

TURNING

HARDINGE CONQUEST H51 Bar and Chucking Machine

COLLET-READY
SPINDLE



THE CLEAR LEADER IN PIONEERING THE COLLET-READY SPINDLE



www.hardinge.com



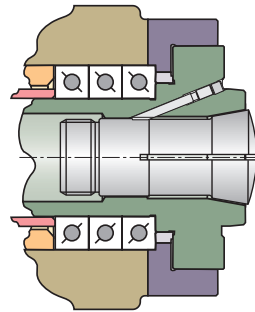
The Hardinge Advantage

The Hardinge Group provides collets, step chucks with closers, dead-length systems, FlexC™ quick change, Sure-Grip® expanding systems, Sure-Grip® 3 jaw chucks and custom solutions to meet the flexible demands of manufacturing today.

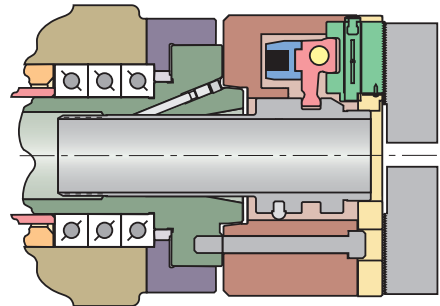
Advantages include:

- Collet seats directly in the Hardinge spindle
- Maximum rigidity and gripping power is transferred to the part
- Maximum utilization of RPM
- Minimum weight on spindle
- Minimum overhang from the spindle bearings assures that spindle accuracy is transferred directly to the workpiece
- Optimum T.I.R.
- Gripping force directly over the workpiece
- Superior tolerances and finishes
- Capable of using maximum machine stroke capacity
- Longer tool life
- Quick changeover
 - collet draw tube is easily and accurately adjusted from the back of the spindle
 - from bar work to chucking work

The Hardinge spindle design is both collet and jaw chuck-ready and does not require a spindle adapter

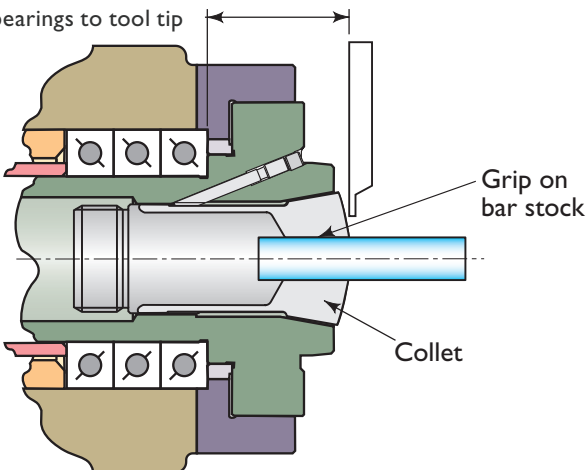


Hardinge Spindle shown with Collet



Hardinge Spindle shown with 3-Jaw Chuck

Minimal distance from spindle bearings to tool tip



Take your Hardinge collet-ready spindle lathe to the limit using flexible workholding options

Hardinge is unique as a machine tool builder — we manufacture our own workholding products. Precision and accuracy is yours when you use Hardinge perfectly-mated workholding products.



Collets

Hardinge hardened and ground collets are inspected and measured in a Hardinge SUPER-PRECISION® spindle. Collets are available in fractional round, hex and square sizes and round metric, as well as round serrated fractional and metric sizes. Use adjustable, machinable collet stops for accurate part positioning.



Style "S" Master Collets and Pads

Pads can be changed much quicker than solid collets can. Pads cost less and use less storage space when compared to a standard solid collet. Choose from hardened and ground, semi-hard and emergency pads. Styles S16, S20 and S26 require a collet closer.

Step Chucks and Closers

Step Chucks and closers are used to accurately hold larger diameter parts.



Emergency Collets

Emergency collets have a soft face with a pilot hole for customer drilling, boring and stepping out to the exact size required. An optional extended nose permits deeper counterbores when required and tool clearance for extended work.

