# Methods

## Methods MV 1600H
## Performance Machining Center


### Designed for productivity and efficiency

Methods Brand 3-Axis Vertical Machining Center are made to Methods design and engineering standards by Litz Hitech Corp., a reputable, well-established, quality machine tool builder and are fully backed by Methods industry-leading technical service and parts support. Methods Machining Centers are affordable, mid-range, best-in-class products providing durability, accuracy and long term reliability.

# Key Design Features

Machine structure features 19 precision hand scraped joints

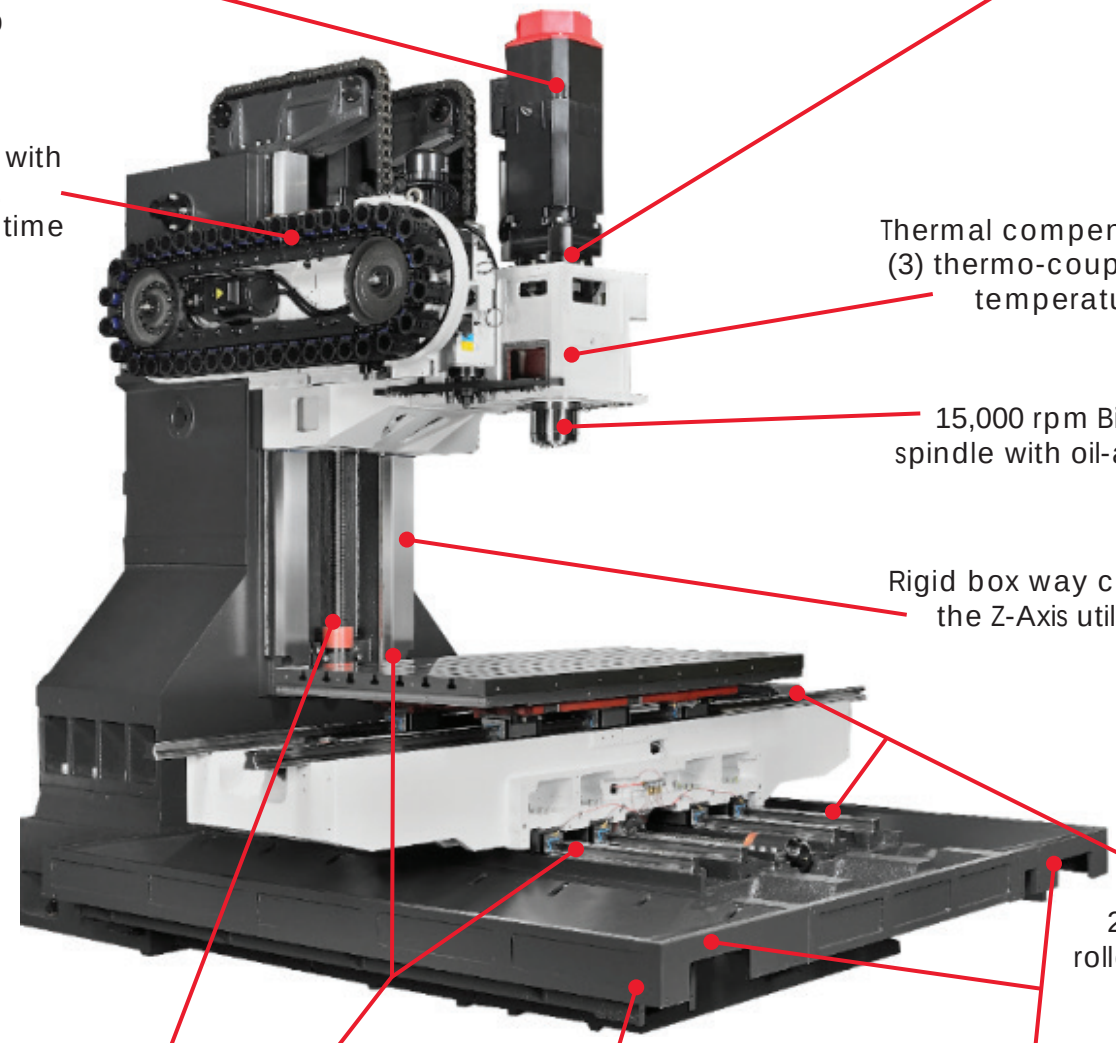
Powerful 30 hp (15 min) direct drive hollow shaft spindle motor w/1000 psi CTS prep

