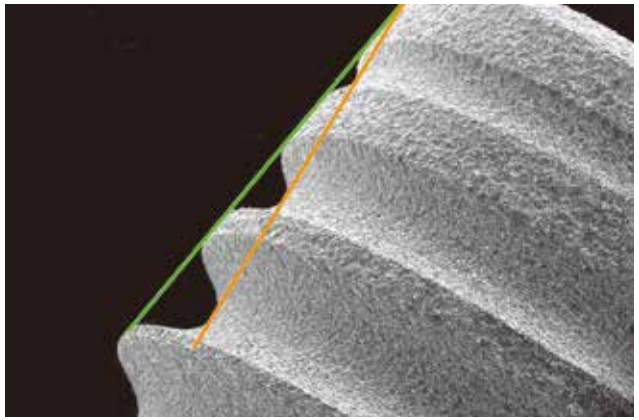
Ideal width ensured by platform switching



The result of finite element stress analysis on the neck of two-stage bodies showed no stress concentration to surrounding periphery bones.

The body design enables initial stability after embedding and excellent functional consistency

The shape of implants affects initial stability after embedding and in-use stability.
The IAT EXA implant system enables sufficient osteogenesis up to the neck of the body through ED Surface application up to the top of the body.
It also acquires strong initial stability by its screw form in which the groove becomes shallower towards the upper part.
Moreover, platform switching ensures an ideal width at the boundary between an implant and an abutment to successfully minimize absorption of alveolar bones.



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

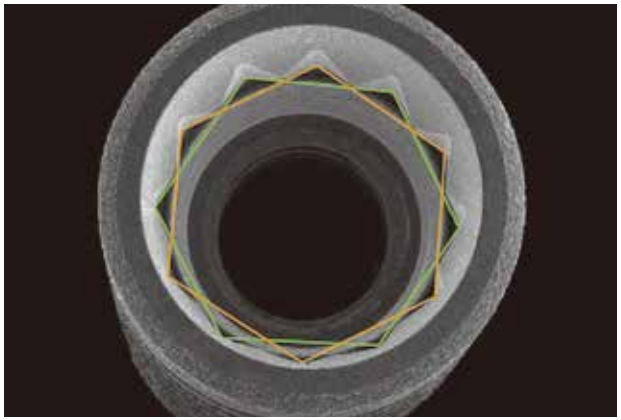
3

Good operability enabled by

Twin Hex Tapered Structure

This unique structure with high operability and adhesion enables better stability

IAT EXA adopts a unique twin hex tapered structure for a close fit with higher operability which enables careful angle adjustment of abutments.
This achieved a significant improvement in adhesion and stability of bodies and abutments.



IAT EXA's unique twin hex tapered structure

4

Simple procedures for each patient with

Systematized Product Line

Simple systematization enables excellent cost performance.

Simple systematization of the product line is one of main characteristics of the IAT EXA implant system. This improves on-site usability and reliability for implant surgical operations.
It also successfully achieved high cost performance by narrowing down products required for each symptom.

Body

Screw Type | Cylinder Type

+

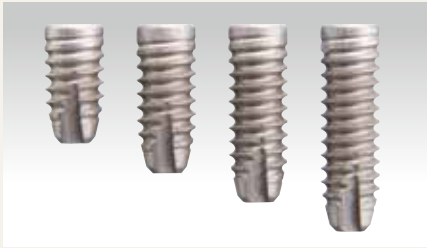
Abutment

Body

Evolutionary body in pursuance of further innovation of performance characteristics

Body
Screw Type | Cylinder Type
+
Abutment

Two-stage screws



Procedure: Two stage technique
Diameter: ø3.3mm*, ø4.0mm, ø5.0mm
Height: 8mm*, 10mm, 12mm, 14mm
(*ø3.3mm diameter is not available in 8mm height.)

One-stage screws

Procedure: One stage technique
Diameter: ø3.3mm*, ø4.0mm, ø5.0mm
Margin diameter: R: ø4.5mm, W: ø5.5mm
Height: 8mm, 10mm, 12mm, 14mm
(*ø3.3mm diameter is not available in 8mm height.)
Mucosa-penetrating depth: L: h1.5mm, H: h3mm

