

Multi-Axis Ultra Precision Machining System

If you need the flexibility of a large frame lathe and the quality of a small frame lathe, the Nanoform® 700 is precisely the machine you need.

The Nanoform 700 ultra has a industry leading surface finish spec of 1 nm Sa. Its unique 700 mm swing and optional 170 kg load capacity make it the largest ultra precision machining system able to achieve that level of performance.

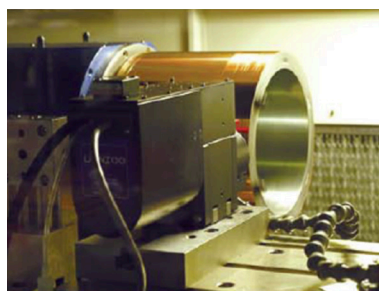
The Nanoform 700 ultra is designed for the production of optical lenses, optical mold inserts, mirrors & mechanical components. The machine can be configured from 2 to 4 axes to produce spherical, aspheric and freeform surfaces.

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.



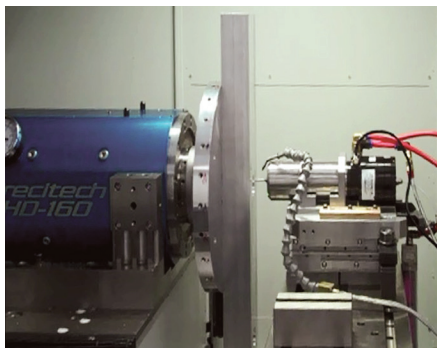
- ▶ **Industry leading swing and load capacity**
- ▶ **Flexibility to manufacture parts up to 700 mm**
350 mm of X axis travel and ultimate load capacity of 170 kg (375 lbs.)
- ▶ **5x improvement in thermal stability**
HS 150 spindle
- ▶ **Reduced sensitivity to vibration**
integral TMC MaxDamp® isolation system
- ▶ **Performance rivaling that of small frame lathes**
industry leading surface finish of less than 1 nm Sa



Machining Drum with FTS



610 mm (24 in.) diameter optic



Milling Attachment

Key Specifications

Turning Performance	Surface finish < 1.0 nm Sa Form accuracy < 0.125 µm P-V (tested and measured on one surface upon request)
Programming resolution	0.01 nm linear / 0.0000001° rotary
Ultimate load capacity	HS 150 - 136 kg (300 lbs) @100 PSI HD 160 - 170 kg (375 lbs) @100 PSI
Swing capacity	700 mm (27.5 in.) diameter up to 900 mm (35.4 in.) with optional risers

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
- 4-axes X-Z-C-W Freeform Fast Tool Servo contouring