3-Jaw Power Chucks

Hardinge power chucks are lever operated, counter-centrifugal and dynamically balanced. Quick-change chucks are also available.



Force-Limiting Step Chuck

The Hardinge force-limiting step chuck has built-in force control to safely grip thin-wall parts. Maintain inside and outside concentricity in a fail-safe process while eliminating the nuisance of manually tweaking the draw bar.



FlexC™ Quick-Change Vulcanized Collet Systems

Interchangeable quick-change vulcanized collet heads have a working range of ± 0.020 " (0.5mm) to accept bar stock variation. Collets change in seconds, while accuracy is maintained at $.0004$ " (.010mm).



Sure-Grip® Expanding Collet Systems

The Hardinge Sure-Grip expanding collet provides high-precision, internal gripping solutions with true parallel gripping. Collet-style and spindle-mount styles are available, depending on the machine model.



Dead-Length® Systems

Maintain part-length control by using Hardinge dead-length systems. Choose from dead-length collet assemblies, thru-hole collets, step chucks and spider-stop step chucks. 16C to #22 B&S adapter shown on A2-5 sub-spindle.



Master Expanding Collets are a lower-cost alternative to Sure-Grip Expanding Collet Systems and include a dead-length feature.

The CONQUEST H5 I is available in the following configurations:

SUPER-PRECISION® (SP)

- MSY (Milling / Sub Spindle / Y Axis)
- MYT (Milling / Y Axis / Tailstock)
- MT (Milling / Tailstock)
- T (Tailstock)

High Performance (HP)

- MSY (Milling / Sub Spindle / Y Axis)
- MYT (Milling / Y Axis / Tailstock)
- MT (Milling / Tailstock)
- T (Tailstock)



Standard Features

- 20C collet / chuck ready main spindle
- .000010" (.1µm) resolution control
- Through tool coolant
- Sub headwall coolant
- Bar feed Interface*
- Three position stack light
- Chip conveyor interface
- Ethernet ready
- USB & PCMCIA memory card
- Rigid tapping
- Mist collector ready
- RS232 C ready
- Auxiliary control (MPG, cycle start & stop, collet open & close)
- Auto power down
- Ready 2 cut
- Two internal LED work lights

SUPER-PRECISION®

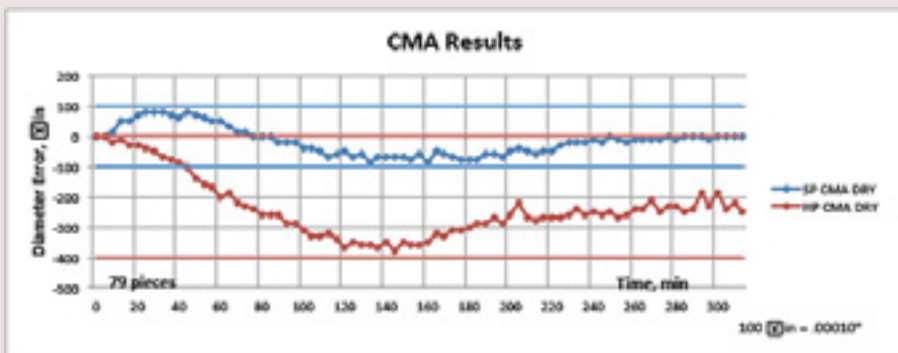
- SP certification
- X-Axis Scale

Included with Sub Spindle:

- I6C collet / chuck ready sub spindle
- Pneumatic collet closer
- Rigid tapping

* Not all barfeed interfaces are the same. Discuss your requirement with your sales representative.

