

# HARDINGE SUPER-PRECISION®

## QUEST Series

Hardinge CHNC 27/42

Hardinge GT27

## Hardinge CONQUEST H5 I

## T Series

Hardinge T42

Hardinge T5 I

Hardinge T65

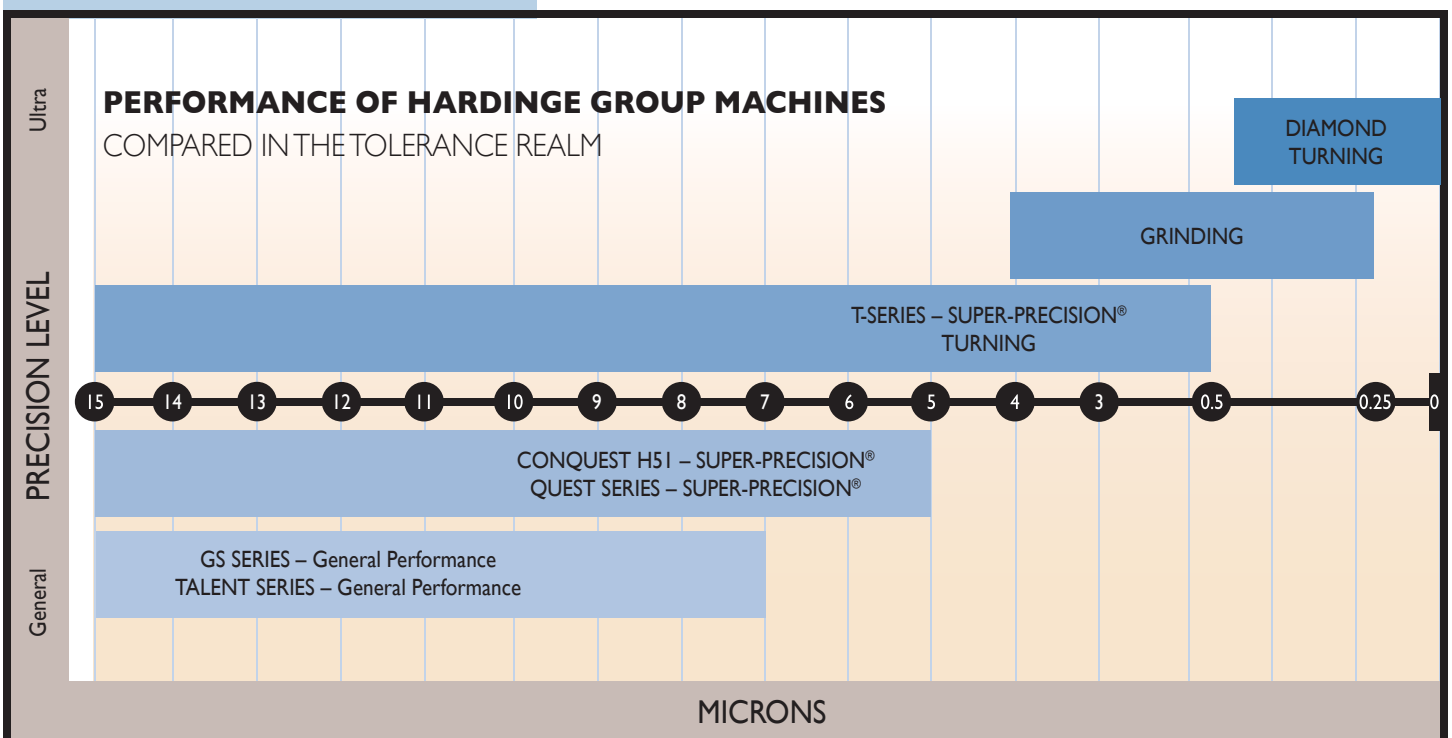
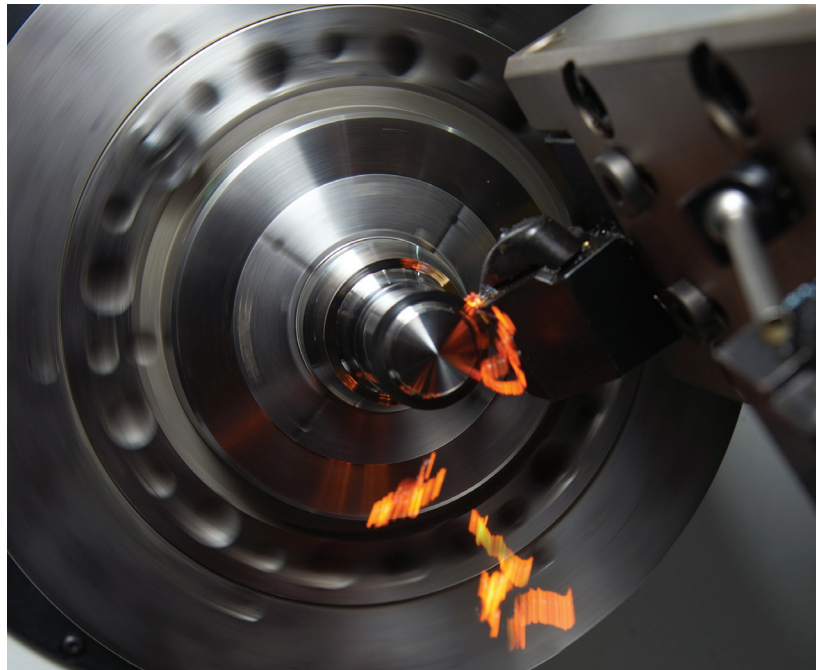


# SUPER-PRECISION®

## KEY DIFFERENTIATORS

- 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
- Integral wrap around spindle motor technology to eliminate belts
- Matched high precision spindle bearings
- Ability to maintain 0.00012" 3 micron 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

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.



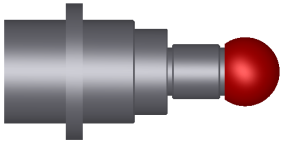
# COMPONENT DEMONSTRATION

Summary of SUPER-PRECISION® demonstration

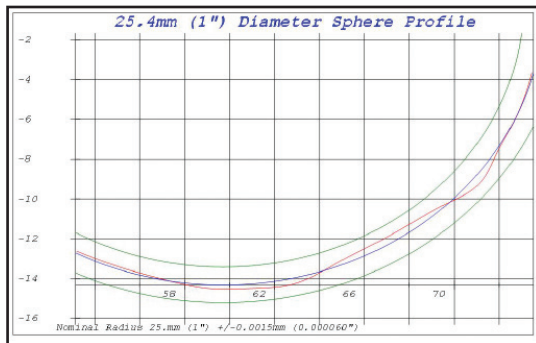
- Machine Model: SUPER-PRECISION® T-42
- Material 8620 Steel 60-62 Rc
- Surface Finish  $\leq 8$  micro-inch
- Holding tolerances normally reserved for grinding
- Workholding – Hardinge I6C collet
- Cutting Tools – Sandvik CBN grade 7015 certified TNR
- Zeiss Rondcom 54 Form Tester  
– measurement verification



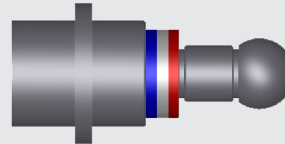
## CUT #1



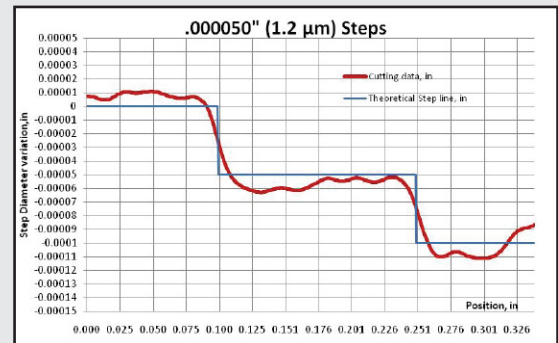
- 1.00" Diameter Sphere
- Profile Tolerance =  $\pm 0.000060''$   
( $\pm 1.5 \mu\text{m}$ )



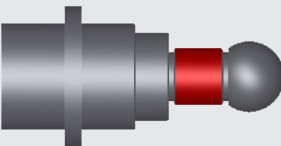
## CUT #3



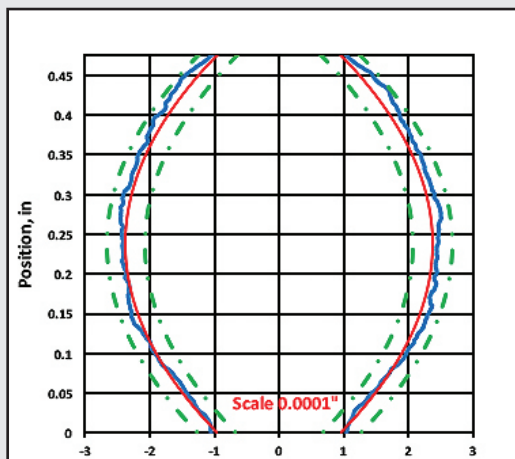
- Small steps  $.000050''$  ( $1.2 \mu\text{m}$ )
- $\pm .000010$  tolerance  
( $\pm 0.25 \mu\text{m}$ )



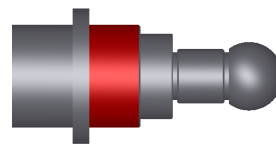
## CUT #2



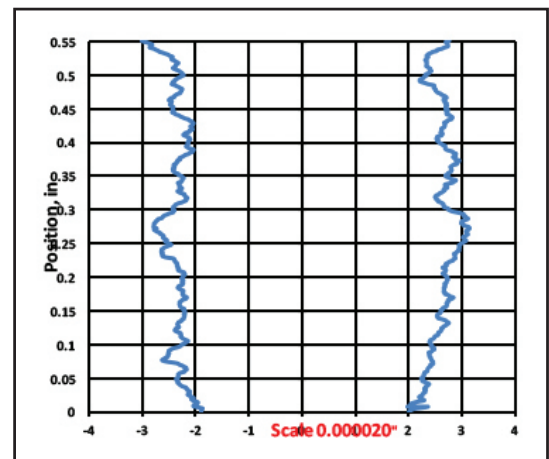
- Profile Tolerance  $\pm .000030''$  ( $.7 \mu\text{m}$ )
- $0.00015''$  ( $3.8 \mu\text{m}$ ) chord height