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 (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 / 0.0000001° rotary		
File Transfer	USB, CD-ROM, Ethernet		
Performance	Surface Finish < 1.0 nm Sa, Form Accuracy < 0.125 µm P-V, tested and measured on one surface upon request (All measurements according to ISO Standard 4287)		
Linear Hydrostatic Slideways		Description	
Type	Hydrostatic bearing slideways with symmetrical linear motor placement and liquid cooling		
Travel	X axis: 350 mm (13.8 in.) Z axis: 300 mm (11.8 in.)		
Maximum Feedrate	3,000 mm/min. (118 in./min.)		
Drive System	Linear motors used on all three linear axes		
Position Feedback Resolution	8 pm (0.008 nm)		
Straightness horizontal/vertical	X axis: 0.3 µm (12 µin.) over full travel / 0.75 µm (30 µin.) over full travel Z axis: 0.3 µm (12 µin.) over full travel / 0.75 µm (30 µin.) over full travel		
Hydrostatic oil supply system	Hydro-7 Smart Servo Control, low pulsation pump, optional thermal control		
Workholding Air Bearing Spindle		High Performance HS150 Spindle (3 Year Warranty)	Heavy Duty HD-160 Spindle (3 Year Warranty)
Spindle Air Bearing Type	Slot type thrust bearing	Slot type thrust bearing	Slot type thrust bearing
Materials	Steel shaft / Bronze journal	Steel shaft / Bronze journal	Steel shaft / Bronze journal
Standard Swing Capacity	700 mm (27.5 in.) diameter 350 mm (13.7 in.) over optional B-axis tabletop	700 mm (27.5 in.) diameter 350 mm (13.7 in.) over optional B-axis tabletop	700 mm (27.5 in.) diameter 350 mm (13.7 in.) over optional B-axis tabletop
Motor	Integral brushless DC motor	Integral brushless DC motor	Integral brushless DC motor
Ultimate Load Capacity (@ spindle nose)	136 kg (300 lbs) @ 100 PSI 204 kg (450 lbs) @ 150 PSI	170 kg (375 lbs) @ 100 PSI 256 kg (564 lbs) @ 150 PSI	170 kg (375 lbs) @ 100 PSI 256 kg (564 lbs) @ 150 PSI
Axial Stiffness	230 N/µm (1,314,000 lbs/in.)	350 N/µm (2,000,000 lbs/in.)	350 N/µm (2,000,000 lbs/in.)
Radial Stiffness	130 N/µm (743,600 lbs/in.)	175 N/µm (1,000,000 lbs/in.)	175 N/µm (1,000,000 lbs/in.)
Motion Accuracy	Axial/Radial ≤ 15 nm (0.6 µin.)	Axial/Radial ≤ 25 nm (1.0 µin.), standard motor	Axial/Radial ≤ 25 nm (1.0 µin.), standard motor
Thermal Control	Liquid cooled chiller +/- 0.1°C accuracy	Liquid cooled chiller +/- 0.1°C accuracy	Liquid cooled chiller +/- 0.1°C accuracy
C-axis Feedback Resolution	0.010 arc-sec 16,200 line encoder (0.018 arc-sec 9,000 line encoder available on request)	0.010 arc-sec 16,200 line encoder (0.018 arc-sec 9,000 line encoder available on request)	0.010 arc-sec 16,200 line encoder (0.018 arc-sec 9,000 line encoder available on request)
C-axis Positioning Accuracy	+/- 1.0 arc-sec	+/- 1.0 arc-sec	+/- 1.0 arc-sec
C-axis Max Speed	2,000 RPM (4,000 RPM with 9,000 line encoder)	2,000 RPM (4,000 RPM with 9,000 line encoder)	2,000 RPM (4,000 RPM with 9,000 line encoder)
Workholding Spindle Max Speed	10,000 RPM	5,000 RPM	5,000 RPM
Rotary B-axis		HydroRound II Rotary B-axis with Hydrolock	
Type	Patented self compensated oil hydrostatic bearing, Bi-conic, integral brushless DC motor		
Material	High-alloy steel		
Tabletop size	380 mm (15 in.)		
Maximum Speed	10 RPM		
Hydrolock Holding Torque	> 108 N-m / 80 ft-lbs		
Position Feedback Resolution	0.003 arc-sec		
Radial Error Motion	0.10 µm (4.0 µin.) @ tool height (6.9 in. above table top), can be improved with optional error mapping		
Axial Error Motion	0.10 µm (4 µin.)		
Coning Error	1.0 nm/mm (1.0 µin./in.)		
Radial Stiffness	525 N/µm (3,000,000 lbs/in.)		
Axial Stiffness	875 N/µm (5,000,000 lbs/in.)		
Moment Stiffness	17 N-m/µrad (150 in.-lbs/µrad)		
Positioning Accuracy	+/- 0.1 arc-sec		
High Speed Milling / Grinding Spindles		SP75FF Spindle	Levicron High Speed Milling Spindle
Air Supply Pressure	690 KPA (100 PSI)	610 KPA (88 PSI)	610 KPA (88 PSI)
Air Consumption	50 lpm (1.7 SCFM)	70 lpm (2.5 SCFM)	70 lpm (2.5 SCFM)
Radial Load Capacity	32 kg (70 lbs) ultimate load capacity	29 kg (65 lbs) ultimate load capacity	29 kg (65 lbs) ultimate load capacity
Axial Stiffness	70 N/µm (400,000 lbs/in.)	50 N/µm (285,000 lbs/in.)	50 N/µm (285,000 lbs/in.)
Radial Stiffness	22 N/µm (125,000 lbs/in.)	35 N/µm (200,000 lbs/in.)	35 N/µm (200,000 lbs/in.)
Axial Error Motion	< 50 nm (2.0 µin.)	< 30 nm (1.2 µin.)	< 30 nm (1.2 µin.)
Radial Error Motion	< 50 nm (2.0 µin.)	< 30 nm (1.2 µin.)	< 30 nm (1.2 µin.)
Maximum Speed	15,000 RPM	80,000 RPM (stiffness increases 50% with 60 k RPM model)	80,000 RPM (stiffness increases 50% with 60 k RPM model)
Facility Requirements		Nanoform® 700 ultra	
Power	208 +/-10% or 230 +/-10% VAC - 3.0 KVA 1 phase - 50/60 Hz		
Compressed Air Supply	Typical: 12 SCFM @ 100 PSIG		
Machine Size and Weight	1437 mm x 1930 mm x 2043 mm (57 in. x 76 in. x 80 in.)		