COMPARISON



Continuous Machining Accuracy Cutting Conditions:

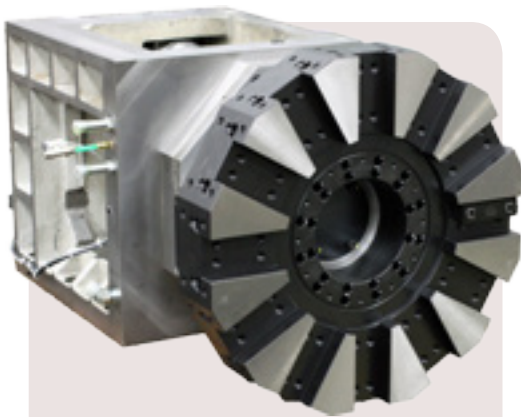
CMA Results: 0.0002"
 Cycle Time: 4 min.
 Spindle Speed: 1200 RPM
 Cutting Depth: .005"
 Feedrate: .005 IPR
 Material: Brass
 Coolant: Dry
 Temperature Controlled Environment

BMT 55 Tooling Specs:

- Hardinge BMT design
- Tooling size BMT55
- 12 station
($\frac{1}{2}$ station index for total of 24)
- Belted live tooling drive
 - Better surface finishes during milling
 - No backlash or bevel gear noise
- Index time rotation 0.40 sec
- Index time clamp-unclamp 1.45 sec
- Repeatability .000060" (1.52 micron)
- Square shank 1.0" - 25mm
- Round shank 1.5" - 38mm
- Max Speed - 8,000 RPM
- Power 7.5hp (5.5 kW) – 30min. rating
- Power 5hp (3.75 kW) – continuous rating
- Torque 24.3 ft-lb (34 Nm) – 30min. rating
- Torque 16 ft-lb (22 Nm) – continuous



- The Hardinge built turret was designed with increased clearance between the top plate and the turret covers, permitting the use of longer drill lengths and increased live tooling capabilities on the sub spindle option
- The turret top plate is indexed by a brushless digital servomotor and is hydraulically "locked" into position on a 3-piece curvic coupling arrangement
- The coupling design allows the top plate to index without raising or lowering and provides optimum protection against chips and coolant ingress.



Hardinge T-Style Top Plate (static)

- Optional T-style top plate
- Utilizes T-series tool holders
- 12-station static only
($\frac{1}{2}$ station index for total of 24)
- Sq. Shank 1" (25mm)
- Round Shank 1.5" (38mm)

Available Options:

- 16 station BMT45 turret
- Parts catcher w/conveyor
- Renishaw Part probe, optical
- Tool probe (manual plug-in)
- Auto door w/light curtain
- Z-axis scale¹
- Y-axis scale¹
- Spindle liner kit
- Thru spindle coolant, main
- Thru spindle coolant, sub
- Air blast, main
- Air blast, sub
- Headwall coolant
- Bar feeds
- Coolant chiller² (SP & HP models)
- Part present detect, sub
- Foot switch, main
- Foot switch, sub
- Foot switch, tailstock
- 230psi coolant
- Chip conveyor rear (hinged-belt)
- Chip conveyor side (hinged-belt)
- Micro hinge chip conveyor (side) - for fine chips
- Micro hinge chip conveyor (rear) - for fine chips

