

250

precitech

Nanoform® 250 ultra Ultra Precision Machining System

This Ultra Precision Diamond Turning Lathe is designed for the production of optical lenses, optical mold inserts, mirror and precision mechanical components. The 250 ultra can be configured from 2 to 4-axes to produce spherical, aspheric and freeform surfaces.



Overview

Slide Travel: 220 mm
Max. Feedrate: 4,000 mm/min
Swing Capacity: 250 mm
222 mm over optional B-axis
Load Capacity: SP-150 = 85 Kg
HS- 75 = 27 Kg
Spindle Speed: SP-150 = 7,000 RPM
HS- 75 = 18,000 RPM

Process Capabilities

2-axes X-Z contouring
3-axes X-Z-B Tool-Normal contouring
High Speed Finishing (Infrared Lenses)
3-axes Freeform X-Z-C Slow Tool Servo contouring
Micro-Milling
High Throughput production capability

Design Features

ONX real time Operating System with industry leading 0.01 nanometer programming resolution
Linear holographic glass scales with 16 picometer feedback resolution
Sealed natural granite base providing exceptional long term machine tool stability
FEA optimized dual sub-frames for the ultimate in environmental isolation
Linear motors coupled to true analog linear amplifiers
Modular design for future capability upgrades
On-machine workpiece balancing system

MAJOR COMPONENTS DESIGNED AND MANUFACTURED BY PRECITECH INC.

- Hydrostatic oil bearing slideways with optimized stiffness and damping characteristics
- Liquid cooled slides for thermal stability
- Motorized air bearing spindles

AMETEK®
ULTRA PRECISION TECHNOLOGIES

Machine Options

Advanced temperature control systems
Fast Tool Servo Freeform® capability
HydroRound rotary B-axis

- Virtual Center
- Error Mapping

CAM software
On machine gage & amplifier
Self leveling pneumatic vibration isolation system
Slow Tool Servo/Positioning C-axis

- Adaptive Control Technology

UltraComp™ on machine metrology
UltraSet optical tool setting system
Video observation camera



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March 10

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	FEA optimized dual sub-frames for the ultimate in environmental isolation
Control System	UPx™ Control System with optional Adaptive Control Technology
Operating System	QNX real time operating system
Programming Resolution	0.01 nanometer linear / 0.000001° Rotary
File Transfer / Storage	USB, CD-RW, Ethernet, On-board data storage backup
Performance	Surface Roughness (RA) < 1.0nm, Form Accuracy (P-V) < 0.1µm

Linear Hydrostatic Slideways	Description
Type	Hydrostatic oil bearing slideways with liquid cooling capability
Travel	X and Z: 220mm (8.6")
Maximum Feedrate	4,000mm/min. (157"/min)
Drive System	AC linear motor
Position Feedback Resolution	16 picometers (0.016 nanometers)
X-axis Straightness	Horizontal: 0.2µm (8µ") full travel 0.05µm/25mm (2µ")
Z-axis Straightness	Horizontal: 0.2µm (8µ") full travel 0.05µm/25mm (2µ")
Vertical Straightness	0.375µm (15µ") full travel

Workholding/Positioning Spindle	High Speed HS 75 Spindle	High Performance SP 150 Spindle
Type	Slot-type thrust bearing	Slot-type thrust bearing
Material	Steel shaft/Bronze journal	Steel shaft/Bronze journal
Standard Swing Capacity	250mm (9.8") diameter	250mm (9.8") diameter
Motor	Integral brushless motor	Integral brushless motor
Load Capacity	27Kg (60 lbs.) @ 100 PSI	85Kg (187 lbs.)
Axial Stiffness	105N/µm (600,000 lbs./in.)	230N/µm (1,314,000 lbs./in.)
Radial Stiffness	35N/µm (200,000 lbs./in.)	130N/µm (743,600 lbs./in.)
Motion Accuracy	Axial/Radial ≤ 20nm (0.8µ")	Axial/Radial ≤ 15nm (0.6µ")
Thermal Control Optional	Liquid cooled chiller +/- 0.1C Accuracy	Liquid cooled chiller +/- 0.1C Accuracy
C-axis Feedback Resolution		0.026 arc-sec
C-axis Position Accuracy		+/- 2 arc-sec
C-axis Max Speed		3,000 RPM
Work Holding Spindle Max speed	18,000 RPM	7,000 RPM

Rotary B-axis	HydroRound Rotary B-axis
Type	Bi-conic, self compensated, oil hydrostatic bearing, DC Brushless direct drive motor
Tabletop Size	330mm (13")
Standard Swing Capacity	222mm (8.75") diameter
Load Capacity	225 Kg (500 lbs.)
Maximum Speed	10 RPM continuous / 50 RPM intermittent
Motor Torque	36 in-lbs/ 4.0 N-m
Position Feedback Resolution	0.004 arc-sec
Position Accuracy	+/- 1 arc-sec
Radial Error Motion	0.10µm (4µ") @ 1" above table
Coning Error	1.0nm/mm (1.0µ"/in.)
Radial Stiffness	225N/µm (1,280,000 lbs./in.)
Axial Stiffness	600N/µm (3,428,000 lbs./in.)
Moment Stiffness	3.4 N-m/micro radian (30 in-lbs/micro radian) (144 in-lbs/arc-sec)

Facility Requirements	Nanoform® 250 ultra
Power	208 +/-10% or 230 +/-10% VAC - 3.0 KVA 1 phase - 50/60Hz
Air Supply	Typical: 12 SCFM @100 PSIG
Machine Footprint	914mm x 2120mm x 1700mm (36" x 83.5" x 67")