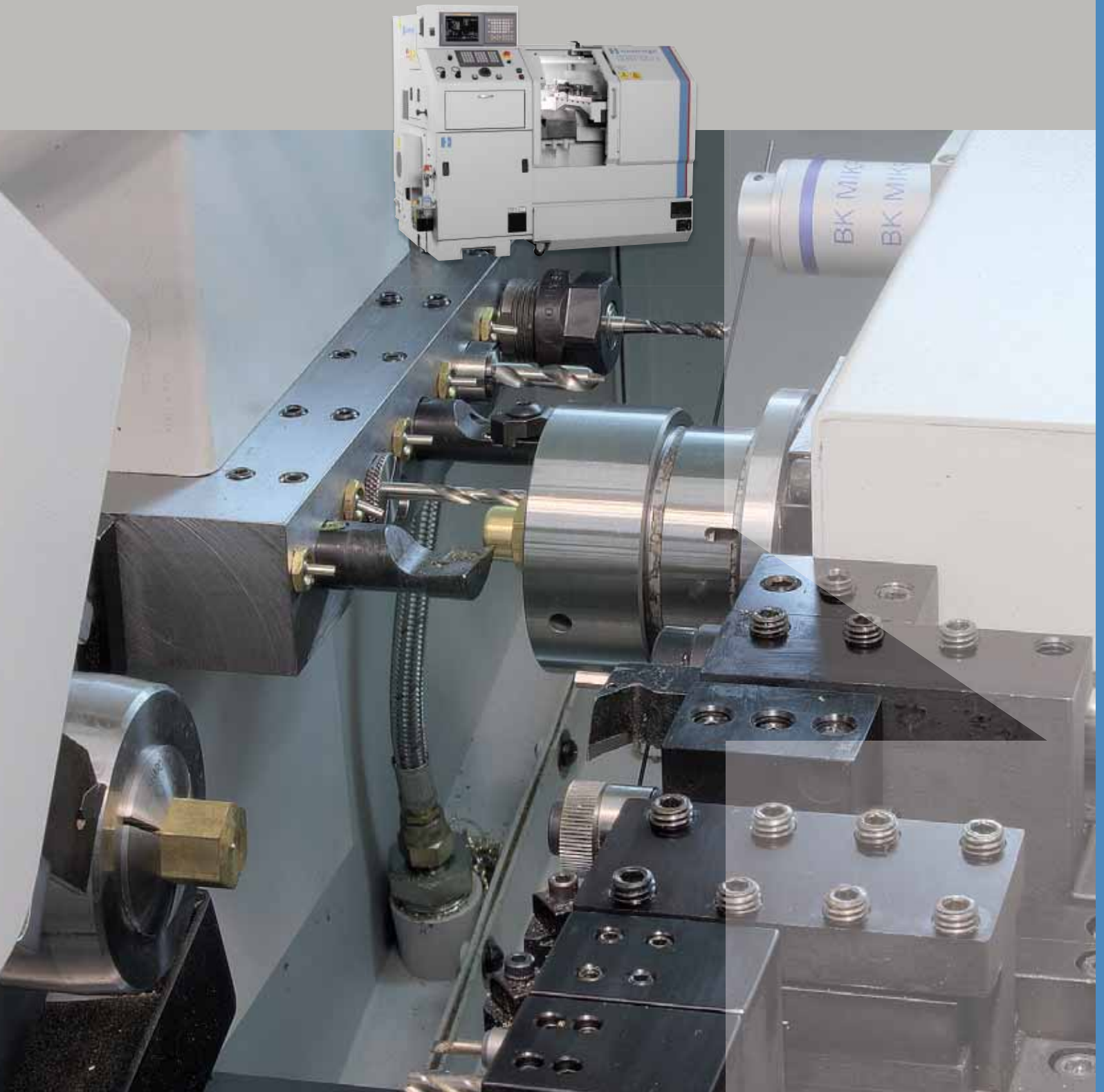


QUEST® Super-Precision®
Gang Tool Turning Centers



QUEST® Gang Tool Turning Centers

Super-Precision® QUEST GT27 machines set the industry standard for part roundness, surface finish, accuracy and SPC

Super-Precision QUEST GT turning centers are unlike all competitive gang tool machines in that they include our patented interchangeable tool top plate and world-renowned, quick-change collet-ready spindle. In 1987 we introduced our first gang tool machine...the CONQUEST® GT. Today there are thousands of Hardinge gang tool "tried and true" installations worldwide, producing high-quality parts for the medical and aerospace industries, among others. Enhanced live tooling, sub spindle and automated robotic parts handling capabilities make the QUEST GT27 machines an outstanding value. Depending on how you outfit the QUEST GT 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 gang tool 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 gang tool machines are as accurate as we say.