¹ only available on SP model

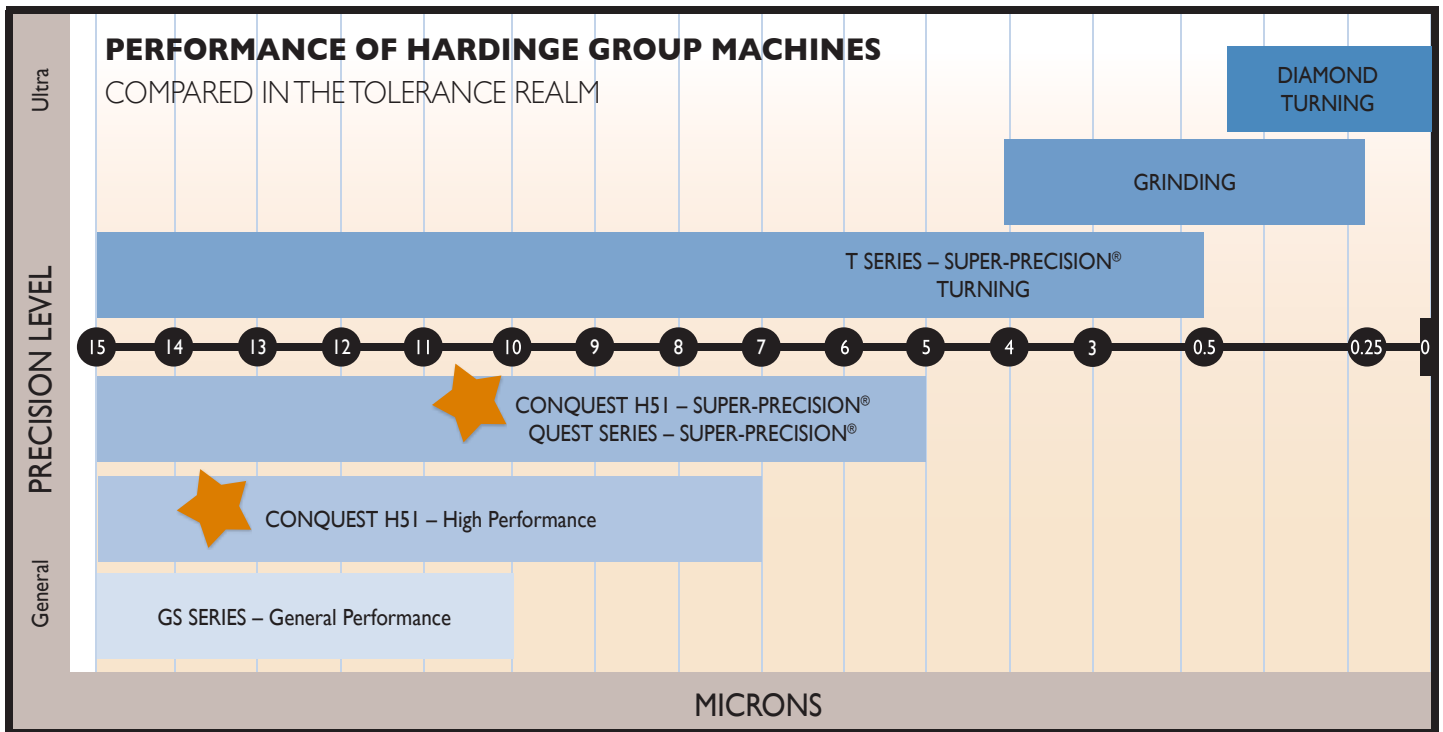
² Recommended when process condition cause coolant temperatures to rise

PERFECTING ACCURACY

Super-Precision is a combination of best practice, design and manufacturing of hardware and software integrated into a machine tool that provides the highest level of precision for production turning centers that require the least amount of human intervention in the marketplace today.

Key differentiators that set Hardinge SUPER-PRECISION® apart from High Performance and the competition:

- High degree of machine stiffness qualified by Finite Element Analysis
- High surface finish capability of eight micro-inch or better
- Ball bar testing for superior geometric accuracy
- Dynamic balancing of spindle and drive motor
- Matched and ground spindle belts
- Matched high precision spindle bearings
- Ability to maintain .0002" (5μ) total deviation in diameter after a brief warm-up
- High repeatability accuracy – 30 millionths (.00003")
- Robust control/motor/drive package with 10 millionths (.00001") control resolution
- High accuracy X-axis digital glass scales



The Hardinge CONQUEST H51 SUPER-PRECISION® and High Performance turning centers set the standard in High Precision and High Performance turning that will take your part quality and manufacturing capabilities to new levels. These turning machines have been designed to exceed your expectations in two-axis, high precision machining of multi-tasking, complex, difficult to handle manufacturing processes.

Collet-Ready Main Spindle

The Hardinge collet-ready spindle is the most versatile machine spindle in the industry – it is uniquely designed to accept both collets and jaw chucks without the use of an adaptor. Because the collet seats directly in the spindle, the workpiece is held close to the spindle bearings which provides the ultimate in accuracy, rigidity and gripping force. It also allows for maximum spindle RPMs which increases productivity. This exclusive design also offers numerous workholding capabilities including solid collets, master collets, dead length collets, step chucks, 3-jaw chucks and FlexC collets systems.

