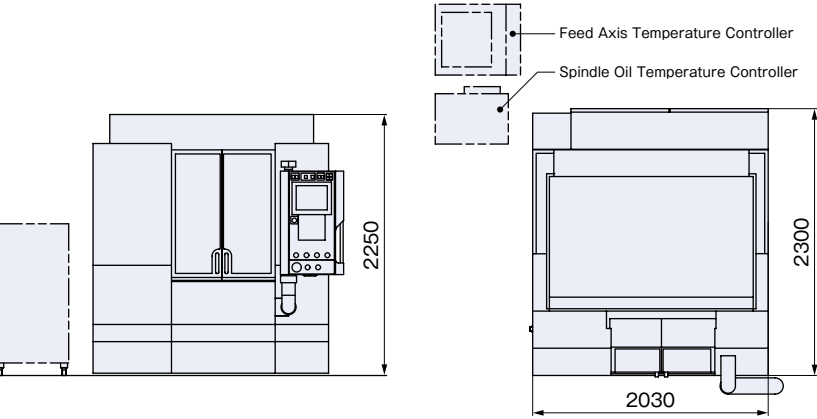


Machine Specifications

Travels	X x Y x Z axes	400 x 350 x 200 mm
	Distance from table surface to spindle gauge line plane	100 - 300 mm
Table	Table working area	600 x 400 mm
	Maximum table load (evenly distributed)	100 kg
	Table surface configuration	T-slots (5 x 14H8)
	Height to table surface	800 mm
Spindle	Spindle speed range	400 - 45,000 min ⁻¹
	Spindle taper hole	HSK-E32
	Spindle bearing inner diameter	40 mm
	Spindle drive motor	9.5 kW
	Spindle torque	2.0 N·m
Feedrates	Rapid traverse	16000 min ⁻¹ (X-Y axes) 8000 min ⁻¹ (Z-axis)
	Cutting feed	1 - 16000 mm/min (X-Y axes) 1 - 8000 mm/min (Z-axis)
Automatic tool changer	Tool storage capacity	20 tools
	Maximum tool diameter	32 mm
	Maximum tool length	120 mm
	Maximum tool weight	0.5 kg
Machine size	Height	2250 mm
	Width x depth	2030 x 2300 mm
	Machine weight	8200 kg



Standard Specifications

- 45000 min⁻¹ spindle
- HSK-E32
- 20-tool ATC magazine
- Spindle lubricant temperature controller
- Automatic lubricant supply device
- Automatic air blower
- Fully enclosed splash guard
- Operator door lock (Operating mode specification)
- ATC door interlock
- 0.005 μm scale feedback
- Hybrid automatic tool length measuring device
- Splash guard lighting device
- Chip bucket
- Thermal Guard
- Portable manual pulse generator (with the handle enable button)
- Rigid tap
- Automatic power shutoff
- Super G1.4 control
- Data center

Optional Specifications (●)
Optional Equipment (★)

- 40-tool ATC magazine (including HSK pots)
- NC rotary worktable (DD motor specification)
- Automatic work changer
 - WPS48-33S
 - WPS60-33S
 - WPS90-33S
- WPS shutter
- 2-nozzle coolant supply device
- MQL device
- Mist collector (including connection port)
- Automatic workpiece measuring device (MARPOSS: OP32, Stylus edge: 4.0 mm dia.)
- Signal light (3 levels)
- Bed and Column Stabilizer
- Thermal Chamber
- ★ Workpiece washing gun
- ★ Operator door lock & ATC door lock (with motive power cutoff function)
- ★ ATC door lock
- Coolant tank bucket specification
- ★ Oil skimmer
- ★ Air dryer
- ★ Portable manual pulse generator with position indicator (with the handle enable button)
- ★ Control panel light & 100 V power outlet
- ★ Circuit breaker

Precision Micromachining Center

iQ3000



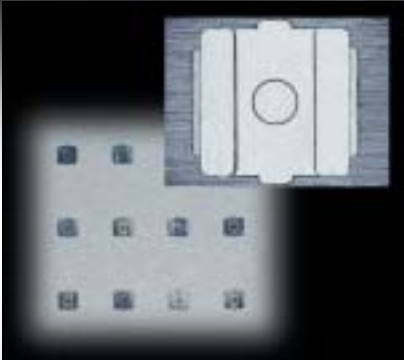
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*The specifications in this catalog may be changed without prior notice to incorporate improvements resulting from ongoing R&D programs.
*The machines displayed in this catalog are fitted with optional equipment.
*This product, including technical data and software, may be subject to the Japanese Foreign Exchange and Foreign Trade Law.
Prior to any re-sale, re-transfer or re-export of controlled items, please contact Makino to obtain any required authorization or approval.