QUEST GT27

- A2-4 5C spindle
- 5-hp/3.7-kW spindle drive system
- 8,000-rpm spindle
- Part surface finish: 8 micro-inch/.20 micron
- Part roundness: .000015"/.40 micron
- Continuous machining accuracy: .0002"/5 micron



QUEST GT27 S

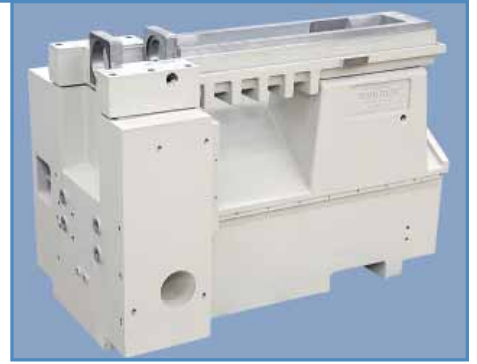
- A2-4 5C spindle
- 5-hp/3.7-kW spindle drive system
- 8,000-rpm main spindle
- 8,000-rpm sub spindle
- Part surface finish: 8 micro-inch/.20 micron
- Part roundness: .000015"/.40 micron
- Continuous machining accuracy: .0002"/5 micron



The best combination of standard features for the machining predictability you need to be more productive and profitable

Rigid machine design and construction

See page 4



Patented interchangeable quick-change tooling system

See page 5



Versatile features for "lights out" operation and reduced operator intervention

See pages 6 and 7



Advanced digital CNC control system

See page 8



QUEST® Gang Tool Turning Centers

Rigid machine design and construction

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 patented interchangeable gang tool top plate mounts securely to the dovetailed cross slide. Dovetail configured tool holders mount to the top plate, resulting in minimal "lifting" action for high precision machining

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

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

High-precision X- and Z-axes ballscrews and linear guideways provide superior surface finishes and part accuracy. The double-nut hardened and ground ballscrews are grease lubricated.

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

The super-stable HARCLETE® 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.

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

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 GT27 machines receive laser calibration to the X and Z axes to ensure positioning accuracy and straightness.

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.

"Hard turning" capability

The QUEST GT27's design characteristics make it ideally suited for "hard turning" to help minimize your grinding requirements. For in-depth information on "hard turning", go to www.hardinge.com/hardturn.

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 GT27SP is no exception. Refer to page 10 for detailed information.

Maintained accuracy over long runs

- .000015"/.40 micron part roundness
- 8 micro-inch/.20 micron part surface finish

The QUEST GT27 features a superior gang tool top plate design and is a great complement to Swiss machine shops

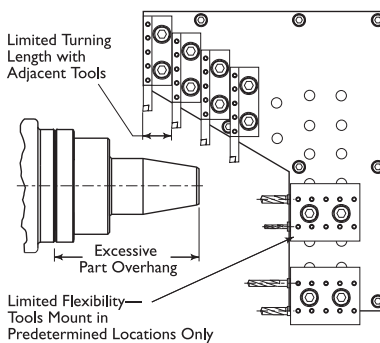


Patented interchangeable gang tool top plate—standard

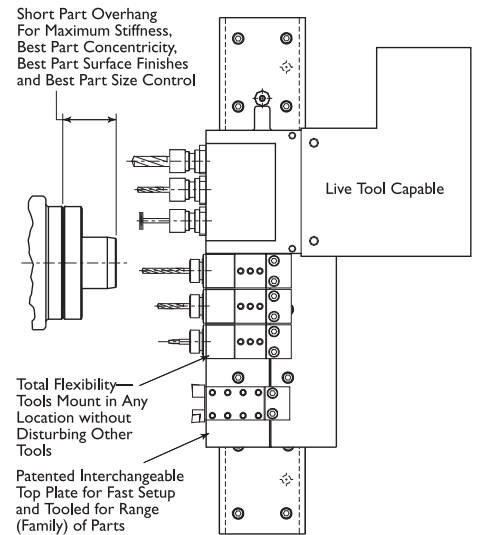
Pre-tooled top plates can be quickly interchanged in less than a minute for a new part or family of parts within .0002" repeatability. Once a component operation is set and proved out, the tooled top plate, program, workshift and tool offsets can be removed from the machine and stored until needed for 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. 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.