Robust 45° base structure

The one-piece 45 degree slant bed design greatly inhibits thermal deformation and twisting, allowing for SUPER-PRECISION® cutting performance and demanding part accuracies.

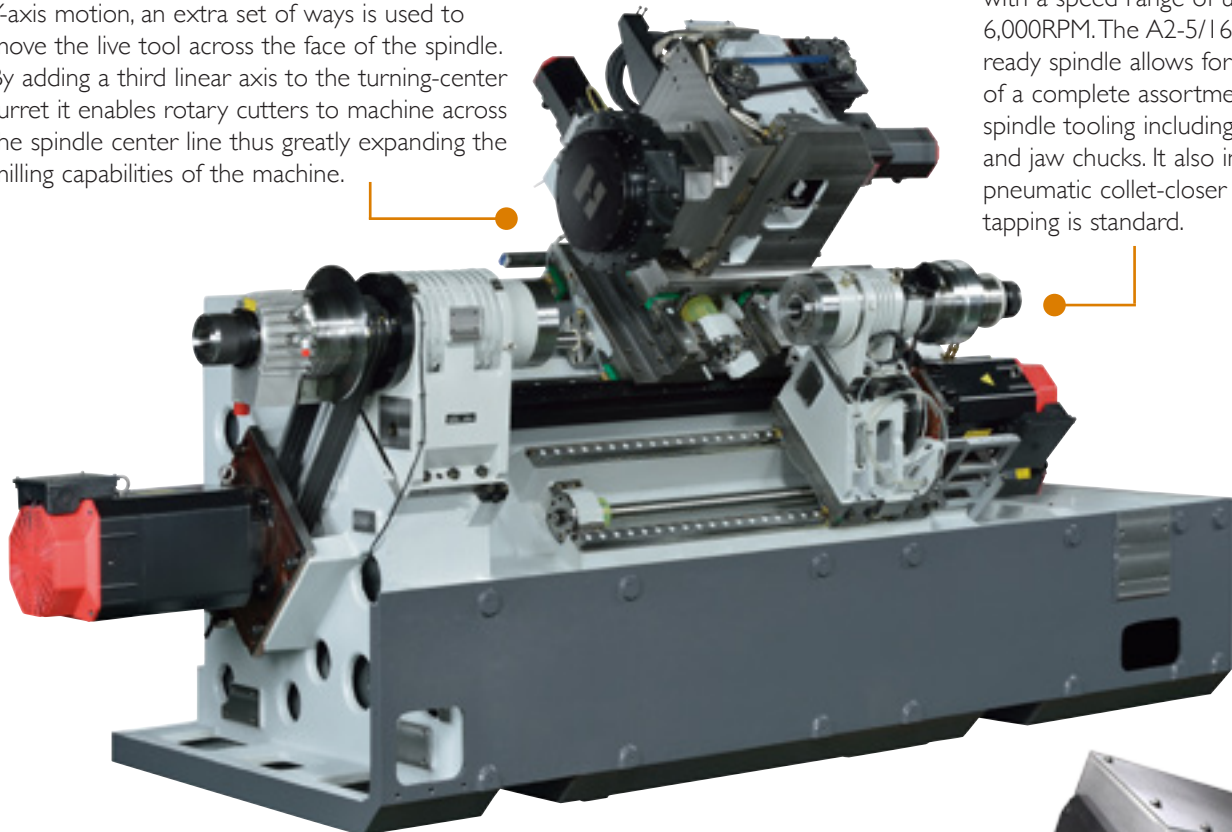
Machine Construction Options

Independent Y-axis

Y-axis capability is a huge productivity enhancement on a turn/mill machine tool. To get Y-axis motion, an extra set of ways is used to move the live tool across the face of the spindle. By adding a third linear axis to the turning-center turret it enables rotary cutters to machine across the spindle center line thus greatly expanding the milling capabilities of the machine.

Sub Spindle

The belt driven sub spindle features a 10HP (7.5kW) motor with a speed range of up to 6,000RPM. The A2-5/16C Collet-ready spindle allows for the use of a complete assortment of spindle tooling including collets and jaw chucks. It also includes a pneumatic collet-closer and rigid tapping is standard.



