

TURNING

HARDINGE
QUEST-Series®
SUPER-PRECISION®
Gang/Turret Turning Centers

COLLET-READY
SPINDLE



www.hardinge.com

HARDINGE®

SUPER-PRECISION® QUEST® - Series machines set the industry standard for part roundness, surface finish, accuracy and SPC

Hardinge's SUPER-PRECISION® QUEST-Series turning centers are unlike all competitive gang tool or gang turret machines in that they include our patented interchangeable top plate and world-renowned, quick-change collet-ready spindle.

Since the 1980's thousands of these machines have been installed and many are still in production holding the same accuracy as the day they were purchased! Producing high-quality parts for the medical and aerospace industries, among others, are ideal for Hardinge's QUEST-Series.

Enhanced automation capability and automated robotic parts handling capabilities make the QUEST-Series machines an outstanding value. Depending on how you outfit your QUEST machine it can be used as a stand-alone unit, a higher capacity system with a bar feed, or a fully automated system with the robot.

A Hardinge QUEST-Series turning center is also an excellent complement to a Swiss machining operation. And that's not all...every machine undergoes strict certification to assure you that our QUEST-Series machines meet the quality standards our customers expect when buying from Hardinge.

QUEST GT 27

- A2-4 5C spindle (A2-5, 16C option)
- A2-5 16C Big Bore option
- 10-hp/7.5kW spindle drive system
- 8,000 RPM spindle
- 5,000 RPM (16C option)
- Part surface finish: 8 micro-inch/.20 micron
- Part roundness: .000015"/.40 micron
- Continuous machining accuracy: .0002"/5 micron



QUEST CHNC 27 & CHNC 42

- A2-4 5C spindle (CHNC 27)
- A2-5 16C spindle (CHNC 42)
- 10-hp/7.5kW spindle drive system
- 8,000 RPM spindle (CHNC 27)
- 5,000 RPM spindle (CHNC 42)
- Part surface finish: 8 micro-inch/.20 micron
- Part roundness: .000015"/.40 micron
- Continuous machining accuracy: .0002"/5 micron

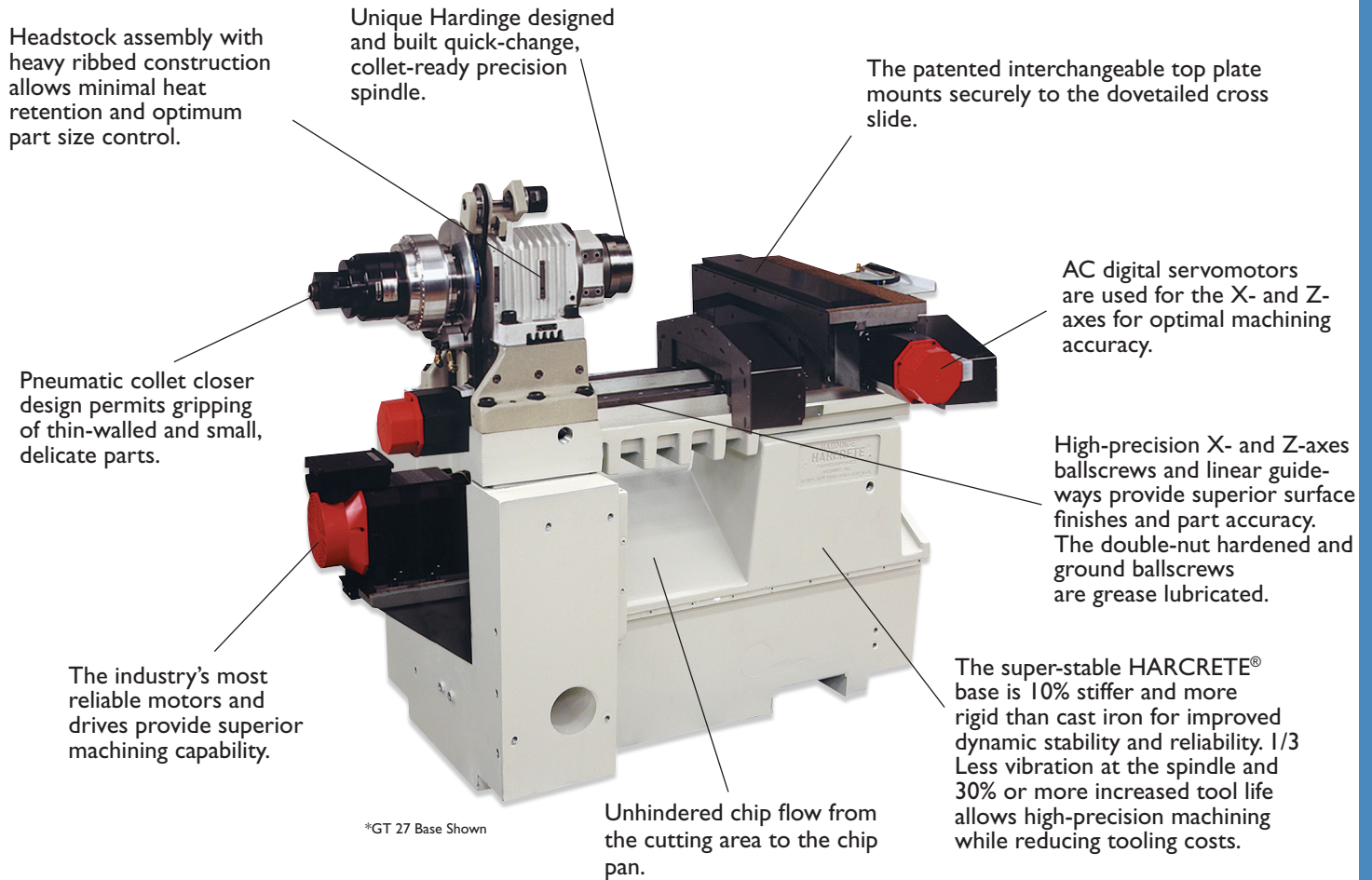
Standard features include:

- Worklight
- Headwall Coolant
- Custom Macro B
- Rigid Tapping
- Run Time / Parts Counter

Optional features include:

- Tool touch probe
- Parts catcher
- Air blast
- Thru-spindle coolant
- Barfeed interface
- Chip conveyor
- Auto door
- High pressure coolant
- 125 psi coolant pump





Designed for performance

The latest software design platform and FEA (finite element analysis) techniques were used to design and build a rigid, structurally-balanced machine to assure optimum performance and machine life. The FEA software accurately depicts the structural deflection, stress levels, thermal response and vibration response of the assembled components and the assembled machine. Extreme-case loadings are used to verify adverse machining conditions.

Laser calibration

QUEST-Series machines receive laser calibration to the X and Z axes to ensure positioning accuracy and straightness.

“Hard turning” capability

The QUEST-Series design characteristics make it ideally suited for “hard turning” to help minimize your grinding requirements.

Accuracy certification

Accuracy certification, personally signed by the President of Hardinge Inc., is included as assurance that the machine is as accurate as we say.

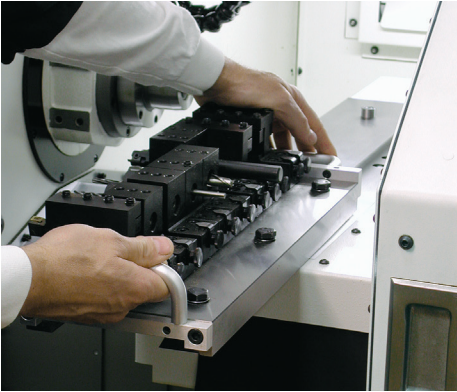
Designed for SPC (Statistical Process Control) and long run accuracy

Size repeatability, surface finish quality and thermal stability is a hallmark for Hardinge lathes—and the QUEST-Series is no exception.