Other Manufacturers' Top Plate Design



Hardinge Design Advantage

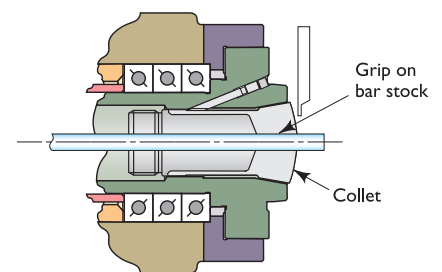


Perfect complement for Swiss machine shops

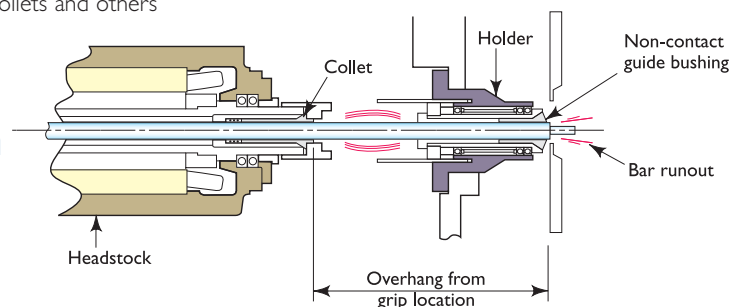
When machining parts having a length-to-diameter ratio up to 5-to-1, a QUEST gang tool machine provides the following benefits compared to producing parts on a Swiss-style machine—

- 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



QUEST® Gang Tool Turning Centers

Standard and optional features for versatile, high-precision machining



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 1/25mm 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 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).

Live tooling option*

This feature is available on the QUEST GT27 model to provide milling/drilling operations in the toughest materials. A 3-spindle attachment is used for end-working operations, while a single-spindle attachment is used for cross-working operations (one short top plate included with the 3-spindle unit). The 6,000-rpm attachments are easy to mount and can be easily removed to allow the use of standard-length top plates. The disc-type spindle brake orients the spindle; one-degree spindle orient is standard.

C-Axis contouring option*

C-axis provides main spindle positioning in increments of .001 degree. Three-dimensional contouring, complex round and prismatic machining, square shoulder and lettering are accomplished by synchronizing the spindle with the X and Z axes.

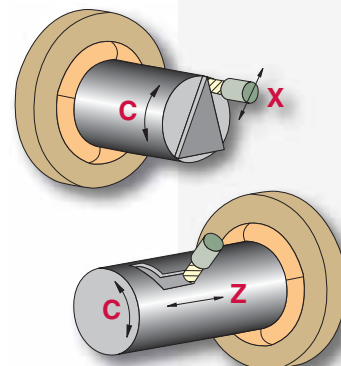
* Not available on QUEST GT27 S machines



Live tooling end-working attachment



Live tooling cross-working attachment



Optional features for enhanced machining performance and reduced operator intervention

FANUC Robotic's intelligent robot

The LR Mate 200iB 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.

Hand-held "Teach" FANUC iPendant

The robot features advanced force control software via the separate iPendant that facilitates "teaching" the robot all movements and "pick-and-place" positions. Simple data setup menus for force control and standard teach programming makes the robot relatively simple to operate.

Sub spindle

Standard on QUEST GT27 S machines is a 2-axis programmable sub spindle that facilitates exacting part transfer with the main spindle. It is canned cycle capable and features a 3-hp/2.2-kW drive system—speeds from 0 to 6,000 rpm both clockwise and counter-clockwise. It includes a pneumatic collet closer with clamping system. The sub spindle secures to a dovetail mounting plate and incorporates a complete Fanuc system—motor and drive. S25-HS Dead-length® collets, as well as hardened & ground collets, are used for accurately holding the workpiece (soft collets used for special workholding applications). Besides complex arcs and angles, typical machining operations include facing, chamfering, grooving, threading, drilling, spot drilling, tapping and boring on parts up to 1 1/25.4 mm in diameter (bar and slug capable). Finished parts are spring ejected into the optional parts catcher. Thru-spindle coolant and part present detector options are available.