Chiller cooled spindle motor plate minimizes heat migration

40 Tool ATC with Fast 1.5 sec. Tool-to-Tool time

Thermal compensation utilizes (3) thermo-couples for actual temperature feedback

15,000 rpm Big Plus/CAT40 spindle with oil-air lubrication



Rigid box way construction in the Z-Axis utilizing Turcite B

Robust 2.17" (55 mm) roller guideways

Fixed pre-tensioned, double-nut 1.97" (50 mm) ball-screws in X/Y/Z Axes

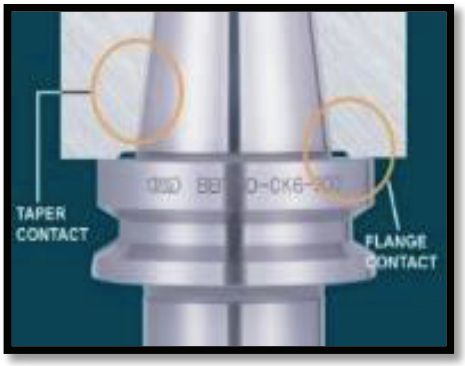
Includes dual ship screws, chip conveyor, coolant wash down, and coolant flush gun

Auto oil lubrication system for all axes

Machine design qualified using FEA (Finite Element Analysis) techniques to provide superior machining performance. All castings are MEEHANITE certified

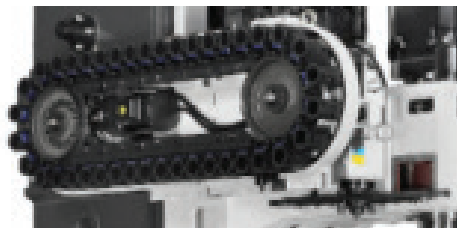
**FANUC is the Industry Benchmark for Quality and Reliability.** We are not FANUC compatible, we are FANUC. The FANUC 0iMF control with 10.4" LCD screen include Manual Guide i, AICC II, 2.0 ms Block Processing Time (BPT) and 200 Block Look Ahead, Ethernet 100 mbps, USB, RS-232C. This package is well suited for industries such as medical, aerospace, automotive and job shops. The remote MPG hand-wheel allows for easy workpiece set-up.

**15,000 rpm Big Plus/CAT40 Taper Spindle** with oil-air lubrication and spindle chiller provides power, speed, stiffness, required for the most adverse machining applications while providing long spindle life, thermal stability and overall machining accuracy.

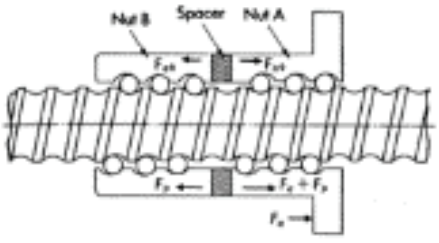



**Powerful Direct Drive 30 hp (15 min), Hollow Shaft Spindle** Motor allows machining of tough-to-machine materials with fine surface finishes and the ability to add Coolant Through Spindle (CTS) easily. A standard spindle chiller and cooled spindle-motor-plate minimizes heat migration from the spindle motor and spindle, to the headframe for added thermal stability.

**BIG PLUS Dual Contact Spindle** provides a stiffer interface between both the spindle surface and tool holder flange surface, & spindle taper and tool holder taper. This design provides higher rigidity, stiffness, longer tool life, and improved accuracy when performing high-speed and difficult to machine applications when compared to traditional 40 Taper Tooling. Tool retention force is a Superior 2,205 lbf (1000 kgf).



**CAM Type Automatic Tool Changer** provides fast, reliable 1.5 sec. Tool-to-Tool Time and includes both Heavy Tool & Big Tool Functions. This design incorporates an inverter type cam-box-motor for easy ATC recovery in the event of a mishap. Large Capacity 40 Tool ATC ensures tooling capacity required for jobs that require it, or multiple jobs to be prepped, and for redundant tools. Brushes mounted near the ATC opening minimize chip contamination in the tool storage area.