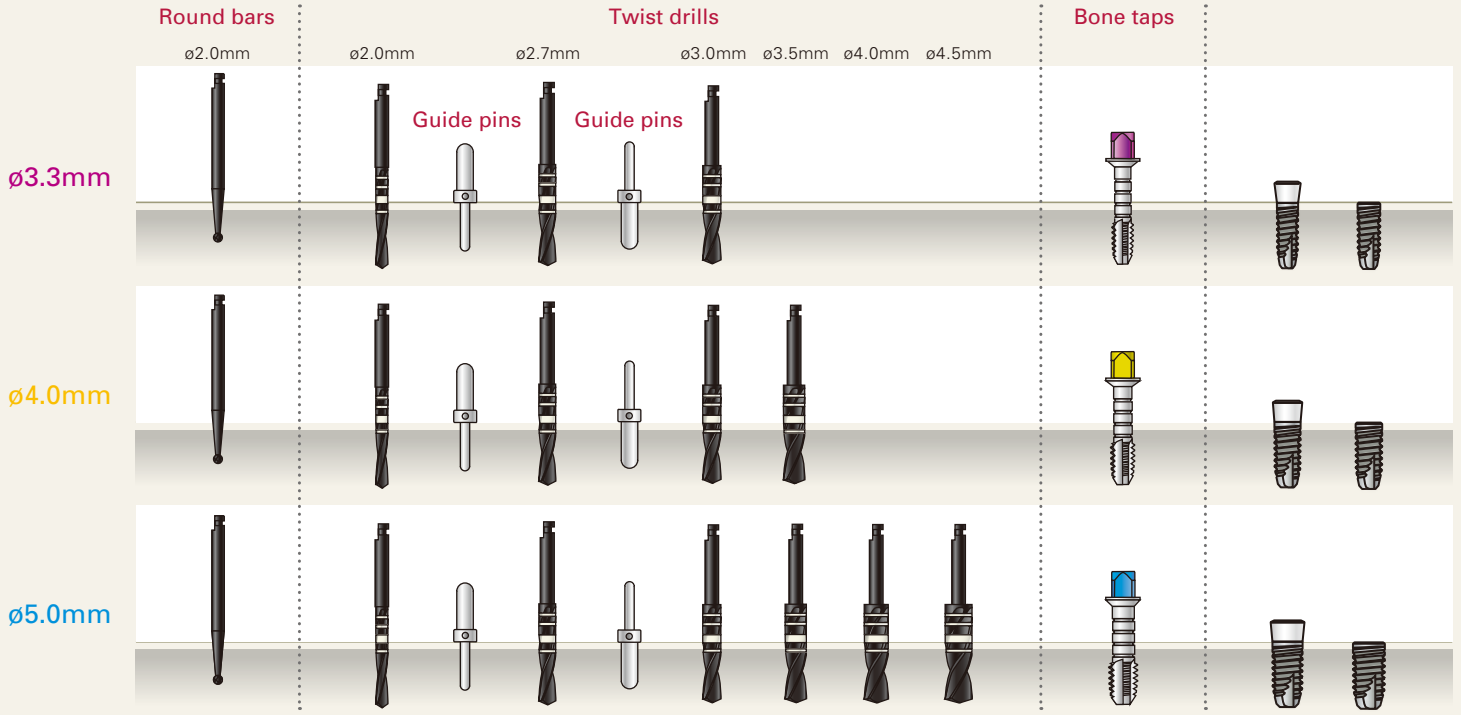
Two-stage cylinders

Procedure: Two stage technique
Diameter: ø3.3mm*, ø4.0mm, ø5.0mm
Height: 8mm, 10mm, 12mm, 14mm
(*ø3.3mm diameter is not available in 8mm height.)