Maintained accuracy over long runs

- .000015”/.40 micron part roundness
- 8 micro-inch/.20 micron part surface finish
- Extended tool life due to stiff structure
- Continuous machining accuracy .0002”/5 micron

Spindles & Top Plates

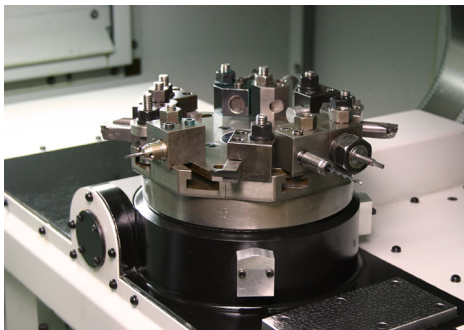


QUEST GT 27

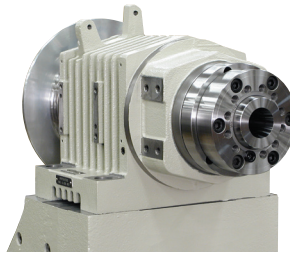
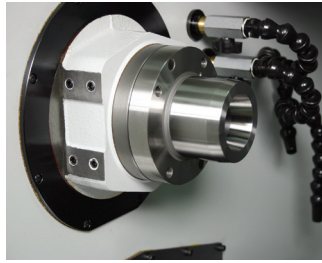
Patented interchangeable top plate-standard

Pre-tooled top plates can be quickly interchanged in less than a minute for a new part or family of parts within .0002" repeatability. Once a component operation is set and proven out, the tooled top plate, program, work shift and tool offsets can be removed from the machine and stored until needed for the next batch of similar parts. Repeat jobs can typically save 50% to 80% on setup time over other manufacturer's gang-type machines. Plus, you can add or remove cutting tools from any location without disturbing any other tools on the top plate. Cut-to-cut time is drastically reduced with gang-tool configuration—there's no time lost on turret indexing (on the GT 27). And you can produce many different parts without changing the top plate tool setup. In our own facility, we produce over 1500 different parts on one machine using a single tooled top plate setup.

Current CHNC customers are thrilled to see they can reduce their investment in a new CHNC machine by using their existing tooling!



CHNC 27/42



Unique Hardinge Spindle Design

The unique Hardinge spindle (made in Elmira, NY) sets the QUEST-Series machines apart from other Gang/Turret lathes in the industry. Shown on the left without the adapter ring, you can see the extended spindle nose giving additional tool clearance when compared to competitive machines.

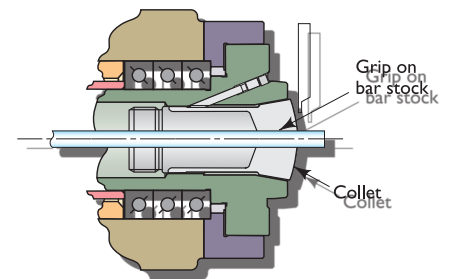
As standard equipment, each spindle comes with an adapter ring (seen on the left) allowing customers to conveniently mount your standard A2-4 & A2-5 chucks directly to the spindle face.

Perfect complement for Swiss machine shops

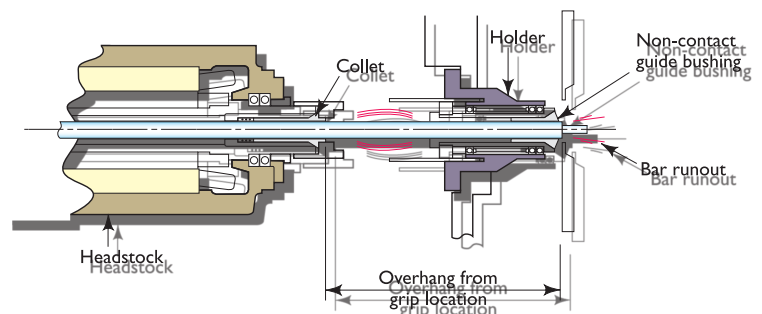
When machining parts having a length-to-diameter ratio up to 5-to-1, a QUEST gang tool machine provides the following benefits compared to producing parts on a Swiss-style machine.

- Collet seats directly in the Hardinge spindle
- Minimum overhang from the spindle bearings—spindle accuracy is transferred directly to the workpiece
- Maximum rigidity and gripping power transferred to the part
- Optimum T.I.R. for exacting concentricity
- Superior tolerances and finishes
- Quick changeover—collet draw tube is easily and accurately adjusted from the back of the spindle
- Longer tool life
- Lower workholding cost—guide bushing eliminated
- No need for expensive ground bar stock/reduced remnant waste
- Ability to use a wide variety of workholding devices—collets, quick-change collets, step chucks, expanding collets and others