## CUT #4



- Cylindricity  
=  $.000040''$  ( $1 \mu\text{m}$ )



# HARDINGE QUEST SERIES

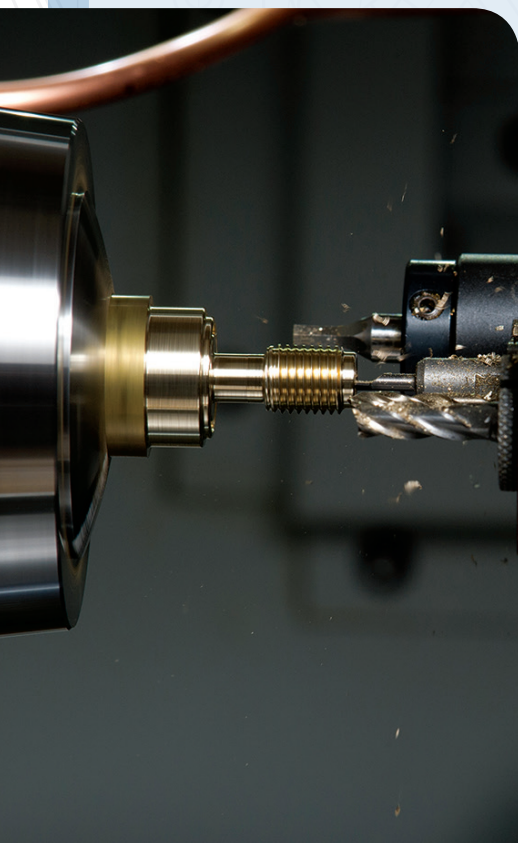
## FEATURES

- Rigid tapping
- Headwall coolant
- Run time/parts counter
- Custom macro B
- Worklight

## MACHINE OPTIONS

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

Hardinge's SUPER-PRECISION® QUEST-Series turning centers are unlike any gang tool or gang turret machine in that they include our patented interchangeable top plate and world-renowned, quick-change collet-ready spindle. The small footprint is perfect for producing high-quality parts for all industries but stand out in medical and aerospace. Every Hardinge QUEST-Series turning center undergoes strict certification to assure you that your machine meets the quality standards our customers expect when buying from Hardinge. Depending on how you outfit your machine, it can be used as a stand-alone unit, a higher capacity system with a bar feed, or a fully automated system with a robot combining both versatility and value in one machine.



## QUEST CHNC 27 & CHNC 42

- A2-4 5C spindle (CHNC 27)
- A2-5 16C spindle (CHNC 42)
- 10HP/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

## QUEST GT 27

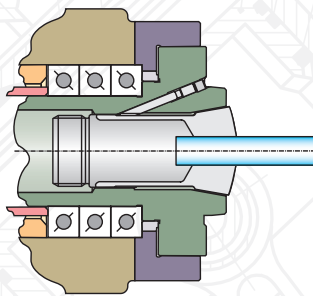
- A2-4 5C spindle
- A2-5 16C Big Bore option
- 10HP/7.5kW spindle drive system
- 8,000 RPM spindle (5C)
- 5,000 RPM (16C option)
- Part surface finish:  
8 micro-inch/.20 micron
- Part roundness: .000015"/.40 micron
- Continuous machining accuracy:  
.0002"/5 micron

## 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.

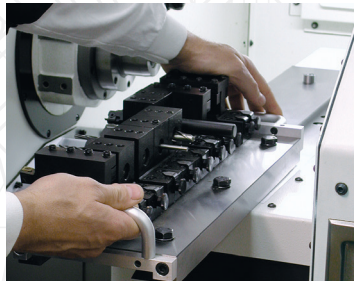
Because the collet seats directly in the spindle, the workpiece is held close to the spindle bearings which provides the ultimate in accuracy, rigidity and gripping force. It also allows for maximum spindle RPMs which increases productivity. This exclusive design also offers numerous workholding capabilities including solid collets, master collets, dead length collets, step chucks, 3-jaw chucks and FlexC collets systems.

COLLET  
READY  
SPINDLE

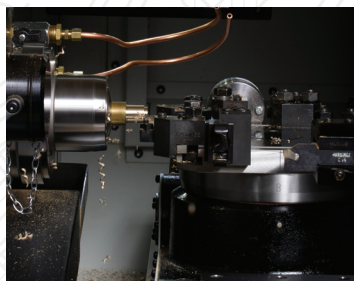


## PATENTED INTERCHANGEABLE TOP PLATE-STANDARD

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 GT27). And you can produce many different parts without changing the top plate tool setup.



\* GT27



\* CHNC 27/42

## HARDINGE SUPER-PRECISION®

- Series turning centers will exceed expectations with superior .000015" part roundness and 0.000008" (Ra) surface finish

## HIGH-PRECISION LINEAR GUIDEWAYS, BALLSCREWS AND AXIS DRIVES

- 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

## IMPROVED MACHINE MAINTENANCE

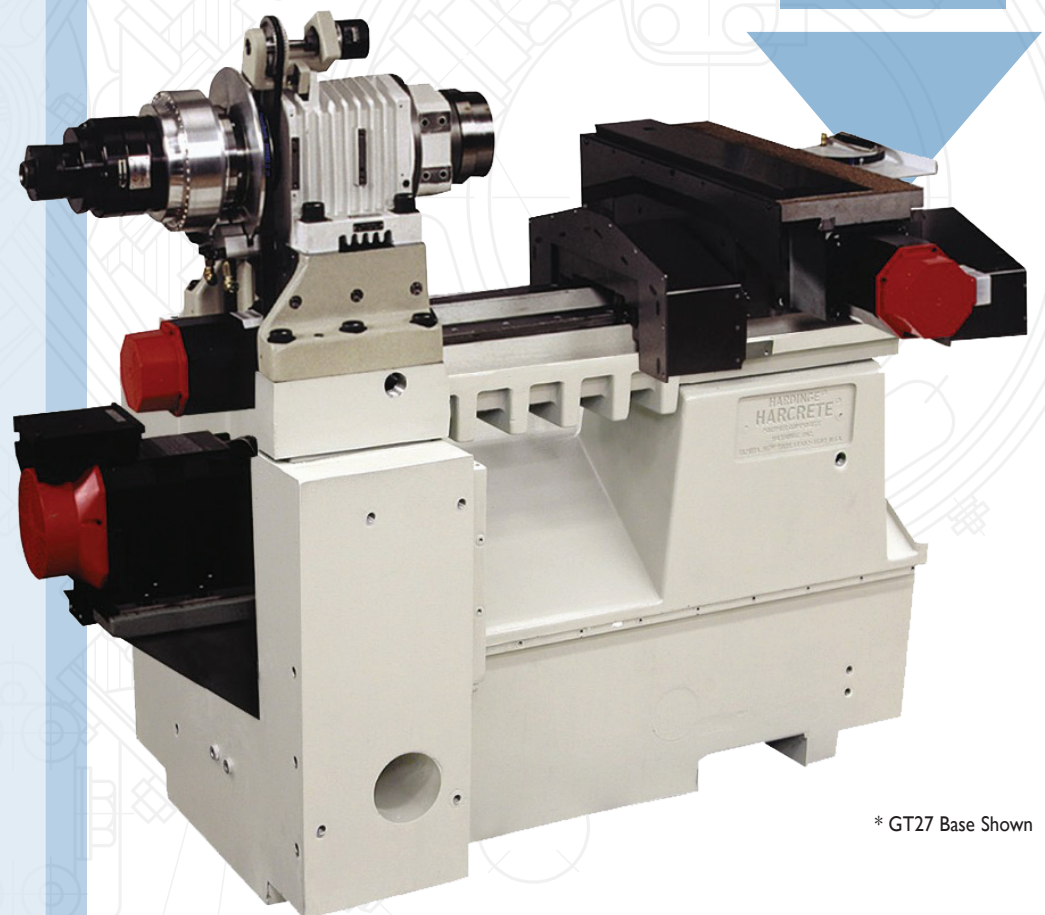
- Grease lubrication provides several advantages over way lube oil systems
  - No oil skimmer required
  - No degradation of water-base coolants
  - Environmentally friendly with no need to dispose of contaminated oil

### MACHINE STRUCTURE

- Unique Hardinge designed and built quick-change, collet-ready precision spindle
- Headstock assembly with heavy ribbed construction allows minimal heat retention and optimum part size control
- Pneumatic collet closer design permits gripping of thin-walled and small, delicate parts
- 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 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
- Unhindered chip flow from the cutting area to the chip pan

