Nanotech®


# 1500 UPL$^{V3}$ LARGE CAPACITY ULTRA-PRECISION SYSTEM

- World's Largest Commercial Diamond Turning and Grinding Machine
- Up to 1.5 Meter Diameter Optical Components
- Optional Grinding Configuration for Glass and Ceramic Mirrors
- Advanced Thermal Management Design

MOORE TOOLS

# 1500 UPL$^{V3}$ SPECIFICATIONS

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|---|---|
| SYSTEM CONFIGURATION | Ultra-Precision three or four axis CNC contouring machine |
| WORKPIECE CAPACITY | Ø 1500mm x 350mm |
| BASE STRUCTURE | Natural granite |
| VIBRATION ISOLATION | Shear damped air isolation system with self-leveling |
| COMPUTER SYSTEM SPECIFICATIONS | Intel i5 2.4 GHz processor running on Windows 64-bit; 32 GB DDR4 memory; 10/100/1000 Base-T external user Ethernet connection; 1 TB SSD. Pendant features dual 22" and 16" wide projected capacitive multi-touch display; USB ports provided on operator pendant. |
| CONTROL SYSTEM | Delta Tau 1.2 GHz Quadcore ARM based PMAC embedded Real-Time 64-bit Linux motion controller with Nanotech's Windows based HMI and a Touch/Swipe gesture interactive display. |
| PROGRAMMING RESOLUTION | x.xxx xxx xx |
| STANDARD FUNCTIONAL PERFORMANCE (As measured with laser interferometer & with light interferometer on same part) | Material: 6061-T6 Aluminum<br>Form Accuracies (P-V): ≤ 0.25 µm / Ø 100 mm, 1000 mm Radius convex sphere.<br>Surface Finishes (Ra): ≤ 2 nm, measured on same parts.<br>Turned at 3 radial positions: 0 mm, 250 mm, and 500 mm from center for a 1250 mm swing. |

| SPINDLE | |
|---|---|
| WORKHOLDING SPINDLE | Standard Heavy Duty |
| TYPE | Aerostatic Bearing |
| LIQUID COOLING | To maintain thermal stability and tool center repeatability, a Temperature Management System (TMS) recirculate temperature-controlled water to cooling channels located around the motor and bearing journals of the spindle to ± 0.1 °C utilizing cascaded PID loop temperature control. Separate TMS devices similarly stabilize and control the temperature of hydrostatic oil supplied to the axis slides and bearings. These TMS devices eliminate the requirement for closed loop PID controlled laboratory chiller. This new stand-alone TMS Utility Systems cabinet monitors and regulates all necessary thermal stability for liquid and air systems on the machine. |
| SPEED RANGE | 0 to 4,000 rpm, bi-directional |
| SWING CAPACITY | Ø 1500mm diameter |
| WORKING LOAD CAPACITY (RADIAL)[1] | 200 kg @ 7bar [450 lbs @ 100 psi] @ spindle nose |
| AXIAL STIFFNESS | 350 N/µm @ 7bar [2,000,000 lbs/in @ 100psi] |
| RADIAL STIFFNESS (@ SPINDLE NOSE) | 280 N/µm @ 7bar [1,600,000 lbs/in @ 100psi] |
| DRIVE SYSTEM | Brushless DC motor, 15Nm continuous torque |
| MOTION ACCURACY | Axial: ≤ 25 nanometers [1.0µ"] Radial: ≤ 25 nanometers [1.0µ"] |

| LINEAR AXES | X | Z | Y (VERTICAL) MOTORIZED DRESSER FOR GRINDING |
|---|---|---|---|
| TYPE | Fully constrained oil hydrostatic, box way slide | Fully constrained oil hydrostatic, box way slide | Recirculating ball linear rails |
| TRAVEL | 800mm (31.5") | 350mm (13.8") | 170mm (6.7") |
| DRIVE SYSTEM | Ironless linear motor | Ironless linear motor | Precision ball-screw |
| FEEDBACK TYPE | Laser holographic linear scale | Laser holographic linear scale | Motor integrated rotary encoder |
| FEEDBACK RESOLUTION | 6 pm | 2 pm | 120 pm |
| FEED RATE (MAXIMUM) | 10,000 mm/min (394 in/min) | 4,500 mm/min (177 in/min) | 5,000 mm/min (197 inch/min) |
| STRAIGHTNESS IN CRITICAL DIRECTION | 0.2 µm (7.9 µ") over full travel | 0.2 µm (7.9 µ") over full travel | 5 µm (0.0002") over full travel |
| HYDROSTATIC OIL SUPPLY | Compact, low flow system with closed loop servo control and pressure accumulator to minimize pump pulsation. | | |

| ROTATIONAL AXES | B-AXIS | WORK SPINDLE / C-AXIS |
|---|---|---|
| TYPE | Fully Constrained Oil Hydrostatic | Aerostatic Bearing |
| TRAVEL | 360° (Bi-directional) | 360° (Bi-directional) |
| DRIVE SYSTEM | Brushless DC motor | Brushless DC motor |
| AXIAL STIFFNESS | 350 N/µm (2,000,000 lbs/inch) | 350 N/µm @ 7bar [2,000,000 lbs/in @ 100psi] |
| RADIAL STIFFNESS (@ SPINDLE NOSE) | 1800 N/µm (10,287,000 lbs./in.) | 280 N/µm @ 7bar [1,600,000 lbs/in @ 100psi] |
| POSITIONING ACCURACY | ± 1.0 arc sec (compensated) | ± 1.0 arc sec (compensated) |
| FEEDBACK RESOLUTION | 0.00042 arc sec | 0.001 arc sec |
| MAXIMUM SPEED (POSITIONING MODE) | 50 rpm | 4,000 rpm |
| MOTION ACCURACY | Axial: ≤ 100 nm (3.9 µ")<br>Radial: ≤ 100 nm (3.9 µ") | Axial: ≤ 25 nm (1.0 µ")<br>Radial: ≤ 25 nm (1.0 µ") |

| WARRANTY | 1 year full parts and labor warranty |
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Notes: [1] Working Load Capacities shown above are defined at 50% of ultimate load capacities.
In an effort to continually improve our product performance, specifications are subject to change without notice. (Please consult your Sales Representative for our latest specifications).