



Empowering High-Tech Industries with Ultra-Precision Machining Solutions:

**Introducing our micro tools for unparalleled precision and
superior microfabrication**

Micro Diamond Corporation

Yokohama JAPAN

July 2023

Our Vision

We aim for a global leader in the single crystal diamond micro tool marketplace.



Contents

- | | |
|---|---------------------------------------|
| 1 Who we are | 6 Industry Applied in |
| 2 What we are doing | 7 Our History |
| 3 Proprietary advanced technology | 8 Our Clients |
| 4 Our Micro Tools | 9 Contact |
| 5 Micro-Total Analysis System
(μ -TAS) Cutting | |

1. Who we are:

We are a leading company specializing in ultra-precision machining solutions for various high-tech industries. We produce and sell high-quality single crystal diamond micro tools for extremely precise and superior microfabrication.



Yokohama city

Micro Diamond Corporation

Representative	Hirokuni Nakajima (CEO)
Capital	10,000,000 JPY
Founded in	January 2000
Head Office	Kannaiekimaedaini Building 2-9 Minato-cho Naka-ku Yokohama-shi Kanagawa, 231-0017, Japan
Phone	+81-45-228-8001
URL	http://www.micro-dia.com/



2. What we are doing:

■ **Pioneers in Ultra-Precision Machining Solutions for High-Tech Industries**

- We are a leading company specializing in ultra-precision machining solutions that are applicable across a wide range of high-technology fields.

■ **Cutting-Edge Microtools for Fine, Precision, and High-Grade Machining**

- Our expertise lies in researching, developing, manufacturing, and selling microtools designed for fine, precise, and high-grade machining. Our tools utilize cutting-edge materials such as single-crystal diamond and **poly-crystal diamond (PCD)** for superior performance.

■ **Trusted by Prominent Companies in Automotive, Semiconductor, Medical, and Precision Instrument Manufacturing**

- Our equipment has earned the trust of numerous large-scale companies, who rely on us for their manufacturing processes in the automotive, semiconductor, medical, and precision instrument industries. We are proud to have delivered our cutting-edge solutions to these esteemed partners.

3-1. Proprietary advanced technology

Single crystal diamond

ACC

Both endmills and turning tools are available. They are designed for ultra precision and super-high quality microfabrication. The minimum radius of single flute ball endmill is R5 μ m.

PRIMO

Only endmills are available. They are designed for machining nonferrous metal or plastics.

Poly crystal diamond

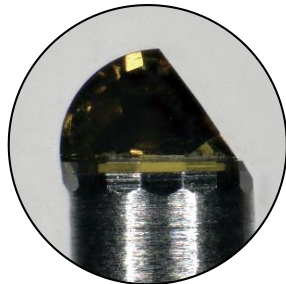
PCD

Various designs are available in order to meet customers' requirements.

3-2. Proprietary advanced technology

Single crystal diamond

ACC



Ball, radius and square endmills with single flute are available. They do not need to screw down the edge made of 2 pieces as the conventional endmills require. Therefore, the effective length can be set in case of diameter or radius size as follows.

Ball : radius $\geq R0.02\text{mm}$ (diameter = 0.04mm)

Radius & Square : diameter $\geq 0.1\text{mm}$

PRIMO



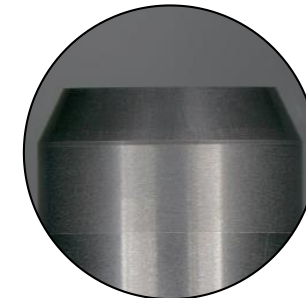
Ball and radius endmills with single flute are available, and each major specification as follows.

