

Sectors:

Portable digital devices, medical equipment, LED equipment parts, optical instruments, semiconductor jig parts

Category:

Ultra-high precision parts production

Press release:

World premiere of iQ300 at EUROMOLD:

Smart solution for economical machining of miniature parts

Up to now, precision micromachining centres have mainly been built by research institutes and some machine tool makers – with little thought to production costs. To meet the growing demand for a machine that can produce very fine part geometries with superb accuracy at acceptable cost levels, Makino has launched its iQ300 Precision Machining Centre at EUROMOLD in Frankfurt, Germany from December 2nd – 5th. This innovative new machine is on view to the trade public for the first time at this exhibition.

iQ by name, iQ by performance: this new precision micromachining centre from Makino is the smart response to the ever-greater miniaturisation and more complex functionality seen, for example, in mobile phones, other portable digital devices, medical equipment and optical products. The iQ300 delivers precision micromachining with the required accuracy at practical cutting feed rates – something that has been difficult to accomplish with conventional vertical machining centres.

Roundness accuracy to within 0.65 µm has actually been measured for a micromachining toolpath radius of 0.1 mm executed at a cutting feed of 100 mm/min. At high cutting feeds of 2,000 mm/min in circular machining (50 mm Ø hole) roundness accuracy was measured to within 0.6 µm with a toolpath radius of 28 mm.

The **feed axis mechanism** features ultra-precision rolling guideways and linear drive motors. This combination ensures fast responsiveness and a smooth feed action similar to that of sliding guideways. The lubrication supply system has been designed to accommodate machining programmes involving long hours of repeated tiny feeds. The XYZ axes all feature linear motors that are optimally positioned to ensure that their push/pull effect does not affect the rolling guideway straightness. The iQ300 is equipped with a 0.005 µm scale feedback system. The feed mechanism provides excellent responsiveness, moving faithfully to command increments of just 0.1 µm, and minimises tiny undulations to deliver high-quality machined surfaces. The lines that occur in a machined surface at the time of quadrant reversal and the striped patterns due to fine undulations are suppressed to a level that cannot be discerned by the human eye.

P The iQ300 is fitted with a **newly developed 45,000 min⁻¹ spindle**, based on the highly reliable V Series spindle of which 6,500 have been installed around the world since 1996. The top spindle speed has been increased by a further 5,000 min⁻¹ and the HSK-E32 spindle taper hole adopted. The cooling efficiency of the spindle motor and bearings has also been improved to reduce spindle dynamic run-out in high-speed operations. This improvement helps to bring out the full performance of micro tools with increasingly small diameters and contributes to a longer tool life.

R The iQ300 follows Makino philosophy in machining centres, where the first priority is to have a stable, rigid and accurate **mechanical structure**. Even with its compact dimensions, the machine weighs over 8,000 kg. Though all movable parts are light in weight, they are supported by a strong, heavy structure.

E **Thermal stability** is important in ensuring precision machining over long periods. The iQ300 comes with a number of thermal stability features: cast-iron machine construction optimally designed on the basis of structural and thermal analyses; spindle core cooling and under race lubrication system; double jacket cooling system for the linear motor drive mechanism; coolant temperature controller (optional); bed and Column Stabiliser (optional); and Makino Thermal Chamber (optional).

S Level differences between areas machined with different micro tools are a big headache in micromachining. A standard feature of the iQ300, the **hybrid automatic tool length measuring device**, accurately measures and corrects the tool tip position and that of the rotating spindle nose. This reduces level differences to an absolute minimum so that the machined surfaces are of outstanding quality and position, even with micro tools.

S The **table** measures 600 mm x 400 mm in relation to XY-axis travels of 400 mm x 350 mm. This practical size is conducive to the machining of multiple same-shape items and the use of automatic chucks and precision vices.

S Last but far from least, the intelligence of the iQ300 is demonstrated in its **ease of operation**. A lighter door makes for easier opening and closing – an important factor in precision micromachining where the machining chamber door is opened and closed more frequently to check the machining condition. Large transparent polycarbonate windows provide improved visibility inside the machining chamber, even when the door is closed.

E Visitors to **EUROMOLD** can see for themselves how smart this precision micromachining solution is at **Booth L166 in Hall 8.0** of Frankfurt Exhibition Centre.

Specifications: Makino iQ300 Precision Micromachining Centre

Travels	X-, Y-, Z- axis	400 mm x 350 mm x 200 mm
	Distance between spindle gauge line and table surface	100~300 mm
Table	Size	600 mm x400 mm
	Maximum work piece size (W x D x H)	600 mm x 580 mm x190 mm (with limitations)
	Height from floor to table sur-	800 mm
	Maximum work piece weight (evenly distributed)	100 kg
	Surface shape	14H 8 x 5, T-slot
Spindle	Rotation speed	400~45,000 min ⁻¹
	Motor (cont.)	9.5 kW
	Spindle torque (cont.)	2 Nm
	Taper	HSK-E32
	Spindle inner diameter	40 mm
	Cooling/lubrication	Spindle core: jacket cooling/under race lubrication
Feed rates	Rapid traverse	16,000 mm/min (X/Y-axis) 8,000 mm/min (Z-axis)
	Cutting feed	1~16,000 mm/min (X/Y-axis) 1~8,000 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
Power sources	Electrical power supply	AC200 V±10%, 50/60 Hz±2%, 25kVA
	Compressed air supply	0.5~0.8 MPa, 750 L/min
Machine size	Height	2,250 mm
	Width x depth	2,030 x 2300 mm
	Machine weight (incl. NC unit)	8,200 kg

MAKINO company background

Makino Milling Machine Co., Ltd. is recognised as a leading technology and service provider in the machine tool industry. The corporation is registered at the Tokyo Stock Ex-

change and has a workforce of some 3,700 people throughout the Americas, Europe and Asia. Its revenues for the fiscal year, which ended March 31st 2009, totalled US\$ 1 billion. Makino's wide range of premium quality products includes machining centres for parts as well as die and mould manufacturing with a large variety of applications in aerospace, automotive, off-highway vehicles, industrial components and micro-technology. The MAKINO Europe Group encompasses technology centres in Hamburg, Stuttgart, Paris, Milan and Bratislava focusing on marketing, sales, application engineering and services.

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Accompanying pictures

The pictures below are enclosed with the press release as printable JPEGs (300 dpi). The text describes the image it accompanies. Reproduction is permitted providing the source is mentioned.



iQ300: precision micro machining center

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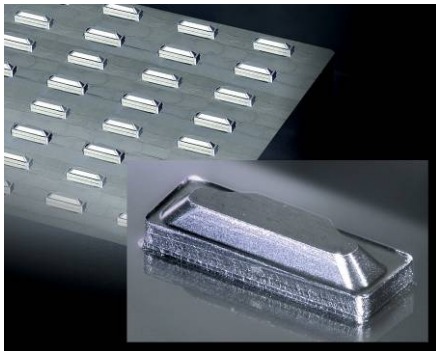
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Integrated circuits mould (each figure dimension: 2,5 mm x 2,5 mm)



LED (socket): 1 mm x 3,5 mm x 0,35 mm



Hydrostatic bearing mould

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