Tailstock

The servo driven tailstock features a non quill style body and is fully programmable with torque control to set the tailstock force, as well as advance or retract between machining cycles. Multiple positioning is possible to allow for multiple bar feed out applications. The system will accommodate either a live or dead center with a #4 Morse taper.





Mitsubishi Control

- 15" color LCD display screen aids in viewing the various programming and function pages
- The operators panel is custom-designed to be user friendly
- Mitsubishi M720V control on robust pendant mount
- The control pendant conveniently swings for better user access and can be moved out of the work zone for robot type applications where interlocking gate access is required
- Full MSY capability
- Navi-Turn programming is standard
- Packed with standard features

Standard Features

General

- 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 it's running)
- Chamfer/Corner Rounding
- Constant Surface Speed Programming
- Continual Thread Cutting
- Coordinate System Setting (G50)
- Custom Macro
- Decimal Point Programming
- Mitsubishi M720V Control Features (Cont)
- Diameter/Radius Programming

General cont'd

- 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 (1,000 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
- Helical Interpolation
- Cylindrical Interpolation
- Polar Interpolation
- Exponential Interpolation

Operation

- Block Delete
- Dry Run
- Dwell Time
- Emergency Stop

Operation cont'd

- Feed Hold
- Feedrate Override (0 to 150%)
- Incremental Jog
- Jog Feed
- Machine Lock
- Manual Pulse Generator (MPG Handwheel)
- On Screen Spindle & Axis Load Monitoring
- Option Stop
- Rapid Traverse Override (Low-25-50-100%)
- 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

FANUC

Fanuc Control

- 10.4" color LCD display screen aids in viewing the various programming and function pages
- The operators panel is custom-designed to be user friendly
- Fanuc 0i-TD control on robust pendent mount
- The control pendent conveniently swings for better user access and can be moved out of the work zone for robot type applications where interlocking gate access is required
- Full MSY capability
- Manual Guide-i (MG-i) programming is standard
- Packed with standard features



Standard Features

General

- Pendent-mounted Full Control
- 10.4" LCD Display
- Graphic Display
- Embedded Ethernet
- RS-232C Communication Ports
- Program Resolution .00001" (.0001mm)
- Tool Offset Capability .00001" (.0001mm)
- Tool Offsets with Geometry/Wear (99)
- Absolute Encoders
- Inch/Metric Selection by G-Code
- Part Program Storage 512KB

Programming Functions

- Absolute/Incremental Programming
- Additional Custom Macro Variables
- Alarm Display
- Auto Acceleration/Deceleration
- Auto Coordinate System Setting
- Background Editing
- Canned Cycles (Drilling)
- Chamfer/Corner Rounding
- Circular Interpolation by R Programming
- Constant Surface Speed Programming
- Continuous Thread Cutting
- Coordinate System Setting (G50)
- Custom Macro B

Programming Functions cont'd

- Decimal Point Programming
- Diameter/Radius Programming
- Direct Drawing Dimension Programming
- Display Position, Program, Alarm, History
- Extended Part Program Edit (copy/replace)
- External Workpiece Number Search
- Hardinge Safe Start Format
- Helical Interpolation (for Y-Axis)
- Helical Interpolation (for Non Y-Axis)
- Help Screen
- Input of Offset Values by (G10)
- Interpolation (Linear/Circular)
- MPG Manual Pulse Generator
- Manual Guide i with full color display
- Multiple Repetitive Cycles I (Turning)
- Multiple Repetitive Cycles II (Pocketing)
- Multi Spindle Control
- Program Number Search
- Programmable Parameter Input
- Reference Point Return
- Registered Part Program Storage (125)
- Rigid Tapping
- Spindle Orient Main & Sub (Std. on Live Tooling Models)
- Spindle Synchronization (Main & Sub)
- Sequence Number Search

