

## Moore Nanotech® 250UPL Ultra-Precision Diamond Turning Lathe (Configurable as a 2, 3, or 4 axis machine)

### Machine Features

- PC based CNC motion controller with Windows operating system and **1.0 nanometer (0.04μ") programming resolution**
- Laser holographic linear scale feedback system with **34 picometer (0.034 nanometer) resolution**
- Natural granite machine base mounted on passive air isolation system
- Box-way hydrostatic oil bearing slideways with 2,000,000 lbs./in. stiffness (350N/μm)
- Linear motor drives for rapid cycle times, improved surface quality, and minimal maintenance
- 10,000 rpm "heavy-duty" air bearing workspindle (with liquid cooling option)
- Swing capacity: 10" diameter (250mm), X & Z slide travel: 8" (200mm)
- Compact footprint (51" x 51")
- *Options* include vertical Y-Axis, rotary B-Axis, C-Axis positioning control of the workspindle, micro-grinding and micro-milling attachments, Fast Tool Servo system, optical tool set station, spraymist coolant system, vacuum chuck, micro-height adjust tool holders, NanoCAM® 2D Aspheric Part Programming Software and on-machine measurement & Workpiece Error Compensation System (WECS)



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# Nanotech 250UPL Specification Overview

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General	Description
System Configuration	Ultra-Precision two, three, or four axis CNC contouring machine with "T" axis orientation.
Workpiece Capacity	250mm diameter x 200mm long (150mm diameter swing capability over the optional rotary B-Axis)
Base Structure	Natural Black Granite – with integral slide channels and protective stainless steel apron
Vibration Isolation	Optimally located passive air isolation system
Control System	Delta Tau PC based CNC motion controller, operating in a Windows environment, with 19" color flat panel touch screen display. 1 GB memory, AGP video, 10/100 Base T Ethernet, CD-RW / DVD Drive, and 80GB hard drive. Total system mounted in NEMA 12 cabinet.
Programming Resolution	1 nanometer linear / 0.00001° rotary
Functional Performance (As measured on laser interferometer and white light interferometer)	Material – High Purity Aluminum Alloy. Form Accuracy (P-V): $\leq 0.125\mu\text{m}$ / 75mm dia, 250mm convex sphere. Surface Finish (Ra): $\leq 2.0$ nanometers

Workholding Spindle	Heavy Duty (Standard)
Type	Fully constrained Professional Instruments groove compensated air bearing
Liquid Cooling (optional)	To maintain thermal stability and tool center repeatability, a closed loop chiller provides recirculating temperature controlled water to cooling channels located around the motor and bearing journals of the air bearing spindle. The chiller has an integral PID controller which maintains temperature control to $\pm 0.5^\circ\text{F}$ . Flow is controlled by a solenoid integrated with the machine's CNC control.
Speed Range	50 to 10,000 rpm, bi-directional
Load Capacity (Radial)	57Kg (125 lbs.) @ spindle nose
Axial Stiffness	140 N/ $\mu\text{m}$ (800,000 lbs./in.) @ 8.3 bar (120 psi)
Radial Stiffness (at nose)	87 N/ $\mu\text{m}$ (500,000 lbs./in.) @ 8.3 bar (120 psi)
Drive System	Frameless, Brushless DC motor
Motion Accuracy	Axial: $\leq 25$ nanometers (1 $\mu\text{m}$ )      Radial: $\leq 25$ nanometers (1 $\mu\text{m}$ )

Linear Axes	X	Z	Y (Vertical) – Option
Type	Fully constrained oil hydrostatic, box way slide	Fully constrained oil hydrostatic, box way slide	Fully constrained oil hydrostatic box way slide with adaptively controlled air bearing counterbalance to negate gravitational forces & varying loads.
Travel	200mm (8")	200mm (8")	100mm (4")
Drive System	Brushless DC Linear Motor	Brushless DC Linear Motor	Brushless DC Linear Motor
Feedback Type	Laser holographic linear scale (athermally mounted)	Laser holographic linear scale (athermally mounted)	Laser holographic linear scale (athermally mounted)
Feedback Resolution	0.034 nanometer	0.034 nanometer	0.034 nanometer
Feed Rate (maximum)	1500mm/min	1500mm/min	1500mm/min
Straightness in critical direction	0.2 $\mu\text{m}$ (8 $\mu\text{m}$ ) over full travel	0.2 $\mu\text{m}$ (8 $\mu\text{m}$ ) over full travel	0.2 $\mu\text{m}$ (8 $\mu\text{m}$ ) over full travel
Hydrostatic Oil Supply	Compact, low flow, low pressure system with closed loop servo control and pressure accumulator to minimize pump pulsation.		

Optional Rotational Axes	B	C
Type	Groove Compensated Air Bearing (fully constrained)	Groove Compensated Air Bearing (liquid cooled)
Travel	360° (Bi-directional)	360° (Bi-directional)
Drive System	Brushless DC motor	Brushless DC motor
Axial Stiffness	280 N/ $\mu\text{m}$ (1,600,000 lbs./in.)	140 N/ $\mu\text{m}$ (800,000 lbs./in.) @ 8.3 bar (120 psi)
Radial Stiffness (at nose)	100 N/ $\mu\text{m}$ (540,000 lbs./in.)	87 N/ $\mu\text{m}$ (500,000 lbs./in.) @ 8.3 bar (120 psi)
Positioning Accuracy	$\leq 2.0$ arc seconds (compensated)	$\leq \pm 2.0$ arc seconds (compensated) static
Feedback Resolution	0.02 arc seconds	0.07 arc seconds
Maximum Speed (Positioning Mode)	50 rpm	1,500 rpm
Motion accuracy	Axial: $\leq 0.05\mu\text{m}$ (2 $\mu\text{m}$ )      Radial: $\leq 0.05\mu\text{m}$ (2 $\mu\text{m}$ )	Axial: $\leq 0.025\mu\text{m}$ (1 $\mu\text{m}$ )      Radial: $\leq 0.025\mu\text{m}$ (1 $\mu\text{m}$ )

Utility Requirements	Air	Electrical	Floor Space
For optimal cutting results, facility thermal stability should be held within $\pm 0.5^\circ\text{C}$ ( $\pm 1.0^\circ\text{F}$ )	7 to 9 bar (100 – 130 psi) 280 liters/min (10 scfm) Dry to 10°C pressure dew point and pre-filtered to 10 $\mu\text{m}$	230 VAC; 50/60hz; 3 Phase (35 amp)	1.30m wide x 1.30m deep x 1.60m high Approx. 1,360 Kg (Includes enclosure but not including peripheral equipment and control pendant)

<b>Warranty</b>	1 year full parts and labor warranty
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Note: In an effort to continually improve our product performance, specifications are subject to change without notice.