Ball : radius \times effective length = $R0.5 \times 3\ell$,
 $R1 \times 6\ell$

Radius : diameter \times effective length =
 $1 \times 3\ell$, $2 \times 6\ell$

Poly crystal diamond

PCD

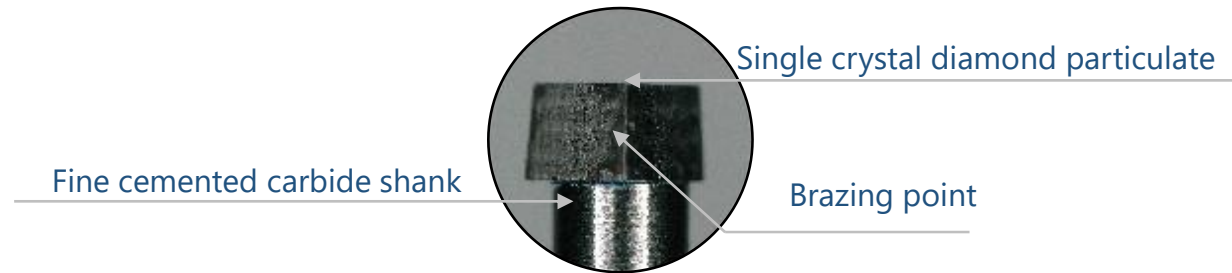


Various designs are available in order to meet customers' requirements.

3-3. Proprietary advanced technology

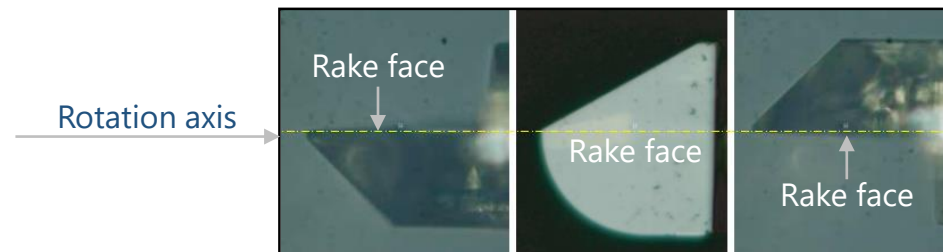
◆ Brazing of micro tools

Technology of brazing single crystal diamond particulates directly on the narrow tip of a fine cemented carbide shank firmly by chemical and physical reaction.



◆ Precision grinding of micro tools

Technology of grinding precisely the rake face or the top of circular arc edge of single flute micro ball endmills within the limit of 3 μm against the rotation axis.



The position of the rake face and the top of arc against the rotation axis. The rake face keeps the same position even if the tool inverted.

4. Our micro tools

Our endmills are the perfect solution for achieving ultra-fine, precise, and high-quality microfabrication with shrinkage fitting. They enable machines and tools to perform at their maximum potential, delivering exceptional results every time.

Single crystal diamond used for cutting edge



We normally use synthetic crystal diamond. We use natural single crystal diamond only with a few limited items, and only when a customer specifically designate to use them.

Single crystal diamond micro endmills



We've standardized the manufacturing process for single crystal diamond endmills and implemented our proprietary grinding system for micro tool production. This has enabled a rapid delivery system. Our innovation has also unlocked new possibilities for diverse micro cutting edge designs that were previously challenging. As a result, our market reach continues to grow.

PCD (poly crystal diamond) micro rotating tools



We supply PCD micro tools as well in order to meet customers' requirements.

