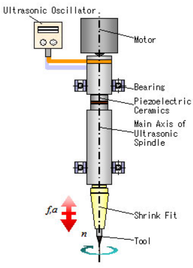
Ultrasonic Spindle

industria More precise and deeper machining can be achieved by Ultrasonic Spindle.

R2 Ultrasonic Spindle

Principles



Components of Ultrasonic Spindle

Good news for you, if you are looking for fine and precise machining.
Ultrasonic Spindle can be customized and built in your present machine.

◆ Transfers the designed vibration to the tool tip.
Shrink Fit is applied to hold the tool tip and steadily drives the vibration.

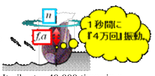
◆ Higly compact in size, 1/3 of the conventional type
The outer diameter of a spindle is one third of the conventional type.
Ultrasonic Spindle can be attached to small machines.

◆ High rotation speed, more than twice higher than the conventional type
Rotation speed of the spindle reaches twice higher than the conventional tools.

◆ Very little tool bending
Limited bending of the tool provides a great advantage espacially in case of a small tip application to high aspect ratio machining.

◆ Fine and high accuracy machining
Ultrasonic Spindle can be applied to hard and fine materials such as ceramics in semiconductor industry.

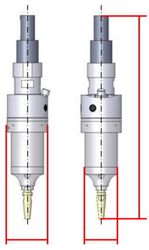
n:r.p.m.
f:frequency
a:amplitude



It vibrates 40,000 times in a second.

Ultrasonic Spindle will match your needs for technology innovation.

Specifications



Height 280mm
Diameter φ56mm

Height 280mm
Diameter φ45mm

R2 Unit

Specifications

Model	R2
Oscillating Direction	Vertical (tool axis direction)
Ultrasonic Frequency	approx. 40 kHz ※1
Amplitude(0-p)	0-2 μm ※1
Revolution Speed	5,000-20,000min-1
Power Supply	AC100V 50／60Hz (for Motor unit and Ultrasonic generator)
Air Pressure※2	0.1 MPa (for Motor) 0.05 MPa (for Cooling)

※1 Depends on the specificatin.
※2 Clean and dry air

Examples

Technical Data 1 Milling by the long ball end mill

Tool (the numbers of edges) : Carbide ball end mill coated by TiAlN for deep rib(two edges)
Radius of ball R=0.1mm , Length of tool L=3mm

Depth of milling : 0.1mm

Spindle Speed	20,000min-1
Work Material	NAK55 (40HRC)
Feed speed	100mm/min
Depth of milling	0.005mm (Ad)
Coolant	Oil Mist
Ultrasonic Frequency	40kHz
Amplitude(0-p)	1μm

No Vibration →
Vibration →

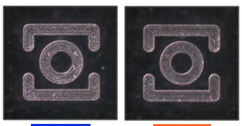
1mm

Technical Data 2 Milling by the long electroplated tool

Tool : Grindstone electrodeposited with diamond grits
Radius of ball R=0.1mm , Length of tool L=0.5mm

Depth of milling

Spindle Speed	20,000min-1
Work Material	Glass
Feed Speed	100mm/min (Ad)
Depth of milling	0.002mm
Coolant	Water Soluble Oil
Ultrasonic Frequency	40kHz
Amplitude (0-p)	1μm



No Vibration 0.5mm

Vibration 0.5mm

Technical Data 3 Drilling by the long drill

Tool : Microdrill
Diameter D=0.1mm
Length of tool L=1.0mm

Tilt angle	0°	10°
Step	20μm	10μm

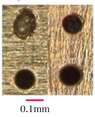
Depth of drilling : 0.1mm

Spindle Speed	20,000min-1
Work Material	NAK55 (40HRC)
Feed Speed	20mm/min
Step Feed	10 , 20μm
Coolant	Oil Mist
Ultrasonic Frequency	40kHz
Amplitude (0-p)	1μm

Tool broken

No Vibration

Vibration



0.1mm

Tool Diamond coated drill
Diameter D=0.15mm
Tool length L=1.5mm

Tool broken

No Vibration

Vibration

0.1mm

Depth of drilling : 0.1mm

Spindle Speed	20,000min-1
Work Material	Ceramics
Feed Speed	10mm/min
Step Feed	10μm
Coolant	Water
Ultrasonic Frequency	40kHz
Amplitude (0-p)	1μm