Programming Functions cont'd

- Single Block Operation
- Skip Function G31
- Stored Stroke Check 1, 2 & 3
- Sub Program Call (10 fold nested)
- Thread Cutting Retract
- Thread Cutting
- Tool Life Management
- Tool Nose Radius Compensation (Geometry/Wear)
- Variable Lead Thread Cutting
- Workpiece Coordinate System (G52-G59)

Miscellaneous

- Actual Cutting Speed and T-Code Display
- Dual Check Safety
- English
- French/German/Italian/Spanish Language
- Chinese in Fanuc menus only
- Flash Card Capability PCMICA (up to 1 GB)
- Full Keyboard
- Ladder Diagram Display
- Polar Coordinate Interpolation
- Cylindrical Interpolation
- Standard
- Option

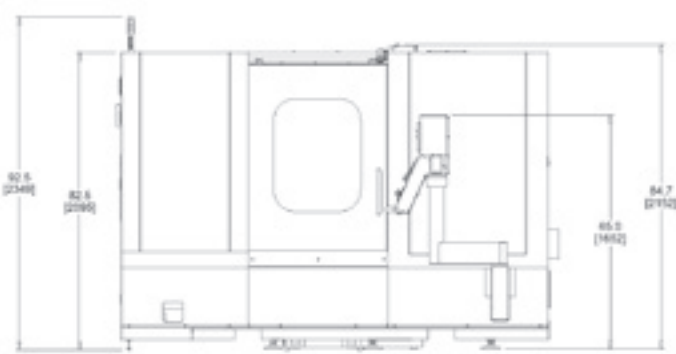
SPECIFICATIONS

Swing Diameter	
Max. Swing Over Way Covers	27.87" (708mm)
Work Capacities	
Chuck Size	8" (200mm)
Maximum Bar Capacity	2.00" (51mm)
Maximum Machining Diameter (BMT55)	12.342" (313mm)
Maximum Machining Diameter (BMT45)	10.600" (269.2mm)
Maximum Machining Diameter (T Style)	15.040" (382mm)
Max. Machining Length w/ Tailstock (BMT55)	25.533" (648.5mm)
Max. Machining Length w/ Tailstock (BMT45)	25.759" (654.2mm)
Max. Machining Length w/ Tailstock Hardinge T style	27.318" (693.9mm)
Max. Machining Length w/Chuck (BMT55)	19.733" (501.2mm)
Max. Machining Length w/Chuck (BMT45)	19.959" (507mm)
Max. Machining Length w/Chuck Hardinge T-Style	21.518" (546.5mm)
Spindle	
Max. Speed	5,000-rpm (SP); 4,700-rpm (HP)
Max. Power Rating (30 mins)	20-hp (15 kW)
Max. Torque (30 min)	168 ft-lb (228 Nm)
Spindle Nose	A2-6 / 20 C
Chuck Size	8" (200mm)
Spindle Center Height	42.96" (1091mm)
Spindle Reach	16.3" (414mm)
Spindle Bore	2.378" (60.4mm)
Spindle Orient	1.0 degree
Max. Distance from Sub to Main Spindle Face	28.9" (734mm)
Min. Distance from Sub to Main Spindle Face	0.625" (15.8mm)
Travels and Feedrates	
Max. X-Axis Travel	7.75" (196mm)
Max. Z-Axis Travel	28.15" (715mm)
Max. Y-Axis Travel	+2.56 to -1.0" (65 to -25.4mm)
X-Axis Rapid Traverse Rates	1,100-ipm (28m/min)
Z-Axis Rapid Traverse Rates	1,500-ipm (38m/min)
Y-Axis Rapid Traverse Rates	236-ipm (6.0m/min)
Hardinge BMT-55 Live Tooling Top Plate	
BMT-55 bi-directional	12-stations (½ turret station index for total of 24)
Square Shank	1" (25mm)
Round Shank Tooling	1.50" (38mm)
Index Time (rotation/including clamp-unclamp)	0.40/1.45 Seconds
Live Tooling Power Rating (30 Min Rating)	7.5HP (5.5 kW)
Live Tooling Max Speed	8,000-rpm