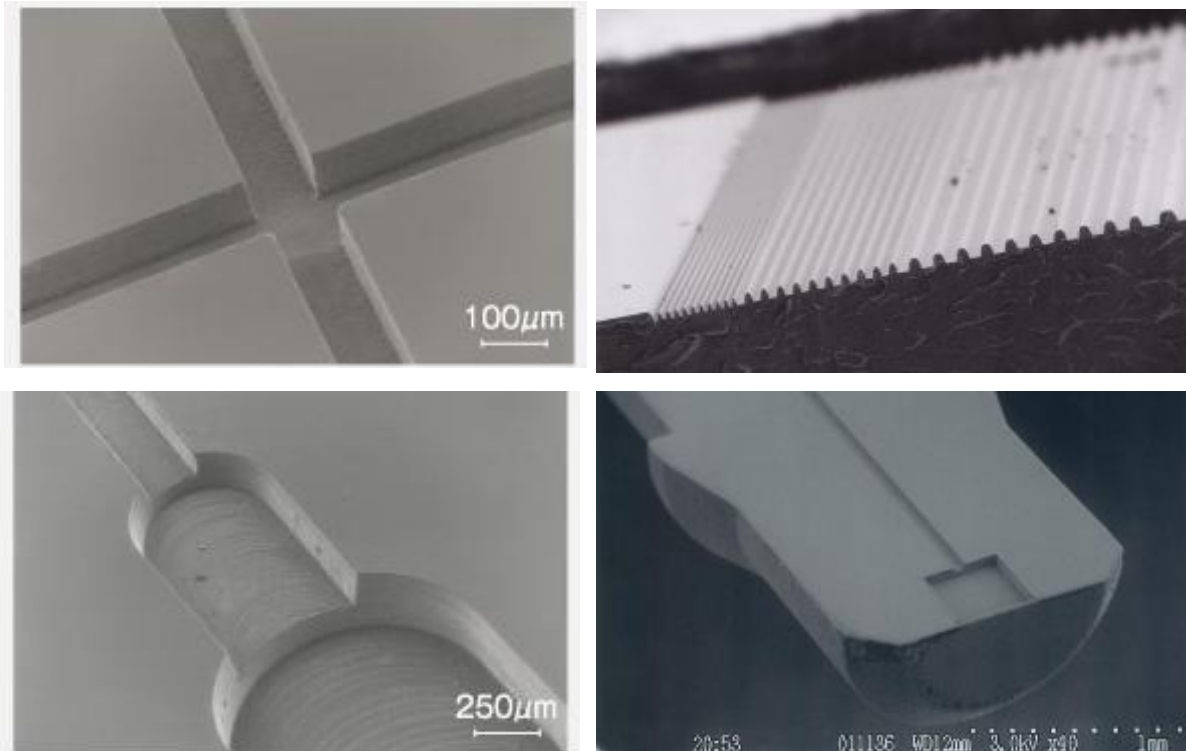
5-1. Micro-Total Analysis System (μ -TAS) Cutting

Advantages of cutting with our ultra-precision single crystal diamond tools

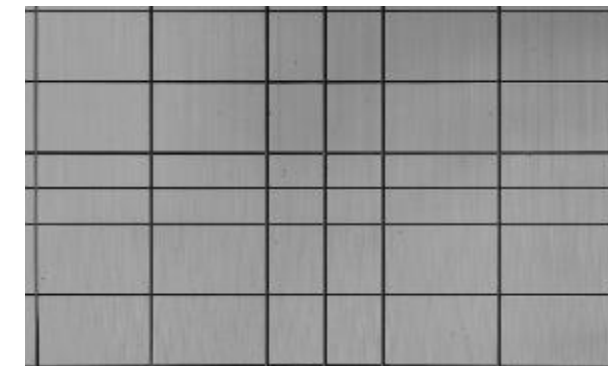
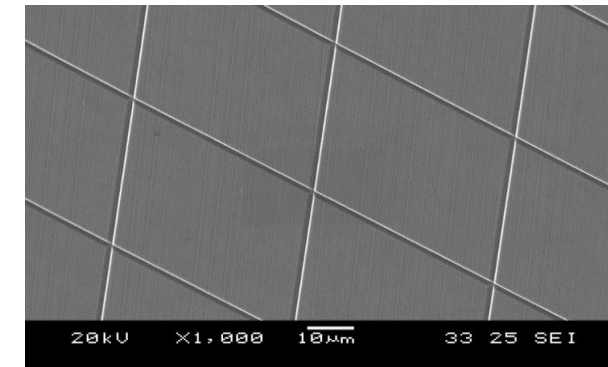
	Cutting process	Electroforming process
Number of processes to molding	2 processes: mold making → molding	More than 4 processes such as inverted mold fabrication process by electroforming
Dimensional Tolerance	$\pm 1\mu\text{m}$	$\pm 5\mu\text{m}$
Delivery timing	Within 1 month	Around 2 months
Error Risk	Low risk due to small number of processes	The number of processes is large, so there is a risk of errors in each process.
Edge sharpness	Superior sharpness	Corners tend to be dull.
Corresponding shapes	Complex shapes can also be accepted.	Limited to simple shapes