Sub spindle back-working tool slide

Five back-working static tool stations are included for tools up to 5/8" using HDB bushings, sleeves or ER-style tool holders. When machining at the main spindle, the back-working tool slide can be programmed to a "safe" position, eliminating any interference with the sub spindle. A second interchangeable back-working tool block is included.

Vertical cutoff slide option

The optional air-over-oil vertical cutoff slide is used in conjunction with the sub spindle on QUEST GT27 S machines. The cutoff slide is M-code activated and uses a .093" wide cut-off blade/insert (sold separately). It features a rigid V-gib design with centering adjustment.

Other optional features include:

- Tool touch probe
- Part probe
- Part present detector
- Parts catcher
- Air blast
- Thru-spindle coolant
- Chip conveyor
- Auto door
- Inch and metric top plate tooling
- Mist collector; bar feed systems and power transformers

- Standard Equipment
- FANUC LR Mate 200iB Robot
 - Dual Gripper Assembly w/blank gripper fingers
 - One Blank Pallet
 - Robot Interface
 - Interlocked Door w/safety guarding
 - Brakes on all Axes
 - Collision Guard (torque sensing)
 - Separate Hand-held Teach Pendant
- Options (recommended):
- Air Blast
 - Thru-spindle Coolant (on main spindle)
 - Additional Blank Pallets
 - Additional Blank Gripper Fingers
 - Trap Door/Automatic Door Option

FANUC LR Mate 200iB robot



Robot safety enclosure



Gripper and pallet

Sub spindle on QUEST GT27 S (tooling sold separately)



Cutoff slide

Back-working operations

QUEST® Gang Tool Turning Centers

Hardinge®/GE Fanuc 32-Bit 21i-T CNC Control Unit—All the control you'll ever need right at your fingertips

Super-Precision® QUEST GT27 gang tool machines 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.



Flash card (PCMCIA) capability



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 ●
- (RS-232 Software/Hardware)
- Ethernet Connection ●
- Flash Card (PCMCIA) Capability ●

Programming Functions

- Absolute/Incremental Programming ●
- Additional Tool Offsets (32 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 ●

Operation (cont'd)

- 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 ●
- C-Axis with 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 Hardinge® Group...

Bridgeport® milling machines, Hardinge turning centers, Hauser, Kellenberger®, Tripet and Tschudin grinding machines, and Workholding and industrial products

Hardinge produces more than just the QUEST® gang tool turning centers shown in this brochure...we build a full range of value-packed and high-precision turning centers; vertical and horizontal machining centers; high-speed and 5-axis milling machines; creep-feed, jig, universal cylindrical and ID/OD grinding machines; and workholding systems and equipment. Hardinge machine tool technology is not only the most comprehensive on the market, it's also creating new benchmarks for quality, productivity and reliability.

Whether you are an OEM or sub-contract precision engineering company—regardless of the sectors you serve (aerospace, automotive, medical, autosport, mold, tool and die or general engineering)—the Hardinge product portfolio will interest you.

Our advanced manufacturing technologies in combination with our range of after-sales and support services (maintenance and service contracts; operator training; technical and applications support) have been designed to help you improve your performance and maintain your competitive advantage.

If you would like to know more about our manufacturing solutions, call us at 800.843.8801 or 607.734.2281 and request our Product Guide #1325. You can also e-mail us at info@hardinge.com or visit our web site at www.hardinge.com.

Hardinge precision and Super-Precision® CNC turning centers

We can help you turn your business around. From our competitively-priced SV-Series range of machines to our TALENT® and ELITE®



Series II range of quick-changeover bar and chucking machines right through to our high-productivity RS-Series and SR-Series multi-tasking turning centers and QUEST® GT gang tool machines, we can provide you with the optimum turning solution.

Milling machines and machining centers

Our comprehensive line of Bridgeport milling machines have been designed to meet any manufacturing challenge you might be facing today or in the future. Our market-leading XR range of vertical machining centers continue to grow in popularity—and



we have similar expectations with our new competitively-priced XV and GX VMCs as well. For heavy-duty, high metal removal we offer our HMC range of Horizontal Machining Centers and for increased manufacturing flexibility and improved productivity there's our 5-axis (5AX) model that is well worthy of consideration. If you are making your first step up to CNC machining, you will find that our entry-level GX 480 and GX 480 DT machines provide the ideal solution. For high-speed machining applications, our HSC machining centers are second to none.