Hardinge BMT45 Live Tooling Top Plate	Fanuc/Mitsubishi
BMT-45 bi-directional	16 station + 1/2 station index
Square shank	3/4" (20mm)
Round Shank Tooling	1.25" (32mm)
Index Time (rotation/including clamp-unclamp)	0.40/1.45 Seconds
Tool Shank Dia w/ER25 Collets	.04-.625" (1mm - 16mm)
Maximum Power Rating (Continuous)	5 HP (3.7kW)
Maximum Torque (Continuous)	16 ft-lb (22Nm)
Live Tooling Power Rating (30 Min Rating)	7.5Hp (5.5kW)
Live Tooling Torque Rating (30 Min Rating)	24.3 ft-lb (33Nm)
Live Tooling Max Speed (*1)	8000rpm
Hardinge T-Style Static Top Plate	
Block Type (Static) bi-directional	12-station
Square Shank (Left, Right or Inverted Tooling)	1" (25mm)
Round Shank Tooling	1.5" (38mm)
Index Time (rotation/including clamp-unclamp)	0.40/1.45 seconds
Servo Driven Tailstock	
Morse Taper (no quill needed)	MT # 4 – min. applied force =350lbs. (1560N)
Max. Traverse Rate	1500-ipm (38m/min)
Max. Applied Force	1500lbs. (6672N)
Sub Spindle	
Max. Speed	6,000-rpm
Max. Power Rating (30 min)	10-hp (7.5 kW)
Max. Torque (30 min)	41.3 ft-lb (56 Nm)
Spindle Nose	A2-5/16C
Chuck Size (Chuck Not Included)	6" (150mm)
Spindle Bore	1.89" (48mm)
Spindle Orient (optional)	1.0 degree
Max. Travel	28.275" (718mm)
Max. Traverse Rate	1500-ipm (38m/min)
Machine Details	
Floor Space	120" x 103" x 85" (3048 x 2616 x 2151mm)
Approx. Weight	13,464 lbs. (6107kg)

Floor Plan

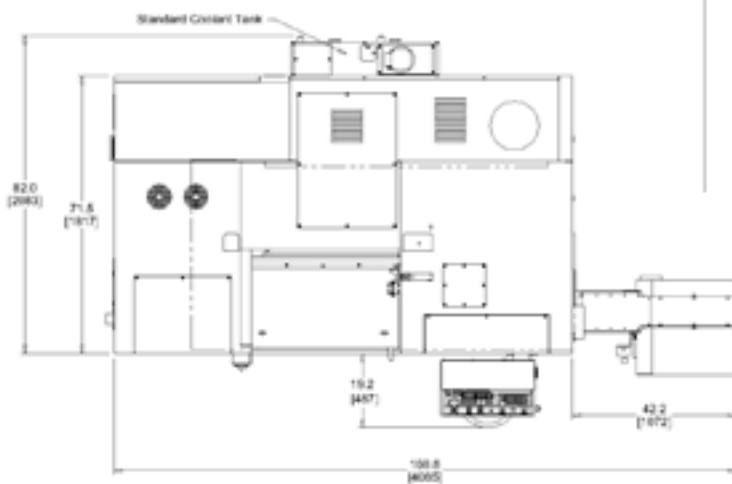
Front



Top

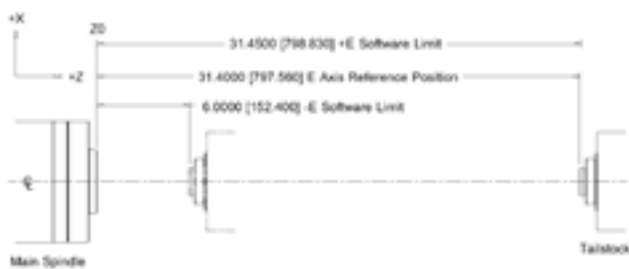


Top with side Chip Conveyor



Machine Travel Capacity

Tailstock



Sub-Spindle



HARDINGE COMPANIES WORLDWIDE

Over the years, The Hardinge Group™ 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, Jones & Shipman, Hauser, Tschudin, Usach and Voumard brands to the Hardinge family. The company also designs and 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.



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