Screw Type

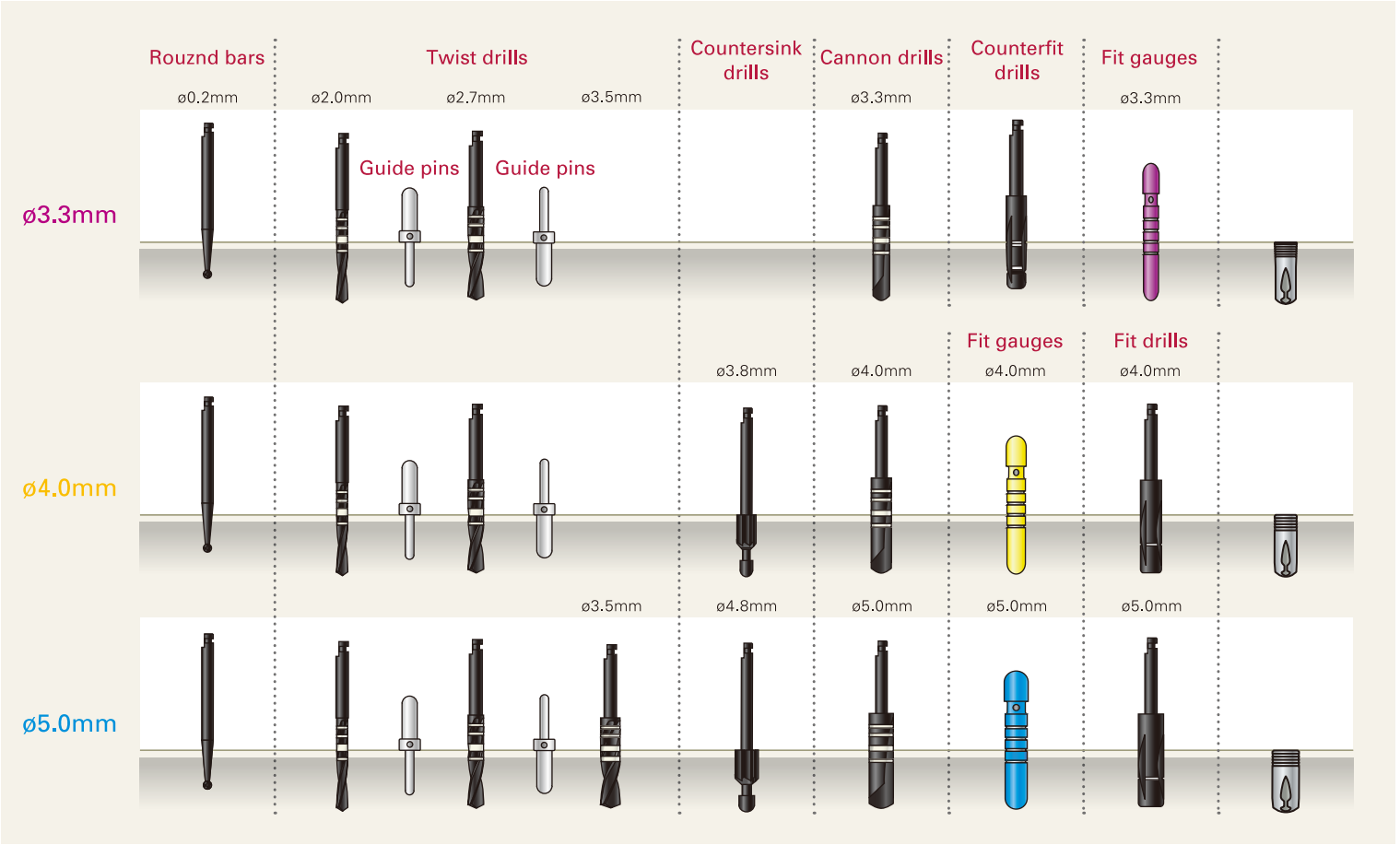
Embedding procedure variation depending on the diameter of screw type bodies

Body
Screw Type | Cylinder Type
+
Abutment



Cylinder Type

Embedding procedure variation depends on the diameter of cylinder type bodies



Body

Screw Type | Cylinder Type

+

Abutment

IAT EXA surgical system

The highly rated drill system especially for long-term clinical settings has great cutting ability and durability.
It helps to shorten the length of surgery and eases the burden of patients.
Also, operation tools are color-coded according to the diameter of bodies to improve operability and safety.

Abutment
flow chart

Prosthetic-related flow of the IAT EXA implant system

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

Non-preparation system

Technical parts

Abutment impressions

Abutment heads

Cement-retained

Preparation system

Fixture impressions

Abutment heads

Cement-retained

Screw-retained system

Technical parts

Abutment impressions

Abutment heads

Screw-retained

Fixtures

Body

Screw Type | Cylinder Type

+

Abutment

Our Recommendation

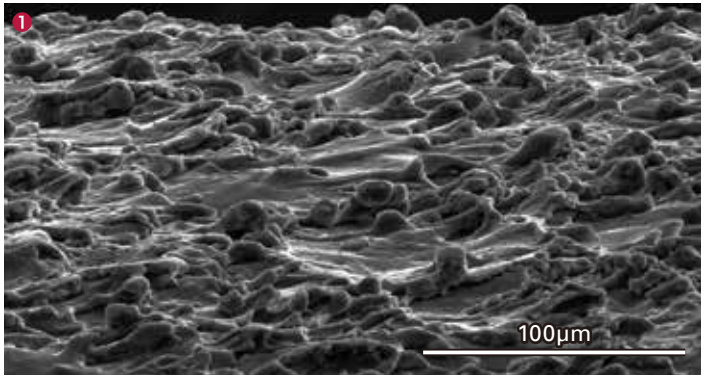
Reasons why I chose IAT EXA

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

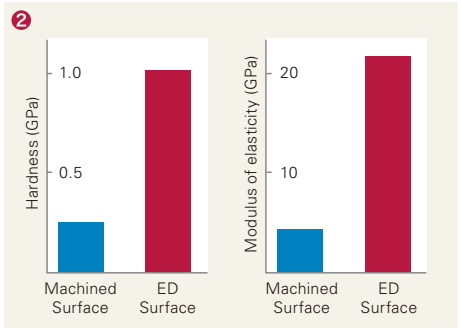
Takashi Miyazaki, DDS, PhD

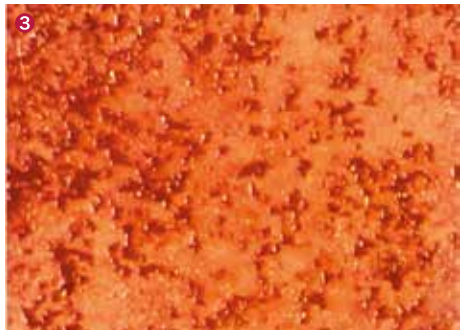
Dean, School of Dentistry, Showa University