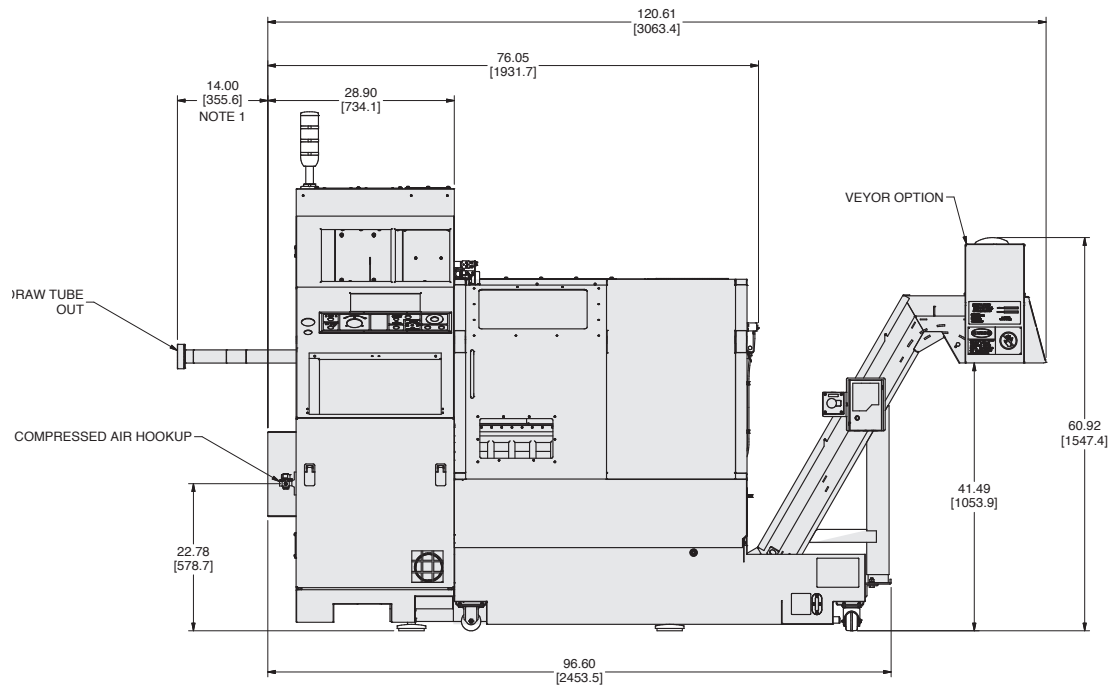
The latest software design platform and FEA (finite element analysis) techniques were used to design and build a rigid, structurally-balanced machine to assure optimum performance and machine life. The FEA software accurately depicts the structural deflection, stress levels, thermal response and vibration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

The super-stable HARGRETE® 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.

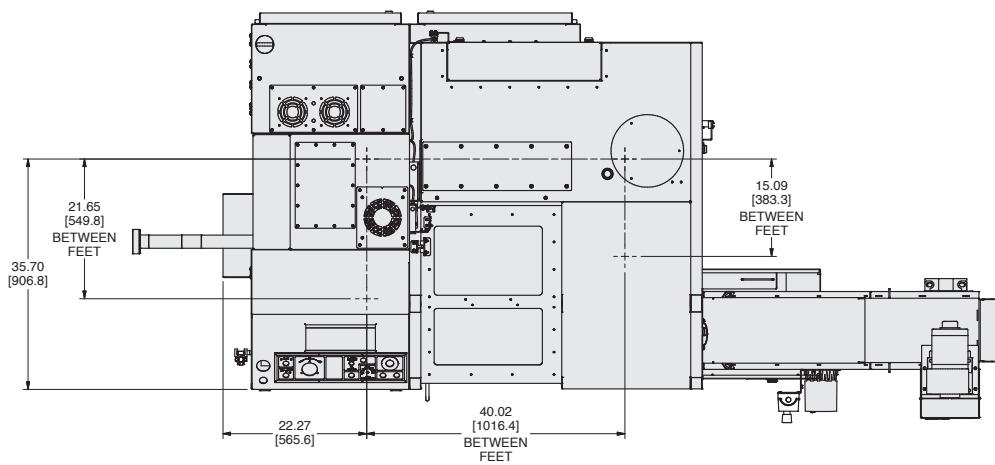


\* GT27 Base Shown

# QUEST SERIES FLOOR PLAN



**FRONT VIEW**



**TOP VIEW**

# SPECIFICATIONS

## QUEST SERIES

	QUEST GT27	QUEST CHNC 27/42
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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)	6"/150mm	6"/150mm
AC Digital Spindle Drive System	10hp/7.5kW	10hp/7.5kW
Speed Range (1-RPM steps)	80 to 8,000 RPM	80 to 8,000 / 50 to 5,000 RPM
Spindle Orient	One-degree	One-degree
Chuck Size	4" (101.6mm)	4" (101.6mm)/ 6" (150mm)

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	_____
Chuck Size	6" (150mm)	_____

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 sec.
Traverse Rate X-Axis (max.)	708ipm/18mpm	472ipm/12mpm
Traverse Rate Z-Axis (max.)	945ipm/24mpm	630pm/16mpm
Travel X-Axis	11.968"/304.0mm	12.76"/324.2mm
Travel Z-Axis 5C Spindle	11.062"/281.0mm	11.5"/292.1mm
Travel Z-Axis 16C Spindle	10.412"/264.5mm	11.8"/299.7mm

	QUEST GT27	QUEST CHNC 27/42
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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	42.40"/1077mm	44.84"/1138mm
Operator's Reach to Spindle	22.84"/580mm	22.84"/580mm

PARTS CATCHER—OPTION		
Workpiece Length (max.)	3"/76.2mm	3"/76.2mm 4"/101.6mm

MISCELLANEOUS		
Power Supply Requirement	230v/33FLA/ 3 phase	230v/33FLA/ 3 phase
Coolant Tank Capacity	20gal/76liter	20gal/76 liter
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	120.61" 3063mm	117.80" 2992mm
Depth	60.13" 1527mm	60.13" 1527mm
Height	68.5" 1739mm	68.5" 1739mm
Floor Area	31.3ft/3m	31.3ft/3m
Approx. Machine Weight	5,230lb 2,370kg	5,220lb 2,376kg

INSPECTION SPECIFICATIONS		
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" .38 micron	.000015" .38 micron
16C Spindle	.000025"/ .63 micron	.000025"/ .63 micron
Continuous Machining Accuracy (Dia. Variation)	.0002" 5 micron	.0002" 5 micron



# MACHINE CONTROLS

## FANUC 32i-T CONTROL

- 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 (*optional*)  
(320, 640 or 1,280 meters total)
- Data Input/Output
- MDI (Manual Data Input) Operation
- Reader/Punch Interface
- Flash Card (PCMCIA) Capability
- Ethernet Ready

**FANUC**



## MITSUBISHI M70V CONTROL

- 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
- Ethernet Data Transfer Capability

 **MITSUBISHI  
ELECTRIC**



# HARDINGE CONQUEST H51

## 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

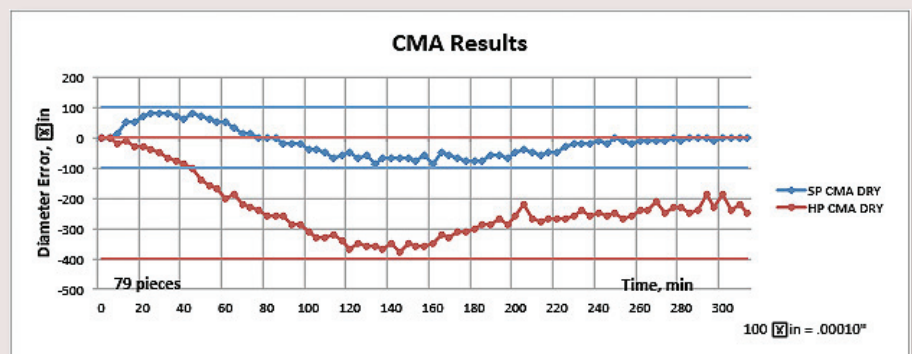
- 16C collet / chuck ready sub spindle
- Pneumatic collet closer
- Rigid tapping

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

The CONQUEST H51 features a 20hp, 5000rpm A2-6" main spindle with a 2" bar capacity. It offers a generous maximum turning diameter of 12.3" and a maximum turning length of 25.5". The 12 station turret offers 1/2 station index for up to 24 tools. The machine offers a wide variety of standard features such as through-tool coolant, bar feed and chip conveyor interfaces, three position stack light, PCMCIA memory card, USB Capability, rigid tapping and many others including state-of-the-art machine crash protection.



## COMPARISON

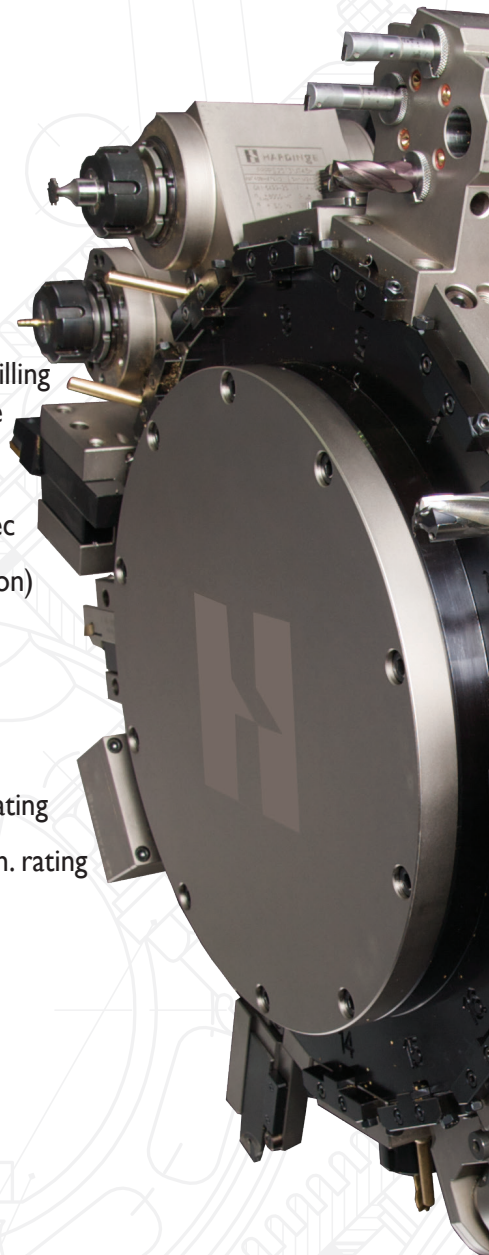


## CONTINUOUS MACHINING ACCURACY CUTTING CONDITIONS

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

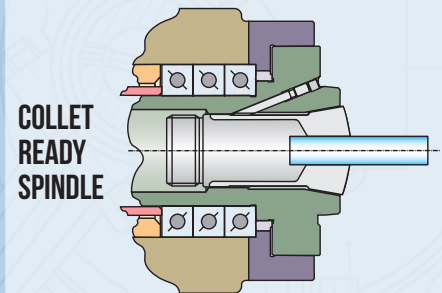
## BMT 55 TOOLING

- 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
- Torque 24.3 ft-lb (34 Nm) – 30min. rating