Grinding machines

The Hardinge grinding companies include Hauser, Kellenberger, Tripet, Tschudin and, most recently, Bridgeport. Collectively we have all the technology, experience and know-how you need to transform your manufacturing operations.



From high-performance cylindrical and jig grinding machines through to multi-functional ID/OD and universal machines—not to mention Bridgeport's state-of-the-art Flexible Grinding Centers (FGC 2). It doesn't get more comprehensive than this.

Workholding

Because we design and manufacture market-leading, technically-excellent machine tools it's no surprise that we know more than a thing or two about workholding solutions.

From our extensive portfolio of CNC toolholders,



collets and chucks—right through to our 5C Indexing systems—our workholding and fixturing technology will improve your performance when and where it matters most.



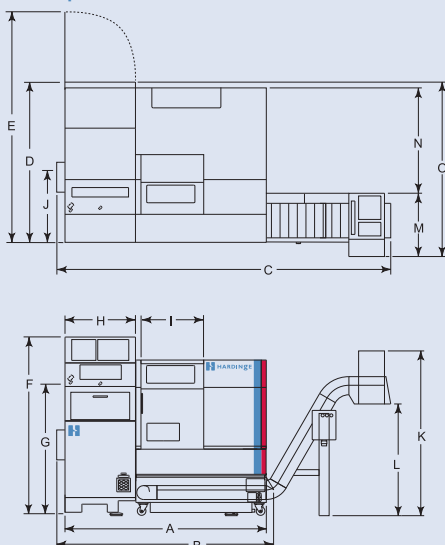
Specifications

	QUEST GT27	QUEST GT27 S		QUEST GT27	QUEST GT27 S
5C Collet Spindle			Sub Spindle		
Spindle Configuration	ANSI A2-4	ANSI A2-4	Spindle Nose	—	Dead-Length
Round 5C Collet (Through Capacity)	1.062"/27mm	1.062"/27mm	S25-HS Collets	—	—
5C Step Chuck (Gripping Capacity)	4.0"/101.6mm	4.0"/101.6mm	Round Capacity	—	3/32" to 1"
4"/100mm Sure-Grip® Power Jaw Chuck (Gripping Capacity)	3.80"/96.0mm	3.80"/96.0mm	Hex Capacity	—	2.38 to 25.4mm .1875 to .866"
AC Digital Spindle Drive System	5hp/3.7kW	5hp/3.7kW	Square Capacity	—	4.76 to 21.99mm .1875 to .707"
Speed Range (1-rpm Steps)—Standard	80 to 8,000 rpm	80 to 8,000 rpm	Power Rating	—	3hp/2.2kW
Spindle Orient—Standard	One-Degree	One-Degree	Torque Rating	—	5.3ft-lb/7.2Nm
I6C "Big-Bore" Spindle Option^{1,2}			Speed Range	—	0 to 6,000 rpm
Spindle Configuration	ANSI A2-5	—	Base Speed	—	3,000 rpm
Round I6C Collet (Through Capacity)	1.625"/42mm	—	Acceleration/Deceleration (0 to 6,000 rpm)	—	1.8 Sec.
I6C Step Chuck (Gripping Capacity)	4.0"/101.6mm	—	Tooling	—	5 Back-end Working
AC Digital Spindle Drive System	5hp/3.7kW	—	Location	—	Mounted on Headwall
Speed Range (1-rpm Steps)	50 to 5,000 rpm	—	Shank Capacity	—	5/8" Round
5C and I6C Spindles			Bushings	—	HDB or ER-Style
Collet Closer Stroke	.5"/12.7mm	.5"/12.7mm	Parts Catcher—Option		
Hang Weight with Device and Part (Max.)	75lb/34kg	75lb/34kg	Workpiece Length (Max.)	3"/76.2mm	3"/76.2mm
Spindle Centerline Height	41.25"/1048mm	41.25"/1048mm	Miscellaneous		
Operator's Reach to Spindle	22"/559mm	22"/559mm	Power Supply Requirement	230v/66FLA/3phase	230v/66FLA/3phase
Capacity			Coolant Tank Capacity	20gal/76liter	20gal/76liter
Swing Diameter	—	—	Compressed Air Requirement	70-90 psi, 5-6 scfm	70-90 psi, 5-6 scfm
Over Way Cover (Max.)	11.760"/298.7mm	11.760"/298.7mm	Machine Dimensions	—	—
Over Tooling Top Plate (Max.)	2.654"/67.4mm	2.654"/67.4mm	Length w/Chip Pan	77.00"/1956mm	77.00"/1956mm
Square Shank Tool Size (Max.)	1/2" 12mm	1/2" 12mm	Length w/Chip Conveyor	117.80"/2992mm	117.80"/2992mm
Round Shank Tool Size (Max.)	3/4" 20mm	3/4" 20mm	Depth	58.63"/1489mm	58.63"/1489mm
Traverse Rate (Max.)	—	—	Height	64.10"/1628mm	64.10"/1628mm
X-Axis	708ipm/18mpm	708ipm/18mpm	Floor Area (Approx.)	30ft ² /3m ²	30ft ² /3m ²
Z-Axis	945ipm/24mpm	945ipm/24mpm	Shipping Weight (Approx.)	5,700lb/2586kg	5,700lb/2586kg
Travel (Max.)	—	—	Inspection Specifications³		
X-Axis	11.968"/304.0mm	11.968"/304.0mm	Part Surface Finish	—	—
Z-Axis—5C Spindle	11.062"/281.0mm	11.062"/281.0mm	5C Spindle	8 micro-inch/.20 micron	8 micro-inch/.20 micron
Z-Axis—I6C Spindle	10.412"/264.5mm	—	I6C Spindle	12 micro-inch/.30 micron	—
Spindle Face to Top Plate Distance (Max.)	—	—	Part Roundness	—	—
5C Spindle	11.259"/286.0mm	11.259"/286.0mm	5C Spindle	.000015"/.40micron	.000015"/.40micron
I6C Spindle	10.609"/269.5mm	—	I6C Spindle	.000025"/.63 micron	—
Spindle Face to Sub Spindle Face (Max.)	—	7.730"/196.3mm	Continuous Machining Accuracy (Total Variation on Diameter)	.0002"/ 5 micron	.0002"/ 5 micron
Live Tooling—Option					
No. of Tool Spindles for End Working	Group of 3	—			
No. of Tool Spindles for Cross Working	1	—			
Live Tooling Attachments—Speed Range	Up to 6,000 rpm	—			
Power Rating at Tool Tip (Continuous)	.7hp/.5kW	—			
Torque Rating (Continuous)	13.276in-lb/1.5Nm	—			