Hardinge Design Advantage



Swiss Machine Spindle Design



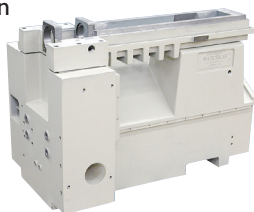
For versatile, high-precision machining

Hardinge SUPER-PRECISION®

A combination of best practice design engineering, high precision manufacturing, high quality purchased components, complex software development and integration, intense testing and certification combined with the Hardinge Global knowledge and experience of producing the most difficult parts and processes known to the industry. The QUEST-Series turning centers will exceed your expectations with superior .000015" part roundness and 0.000008" (Ra) surface finish. With these superior specifications our customers are able to eliminate expensive secondary finishing operations while reducing cost and part handling!

Super-stable HARCRETE® Base

The strength-to-weight ratio of the polymer composite base is superior to that made solely of cast iron—its 10% stiffer for improved dynamic stability and has 1/3 less vibration at the spindle. This results in increased tool life (30% or more), improved surface finishes (37% or more) and optimal dimensional control—as confirmed by users of Hardinge gang tool turning centers! Additionally, HARCRETE provides longer machine life, heavier/deeper cuts and faster machining speeds.



High-precision linear guideways, ballscrews and axis drives

The linear guideways provide optimum stiffness with less friction, less heat and less thermal growth for faster traverse rates, longer machine life and greater positioning accuracy. The 1 1/2" / 25mm hardened and ground, double-nut ballscrews and guide trucks used for the X and Z axes are grease lubricated. Fast traverse rates of 708ipm/18mpm on the X axis and 945ipm/24mpm on the Z axis (GT 27) provide reduced cycle times.

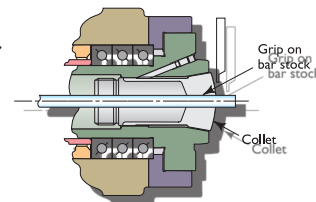
Grease lubrication system

Grease lubrication is provided for all ballscrews and linear guide truck bearings. Grease lubrication provides several advantages over way lube oil systems—

- No oil skimmer required
- No degradation of water-base coolants
- Environmentally friendly—no need to dispose of contaminated oil
- Improves machine maintenance

Unique Hardinge® quick-change collet-ready spindle

The ANSI A2-4, 5C collet-ready 8,000-rpm spindle provides for bar work up to 1 1/16" / 27mm diameter (5,000-rpm, A2-5 "Big-Bore" spindle option with 1 5/8" / 42mm capacity available). The headstock assembly features heavily ribbed construction, allowing minimal heat retention and optimum part size control (refer to the previous page for other advantages of the Hardinge spindle design).



FANUC Robotic's intelligent robot

The LR Mate 200iD robot is one of our many automation solutions and features six axes of motion with dual gripper assembly and blank gripper fingers for precision "pick and place" of raw and finished workpieces. Workpieces can be machined complete in a single setup with very little operator involvement—simply interchange a pallet containing raw or near-net-shape parts with the pallet filled with completed parts. Included as standard equipment with the LR Mate is a blank pallet, brakes on all axes, torque sensing collision guard, a separate hand-held "teach" pendant and an interlocked door/safety guard.



Mitsubishi Electric's RV-7FL Six-Axis Robot

The robot is top mounted to the machine and incorporates a double gripper, custom fingers and a self-contained perimeter guard with interlocked access doors. Two pallet trays are integrated into the guard design so they can be accessed without the need to enter the work envelope. Both trays are manually loaded with blank parts and the robot removes the blanks from one pallet and loads them in and out of the machine. When completed, the robot can either put the finished parts back into the pallet or deposit them onto a simple gravity chute. When one pallet tray has been completed, the robot will automatically switch to the other pallet so the operator can replenish blanks on the first pallet. A hand-held "teach" pendant is provided. Mitsubishi Electric now offers a full three-year warranty on all new robots. Warranty includes on-site Service, travel, parts & labor.



Hardinge® Fanuc 32i-T CNC Control Unit

All the control you'll ever need right at your fingertips

SUPER-PRECISION® QUEST-Series feature a custom-designed CNC control with the latest hardware and software technology, providing an operator-friendly, common platform. Many standard features are included that other machine tool builders charge extra for—rigid tapping, tool life management, variable lead thread cutting, run time and parts counter, and Ethernet connection.