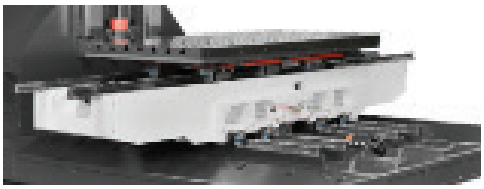



**Fixed, Pre-Tensioned 1.97" (50 mm) Double-Nut Ball-Screws** are featured in the X, Y & Z-Axes. This design minimizes thermal growth, enhances rigidity, stability, and precision of the machine. The X & Y-Axis feature a fast 1417 ipm (36 m/min) rapid rate reducing non-cutting time.

# Features & Benefits

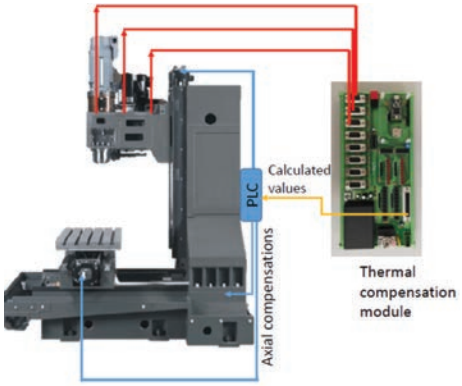
**Robust 2.17" (55 mm) LR Type Roller Guideways** in the X & Y-Axis utilize cylindrical rollers with greater contact area and vibration-damping characteristics that provide improved rigidity, cutting performance, surface finish and longer overall service life when compared to LM Ball Type Guideways. (4) Roller gideways are featured in the Y-Axis providing added stiffness and rigidity.

**Heavy Duty 41,888 lb. Machine** required for demanding machining applications and is designed for superior cutting performance and/or, large complex work pieces. With impressive travels of 63" (1600 mm) in X-Axis, 35.4" (900 mm) in Y-Axis, combined with a 66.9" x 33.5" (1700 mm x 850 mm) table allows for multiple work holding devices for high volume part production, or large diverse components. All design components are qualified by Finite Element Analysis.

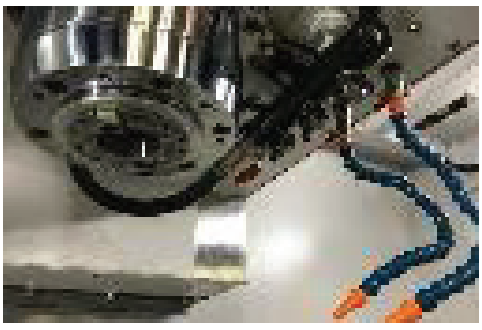


**Machine Structure Features 19 Precision Hand Scraped Joints** for increased structural rigidity, maximum stiffness, and optimum cutting performance. Proper hand scraping techniques improve the overall machine geometry, and minimizes the amount of electronic compensation required on the machine. For example, ball-screw bearing housings can be aligned to closer tolerances, improving all axes laser interferometry results and minimizing required electronic compensation. Proper scraping improves all axes straightness, squareness and tram, also limiting the effects of roll, pitch and yaw.

**Thermal compensation utilizes (3) Thermo-Couples** for actual temperature feedback. This feedback then allows the proprietary software to accurately compensate for thermal growth, greatly minimizing the impact of overall thermal movement. Thermal compensation combined with spindle chiller, chilled motor plate, oil-air lubrication, and fixed, pre-tensioned double-nut ball-screws proved a thermally stable machine.




**Efficient Chip and Coolant Management** featuring Spindle Coolant Ring (4-ports on the spindle face) Spindle Flushing (3-adjustable ports right side of spindle) Spindle Air Blast (2-lock lines right side of spindle) Coolant Wash Down System (base chip wash-down), Coolant Wash-down Gun, Dual Chip Screws, and Hinge Type Chip Conveyor with 41.34" (1050 mm) drop height provides efficient chip and coolant evacuation and management.