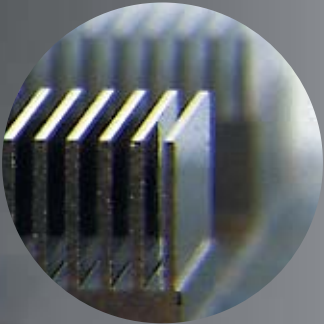
Ever-advancing precision components.
Molds foretell the future.



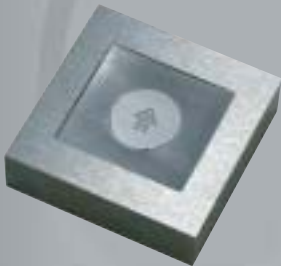
IC Parts
2.5 x 2.5 mm



LED (Socket)
1 x 3 x 0.35 mm



Connector parts
Pitch: 0.3 mm



Battery Cover



Base (Lens molds)



Buttons



Connector parts



Diaphragm
15 mm dia. x 3 mm

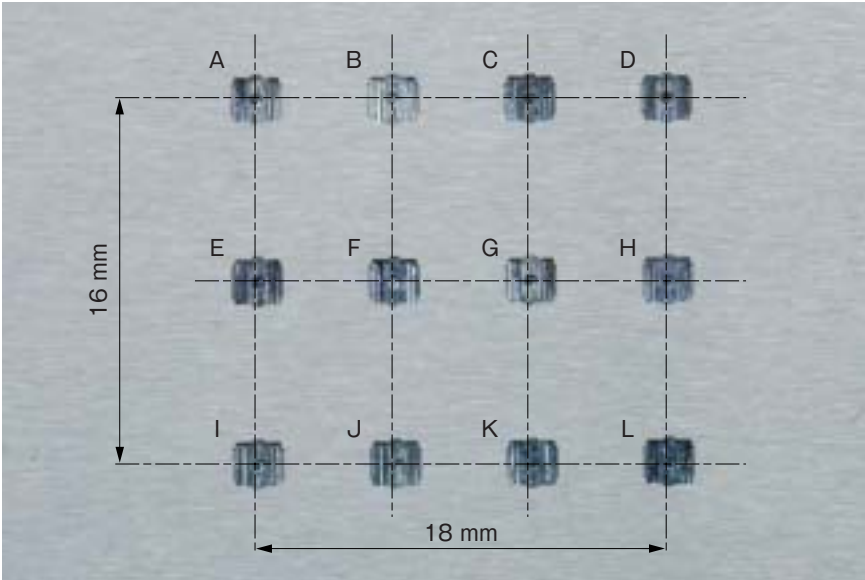


Housing (Cell phone)



Machining samples

Maximum center position error of 1 μm *



Multiple IC Parts

<Machining conditions>

Spindle speed: 45000 min^{-1}

Cutting feed: 200 mm/min

Tool used: 0.2 mm dia. end mill

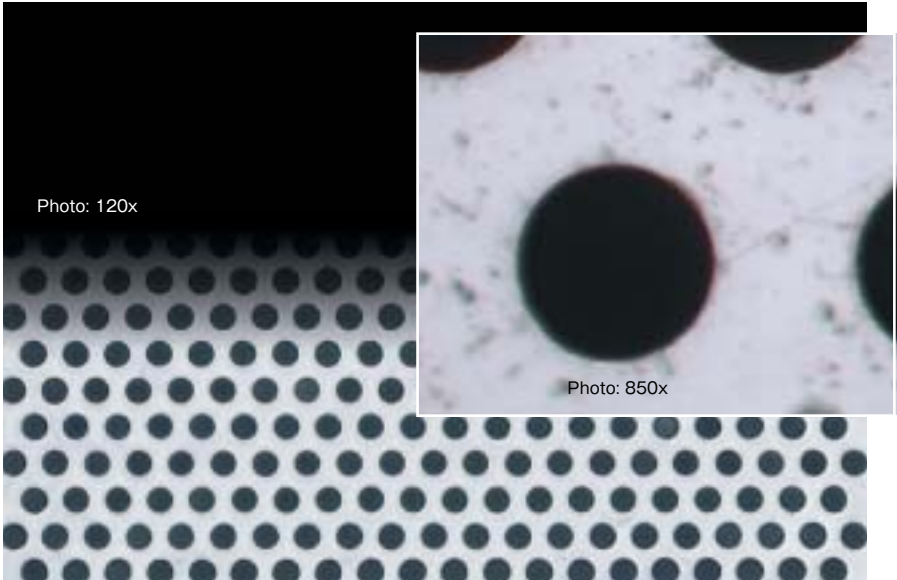
Workpiece material:
AISI P21 (NAK80 tool steel)

