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# **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.*



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## 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	<a href="http://www.micro-dia.com/">http://www.micro-dia.com/</a>



## 2. What we are doing:

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### ■ **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 $\mu$ m.

PRIMO

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

### Poly crystal diamond

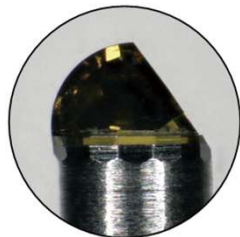
PCD

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 =  $0.04\text{mm}$ )

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

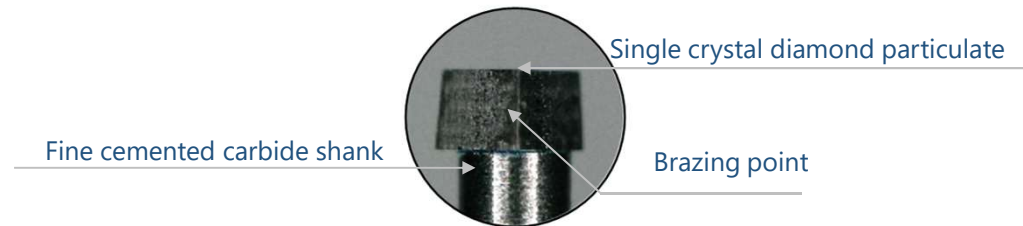


Various designs are available in order to meet customers' requirements.

## 3-3. Proprietary advanced technology

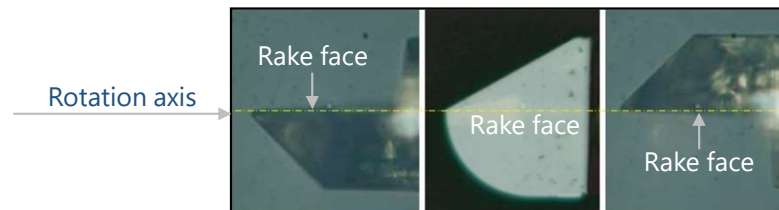
### ◆ Brazing of micro tools

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  $\mu\text{m}$  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.

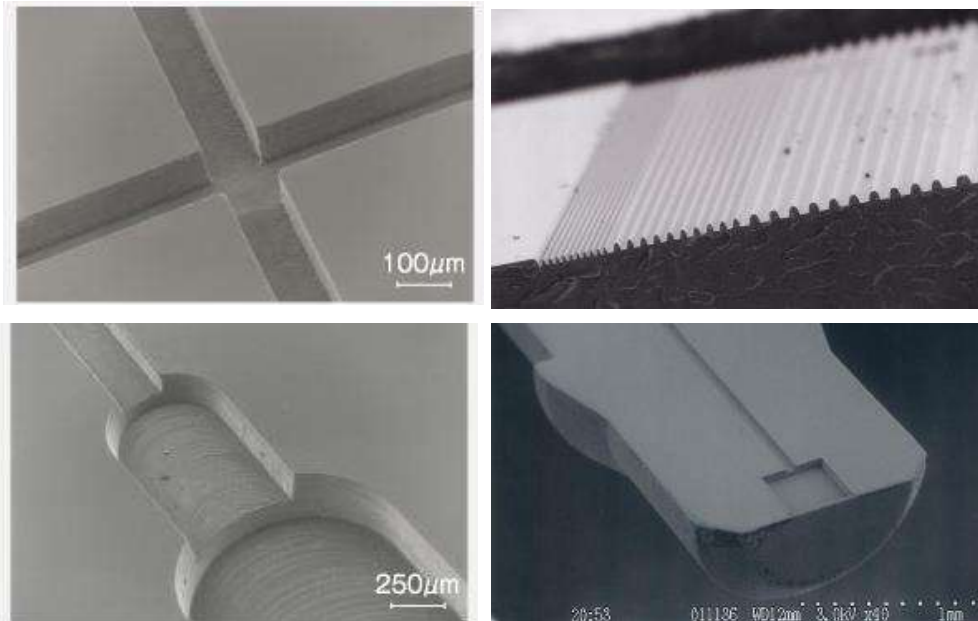
## 5-1. Micro-Total Analysis System ( $\mu$ -TAS ) Cutting

