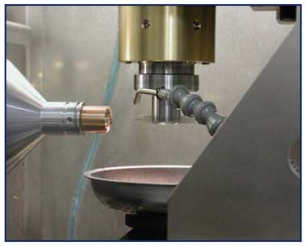
Nanoform® 250 ultra grind Precision Diamond Turning Lathe

250

up to 5-axes X, Z, C, B, W, Machine

precitech

This Revolutionary, flood-coolant compatible up to 5-axes ultra precision freeform machine is designed for diamond turning, and deterministic freeform grinding the most challenging applications. ***Common applications:*** *glass grinding for aspheric glass lenses, mold inserts for molding lenses for glass pressing.*



Spiral Milling - 3-axes X,Z,B -Brass

Guaranteed Performance:

Diamond Turning
Form accuracy: ≤0.15 micron (λ/4)PV • **Surface roughness** ≤1.5 nanometer Ra

High Speed Grinding
Form accuracy: ≤0.20 micron (λ/3)PV • **Surface roughness** ≤5 nanometer Ra

Machine Overview:

Slide Travel X & Z	220 mm	Ultimate Radial Load Capacity	SP-150 114 kg (250 lbs.) HS-75 38 kg (85 lbs.)
Swing Capacity	440 mm 220 mm over B-axes	Spindle Speed	SP-150 7,000 RPM HS-75 18,000 RPM

Machine Features:

- QNX® real time Operating System with 0.01 nanometer programming resolution
- Linear holographic glass scales with 16 picometer feedback resolution
- Windows® interface for easy network integration with Diffsys® Basic
- Completely sealed stainless steel enclosure
- 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

Horizontal Grinding with Tool Normal - 3-axes X,Z,B

45° Grinding with Tool Normal

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 with 3 year warranty

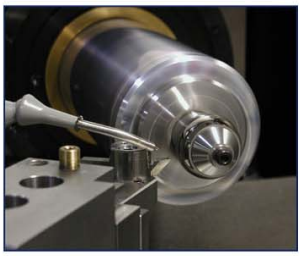
Configuration & Process Capabilities:

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



Tool Normal Diamond Turning
3-axes X,Z,B Nickel Plated Toric

AMETEK® Precitech, Inc.
Global Manufacturer of Innovative Ultra Precision Machining Solutions
44 Blackbrook Road • Keene, NH 03431 USA • Phone: 603-357-2511 • Fax: 603-358-6174
Precitech.machinesales@ametek.com • www.precitech.com

AMETEK®
ULTRA PRECISION TECHNOLOGIES

Technical Product Specification **Nanoform® 250 ultragrind**

Machine Base and Control	Description
Machine Base	Natural, high-stability, sealed granite, with flood coolant stainless steel enclosure
Machine Type	Ultra precision, two, three, four or five 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, Ethernet, On-board data storage backup
Performance (SPDT)	Surface Roughness (Ra) < 1.5 nm, Form Accuracy (P-V) < 0.15 micron
Performance (Grinding)	Surface Roughness (Ra) < 5 nm, Form Accuracy (P-V) < 0.15 micron Tungsten carbide

Linear Hydrostatic Slideways	Description
Type	Hydrostatic oil bearing slideways with symmetrical linear motor placement
Material	Durabar cast iron
Travel	X and Z: 220 mm (8.6 inch)
Maximum Feedrate	4,000 mm/minute (157 inch/minute)
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:** 0.2 micron (8 micro inch) full travel 0.05 micron/25 mm (2 micro inch)
Z-axis Straightness	**Horizontal:** 0.2 micron (8 micro inch) full travel 0.05 micron/25 mm (2 micro inch)
Vertical Straightness	0.375 micron (15 micro inch) full travel

Workholding/Positioning Spindle	High Performance SP150 Spindle
Type	Slot-type thrust bearing
Material	Steel shaft/Bronze journal
Standard Swing Capacity	250 mm (9.8 inch) diameter
Motor	Integral brushless motor
Ultimate Load Capacity	114 Kg (250 pounds) 50 mm (2 inch) out from spindle nose
Axial Stiffness	230 N/micron (1,314,000 pounds/inch)
Radial Stiffness	130 N/micron (743,600 pounds/inch)
Motion Accuracy	Axial/Radial ≤ 15nm (0.6 micro inch)
Thermal Control Optional	Liquid cooled chiller +/- 0.1C Accuracy
C-axis Feedback Resolution	0.010 arc-sec
C-axis Position Accuracy	+/- 1 arc-sec
C-axis Max Speed	1,500 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	330 mm (13 inch)
Standard Swing Capacity	220 mm (8.75 inch) diameter over tabletop / 440 mm otherwise
Load Capacity	225 Kg (500 pounds)
Maximum Speed	10 RPM continuous / 50 RPM intermittent
Motor Torque	36 inch-pounds/ 4.0 N-m
Position Feedback Resolution	0.004 arc-sec
Positioning Accuracy	+/- 1 arc-sec
Radial Error Motion	0.10 µm (4 micro inch) @ 1 in. above table and can be improved with optional error mapping
Coning Error	1.0 nm/mm (1.0 micro inch/inch)
Radial Stiffness	225 N/micron (1,280,000 pounds/inch)
Axial Stiffness	600 N/micron (3,428,000 pounds/inch)
Moment Stiffness	3.4 N-m/micro radian (30 inch-pounds/micro radian) (144 inch-pounds inch-pounds/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 pounds)
Axial Stiffness	70 N/micron (400,000 pounds/inch)	69 N/micron (392,000 lbs/inch)
Radial Stiffness	22 N/micron (125,000 pounds/inch)	23 N/micron (130,000 lbs/inch)
Axial Error Motion	< 0.05 micron (2 micro inch)	< 0.05 micron (2 micro inch)
Radial Error Motion	< 0.05 microns (2 micro inch)	< 0.05 micron (2 micro inch)
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	914 mm x 2120 mm x 1700 mm (36 inch x 83.5 inch x 67 inch)

AMETEK® Precitech, Inc.
Global Manufacturer of Innovative Ultra Precision Machining Solutions
44 Blackbrook Road • Keene, NH 03431 USA • Phone: 603-357-2511 • Fax: 603-358-6174
Precitech.machinesales@ametek.com • www.precitech.com

AMETEK®
ULTRA PRECISION TECHNOLOGIES