Test cut time: 12 hr.

<Test cut details>

1. Machining of (A) in the diagram.
2. Idling for 1 hr. after machining (A).
Spindle speed: 45000 min^{-1}
Feedrates in XYZ axes: 4000 mm/min
3. Machining of (B).
4. Idling under the same conditions as in (2).
5. Machining of C-L in the same way.

Continuous machining with small diameter drills



Machining over 200 holes with one tool

<Machining conditions>

Spindle speed: 25000 min^{-1}

Tool used: 0.03 mm dia. drill

Plate thickness: 0.15 mm

Workpiece material: SUS304

Machining time: 69 s/hole

Maximum depth dimension error of 0.5 μm *



Hydrostatic bearing Mold

<Machining conditions>

Workpiece size: 6.0 mm diameter

Workpiece material:
Powder metal high-speed tool steel
(HAP40:65 HRC)

No. of grooves: 12

Depth of grooves: 6.6 μm

*Target value: 7 μm \pm 0.5 μm (tolerance)

Groove surface finish: Ra 0.05 μm

Fine surface



3D shape machining

<Machining conditions>

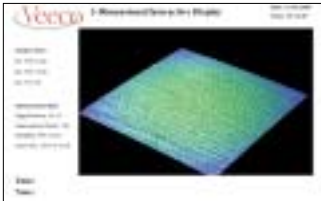
Spindle speed: 30000 min^{-1}

Cutting feed: 1800 mm/min

Tool used: 1.0 mm radius ball end mill

Workpiece material:
420 stainless steel (STAVAX: 52 HRC)

Surface finish
Sides: Ra 0.05 μm *, Bottom: Ra 0.06 μm *



Measured with
a Veeco NT8000
optical profiler

*Actual value measured in Makino's factory environment

Thermal stability measures

- ◎ Spindle core cooling /jacketcooling system
- ◎ Linear motor cooling
- ◎ Thermal Guard
- ◎ Bed and column insulation
- ◎ Bed and Column Stabilizer (optional specification)
- ◎ Thermal Chamber (optional specification)
- ◎ Stand-alone power supply unit

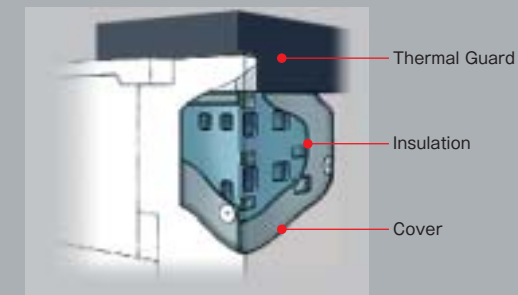


Heat generation by linear motors

Cooling oil is circulated through the motor flanges to remove heat and control the motor temperature to that of the machine.

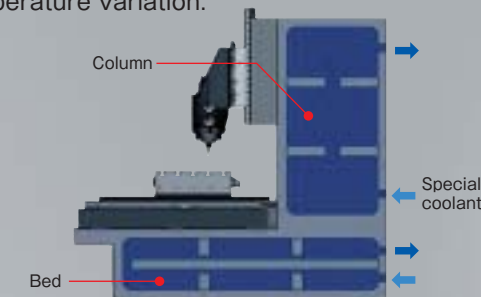
Thermal Guard/ Bed and column insulation

The entire machine is provided with covers from the floor to the machining chamber ceiling to suppress the effects of ambient temperature changes. In addition, the cast iron surfaces of the column and bed are covered with insulation to prevent machine attitude changes.