- 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.

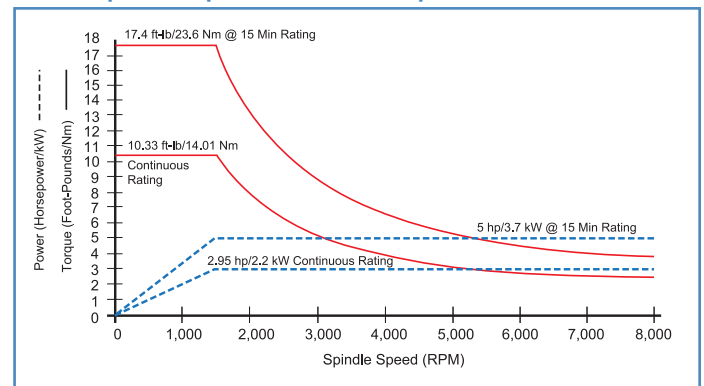
NOTE: A supplementary power transformer is required for all voltages other than 230v, 50/60Hz.

Floor plan



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

Main spindle power and torque curves





Over the past 10 years Hardinge steadily diversified both its product offerings and operations. Today, the company has grown into a globally diversified player with manufacturing operations in North America, Europe and Asia. In addition to designing and building turning centers and collets, Hardinge is a world leader in grinding solutions with the addition of the Kellenberger, Hauser, Tripet and Tschudin brands to the Hardinge family. The company also manufactures Bridgeport machining centers and other industrial products for a wide range of material cutting, turnkey automation and workholding needs.

Expect more from your Hardinge products. Choose Hardinge precision and reliability for increased productivity and value!

Call us today, we've got your answer.

Hardinge Inc. One Hardinge Drive | P.O. Box 1507 | Elmira, New York 14902-1507 USA
USA: 800.843.8801 | Canada: 800.468.5946 | Phone: 607.734.2281 | Fax: 607.734.8819
Corporate Web Site: www.hardinge.com | E-mail: info@hardinge.com