5-2. Micro-Total Analysis System (μ -TAS) Cutting

μ -TAS Processing Sample Images

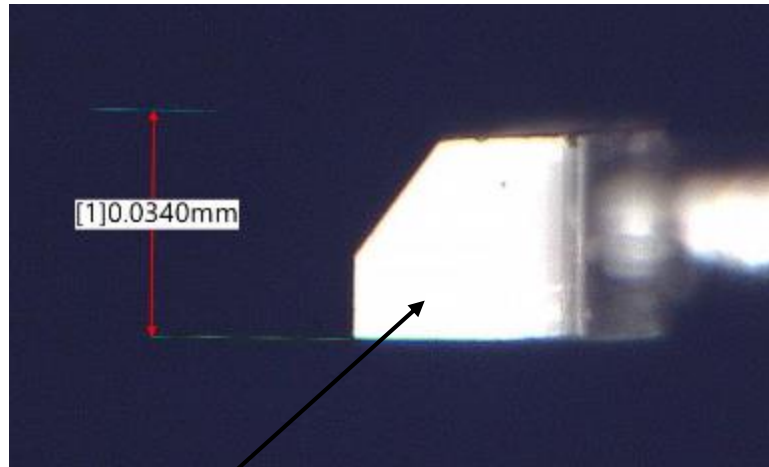


Groove width 0.3 to 1.0 mm, depth 0.5 to 0.8 mm

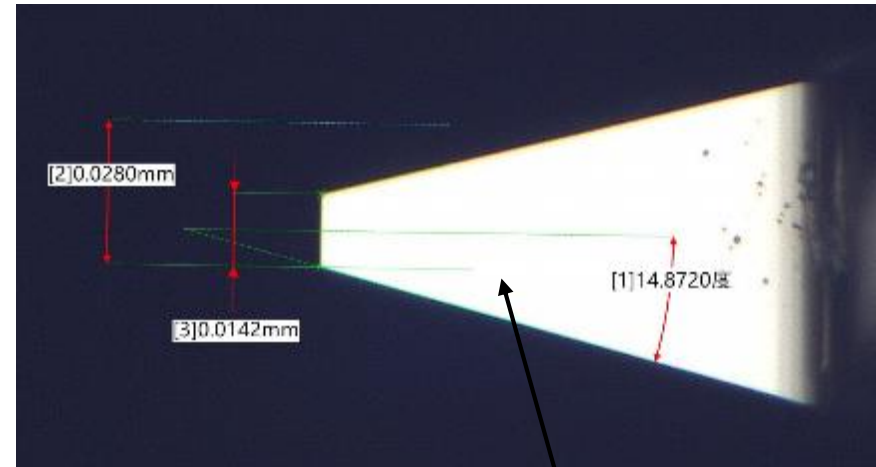


5-3. Micro-Total Analysis System (μ -TAS) Cutting

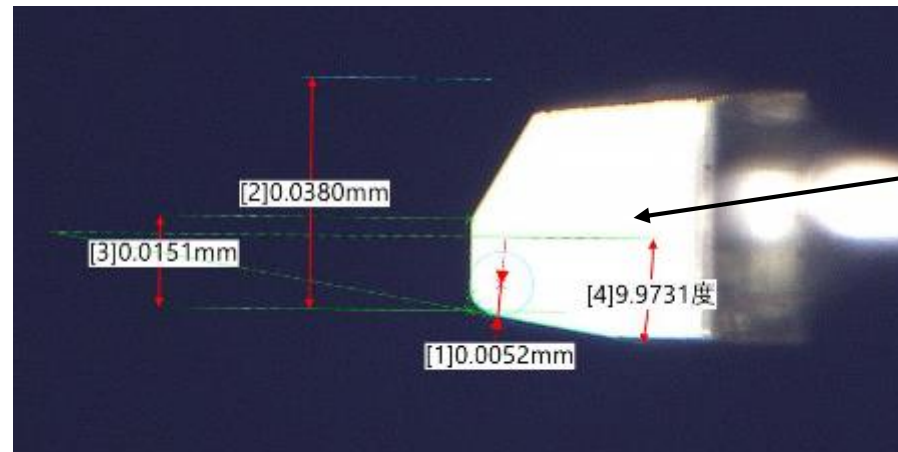
Single crystal diamond micro tools



Single crystal diamond



Single crystal diamond



6. Our technology is applied in various high-technology fields



Various test workings for end users

Automobile

LED headlights (PES)
Guide Lights
Head-up display



Drilling a huge number of holes in SiC wafer

Optical Lens

Camera lenses
Fresnel lenses
DOE



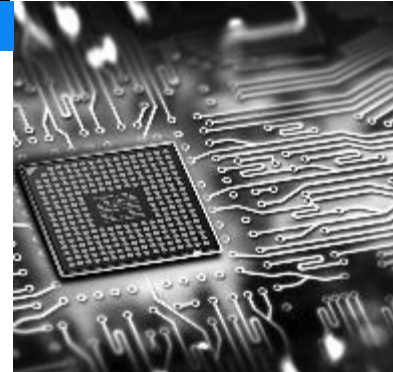
Finishing hands, dials, bezels and cases