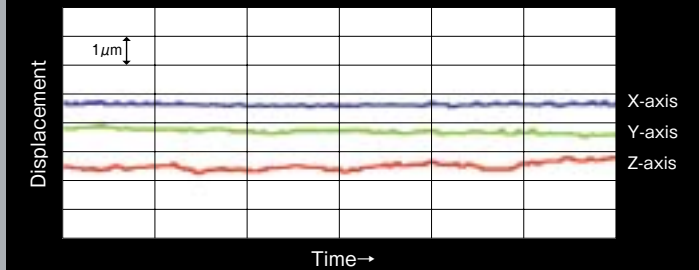
Bed and Column Stabilizer (optional specification)

The bed and column are filled with a special coolant that is circulated internally to suppress machine attitude changes due to ambient temperature variation.



Stable tool tip position to within 1 μm (12 hours)

Displacement in XYZ axes during full stroke operation



Spindle speed: 45000 min^{-1}

Feedrate: (X-Y axes) 16000 mm/min, (Z-axis) 8000 mm/min

Thermal Chamber (optional specification)

Temperature-controlled air is fed into the splash guard to keep the temperature inside the guard constant.

Heat evacuation from power supply unit

Heat generated by the power supply unit is discharged from a side heat exhaust port to avoid affecting the machine.



Axis travels:
400 x 350 x 200 mm (X x Y x Z)

Spindle speed range:
400 - 45000 min^{-1}

Feedrate:
16000 mm/min (X Y axes)
8000 mm/min (Z-axis)



45000 min⁻¹ spindle

The spindle does not show any thermal growth, deflection or vibration even during long hours of machining at top speed.

- Taper hole: HSK-E32
- Spindle speed range: 400 - 45000 min⁻¹
- Spindle bearing inner diameter: 40 mm
- Spindle power: 9.5 kW (cont.)
- Spindle torque: 2.0 N·m (cont.)
- Spindle core cooling, jacket cooling, under race lubrication

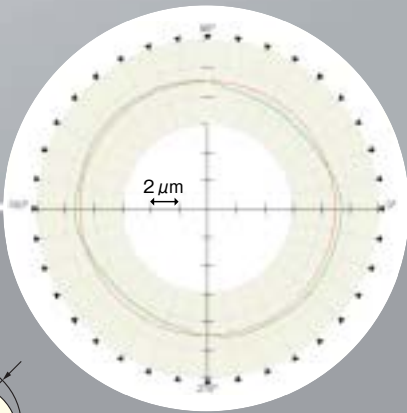
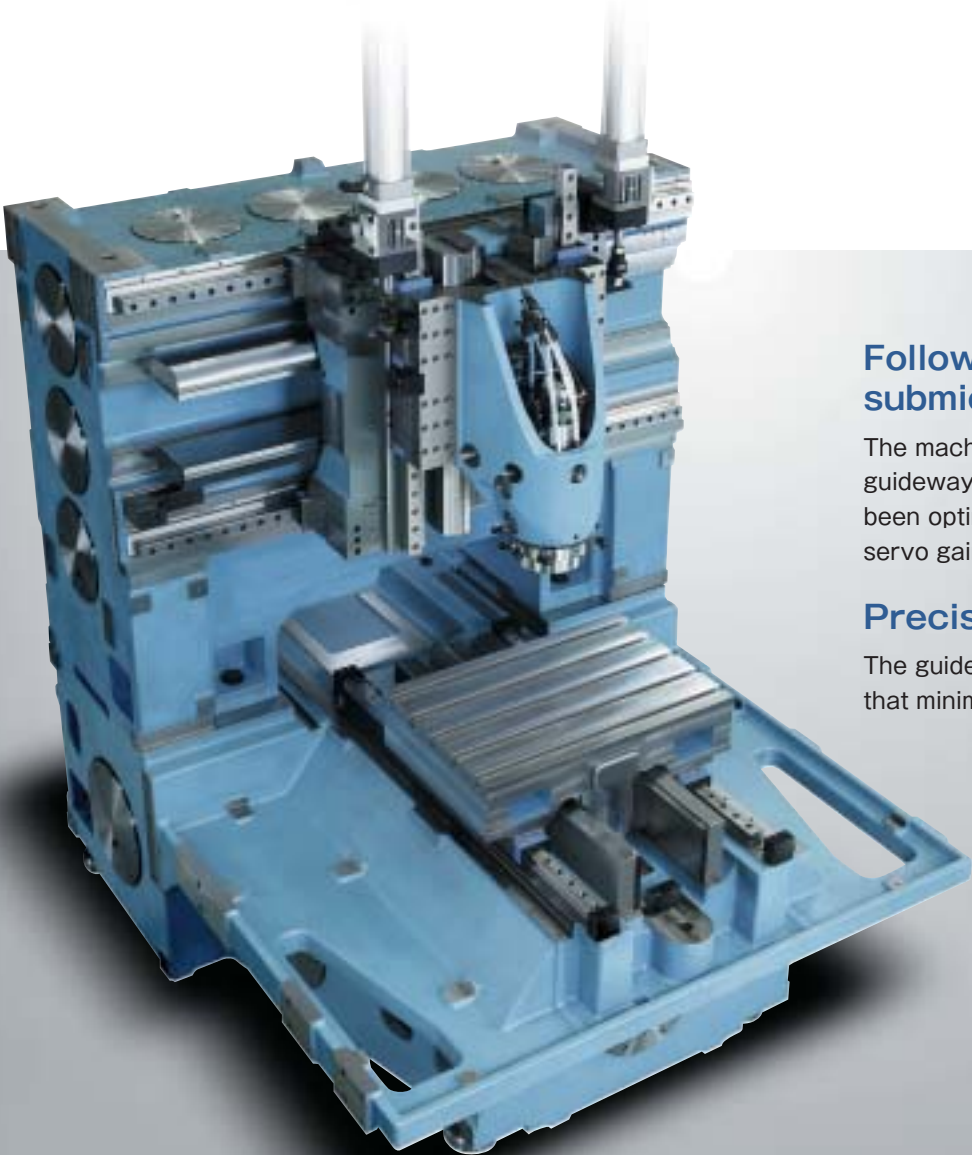
Machine construction