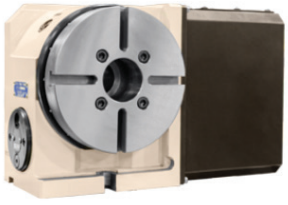


## Standard Features

- FANUC 0i-MF Control, 10.4" LCD, MGI, AICC II, 2.0ms BPT, 200 block look ahead, Ethernet 100Mbps, USB, PMCIA, RS232C
- 15,000 rpm, Oil-Air Lubricated Spindle
- Big Plus/CAT40 Taper
- aT15 Direct Drive, 30 hp (15 min), Hollow Shaft Spindle Motor
- Spindle Chiller, Motor Plate Cooling, Spindle Air Dryer, and Thermal Compensation
- 40 Tool Dual Swing Arm ATC w/1.5 sec. Tool-to-Tool time
- 1280 meters of memory (512 K), Custom macro B, 400 tool offsets, Helical Interpolation, Rigid tapping, Auto power off
- Remote manual pulse generator (MPG) hand-wheel
- Extra set of 8 M-Code functions (4 on, 4 off)
- Chain/Hinge Chip Conveyor 41.3" (1050 mm) Drop-off Ht., Speed - 55 ipm (1400 mm/min)
- Dual chip augers
- Prepped for 1000 psi (70 bar) coolant through spindle (does not include pump)
- Pre-wired for 4th axis (does not include drives, or motors)
- Fixed pretensioned 1.97" (50 mm) double-nut ball-screws in the X/Y/Z-Axes
- X/Y/Z ravel at 63" x 35.4" x 31.5" (1600 mm x 900 mm x 800 mm)
- Z-Axis Box Way with Turcite B
- LR Type 2.17" (55mm) Roller Guideways in the X/Y-Axes
- X/Y/Z Rapid Travel at 1417/1417/944 in/min (36/36/24 m/min)
- Automatic oil lubrication system with gravity waste-oil recovery tank
- Fully enclosed splash guard
- Dust-proof electrical cabinet with heat exchanger
- Coolant System includes spindle coolant nozzles (3), spindle coolant ring nozzles (4), spindle air blast nozzles (2), coolant chip flush wash down, and coolant flush gun
- Bright interior work lights
- 3-color signal light
- Air gun
- Tool kit
- Methods Safety Spec (CE Mark Modified)
- Machine Operating Manual & Control Manual (CD)
- 2-Year Machine and Control Warranty

## Options

- Heidenhain Linear Scales in X/Y/Z Axes*
- Tool and Part Probe Measurement
- High Pressure Coolant Through Spindle (up to 1000psi)
- MIDACO Pallet Changers
- 4th Axis Rotary Tables
- CT to BT Arm
- Oil/Coolant Separator
- Filter Mist Collector
- Electrical Cabinet Air Conditioner*
- Transformer