## COLLET-READY SPINDLE ADVANTAGES

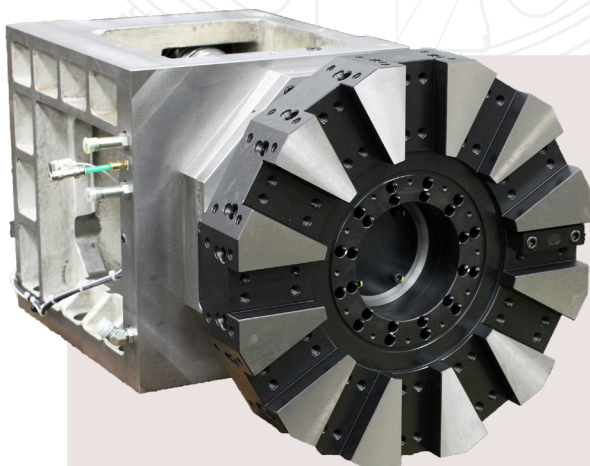
- Collet seats directly in the Hardinge spindle
- Maximum rigidity and gripping power is transferred to the part
- Maximum utilization of RPM
- Minimum weight on spindle
- Minimum overhang from the spindle bearings that assures spindle accuracy is transferred directly to the workpiece
- Optimum T.I.R.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



COLLET READY SPINDLE

## 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.



## HARDINGE T-STYLE TOP PLATE (STATIC)

- Optional T-style top plate
- Utilizes T-series tool holders
- 12-station static only
- Sq. Shank 1" (25mm)
- Round Shank 1.5" (38mm)

# MACHINE CONSTRUCTION

## CONQUEST H51

### 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

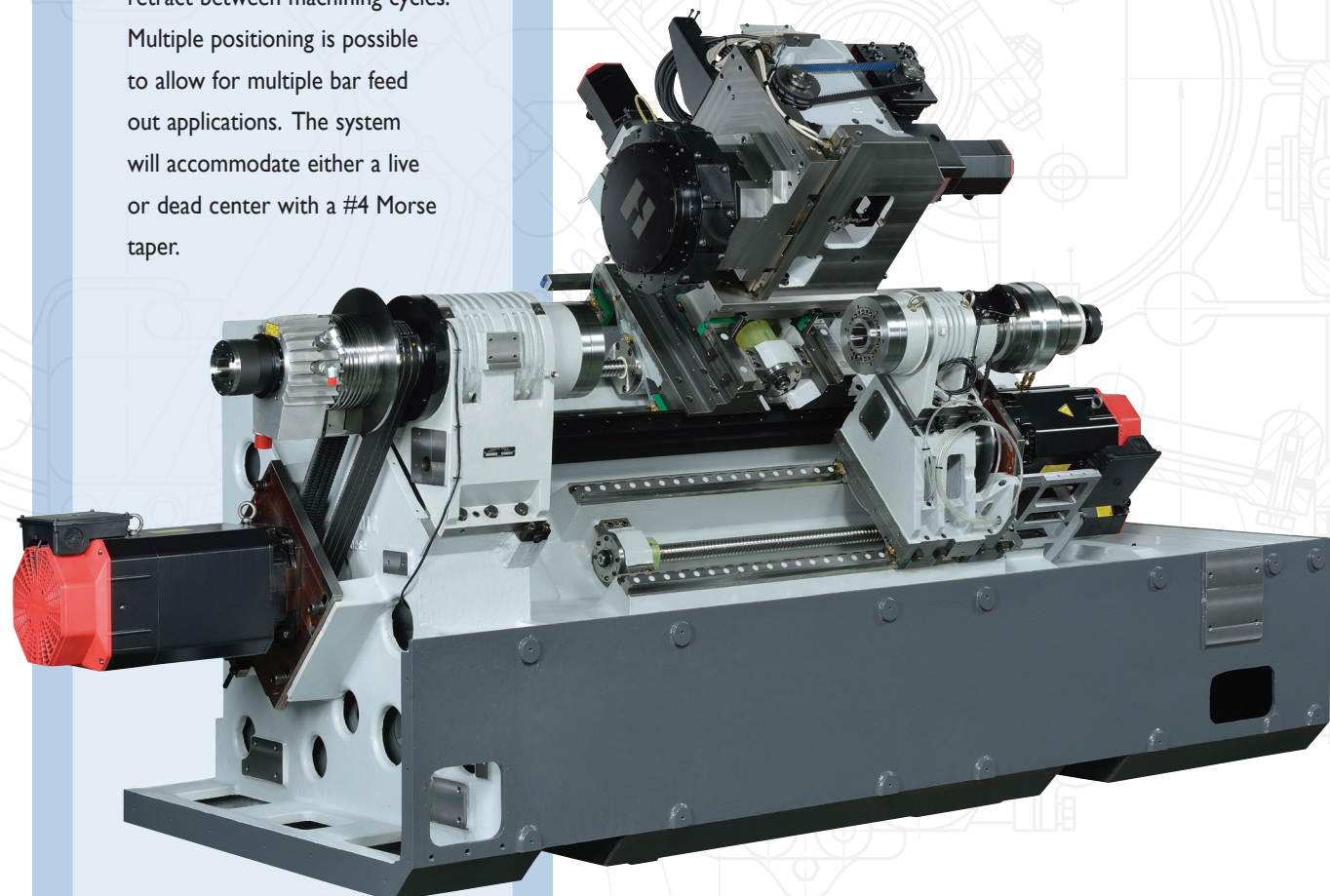
The servo driven tailstock features a non quill style body and is fully programmable with torque control to set the tailstock force, as well as advance or retract between machining cycles. Multiple positioning is possible to allow for multiple bar feed out applications. The system will accommodate either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

### 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

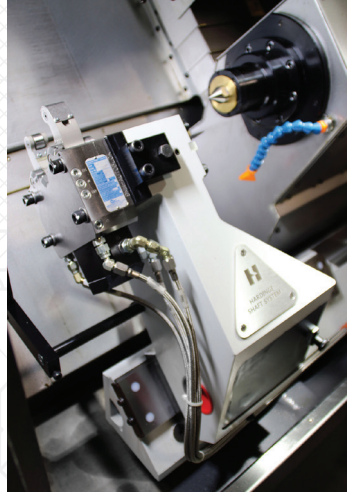
The one-piece 45 degree slant bed design greatly inhibits thermal deformation and twisting, allowing for SUPER-PRECISION® cutting performance and demanding part accuracies.



# CONQUEST H51 MACHINE OPTIONS

## HYDRAULICALLY-OPERATED STEADY REST

The Forkardt SRFNI Compact Steady Rest and is the ideal tool to support long workpieces without distorting or deflecting the part. It features a highly stiff structure, compact design and a fully sealed body for better protection from coolant and chips. The gripping range is 0.24" – 2.76" (6mm–70mm) and the unit provides 5 micron repeatability.



Additional features include:

- Hydraulic ports on top and side of cylinder
- Inbuilt safety valve
- Feed-back for maximum opening
- Port for compressed air
- Provision for centralized lubrication suitable for grease or oil
- Front body profile for easy chip flow
- Steady rest unit moves on a dovetail, gripper is programmable