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

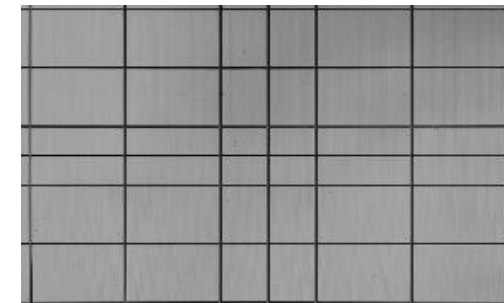
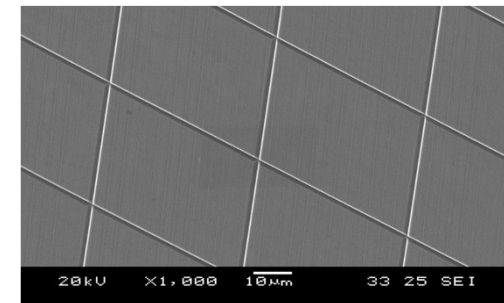
	Cutting process	Electroforming process
<b>Number of processes to molding</b>	2 processes: mold making → molding	More than 4 processes such as inverted mold fabrication process by electroforming
<b>Dimensional Tolerance</b>	$\pm 1\mu\text{m}$	$\pm 5\mu\text{m}$
<b>Delivery timing</b>	Within 1 month	Around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