* Factory Installed

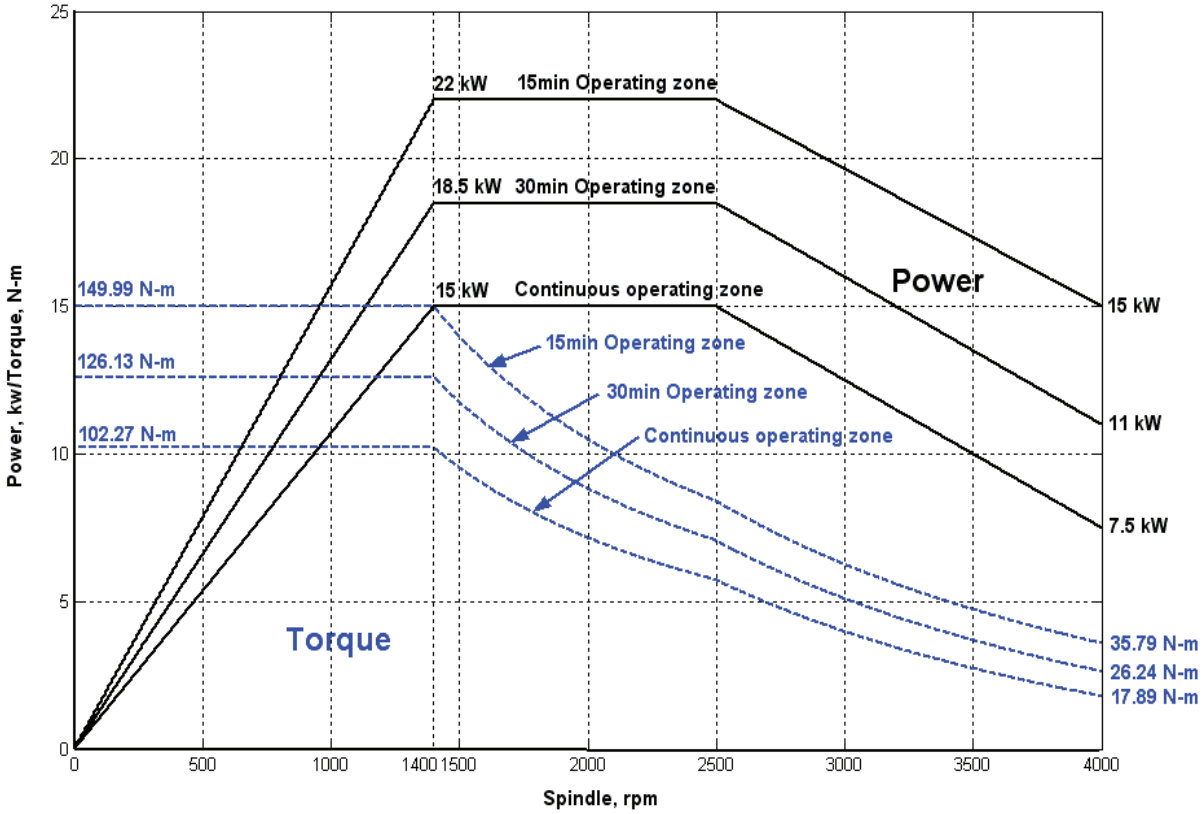
# Specifications

| FEATURES | UNIT | MV 1600H |
|---|---|---|
| **X/Y-Axis Roller Guideways** | | |
| **X/Y-Axis Travel** | in (mm) | X - 63 (1,600)<br>Y - 35.43 (900) |
| **X/Y-Axis Rapid Traverse** | in/min (m/min) | 1,417 (48) |
| **X/Y-Axis Max Cutting Speed** | in/min (m/min) | 787 (20) |
| **X/Y-Axis LR Type Roller Guideways** | in (mm) | 2.17 (55) |
| **X/Y-Axis Distance Between Guideways** | in (mm) | X - 11.81 (400)<br>Y - 9.76 / 20.83 / 9.76 (248 / 529 / 248) |
| **X/Y-Axis Encoder Resolutions** | - | 4 million pulse |
| **X/Y-Axis Motor** | FANUC | a22i |
| **X/Y-Axis Power** | hp (kw) | 5.4 (4) |
| **X/Y-Axis Ball Screw Class** | - | C3 |
| **X/Y-Axis Ball Screw Diameter** | in (mm) | 1.97 (50) |
| **Z-Axis Box Way** | | |
| **Z-Axis Travel** | in (mm) | 31.5 (800) |
| **Z-Axis Rapid Traverse** | in/min (m/min) | 944 (24) |
| **Z-Axis Max Cutting Speed** | in/min (m/min) | 591 (15) |
| **Z-Axis Distance Between Box Ways** | in (mm) | 21.85 (555) |
| **Z-Axis Encoder Resolution** | - | 4 million pulse |
| **Z-Axis Motor** | FANUC | a22Bi |
| **Z-Axis Power** | hp (kw) | 5.4 (4) |
| **Z-Axis Ball Screw Class** | - | C3 |
| **Z-Axis Ball Screw Diameter** | in (mm) | 1.97 (50) |
| **X/Y/Z Axes Lubrication** | - | Auto Oil |
| **Spindle** | | |
| **Spindle Speed** | rpm | 15,000 |
| **Spindle Type** | Dual Contact | BIG-PLUS CAT 40 Taper |
| **Spindle Power** | hp (kw) Cont.<br>hp (kw) 30 min<br>hp (kw) 15 min | 20 (15)<br>25 (18.5)<br>30 (22) |
| **Spindle Torque** | ft-lb (nm) Cont.<br>ft-lb (nm) 30 min<br>ft-lb (nm) 15 min | 76 (102)<br>93 (126)<br>111 (150) |
| **Spindle Base Speed** | rpm | 1,400 |
| **Spindle Lube** | - | Oil / Air |
| **Spindle Cooling** | - | Chiller |
| **Spindle Bearings** | - | 70 mm Ceramic Angular (6) |
| **Specifications subject to change without notice** | | |