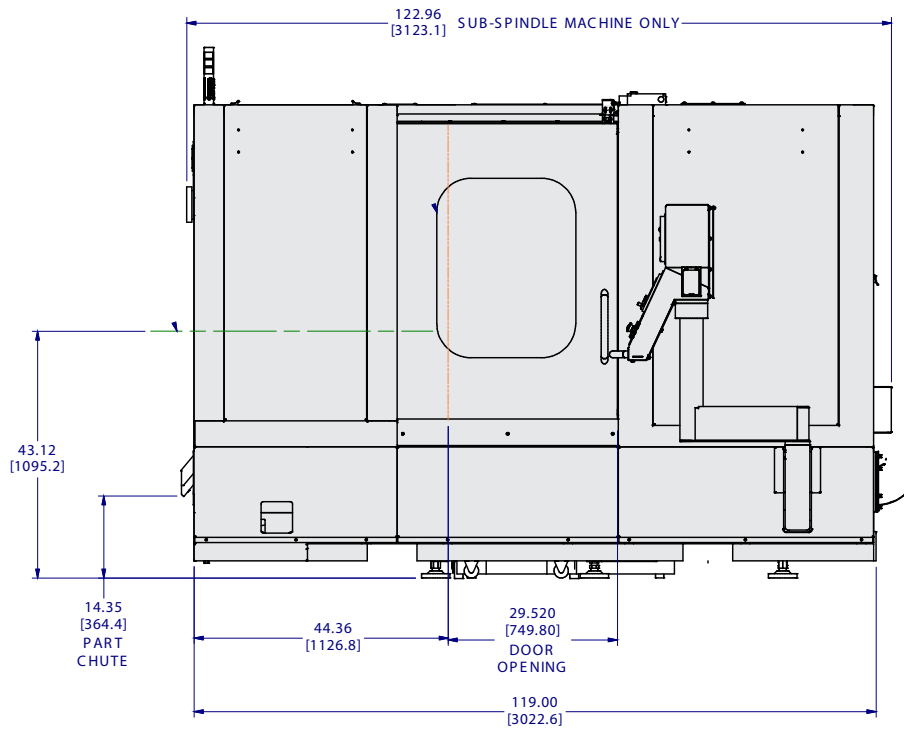


## MACHINE OPTIONS

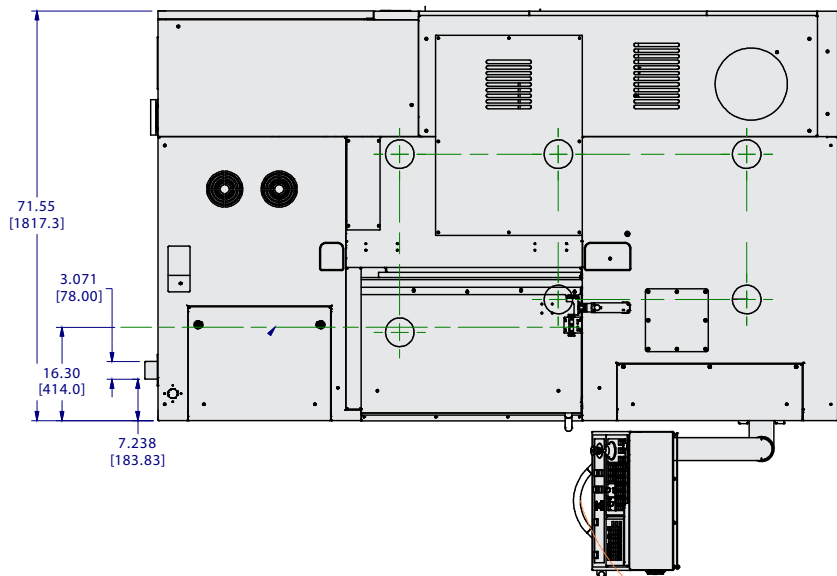
- 16 station BMT45 turret
- Parts catcher w/conveyor
- Renishaw Part probe, optical
- Tool probe (manual plug-in)
- Auto door w/light curtain
- Z-axis scale I
- Y-axis scale I
- Spindle liner kit
- Thru spindle coolant, main
- Thru spindle coolant, sub
- Air blast, main
- Air blast, sub
- Headwall coolant
- Bar feeds
- Coolant chiller2
- 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

# FLOOR PLAN

# CONQUEST H51



**FRONT VIEW**



**TOP VIEW**

# CONQUEST H51 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 (6m/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	
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)
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)
Max. BMT cutting length between centers	24.25" (615.9mm)
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. Shipping Weight	16,600 lbs. (7566kg)



# MACHINE CONTROLS

## 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 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
- Navi-Turn programming is standard  
*Limited to 2-axis turning only*
- Packed with standard features



## 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





# WORKHOLDING FLEXIBILITY

## UNLIMITED 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.

### 1 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.

### 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.

### 2 FLEXC™ QUICK-CHANGE VULCANIZED COLLET SYSTEMS

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

### 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.

### 3 3-JAW POWER CHUCKS

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

### 4 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.

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

### 5 STEP CHUCKS AND CLOSERS

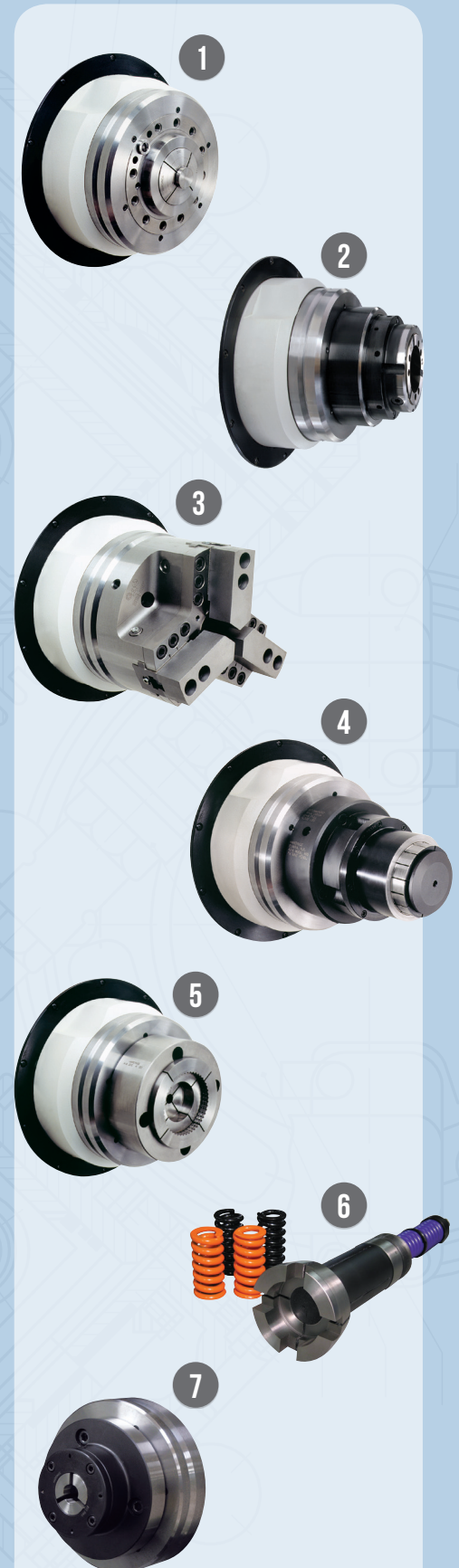
Step Chucks and closers are used to accurately hold larger diameter parts.

### 6 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.

### 7 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.



# HARDINGE T-SERIES



The Hardinge T-Series turning centers are the recognized market leader in Super Precision and hard turning applications providing superior SPC (Statistical Process Control), precise micron part size control and repeatability, high surface finish capability, and thermal stability with minimal human intervention allowing the most complex parts to be manufactured to the highest precision and quality standards.

- “Soft turn” and “hard turn” on the same machine
- Less floor space requirement
- Lower overall investment
- Metal removal rates of four to six times greater
- Eliminate operations
- Multiple operations in a single setup
- Finer micro finishes
- Easier Part configuration changes
- Lower cost tooling inventory
- Easier waste management (chips vs. “swarf”)

The Hardinge T-Series turning centers and SUPER-PRECISION® T-Series turning centers set the standard in high-precision and high-performance turning that will take your part quality and manufacturing capabilities to new heights. T-Series machines are designed to exceed your expectations and are ideal for two axis high-precision machining or complex multi-tasking operations that require a high level of precision, delicate part handling and for parts made complete in a single setup. Machine packages are pre-configured with our most popular features allowing you to select the proper machine tool configuration to produce your parts in the most effective and profitable manner.



# T-SERIES MODELS

## STANDARD SPECIFICATIONS

T-42 M T MT MY MYT S MS MSY

- Spindle Nose: A2-5 / 16C (A2-6 / 20C Big Bore Option)
- Collet Capacity (in/mm): 1.625 / 42 (2 / 51 Big Bore Option)
- Spindle Through Hole (in/mm): 1.890/48 (2.373 / 60.4 Big bore)
- Chuck Size (Chuck not Included) (in/mm) 6/150 (8 / 200 Big bore)
- Spindle Motor (hp/kW): 15 / 11
- Max Spindle Speed (rpm): 6,000 (5,000 Big Bore Option)
- Number of Turret Stations (BMT-45 / block type): 16 / 12
- CNC Control: Fanuc 31i



## STANDARD SPECIFICATIONS

T-51 M T MT MY MYT S MS MSY

- Spindle Nose: A2-6 / 20C
- Collet Capacity (in / mm): 2 / 51
- Spindle Through Hole (in / mm): 2.378 / 60.4
- Chuck Size (Chuck not included) (in / mm): 8 / 200
- Spindle Motor (hp / kW): 20 / 15
- Max Spindle Speed (rpm): 5,000
- Number of Turret Stations BMT-55 / block type): 12 / 12
- CNC Control: Fanuc 31i



## STANDARD SPECIFICATIONS

T-65 M T MT MY MYT S MS MSY

- Spindle Nose: A2-6 / 25C
- Collet Capacity (in/mm): 2.5 / 65
- Spindle Through Hole (in/mm): 2.930 / 74.4
- Chuck Size (Chuck not Included) (in/mm): 10 / 250
- Spindle Motor (hp/kW): 35 / 26
- Max Spindle Speed (rpm): 4,000
- Number of Turret Stations (BMT-55 / block type): 12 / 12
- CNC Control: Fanuc 31i



# KEY FEATURES

## T-SERIES

### COLLET-READY SPINDLE ADVANTAGES

- 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 that assures 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

