

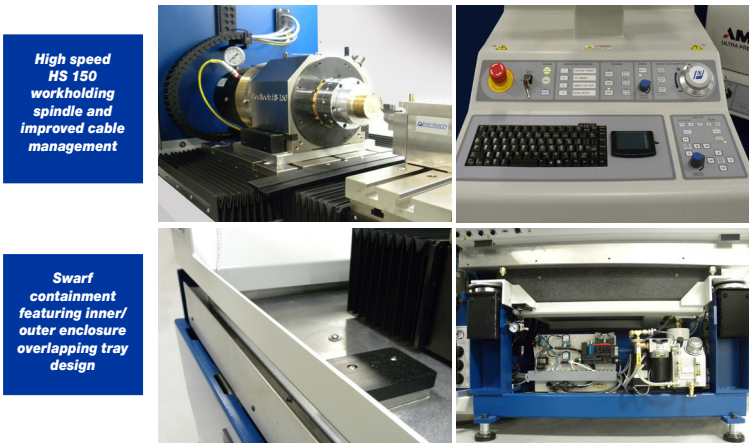
Upper enclosure opens for cleaning and maintenance

Nanoform[®] X
Small Frame Diamond Turning Lathe

The Nanoform X is designed to increase productivity and ease of use in the diamond turning, milling, and grinding of optical lenses, mold inserts, mirrors, and precision mechanical components. The machine can be configured from 2 to 4 axis to produce spherical, aspherical and freeform surfaces of up to 440 mm diameter.

Since 1962, Precitech has delivered complete ultra precision solutions and maintains an installed base of over 1,500 systems worldwide. We continue to define the state-of-the-art, enhancing accuracy, productivity, and ease of use. **Precitech is ultra precision machining solutions.**

- ▶ **Fully-opening upper enclosure and lower work envelope allows easier access for setup and cleanup**
- ▶ **Unique inner compartment design improves Swarf containment**
- ▶ **Operator console enhancements lead to greater ease of use**
- ▶ **Innovative suite of productivity tools reduces part and tool setup time**
- ▶ **HS 150 spindle provides for 5x improvement in thermal stability**
- ▶ **Dual frame design with TMC MaxDamp[®] isolation reduces sensitivity to vibration**
- ▶ **Industry leading surface finish less than 1 nm Sa**



High speed HS 150 workholding spindle and improved cable management

Swarf containment featuring inner/outer enclosure overlapping tray design

User-friendly control console features

Lower work envelope and integral TMC MaxDamp[®] vibration isolation system

Key Specifications

Turning performance	Surface roughness < 1 nm Sa Form accuracy < 0.1 μm P-V (tested and measured on one surface upon request)
Programming resolution	0.01 nm linear / 0.0000001° rotary
Ultimate load capacity	136 kg (300 lbs) @ 100 PSI
Swing capacity	Max swing 440 mm dia., w/ 100 mm riser block (250 mm dia. standard swing)

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 and integral self-leveling TMC MaxDamp® isolators (Optional PEPS® II-VX active vibration cancellation available)	
Control System	UPx™ Control System with optional Adaptive Control Technology	
Operating System	QNX real time operating system	
Programming Resolution	0.01 nm linear / 0.000001° rotary	
File Transfer/Storage	USB, CD, ethernet, on-board data storage backup	
Performance	Surface roughness (Sa) < 1.0 nm, form accuracy (P-V) < 0.1 µm (tested and measured on one surface upon request)	
Linear Hydrostatic Slideways	Description	
Type	Hydrostatic bearing slideways with symmetrical linear motor placement and liquid cooling	
Travel	X and Z: 220 mm (8.6 in.)	
Maximum Feedrate	4,000 mm/min. (157 in./min.)	
Drive System	Linear motor	
Position Feedback Resolution	8 µm (0.008 nm)	
X-axis Straightness	Horizontal (critical direction): 0.2 µm (8.0 µin.) full travel	0.05 µm/25 mm (2.0 µin.)
Z-axis Straightness	Horizontal (critical direction): 0.2 µm (8.0 µin.) full travel	0.05 µm/25 mm (2.0 µin.)
Vertical Straightness	0.375 µm (15 µin.) full travel	
Hydrostatic oil supply system	Hydro-7 Smart Servo Control, low pulsation pump, optional thermal control	
Workholding/Positioning Spindle	High Speed HS 75 Spindle (3 Year Warranty)	High Performance HS 150 Spindle (3 Year Warranty)
Air Bearing Type	Slot-type thrust bearing	Slot-type thrust bearing
Material	Steel shaft/Bronze journal	Steel shaft/Bronze journal
Motor	Integral brushless DC motor	Integral brushless DC motor
Ultimate Load Capacity (@ spindle nose)	45 kg (100 lbs) @ 100 PSI	136 kg (300 lbs) @ 100 PSI / 204 kg (450 lbs) @ 150 PSI
Axial Stiffness	105 N/µm (600,000 lbs/in.)	230 N/µm (1,314,000 lbs/in.)
Radial Stiffness	35 N/µm (200,000 lbs/in.)	130 N/µm (743,600 lbs/in.)
Motion Accuracy	Axial/Radial ≤ 20nm (0.8 µin.)	Axial/Radial ≤ 15 nm (0.6 µin.)
Thermal Control	Liquid cooled chiller ±0.1° C Accuracy	Liquid cooled chiller ±0.1° C Accuracy
C-axis Feedback Resolution	0.018 arc-sec 9,000 line encoder	0.010 arc-sec 16,200 line encoder (9,000 line encoder available on request)
C-axis Position Accuracy	±1.0 arc-sec	±1.0 arc-sec
C-axis Max Speed	4,000 RPM	2,000 RPM (4,000 RPM with 9,000 line encoder)
Work Holding Spindle Max speed	18,000 RPM	10,000 RPM
Rotary B-axis	HydroRound Rotary B-axis with Hydrolock	
Type	Patented self compensated oil hydrostatic bearing, bi-conic, integral brushless DC motor	
Tabletop Size	330 mm (13 in.)	
Load Capacity	225 kg (500 lbs)	
Maximum Speed	10 RPM continuous / 50 RPM intermittent	
Hydrolock Holding Torque	> 108 N-m / 80 ft-lbs	
Position Feedback Resolution	0.004 arc-sec	
Radial Error Motion	0.10 µm (4.0 µin.) @ tool height (4.4 in. above table top), can be improved with optional error mapping	
Coning Error	1.0 nm/mm (1.0 µin./in.)	
Radial Stiffness	225 N/µm (1,280,000 lbs/in.)	
Axial Stiffness	600 N/µm (3,428,000 lbs/in.)	
Moment Stiffness	3.4 N-m/µrad (30 in.-lbs/µrad) (144 in.-lbs/arc-sec)	
Positioning Accuracy	±0.1 arc-sec	
Facility Requirements	Nanoform® X	
Power	208 ±10% or 230 ±10% VAC - 3.0 KVA 1 phase - 50/60 Hz	
Air Supply	Typical: 12 SCFM @ 100 PSIG	
Machine Footprint (W x L x H)	929 mm x 2152 mm x 1790 mm (36.6 in. x 84.8 in. x 70.5 in.)	