

250

precitech

Nanoform® 250 ultragrind Ultra Precision Machining System

This revolutionary, flood coolant compatible 2, 3 or 4-axes ultra precision freeform machine is designed for diamond turning, and deterministic freeform milling and grinding the most challenging applications.

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 = 60 Kg
Spindle Speed:	SP-150 = 7,000 RPM
Grind Spindle Speed:	Either 15,000 RPM or 50,000 RPM

Configuration & Process Capabilities

Single Point Diamond turning (2 or 3-axes)

Direct lathing of optics and optical molds including freeform non-axi-symmetrical designs

Tool Normal diamond turning (3 or 4-axes)

Utilizing a contouring B-axis for freeform shapes in challenging materials, such as silicon

Precision grinding and milling (2 or 3-axes)

Utilizing a 15,000 rpm spindle in the vertical orientation for cross-axis grinding for the direct machining of precision glass optics

Freeform grinding and milling (3 or 4-axes)

Utilizing a 50,000 rpm spindle and a rotary B-axis for parallel grinding or 45° grinding for optical mold inserts, such as tungsten carbide for glass pressing applications

Design Features

QNX real time Operating System with industry leading 0.01 nanometer programming resolution

Linear holographic glass scales with 16 picometer feedback resolution

Completely sealed stainless steel enclosure

Sealed natural granite base providing exceptional long term machine tool stability

Linear motors coupled to true analog linear amplifiers

FEA optimized dual sub-frames for the ultimate in environmental isolation

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



AMETEK® Precitech, Inc.
44 Blackbrook Road
Keene, NH 03431 USA
Phone: 603-357-2511
Fax: 603-358-6174
Precitech.machinesales@ametek.com
www.precitech.com

Machine Base and Control	Description
Machine Base	Natural, high-stability, sealed granite, with flood coolant stainless steel enclosure
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 / 0.0000001° Rotary
File Transfer Storage	USB, CD-RW, Ethernet, On-board data storage backup
Performance (SPDT)	Surface Roughness (Ra) < 1.5nm, Form Accuracy (P-V) < 0.1µm
Performance (Grinding)	Surface Roughness (Ra) < 10nm, Form Accuracy (P-V) < 0.15µm Tungsten carbide

Linear Hydrostatic Slideways	Description
Type	Hydrostatic oil bearing slideways with symmetrical linear motor placement
Material	Durabar cast iron
Travel	X and Z: 220mm (8.6")
Maximum Feedrate	4,000mm/min. (157"/min)
Drive System	AC linear motor
Motor Location	Located centrally and mounted vertically eliminating offset drive forces and minimizing thermal distortions
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 Performance SP150 Spindle
Type	Slot-type thrust bearing
Material	Steel shaft/Bronze journal
Standard Swing Capacity	250mm (9.8") diameter
Motor	Integral brushless motor
Load Capacity	60 Kg (133 lbs) 50mm (2") out from spindle nose
Axial Stiffness	230N/µm (1,314,000 lbs./in.)
Radial Stiffness	130 N/µm (743,600 lbs./in.)
Motion Accuracy	Axial/Radial ≤ 15nm (0.6µ")
Thermal Control Optional	Liquid cooled chiller +/- 0.1C Accuracy
C-axis Feedback Resolution	.026 arc-sec
C-axis Position Accuracy	*+/- 2 arc-sec
C-axis Max Speed	3,000 RPM
Work Holding Spindle Max Speed	7,000 RPM

Rotary B-axis	HydroRound Rotary B-axis
Type	Bi-conical, self compensated, Oil hydrostatic bearing, DC Brushless direct drive motor
Material	Stainless Steel
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 and can be improved with optional error mapping
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)

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)
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	Nanoform® 250 ultragrind
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")