General

- Two Interpolating Axes ●
- Programmable Resolution—.000010"/.00010mm ●
- Tool Offset Capability—.000010"/.00010mm ●
- Inch/Metric Data Selection by G-Code ●
- 160 Meters Part Program Storage ●
- Part Program Storage ○
- (320, 640 or 1,280 meters total)
- Data Input/Output ●
- MDI (Manual Data Input) Operation ●
- Reader/Punch Interface ●
- Flash Card (PCMCIA) Capability ●
- Ethernet Ready ●

Programming Functions

- Absolute/Incremental Programming ●
- Additional Tool Offsets (64 pair total) ●
- Additional Custom Macro Variables ○
- Auto Coordinate System Setting ●
- Auto Acceleration/Deceleration ●
- Background Editing ●
- Canned Cycles (Drilling) ●

Programming Functions (cont'd)

- Chamfer/Corner Rounding
- Constant Surface Speed Programming
- Continual Thread Cutting
- Coordinate System Setting (G50)
- Custom Macro B
- Decimal Point Programming
- Diameter/Radius Programming
- Extended Part Program Edit (Copy/Paste)
- External Workpiece Number Search
- Hardinge Safe Start Format
- Input of Offset Value by Programming (G10)
- Interpolation (Linear and Circular)
- Multiple Repetitive Canned Cycles I (Turning)
- Multiple Repetitive Canned Cycles II (Pockets)
- Program Number Search
- Reference Point Return
- Registered Part Programs (63 total)
- Registered Part Programs (125 or 200 total)
- Rigid Tapping
- Sequence Number Search
- Single Block Operation
- Stored Stroke Check
- Thread, Synchronous Cutting
- Tool Life Management
- Tool Nose Radius Compensation
- Variable Lead Thread Cutting

Operation

- Block Delete ●
- Dry Run ●
- Dwell Time ●
- Emergency Stop ●
- Feed Hold ●
- Feedrate Override (0 to 150%) ●
- Incremental Jog ●
- Jog Feed ●
- Machine Lock ●
- Manual Pulse Generator (MPG Handwheel) ●
- On-Screen Spindle & Axis Load Meters ●
- Option Stop ●
- Rapid Traverse Override (Low-25-50-100%) ●
- Spindle Speed and T-Code Displays on All Screens ●
- Tool Geometry and Tool Wear Offsets ●
- (32 pairs each)

Miscellaneous

- Actual Cutting Speed Display ●
- Alarm Display ●
- Polar and Cylindrical Interpolation ○
- Clock Function ●
- Graphic Display ●
- English Color LCD Display with Full Keyboard ●
- French, German, Italian or Spanish ○
- Ladder Diagram Display ●
- Mechanical Run Meter ●
- On-Screen "HELP" Functions for Alarms ●
- One-Degree Spindle Orient ●
- Program Protect ●
- Run Time and Parts Counter ●
- Self-Diagnosis Function ●

● Standard

○ Optional

Hardinge® Mitsubishi M70V Unit

Mitsubishi control is now available on CHNC models

The Mitsubishi M70V Series control is capable of supporting complex turning applications. This control comes packed with every option available making it easy for our customers. Mitsubishi has the industry's leading cost vs. performance ratio allowing you to see overall lower total cost of ownership.

**General**

- Two Interpolating Axes ●
- Programmable Resolution—.000010"/.00010mm ●
- Tool Offset Capability—.000010"/.00010mm ●
- Inch/Metric Data Selection by G-Code ●
- 1280 Meters Part Program Storage ●
- Part Program Storage USB or Compact Flash ●
- Data Input/Output - USB or Compact Flash ○
- MDI (Manual Data Input) Operation ●
- Reader/Punch Interface RS232 Compact Flash Card ●
- Ethernet Data Transfer Capability ●

Programming Functions

- Absolute/Incremental Programming ●
- 700 Additional Custom Macro Variables ●
- Auto Coordinate System Setting ●
- Auto Acceleration/Deceleration ●
- Background Editing ●
- Canned Cycles (Drilling) ●
- Navi-Lathe® Conversational Programming ●
- Buffer Editing (Edit program while running) ●

Programming Functions (cont'd)