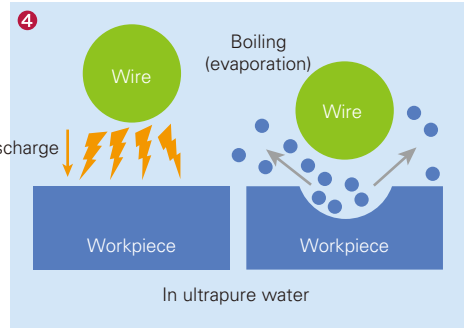
Implant treatments based on a concept of osseointegration has spread, requiring early start of functions and improvement in bone quality. The IAT implant system is the only one in the world which is processed by wire electric discharge machining. Wire electric discharge machining uses titanium wires 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

Implant Treatments Add Evident Reliability of Made-in-Japan Technologies

Shigeru Fujino, DDS, PhD

Medical Advisor, Japanese Society of Oral Implantology (JSOI)
Facility Director, Institute of Implant Reconstructive Dentistry (IIRD; JSOI's Training Facility for Certification)

Currently, dental implants are an established dental treatment option through the development of various implant systems for clinical application. The IAT implant system is entirely “made-in-Japan” from basic research and development to production featuring surfaces machined by wire electric discharging (ED Surfaces). In 1994, it started to be clinically applied as the IAT FIT implant system for twenty years and even today it is consistently showing good clinical results. The IAT EXA implant system was developed as a next-generation implant system with ED Surfaces in 2008. The IAT EXA implant system is clinically featuring ED Surfaces with high biocompatibility and the distinctive shape of implants developed from the point of view of bionics. The high osteocompatibility of ED Surfaces has already been proven by twenty-year clinical results of the IAT FIT implant system. There are two types of implant bodies, cylinder shape and screw shape, and two types of procedures, one stage technique and two stage technique, for type selection of implants in accordance with various clinical conditions depending on locations for embedding implants. Recent clinical research reports on the IAT EXA implant system exhibit good clinical results even from a number of applications for immediate post-extraction embedding cases and immediate post-embedding loading cases, in addition to general cases subject to existing bones.
I expect that the IAT EXA implant system will evolve into higher levels in the future through acceleration of new development of not only implant bodies but also peripheral components based on clinical results for a longer term.

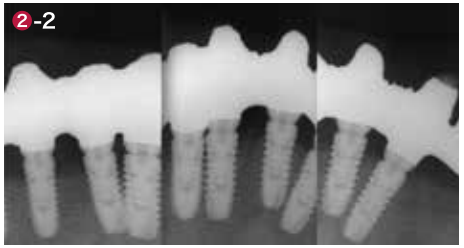
Observation period (year)	Number of implants	Number of omissions from the research	Number of problem occurring implants	Cumulative success rate (%)
Embedding–1	220	0	1	99.55
1–5	189	31	2	99.04
5–10	171	22	4	96.83
10–15	133	38	4	94.15

Cumulative success rate of the IAT FIT implant system in a range of ten to fifteen years
A clinical study of cylinder-shape implants indicated that ED Surfaces are clinically highly biocompatibile and stable for a long period of time. (Extracted and reorganized from Fijino et al.: Journal of Japanese Society of Oral Implantology; 2-1326,3,444-453)

❶-1 **IAT FIT implant case (intraoral photo)**
At the time of application of upper structures after three IAT FIT cylinder implant bodies were embedded into mandibular molar area in 1995.

❶-2 **IAT FIT implant case (dental X-ray photo)**
A dental X-ray photo of an upper structure after twenty years, which shows the high osteocompatibility of ED Surfaces.

❷-1 **IAT EXA implant case**
A bone anchored bridge was applied after embedding six IAT EXA implant bodies into the lower edentulous jaw in 2008.



❷-2 **IAT EXA implant case (dental X-ray photo)**
The condition of bones around implant necks exhibits stability enabled by platform switching for the part of implant-abutment connection.

Manufacturer
Nippon Piston Ring Co., Ltd.

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http://www.npr.co.jp/english/index.html

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