### LIVE TOOLING

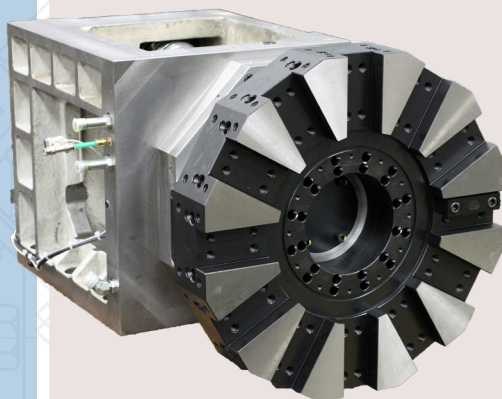
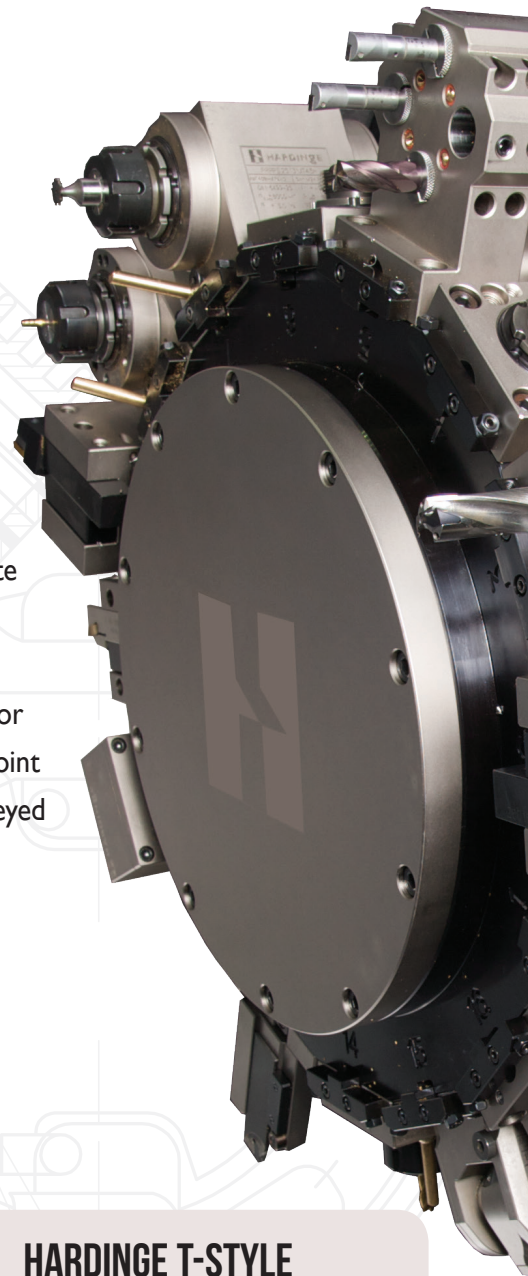
Live tool holders start at 8,000 RPM and are capable of up to 32,000 RPM when purchased with ratios of 2:1 or 4:1 when high speeds are required. The Hardinge BMT live tooling holders provide superior run-out within .00012" (3 micron) making it the overall best in class tooling system.



### TURRET & TOP PLATE

The Hardinge BMT-45 Live Tooling Top Plate with Tenon tool drive system provides 16 live tooling stations with 1/2 station index between each station providing 32 stations. The Hardinge BMT-55 has 12 and 24 station respectively.

Both the static and live tool holders are designed to adapt modular add-on tool holder blocks providing the ultimate in overall tooling flexibility. The unique Hardinge BMT system also allows fine adjustment of tools in the Y-axis plane for machines without a true Y-axis for pinpoint tool alignment. Our tooling system is keyed for precision and provides unparalleled station to station tooling accuracy and repeatability.



### HARDINGE T-STYLE TOP PLATE (STATIC)

- Optional T-style top plate
- Utilizes T-series tool holders
- 12-station static only
- Sq. Shank: T42: 3/4" (20mm)  
T51 & T65 1" (25mm)
- Rd. Shank: T42: 1.25" (32mm)  
T51 & T65 1.5" (40mm)

# T-SERIES MACHINE CONSTRUCTION

## 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.

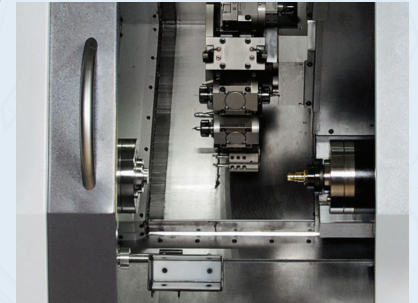
## LINEAR GLASS SCALE

The Heidenhain closed-loop linear scale system on the X,Y, Z axes provide direct measurement to compensate for any ballscrew thermal growth and wear ensuring the highest accuracy through the most demanding duty cycles and over the life of the machine.

*\* X-axis standard and Z-axis optional on HP models*

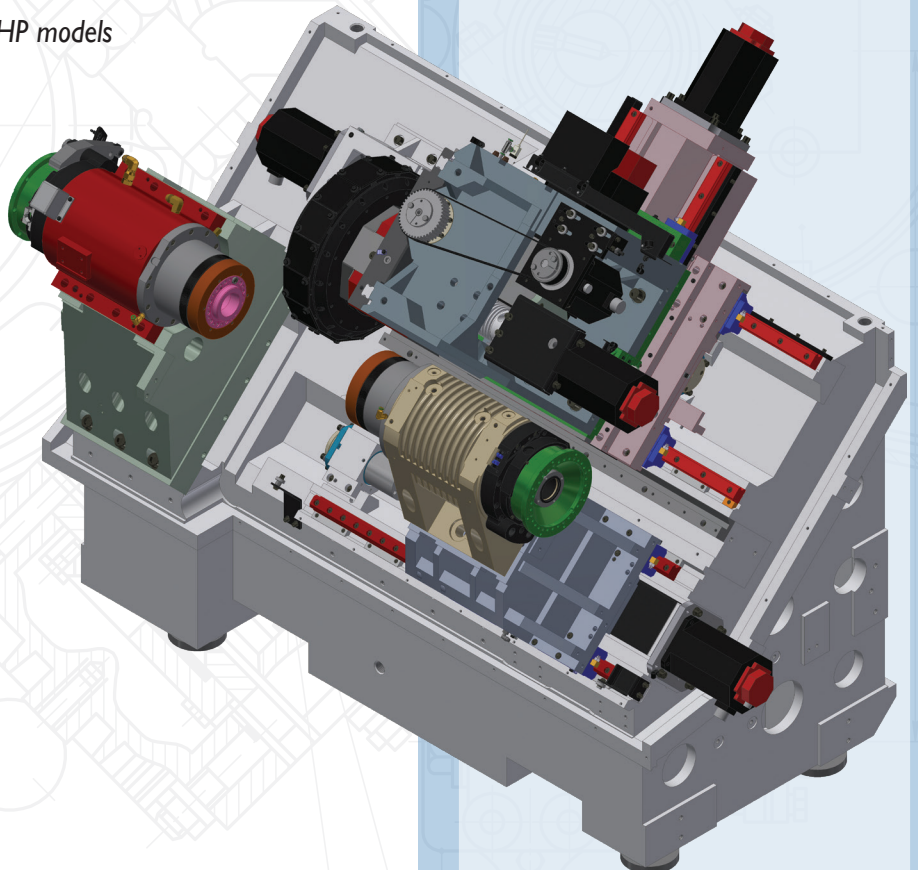
## ROBUST 45° BASE STRUCTURE

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

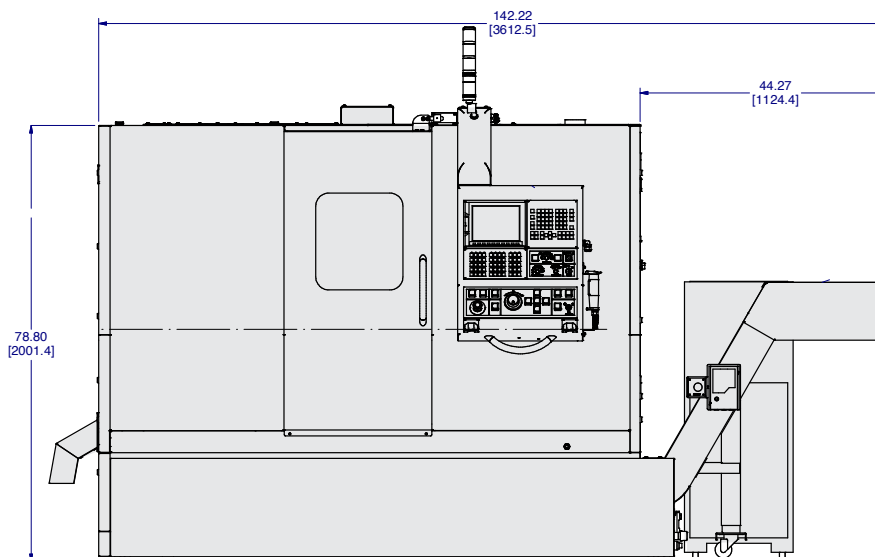


## TAILSTOCK

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.