## 5-2. Micro-Total Analysis System ( $\mu$ -TAS ) Cutting

$\mu$ -TAS Processing Sample Images

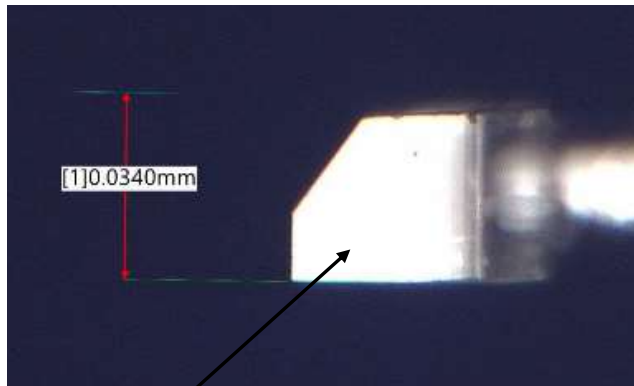


Groove width 0.3 to 1.0 mm, depth 0.5 to 0.8 mm

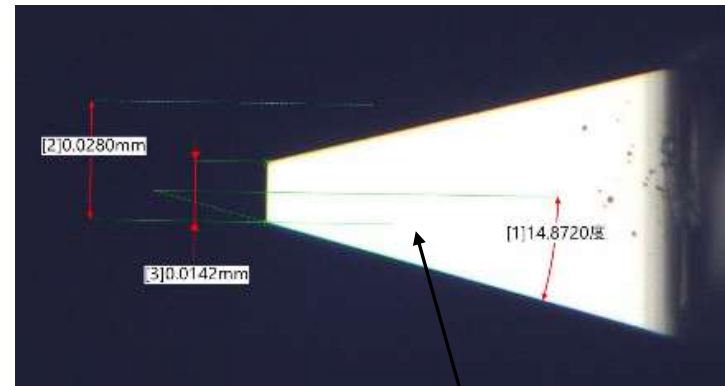


## 5-3. Micro-Total Analysis System ( $\mu$ -TAS ) Cutting

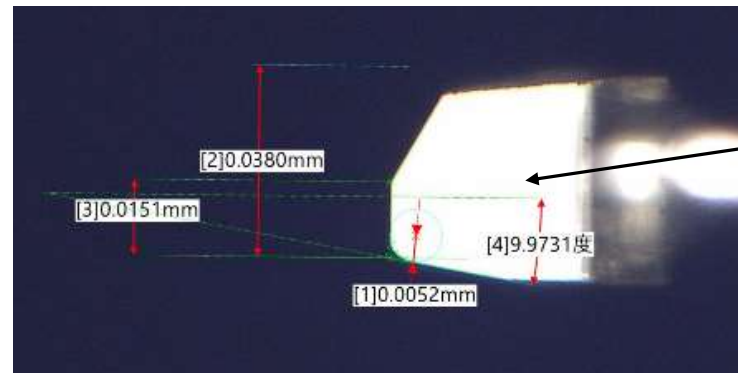
### Single crystal diamond micro tools



Single crystal diamond



Single crystal diamond



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



Automobile

LED headlights (PES)  
Guide Lights  
Head-up display

Various test  
workings for end  
users



Machine Tools



Optical Lense

Camera lenses  
Fresnel lenses  
DOE

Drilling a huge  
number of holes in  
