

# Nanotech 450UPL Specification Overview

April 1<sup>st</sup>, 2010

General	Description
System Configuration	Ultra-Precision two, three, or four axis CNC contouring machine with "T" axis orientation.
Workpiece Capacity	450mm diameter x 300mm long - (200mm diameter swing capability over the optional rotary B-Axis) (Note: additional swing capacity available upon request)
Base Structure	Monolithic cast epoxy-granite, with integral coolant troughs
Vibration Isolation	Optimally located three point passive air isolation system. Optional Self-Leveling Shear Damped 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	0.01 nanometer linear / 0.0000001° rotary
<b>Functional Performance</b> (As measured with laser interferometer & white light interferometer on <u>same</u> part)	Material – High Purity Aluminum Alloy. Both accuracies measured on the <u>same</u> part. Form Accuracy (P-V): ≤ 0.125µm -- 75mm Diameter, 250mm Radius convex sphere. Surface Finish (Ra): ≤ 2.0 nanometers

Workholding Spindle	Heavy Duty (Standard)
Type	Exclusive Professional Instruments axial & radial groove compensated air bearing with a center mounted thrust plate.
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 ± 0.5°F. Flow is controlled by a solenoid integrated with the machine's CNC control.
Speed	50 to 10,000 rpm, bi-directional
Radial Load Capacity (@ spindle nose)	70Kg (154 lbs.) @ 100 psi. / 85Kg (187 lbs.) @ 145 psi.
Axial Stiffness	228 N/µm (1,300,000 lbs/in) @ 100 psi / 260 N/µm (1,500,000 lbs/in) @ 145 psi
Radial Stiffness (@ spindle nose)	98 N/µm (560,000 lbs/in) @ 100 psi / 140 N/µm (800,000 lbs/in) @ 145 psi
Drive System	Frameless, Brushless DC motor
Motion accuracy	Axial: ≤ 12.5 nanometers (0.5µ")      Radial: ≤ 12.5 nanometers (0.5µ")

Axes	X	Z
Type	Fully constrained oil hydrostatic, box way slide	Fully constrained oil hydrostatic, box way slide
Travel	350mm (14")	300mm (12")
Drive System	Brushless DC Linear Motor	Brushless DC Linear Motor
Feedback Type	Laser holographic linear scale (athermally mounted)	Laser holographic linear scale (athermally mounted)
Feedback Resolution	34 picometer (0.034 nanometer)	34 picometer (0.034 nanometer)
Feed Rate (maximum)	4500mm/min	4500mm/min
Straightness in critical direction	0.3µm (12µ") over full travel	0.3µm (12µ") 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	Oil Hydrostatic (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	875 N/µm (5,000,000 lbs./in.)	See <b>Workholding Spindle</b> Specifications Listed Above
Radial Stiffness (at nose)	260 N/µm (1,500,000 lbs./in.)	See <b>Workholding Spindle</b> Specifications Listed Above
Positioning Accuracy	± 1.0 arc seconds (compensated)	± 1.0 arc seconds (compensated) static
Feedback Resolution	0.02 arc seconds	0.07 arc seconds
Maximum Speed (Positioning Mode)	50 rpm	3,000 rpm
Motion accuracy	Axial: ≤ 0.1µm (4µ")      Radial: ≤ 0.1µm (4µ")	Axial: ≤ 12.5 nm (0.5µ")      Radial: ≤ 12.5 nm (0.5µ")

Utility Requirements	Air	Electrical	Floor Space
For optimal cutting results, facility thermal stability should be held within ±0.5°C (±1.0°F)	7 to 10 bar (100-145psi) 280 liters/min (10 scfm) Dry to 10°C pressure dew point and pre-filtered to 10µm	11kVA at the customer specified voltage from 208 - 480 VAC; 50 / 60hz; 3 Phase (26kVA with optional oil hydrostatic grinder)	1.72m wide x 1.73m deep x 1.84m high Approx. 2,650 Kg (Includes enclosure but not including peripheral equipment and control pendant)

Warranty	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.*