

700_A

Freeform® 700_A Multi-Axes Machining System

This Ultra Precision Freeform machine is designed for versatility allowing three dimensional diamond turning, micro-milling, micro-grinding and grooving of non-rotationally symmetric surfaces. The machine can be configured up to 5-axes of simultaneous operation.

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Overview

Slide Travel: X-350mm (14") Z-300mm (12")
Y-150mm (6")

Max Feedrate: 3,000mm/min. (118"/min.)

Swing Capacity: 700mm (28")
381mm (15") over optional B-axis

Spindle Speed: 7,000RPM

Process Capabilities

2-axes Contouring

3-axes Tool-Normal Contouring

Freeform Optics

Micro-Grinding

Micro-Milling

Raster and Groove Milling

Machine Options

Advanced temperature control system

Aspheric grinding systems 50,000/15,000 RPM

Fast Tool Servo Freeform® capability

CAM software

HydroRound rotary B-axis

- Virtual Center
- Ultra Mapping

On-machine gage & amplifier

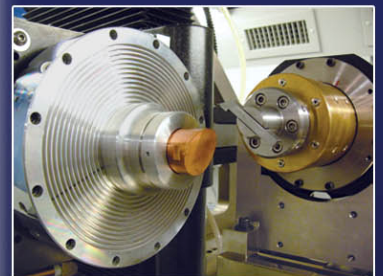
Slow Tool Servo/Positioning C-axis

- Adaptive Control Technology

UltraComp™ on machine metrology

UltraSet optical tool setting system

Video observation camera



Design Features

QNX real time Operating System including Fast Fourier Transform capability

Sealed natural granite base provides exceptional long term machine tool stability

Self leveling dual chamber pneumatic isolation system

Hydrostatic oil bearing slideways with optimized stiffness and damping characteristics

Linear motors coupled to true analog linear amplifiers

Largest work envelope providing the greatest versatility

Modular design for future capability upgrades

Active real time counter balance system



Machine Base and Control	Description
Machine Base	Sealed natural granite base provides exceptional long term machine tool stability
Machine Type	Ultra precision, two, three or four axes CNC contouring machine
Vibration Isolation	Self leveling dual chamber pneumatic isolation system
Control System	UPx™ Control System with optional Adaptive Control Technology
Operating System	QNX real time operating system
Programming Resolution	1.0 nanometer linear / 0.000001° Rotary
File Transfer Data	USB, CD-ROM, Ethernet
Performance	Surface Roughness 4.0nm (RA) Form Accuracy 0.15µm P-V

Linear Hydrostatic Slideways	Description
Travel	X-axis: 350mm (14") Y-axis: 150mm (6") Z-axis: 300mm (12")
Maximum Feedrate	3000mm/min. (118"/min.)
Drive System	AC Linear Motor
Position Feedback Resolution	4.3nm
Straightness Horizontal/Vertical	X-axis: 0.3µm (12µ") / 0.75µm (30µ") Y-axis: 0.5µm (20µ") both directions Z-axis: 0.3µm (12µ") / 0.5µm (20µ")
X-Pitch / Roll Motion	2.0 arc-sec
Z-Pitch / Roll Motion	2.0 arc-sec
Z-Pitch / Yaw Motion	2.0 arc-sec
X-Vertical / Horizontal Stiffness	438 N/µm / 438 N/µm (2,500,000 lbs/in.)
Z-Vertical / Horizontal Stiffness	438 N/µm / 438 N/µm (2,500,000 lbs/in.)
Y- Z Dir. / X-Dir. Stiffness	263 N/µm / 263 N/µm (1,500,000 lbs/in.)

Workholding/Positioning Spindle	High Performance SP150 Spindle
Standard swing capacity	Slot type thrust bearing
Material	Steel shaft/Bronze journal
Standard swing capacity	700mm (27.5") diameter (381mm diameter over B-axis)
Load capacity	68Kg (150 lbs.) @ spindle nose - 48 Kg (105 lbs.) 50mm (2") out from spindle nose
Axial Stiffness	228 N/µm (1,300,000 lbs/in.)
Radial Stiffness	88 N/µm (500,000 lbs/in.)
Motion Accuracy	Axial/Radial ≤ 25nm (1µ")
Thermal Control	Liquid cooled chiller +/- 0.1C Accuracy
C-axis Feedback Resolution	0.026 arc-sec
C-axis Position Accuracy	+/- 2.0 arc-sec
C-axis Max Speed	3000 RPM
Workholding Spindle Max Speed	7000 RPM

Rotary B-axis	HydroRound Rotary B-axis
Type	Bi-conical, self compensated, Oil hydrostatic bearing, DC Brushless direct drive motor
Material	High-alloy steel
Tabletop size	380mm (15")
Standard swing capacity	350mm (13.8") diameter
Load Capacity	454 Kg (1000 lbs.)
Maximum Speed	10 RPM
Motor Torque	6 Ft-lbs.
Position Feedback Resolution	0.027 arc-sec
Radial Error Motion	0.10µm (4µ") @ 1" above table and can be improved with optional error mapping.
Axial Error Motion	0.10µm (4µ")
Coning Error	1.0nm/mm (1.0µ"/in.)
Radial Stiffness	525N/µm (3,000,000 lbs./in.)
Axial Stiffness	875N/µm (5,000,000 lbs./in.)
Moment Stiffness	17N-m/µrad (150 lbs-in/µrad.)

High Speed Milling/Grinding Spindle	High Speed SP75FF Spindle	High Speed PI ISO 2.25 Spindle
Air Supply Pressure	690 KPA (100 PSI)	690 KPA (100 PSI)
Air Consumption	2.8 l/s (6.0 SCFM)	0.9 l/s (2.0 SCFM)
Cooling Water Flow	0.03-0.08 l/s (0.47-1.27 gal/min)	0.7 l/s (3.17 gal/min))
Radial Load Capacity	20.5 Kg (45 lbs)	10 Kg (20 lbs)
Axial Stiffness	70N/µm (400,000 lbs/in.)	69N/µm (392,000 lbs/in.)
Radial Stiffness	22N/µm (125,000 lbs/in.)	23N/µm (130,000 lbs/in.)
Axial Error Motion	< 0.05µm (2µ")	< 0.05µm (2µ")
Radial Error Motion	< 0.05µm (2µ")	< 0.05µm (2µ")
Maximum Speed	15,000 RPM	50,000 RPM

Facility Requirements	Freeform® 700A
Power	208 or 230 VAC 1 phase - 50/60 Hz
Air Supply	Typical: 16SCUM @100 PSIG
Floor space	2930mm x 3807mm x 2043mm (115" x 150" x 80")