SiC wafer



Semiconductor



Medical Lense

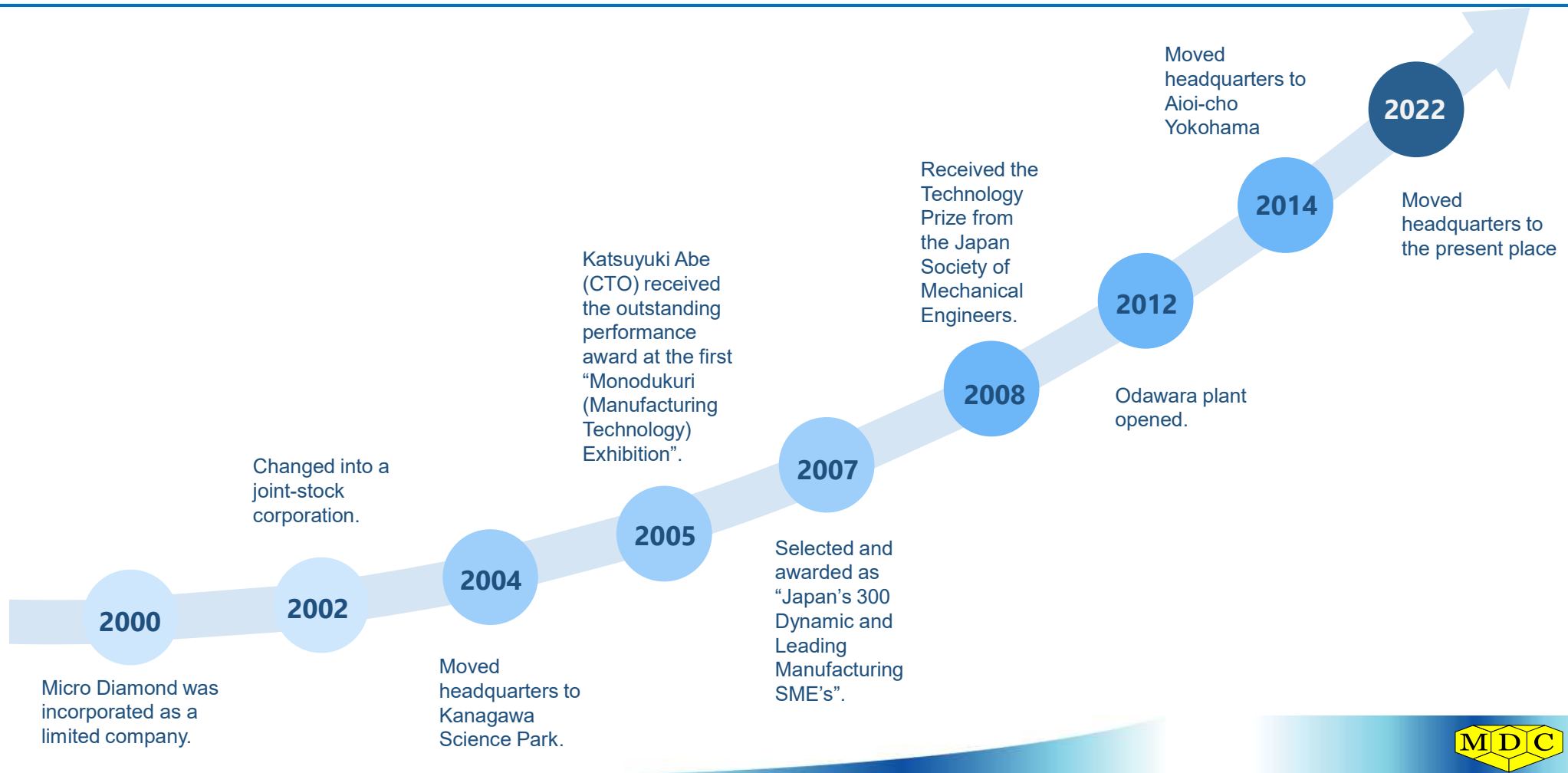
Intraocular lenses  
Micro-TAS

Finishing hands,  
dials, bezels and  
cases



Watch

## 7. Our over 20-year history



## 8. Our Clients

**HONDA**  
The Power of Dreams

**KōITO**

**STANLEY**

**RICOH**



**Panasonic**

**Canon**

**CASIO**

**SEIKO**

**CITIZEN**

 **Menicon**

**Kowa**

**FANUC**

 **NAGASE**  
Delivering next.



 **MAKINO**

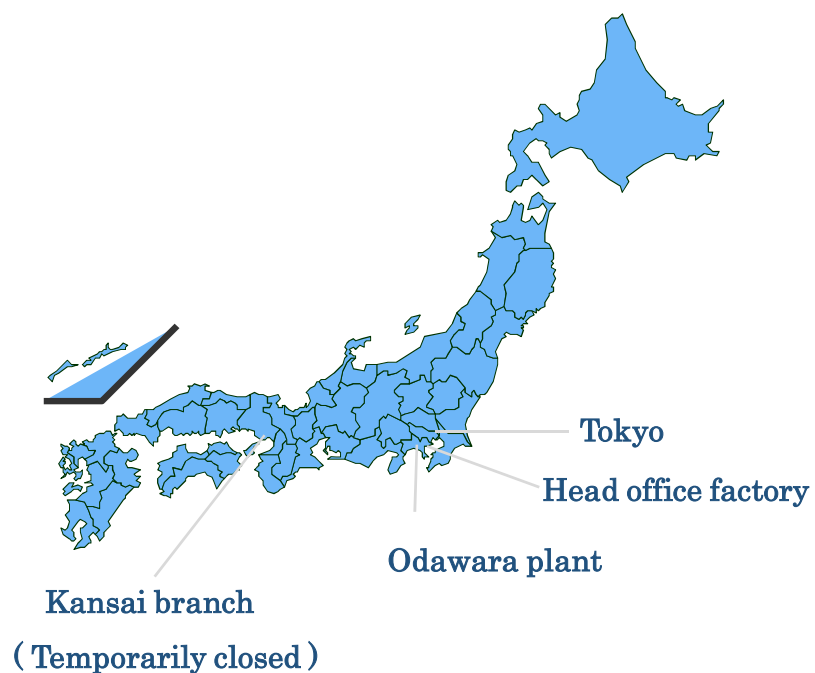
**JAXA**

 **JAMSTEC** 国立研究開発法人  
海洋研究開発機構  
Japan Agency for Marine-Earth Science and Technology

(listed in) no particular order



## 9. Contact



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