Medical Lens

Intraocular lenses
Micro-TAS



Machine Tools

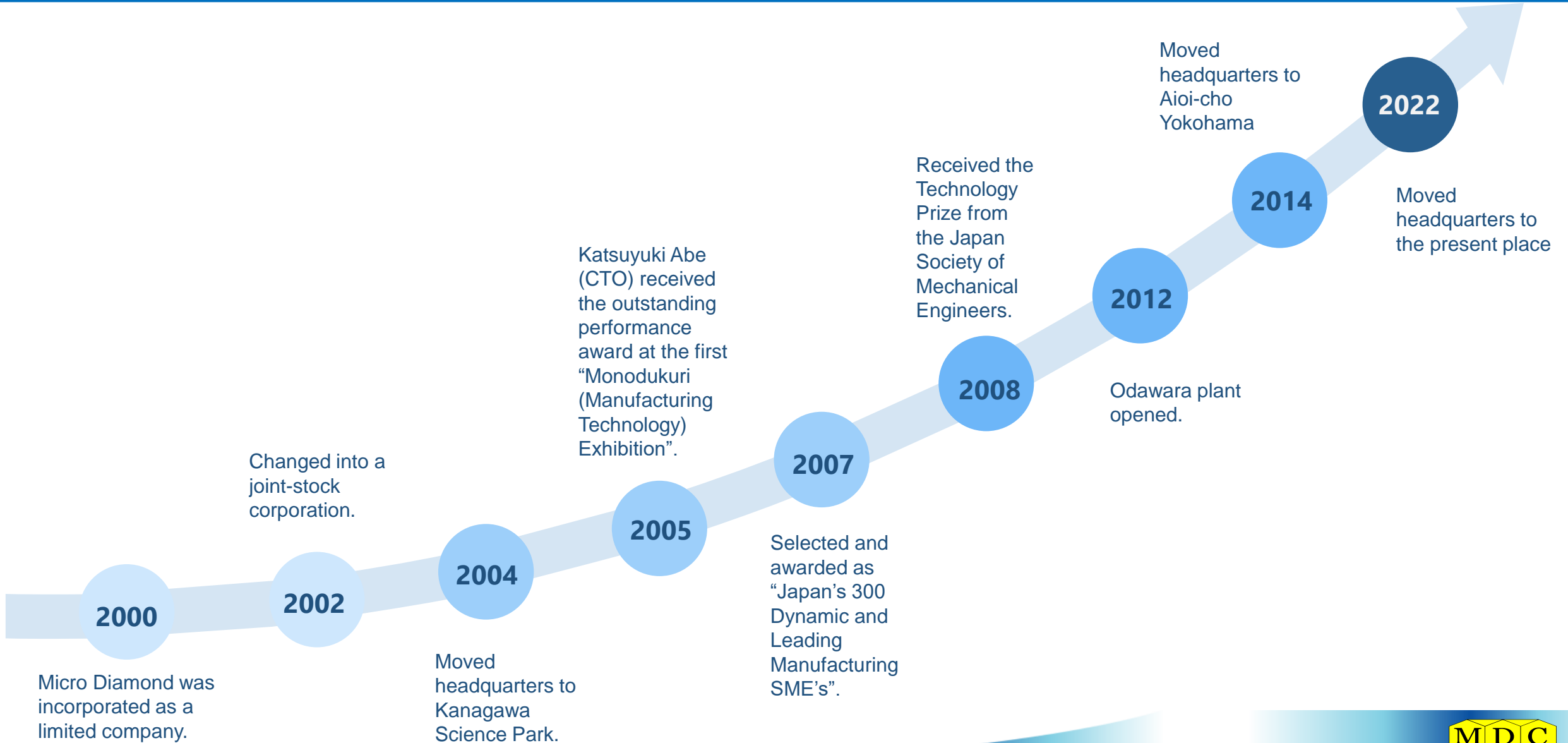


Semiconductor



Watch

7. Our over 20-year history



8. Our Clients

HONDA
The Power of Dreams

KOITO

STANLEY

RICOH



Panasonic

Canon

CASIO

SEIKO

CITIZEN

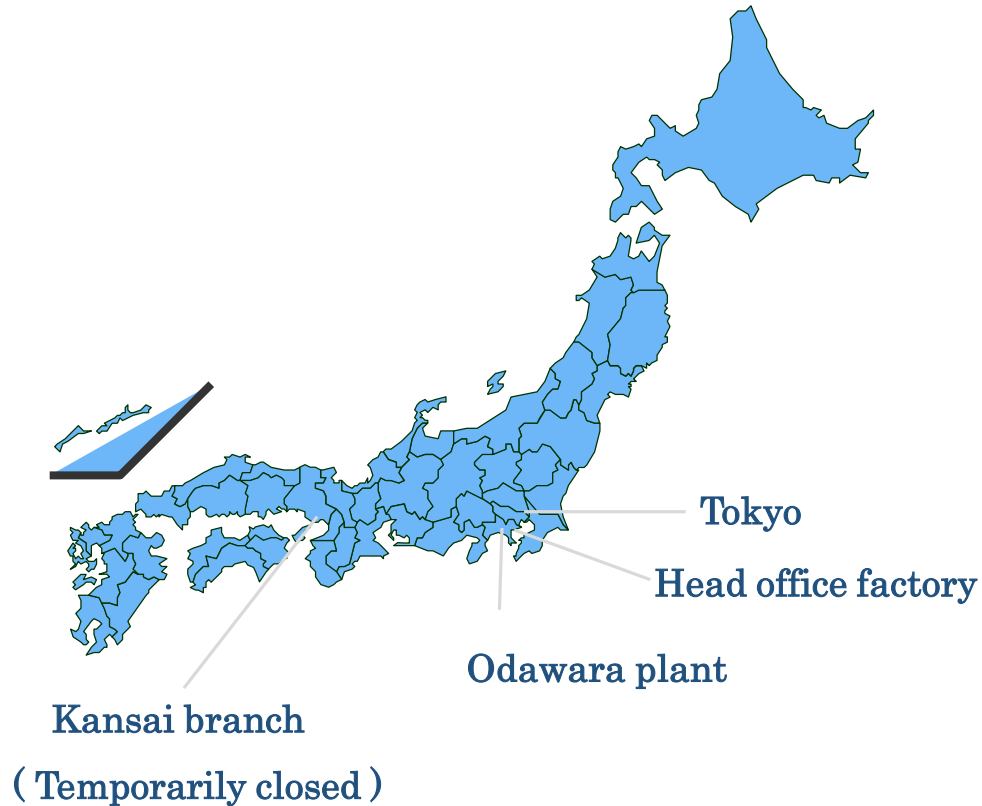


FANUC



(listed in) no particular order

9. Contact



Head Office &
Plant

Yokohama Aoi-cho bld. 6-104-2 Aoi-cho, Naka-ku,
Yokohama city, Kanagawa
〒231-0012 Japan

Odawara Plant

10-A Oak-Plaza 1792 Sobi Odawara city Kanagawa
〒250-851 Japan

Kansai Branch

103 Fuji Palace Nishitachibana -7, 3-6-1 Nishitachibana-
cho, Amagasaki city, Hyogo
〒660-0054 Japan

For inquiries about our products and technologies, please contact

Hirokuni Nakajima

Chief Executive Officer & Global Sales Director

E-mail: precision@micro-dia.com