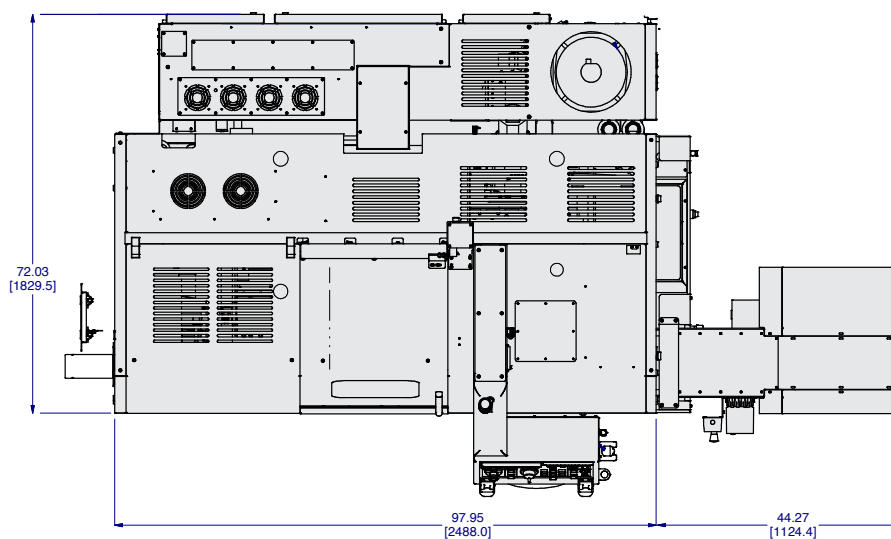


# FLOOR PLAN T-42



**FRONT VIEW**

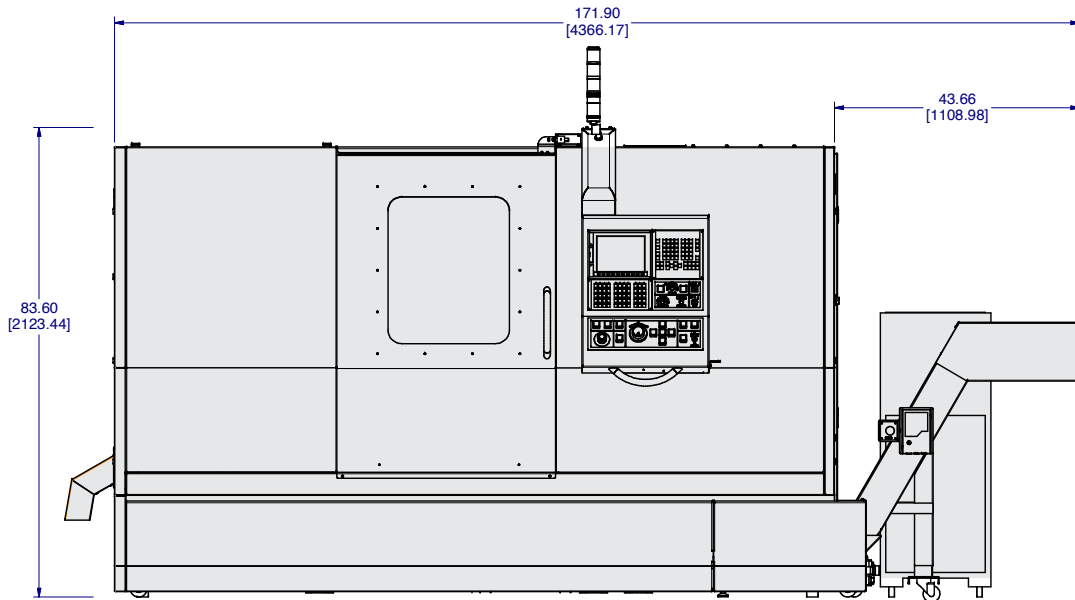
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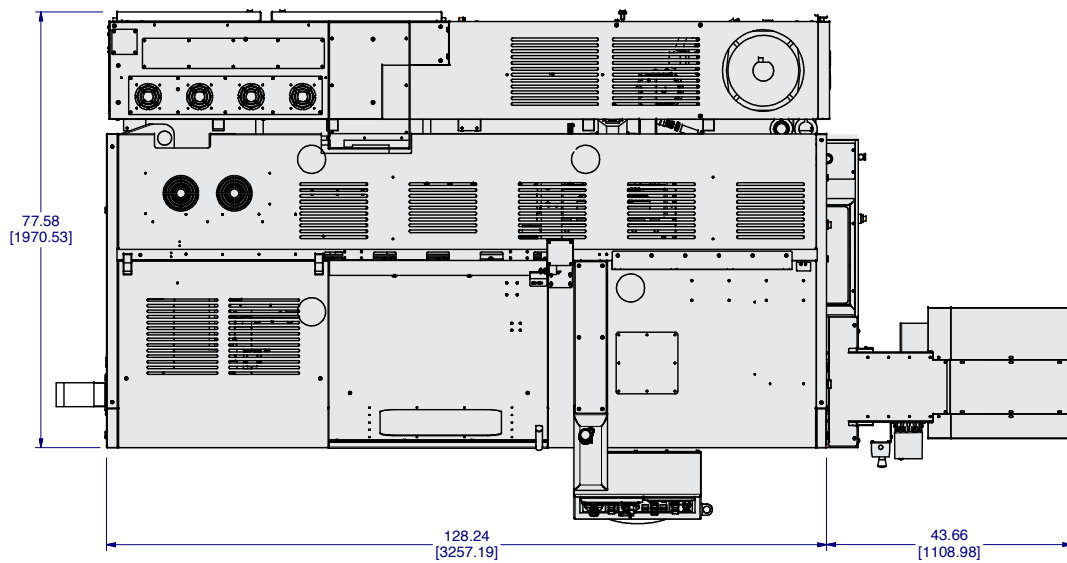
**TOP VIEW**

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# T-51 & T-65 FLOOR PLAN



**FRONT VIEW**



**TOP VIEW**

# CONTROLS

## T-SERIES

# FANUC

### GENERAL

- Pendant-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 Geom/Wear (99)
- o Tool Offsets with Geom/Wear (200/400)
- Absolute Encoders
- Inch/Metric Selection by G-Code
- 160 Meters (64Kbyte) Part Program Storage
- o Part Program Storage (128/256/512KB, 1/2/4MB)

### MISCELLANEOUS

- Actual Cutting Speed and T-Code Display
- Dual Check Safety (Spindle Speed)
- English Language
- o French/German/Italian/Spanish Language
- o Chinese in FANUC menus only
- Flash Card Capability PCMCIA (up to 1-GB)
- o Floating Reference Point Return
- Full Keyboard
- Ladder Diagram Display
- Mechanical Run Meter
- Standard
- o Option

### PROGRAMMING FUNCTIONS

- Absolute/Incremental Programming
  - o 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
- 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)
- o 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)
- o Multiple Repetitive Cycles II (Pocketing)
- Multi Spindle Control
- Program Number Search
- Programmable Parameter Input
- Reference Point Return
- Registered Part Program Storage (125)
- Rigid Tapping
  - o Spindle Orient Main & Sub (Std. on Live Tooling Models)
  - Spindle Synchronization (Main & Sub)
  - Sequence Number Search
  - Single Block Operation
  - Skip Function G31
  - Stored Stroke Check 2 & 3
  - Sub Program Call (10 fold nested)
  - o Thread Cutting Retract
  - Thread Cutting
  - Tool Life Management (32 Pair)
  - o Tool Life Management Offset Pair (64/240)
  - Tool Nose Radius Compensation (Geom/Wear)
  - o Variable Lead Thread Cutting
  - Workpiece Coordinate System (G52-G59)
- Standard
- o Option





