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.

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**“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.

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**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

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**Unhindered chip flow from the cutting area to the chip pan.**

**The patented interchangeable top plate mounts securely to the dovetailed cross slide.**

**AC digital servomotors are used for the X- and Z-axes for optimal machining accuracy.**

**High-precision X- and Z-axes ball screws and linear guide-ways provide superior surface finishes and part accuracy. The double-nut hardened and ground ball screws are grease lubricated.**

**The super-stable HARCREE® base is 10% stiffer and more rigid than cast iron for improved dynamic stability and reliability. 1/3 Less vibration at the spindle and 30% or more increased tool life allows high-precision machining while reducing tooling costs.**

**Headstock assembly with heavy ribbed construction allows minimal heat retention and optimum part size control.**

**Unique Hardinge designed and built quick-change, collet-ready precision spindle.**

**The industry’s most reliable motors and drives provide superior machining capability.**

**Pneumatic collet closer design permits gripping of thin-walled and small, delicate parts.**

**Machine Construction**

*GT 27 Base Shown*
Spindles & Top Plates

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!

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
The ANSI A2-4, 5C collet-ready 8,000-rpm spindle provides for bar work up to $\frac{11}{16}$ / 27mm diameter (5,000-rpm, A2-5 “Big-Bore” spindle option with $\frac{15}{8}$ / 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 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”/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

Key Features

For versatile, high-precision machining
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.

Hardinge® Fanuc 32i-T CNC Control Unit
All the control you’ll ever need right at your fingertips

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/Crner Rounding
Constant Surface Speed Programming
Continuous 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
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”/.000010mm
Tool Offset Capability—.000010”/.000010mm
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
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
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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)
Compact Flash Card Capability

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### Specifications

<table>
<thead>
<tr>
<th>Quest GT27</th>
<th>Quest CHNC 27/42</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Collet-Ready Spindle</strong></td>
<td></td>
</tr>
<tr>
<td>Spindle Configuration (ANSI)</td>
<td>A2-4/5C</td>
</tr>
<tr>
<td>Round Collet (Through Capacity)</td>
<td>1.062”/27mm</td>
</tr>
<tr>
<td>Step Chuck (Gripping Capacity)</td>
<td>6”/150mm</td>
</tr>
<tr>
<td>AC Digital Spindle Drive System</td>
<td>10hp/7.5kW</td>
</tr>
<tr>
<td>Speed Range (1-rpm Steps)—Standard</td>
<td>80 to 8000 rpm</td>
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<tr>
<td>Spindle Orient—Standard</td>
<td>One-Degree</td>
</tr>
<tr>
<td>Chuck Size</td>
<td>4” (101.6mm) / 6” (150mm)</td>
</tr>
</tbody>
</table>

**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 5000 rpm
- Chuck Size 6” (150mm)

**5C and 16C Spindles**
- Collet Closer Stroke 5/8”/12.7mm
- Hang Weight with Device and Part (Max.) 75lb/34kg
- Spindle Centerline Height 41.25”/1048mm
- Operator’s Reach to Spindle 22”/559mm

**Capacity**
- Swing Diameter
  - Over Way Cover (Max.) 11.76”/298.7mm
  - Round Shank Tool Size (Max.) 1/2” 12mm
  - Round Shank Tool Size (Max.) 3/4” 20mm
  - Bi-Directional Indexing Time (Station to Station) 35 Seconds
  - Traverse Rate (Max) X-Axis 708ipm/18rpm
  - Traverse Rate (Max) Z-Axis 945ipm/24rpm
  - Travel (Max.)
    - X-Axis 11.96”/304mm
    - Z-Axis—5C Spindle 4.01”/101.6mm
    - Z-Axis—16C Spindle 10.41”/264mm

**Parts Catcher—Option**
- Workpiece Length (Max.) 3’/762.2mm

**Miscellaneous**
- Power Supply Requirement 230v/33FLA/3phase
- Coolant Tank Capacity 20gal/76liter
- Compressed Air Requirement 70-90 psi, 5-6 scfm
- Machine Dimensions
  - Length w/Chip Pan 77.00”/1956mm
  - Length w/Chip Conveyor 117.80”/2992mm
  - Depth 58.63”/1489mm
  - Height 41.25”/1048mm
  - Floor Area (Approx.) 31.38’2”/803mm
- Shipping Weight (Approx.) 5,230lb/2370kg

**Inspection Specifications 3**
- Part Surface Finish
  - 5C Spindle 8 micro-inch/.20 micron
  - 16C Spindle 12 micro-inch/.30 micron
- Part Roundness
  - 5C Spindle .000015”/.38micron
  - 16C Spindle .000022”/.55micron
- Continuous Machining Accuracy (Total Variation on Diameter)
  - .0002”/.05 micron

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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.

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### Continuous Machining Accuracy Test Results

- .0002”/.05 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°F ±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.

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**Cutting Conditions**

<table>
<thead>
<tr>
<th>Material</th>
<th>ROUGH</th>
<th>FINISH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>Diamond</td>
<td>Diamond</td>
</tr>
<tr>
<td>Spindle speed</td>
<td>1850 rpm</td>
<td>1250 rpm</td>
</tr>
<tr>
<td>Cutting depth</td>
<td>.00025”</td>
<td>.00025”</td>
</tr>
<tr>
<td>Feed rate</td>
<td>.003 ipr</td>
<td>.0005 ipr</td>
</tr>
</tbody>
</table>

Coolant (water base)—On