- Chamfer/Corner Rounding
- Constant Surface Speed Programming
- Continual Thread Cutting
- Coordinate System Setting (G50)
- Custom Macro
- Decimal Point Programming
- Diameter/Radius Programming
- Extended Part Program Edit (Copy/Paste)
- External Workpiece Number Search
- Hardinge Safe Start Format
- Input of Offset Value by Programming (G10)
- Interpolation (Linear and Circular)
- Multiple Repetitive Canned Cycles I (Turning)
- Multiple Repetitive Canned Cycles II (Pockets)
- Program Number Search
- Reference Point Return
- Registered Part Programs (1000 total)
- Rigid Tapping
- Sequence Number Search
- Single Block Operation
- Stored Stroke Check
- Thread, Synchronous Cutting
- Tool Life Management
- Tool Nose Radius Compensation
- Variable Lead Thread Cutting

Operation

- Block Delete ●
- Dry Run ●
- Dwell Time ●
- Emergency Stop ●
- Feed Hold ●
- Feedrate Override (0 to 150%) ●
- Incremental Jog ●
- Jog Feed ●
- Machine Lock ●
- Manual Pulse Generator (MPG Handwheel) ●
- On-Screen Spindle & Axis Load Meters ●
- Option Stop ●
- Rapid Traverse Override (Low-25-50-100%) ●
- Spindle Speed and T-Code Displays on All Screens ●
- Tool Geometry and Tool Wear Offsets (80 pairs each) ●
- Flash Card (PCMCIA) Capability ●

Miscellaneous

- Actual Cutting Speed Display ●
- Alarm Display ●
- Polar and Cylindrical Interpolation ●
- Clock Function ●
- Graphic Display ●
- English Color LCD Display with Full Keyboard ●
- French, German, Italian or Spanish ●
- Ladder Diagram Display ●
- Mechanical Run Meter ●
- On-Screen "HELP" Functions for Alarms ●
- One-Degree Spindle Orient ●
- Program Protect ●
- Run Time and Parts Counter ●
- Self-Diagnosis Function ●
- ● Standard
- ○ Optional

Specifications

QUEST GT27

QUEST CHNC 27/42

Collet-Ready Spindle

Spindle Configuration (ANSI)	A2-4/5C	A2-4/5C (27) A2-5, 16C (42)
Round Collet (Through Capacity)	1.062"/27mm	1.062"/27mm / 1.625"/42mm
Step Chuck (Gripping Capacity)	4.0"/101.6mm	4.0"/101.6mm / 5.6"/139mm
AC Digital Spindle Drive System	10hp/7.5kW	10hp/7.5kW
Speed Range (1-rpm Steps)—Standard	80 to 8,000 rpm	80 to 8,000 / 50 to 5,000 rpm
Spindle Orient—Standard	One-Degree	One-Degree

16C "Big-Bore" Spindle Option ^{1,2}

Spindle Configuration	ANSI A2-5	—
Round 16C Collet (Through Capacity)	1.625"/42mm	—
16C Step Chuck (Gripping Capacity)	4.0"/101.6mm	—
AC Digital Spindle Drive System	10hp/7.5kW	—
Speed Range (1-rpm Steps)	50 to 5,000 rpm	—

5C and 16C Spindles

Collet Closer Stroke	.50"/12.7mm	.50"/12.7mm
Hang Weight with Device and Part (Max.)	75lb/34kg	75lb/34kg
Spindle Centerline Height	41.25"/1048mm	43.69"/1109mm
Operator's Reach to Spindle	22"/559mm	22"/559mm

Capacity

Swing Diameter		
Over Way Cover (Max.)	11.760"/298.7mm	17.94"/455.6mm
Square Shank Tool Size (Max.)	1/2" 12mm	1/2" 12mm
Round Shank Tool Size (Max.)	3/4" 20mm	3/4" 20mm
Bi-Directional Indexing Time (Station to Station)	-	.25 Seconds
Traverse Rate (Max.) X-Axis	708ipm/18mpm	472ipm/12mpm
Traverse Rate (Max.) Z-Axis	945ipm/24mpm	630ipm/16mpm
Travel (Max.)		
X-Axis	11.968"/304.0mm	12.24"/310.9mm
Z-Axis—5C Spindle	11.062"/281.0mm	12.25"/311.2mm
Z-Axis—16C Spindle	10.412"/264.5mm	12.25"/311.2mm