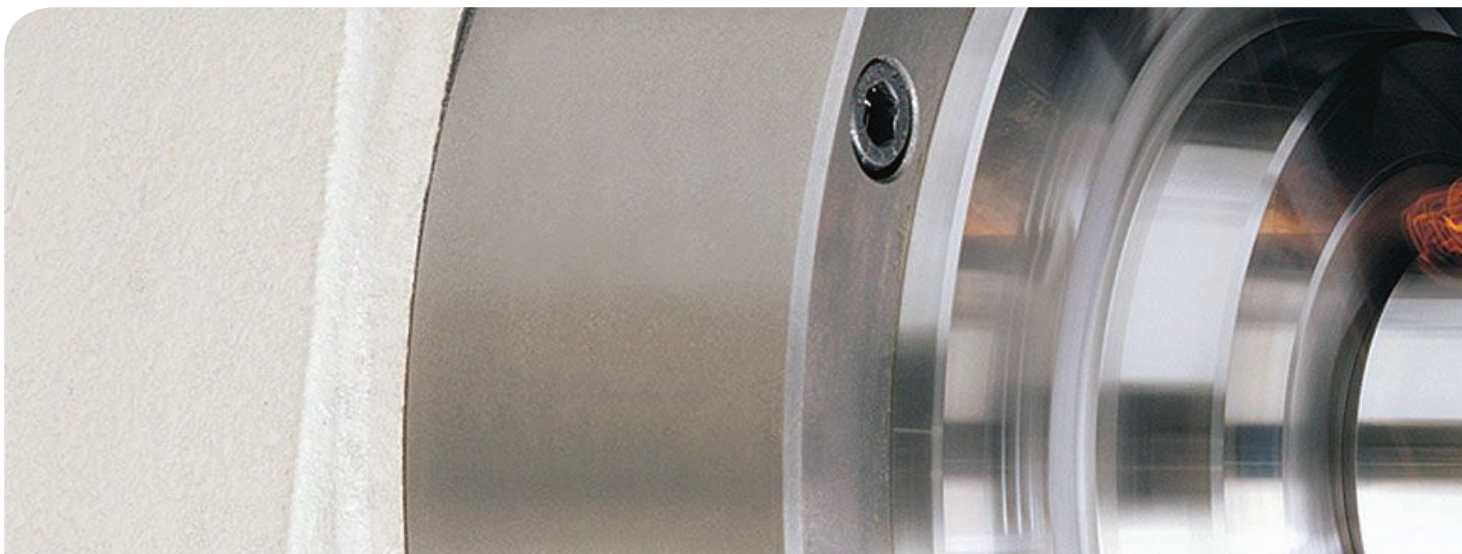
# T-SERIES SPECIFICATIONS

	T-42	T-51	T-65
<b>WORK CAPACITIES</b>			
Max. Swing Over Way Covers	27" (685.8mm)	29.88" (758.9mm)	29.88" (758.9mm)
Chuck Size	6" (150mm)	8" (200mm)	10" (250mm)
Max. Bar Capacity	1.625" (42mm)	2" (51mm)	2.5" (65mm)
Max. Machining Diameter (BMT)	9.41" (239mm)	12.35" (313.7mm)	12.35" (313.7mm)
Max. Machining Diameter (T-Style)	12.9" (327.7mm)	15.245" (387.2mm)	15.245" (387.2mm)
Max. Machining Length w/Tailstock BMT	14.2" (360.6mm)	22.47" (570.7mm)	22.47" (570.7mm)
Max. Machining Length w/Tailstock Hardinge T-style	14.9" (378.5mm)	23.6" (599.4mm)	23.6" (599.4mm)
Max. Machining Length w/Chuck BMT	9.63" (244.6mm)	16.85" (428mm)	15.70" (398.65mm)
Max. Machining Length w/Chuck Hardinge T-style	10.3" (261.6mm)	17.99" (456.8mm)	16.83" (427.36mm)
<b>MAIN SPINDLE</b>			
Max. Speed	6000-rpm	5000-rpm	4000-rpm
Max. Power Rating (cont.)	15-hp (11 kW)	20-hp (15 kW)	35-hp (26 kW)
Max. Torque (cont.)	108 ft-lb (146.3 Nm)	256 ft-lb (347 Nm)	311 ft-lb (421 Nm)
Base Speed	750-rpm	420-rpm	590-rpm
Spindle Nose	A2-5 / 16 C	A2-6 / 20 C	A2-6 / 25 C
Chuck Size (chuck not included)	6" (150 mm)	8" (200 mm)	10" (250 mm)
Spindle Bore (not bar capacity)	1.89" (48mm)	2.378" (60.4mm)	2.935" (75mm)
Spindle Center Height	42" (1066.8mm)	42" (1066.8mm)	42" (1066.8mm)
Spindle Reach	16" (406.4mm)	17.5" (444.5mm)	17.5" (444.5mm)
Spindle Orient (opt.)	1.0 degree	1.0 degree	1.0 degree
Closer Type	Hydraulic	Hydraulic	Hydraulic
Max. Hang Weight	100 lbs. (45.3kg)	300 lbs. (136kg)	300 lbs. (136kg)
<b>SUB-SPINDLE</b>			
Max. Speed	6000-rpm	5000-rpm	5000-rpm
Max. Power Rating (cont.)	15-hp (11 kW)	15-hp (11 kW)	15-hp (11 kW)
Max. Torque (cont.)	108 ft-lb (146.3 Nm)	108 ft-lb (146.3 Nm)	108 ft-lb (146.3 Nm)
Base Speed	750-rpm	750-rpm	750-rpm
Spindle Nose	A2-5 / 16 C	A2-6 / 20 C	A2-6 / 20 C
Chuck Size (chuck not included)	6" (150 mm)	6" (150 mm)	6" (150 mm)
Spindle Bore (not bar capacity)	1.89" (48mm)	2.378" (60.4mm)	2.378" (60.4mm)
Spindle Center Height	42" (1066.8mm)	42" (1066.8mm)	42" (1066.8mm)
Spindle Reach	16" (406.4mm)	17.5" (444.5mm)	17.5" (444.5mm)
Spindle Orient (opt.)	1.0 degree	1.0 degree	1.0 degree
Closer Type	Pneumatic	Pneumatic	Pneumatic
Max. Travel	16" (406.4mm)	25.125" (638mm)	25.125" (638mm)
Max. Traverse Rate	1200-ipm (30.5m/min)	1500-ipm (38m/min)	1500-ipm (38m/min)
Max. Distance from Sub to Main Spindle Face	16.5" (419.1mm)	25.75" (654.1mm)	25.75" (654.1mm)
Min. Distance from Sub to Main Spindle Face	.5" (12.7mm)	.625" (15.8mm)	.625" (15.8mm)
Max. Hang Weight	100 lbs. (45.3kg)	100 lbs. (45.3kg)	100 lbs. (45.3kg)

# SPECIFICATIONS

## T-SERIES

	T-42	T-51	T-65
<b>TRAVELS AND FEEDRATES</b>			
Max. X-Axis Travel	6.37" (161.8mm)	7.76" (197mm)	7.76" (197mm)
Max. Z-Axis Travel	16" (406.4mm)	25" (635mm)	25" (635mm)
Max. Y-Axis Travel	3.25" (82.55mm)	3.50" (88.90mm)	3.50" (88.90mm)
Continuous Z-Axis Thrust	1,500 lbs. (6,672N)	2,250 lbs (10,008N)	2,250 lbs (10,008N)
X-Axis Rapid Traverse Rates	945-ipm (24m/min)	1100-ipm (28m/min)	1100-ipm (28m/min)
Z-Axis Rapid Traverse Rates	1200-ipm (30.5m/min)	1500-ipm (38m/min)	1500-ipm (38m/min)
Y-Axis Rapid Traverse Rates	500-ipm (12.7m/min)	500-ipm (12.7m/min)	500-ipm (12.7m/min)
<b>HARDINGE BMT LIVE TOOLING TOP PLATE</b>			
BMT bi-directional	16-station + ½ station index	12-station + ½ station index	12-station + ½ station index
Square Shank	3/4" (20mm)	1" (25mm)	1" (25mm)
Round Shank Tooling	1.25" (32mm)	1.5" (40mm)	1.5" (40mm)
Index Time (rotation/including clamp-unclamp)	.35/1.45 sec	.35/1.35 sec	.35/1.35 sec
Tool Shank Dia. w/ER 25 Collets	.04 - .625" (1mm -16mm)	.04 - .625" (1mm -16mm)	.04 - .625" (1mm -16mm)
Live Tooling Power Rating (30 Min Rating)	7.5-hp (5.5 kW)	10-hp (7.5 kW)	10-hp (7.5 kW)
Live Tooling Torque Rating (30 Min Rating)	25 ft-lb (33 Nm)	31 ft-lb (42 Nm)	31 ft-lb (42 Nm)
Live Tooling Max Speed	8,000-rpm	8,000-rpm	8,000-rpm
<b>HARDINGE BLOCK TYPE (T-STYLE) STATIC TOP PLATE</b>			
Block Type (Static) bi-directional	12-station	12-station	12-station
Square Shank (Left, Right or Inverted Tooling)	3/4" (20mm)	1" (25mm)	1" (25mm)
Round Shank Tooling	1.25" (32mm)	1.5" (40mm)	1.5" (40mm)
Index Time (rotation/including clamp-unclamp)	.35/1.2 sec.	.35/1.2 sec.	.35/1.2 sec.
<b>SERVO DRIVEN TAILSTOCK</b>			
Morse Taper (no quill needed)	MT # 4	MT # 4	MT # 4
Max. Tailstock Travel	16" (406.4mm)	25.15" (638.8mm)	25.15" (638.8mm)
Max. Traverse Rate	1200-ipm (30.5m/min)	1500-ipm (38m/min)	1500-ipm (38m/min)
Min. Applied Force	350 lb. (1.55kN)	370 lb. (1.6kN)	370 lb. (1.6kN)
Max. Applied Force	1500 lb. (6.7kN)	1599 lb. (7.1kN)	1599 lb. (7.1kN)



# T-SERIES SPECIFICATIONS

	T-42	T-51	T-65
<b>COOLANT FACILITIES</b>			
Coolant Capacity	55 gallon (208 liter)	67 gallon (254 liter)	67 gallon (254 liter)
Max. Pressure	200 psi (13.8 bar)	200 psi (13.8 bar)	200 psi (13.8 bar)
Coolant Flow Rate (Per-Minute)	6.7 gallon (25.4 liters)	6.7 gallon (25.4 liters)	6.7 gallon (25.4 liters)
High Pressure Through Turret (Option)	1,000 psi (68.95 bar)	1,000 psi (68.95 bar)	1,000 psi (68.95 bar)
<b>HIGH-PERFORMANCE ACCURACY &amp; SURFACE FINISH SPECIFICATIONS</b>			
Part Surface Finish	12 micro-inch / .30 micron	12 micro-inch / .30 micron	12 micro-inch / .30 micron
Overall Axis Repeatability	.00005" / 1.27 micron	.00005" / 1.27 micron	.00005" / 1.27 micron
Program Resolution (non-SP)	.00001" (.0001mm)	.00001" (.0001mm)	.00001" (.0001mm)
Turret Indexing Repeatability	.000060" / 1.52 micron	.000060" / 1.52 micron	.000060" / 1.52 micron
<b>SUPER-PRECISION® ACCURACY &amp; SURFACE FINISH SPECIFICATIONS</b>			
Overall Axis Repeatability (X, Z)	.000030" (.76 micron)	.000030" (.76 micron)	.000030" (.76 micron)
Part Surface Finish	6 micro-inch (.15 micron)	8 micro-inch (.2 micron)	8 micro-inch (.2 micron)
Roundness	.00001" (.25 micron)	.00002" (.5 micron)	.000025" (.625 micron)
Total Variation on Diameter	.00012" (3 micron)	.00012" (3 micron)	.00012" (3 micron)
Program Resolution	.00001" (.0001mm)	.00001" (.0001mm)	.00001" (.0001mm)
Turret Indexing Repeatability	.000060" / 1.52 micron	.000060" / 1.52 micron	.000060" / 1.52 micron
<b>POWER REQUIREMENTS (MSY CONFIGURATION)</b>			
Max. kVA/Full Load Amps	81 kVA/102FLA	89 kVA/112FLA	89 kVA/112FLA
Max. Voltage/Hz	400/50Hz, 460/60Hz	400/50Hz, 460/60Hz	400/50Hz, 460/60Hz
Phase/Hertz	3-phase/50-60 Hz	3-phase/50-60 Hz	3-phase/50-60 Hz
<b>MISCELLANEOUS</b>			
Lubrication	Grease	Grease	Grease
Communication	RS-232-C, Ethernet	RS-232-C, Ethernet	RS-232-C, Ethernet
Length	98" (2489.2mm)	128.23" (3257mm)	128.23" (3257mm)
Depth	85.24" (2165mm)	91.04" (2312.4mm)	91.04" (2312.4mm)
Height (no stack light)	82.25" (2089mm)	83.6" (2123mm)	83.6" (2123mm)
Approx. Weight	13,100 lb (5940kg)	17,200 lb (7800kg)	17,200 lb (7800kg)
Approx. Shipping Weight	13,600 lb (6170kg)	18,900 lb (8570kg)	18,900 lb (8570kg)
Air Requirement	70 - 90 psi (4.8-6.2 bar)	70 - 90 psi (4.8-6.2 bar)	70 - 90 psi (4.8-6.2 bar)





## HARDINGE WORLDWIDE

Hardinge is a leading international provider of advanced metal-cutting solutions. We provide a full spectrum of highly reliable CNC turning, milling, and grinding machines as well as technologically advanced work-holding accessories.

The diverse products we offer enable us to support a variety of market applications in industries including aerospace, agricultural, automotive, construction, consumer products, defense, energy, medical, technology, transportation and more.

We've developed a strong global presence with manufacturing operations in North America, Europe, and Asia. Hardinge applies its engineering and applications expertise to provide your company with the right machine tool solution and support every time.

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