Follows NC commands with submicron accuracy

The machine construction, precision roller guideways and linear drive motors have all been optimally balanced so as to raise the servo gain to its highest limit.

Precision rolling guideways

The guideways provide smooth feed action that minimizes waviness.



Seam level differences kept within 0.8 μm

The hybrid automatic tool length measuring device (optional specification) minimizes tiny level differences that can occur at the seams of machined surfaces due to tool changes.
(Can be used with tools as small as 0.03 mm in diameter)

Measures the tool length with a low pressure contact probe



Measures spindle thermal distortion with a non-contact sensor during spindle rotation



Static accuracy	Guaranteed value (μm)	Actual value (μm)
Positioning accuracy (full stroke)	±1.0	±0.4
Repeatability accuracy (full stroke)	±0.5	±0.1
Straightness (full stroke) (100 mm)	3.0 1.0	0.7 0.1
Squareness (full stroke)	3.0	1.3
Roundness	3.0	0.6

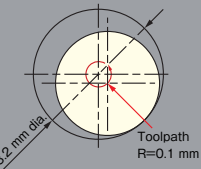
Test piece
Circular machining with a toolpath radius of 0.1 mm

<Machining conditions>

Spindle speed: 20000 min⁻¹

Tool used: 3.0 mm dia. end mill

Workpiece material: AISI P21 (NAK55 tool steel)



Roundness: 0.98 μm

(actual measured value)

Cutting feed: 200 mm/min (actual feedrate)

*Tolerances measured at Makino's assembly plant

Efficient chip evacuation and outstanding operating ease



Coolant and air systems

The iQ300 is equipped with a 2-nozzle air blower (standard specification) and can be fitted with a 2-nozzle coolant supply device (optional specification).

Automatic tool changer



Tool storage capacity:
20 tools (optional specification: 40 tools)
Maximum tool diameter: **32 mm**
Maximum tool length: **120 mm**
Maximum tool weight: **0.5 kg**



Improved visibility

Enhanced productivity



The table size allows the use of multiple precision vises and automatic chucks, facilitating the machining of multiple same-shape workpieces. An automatic work changer (optional specification) can also be installed to enable continuous unmanned operation at night or on weekends.