Parts Catcher—Option

Workpiece Length (Max.)	3"/76.2mm	3"/76.2mm / 4"/101.6mm
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Miscellaneous

Power Supply Requirement	230v/33FLA/3phase	230v/33FLA/3phase
Coolant Tank Capacity	20gal/76liter	20gal/76liter
Compressed Air Requirement	70-90 psi, 5-6 scfm	70-90 psi, 5-6 scfm
Machine Dimensions		
Length w/Chip Pan	77.00"/1956mm	77.00"/1956mm
Length w/Chip Conveyor	117.80"/2992mm	117.80"/2992mm
Depth	58.63"/1489mm	58.63"/1489mm
Height	64.10"/1628mm	64.10"/1628mm
Floor Area (Approx.)	31.3ft ² /3m ²	31.3ft ² /3m ²
Shipping Weight (Approx.)	5,700lb/2586kg	5,220lb/2368kg

Inspection Specifications ³

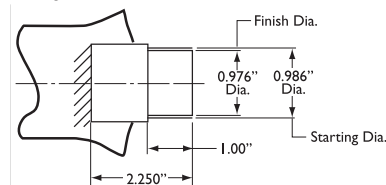
Part Surface Finish		
5C Spindle	8 micro-inch/.20 micron	8 micro-inch/.20 micron
16C Spindle	12 micro-inch/.30 micron	12 micro-inch/.30 micron
Part Roundness		
5C Spindle	.000015"/.38micron	.000015"/.38micron
16C Spindle	.000025"/.63 micron	.000025"/.63 micron
Continuous Machining Accuracy (Total Variation on Diameter)	.0002"/ 5 micron	.0002"/ 5 micron

¹ Original equipment only.

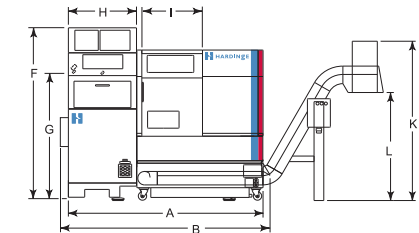
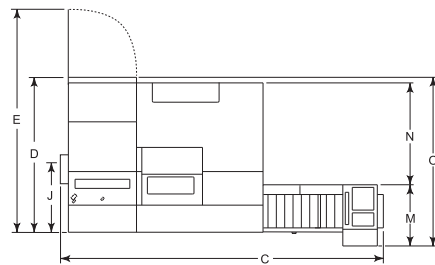
² C-axis option not available.

³ Inspected to ISO 230-2 standard. Actual results may be greater or less than those listed due to a number of factors, including but not limited to speeds, feeds, tooling, machine maintenance, coolant, material, ambient temperature and type of machine foundation.

NOTE: A supplementary power transformer is required for all voltages other than 230v, 50/60Hz.



Floor plan



A - 70.20"/1783mm	F - 64.10"/1628mm	K - 57.30"/1455mm
B - 77.00"/1956mm	G - 41.25"/1048mm	L - 38.80"/987mm
C - 117.80"/2992mm	H - 24.50"/622mm	M - 22.00"/559mm
D - 58.63"/1489mm	I - 18.00"/457mm	N - 36.60"/931mm
E - 79.13"/2010mm	J - 22.00"/559mm	O - 69.60"/1616mm

Continuous Machining Accuracy Test Results

- .0002"/5 micron on diameter
- Part roundness variation: .000008" to 0.000014"
- Part surface finish variation: 1 to 1.5 micro-inch

This test was performed from a "cold start" in a plant with temperature controlled at 68° ±3° F.

All rapid axis moves were at maximum traverse rates of 708 ipm for the X axis and 945 ipm for the Z axis.

Cutting Conditions

Material	• ROUGH	• FINISH
Tool	• Diamond	• Diamond
Spindle speed	• 1850 rpm	• 1250 rpm
Cutting depth	• 0.0025"	• 0.0025"
Feed rate	• 0.003 ipr	• 0.0005 ipr
Coolant (water base)—On		

ACTUAL TEST RESULTS FROM A "COLD" START WITHOUT OFFSET ADJUSTMENTS