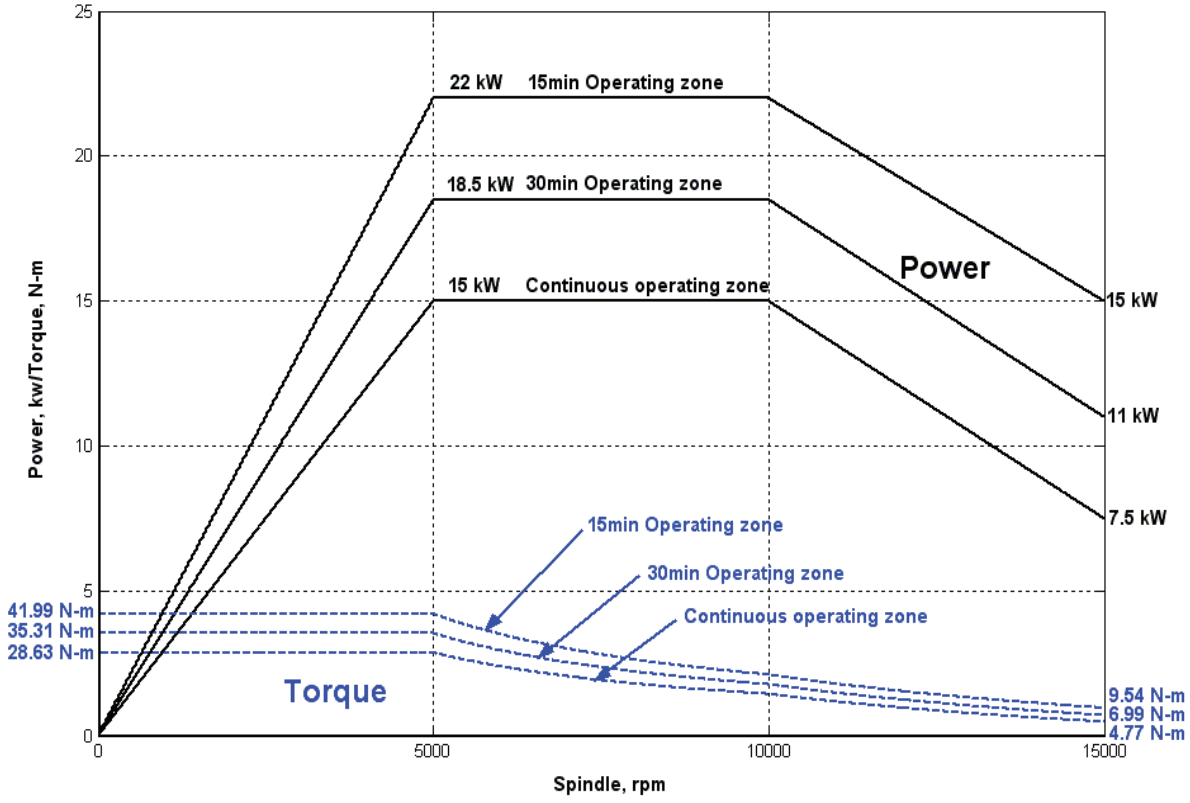
| FEATURES | UNIT | MV 1600H |
|---|---|---|
| **Automatic Tool Changer (Random/Bi-Directional)** | | |
| Tool Changer for Big Plus/CAT40 Tool Holders | - | Dual Swing Arm Type |
| Maximum Number of Tools | - | 40 |
| Pull Stud | - | DIN CAT40 A Type |
| Maximum Tool Weight | lbs (kg) | 17.6 (8) |
| Maximum Tool Length | in (mm) | 11.8 (300) |
| Maximum Tool Diameter | in (mm) | 3 (76) |
| Maximum Tool Diameter - No Adjacent Tool | in (mm) | 4.9 (125) |
| Tool Changing Time - Tool-to-Tool | sec | 1.5 |
| Tool Holder | - | Big Plus / CAT40 |
| Tool Clamp Force | lbf (kgf) | 2,205 lbf +/- 220 lbf (1,000 kgf +/- 100 kgf) |
| **Accuracies (ISO 230-2) without scale** | | |
| X/Y-Axis Positioning Accuracy | in (µm) | .00047 (12) |
| X/Y-Axis Repeatability Accuracy | in (µm) | .0002 (6) |
| Z-Axis Positioning Accuracy | in (µm) | .00059 (15) |
| Z-Axis Repeatability Accuracy | in (µm | .00027 (7) |
| **Table** | | |
| Table Dimensions | in (mm) | 66.9 x 33.5 (1,700 x 850) |
| Spindle Nose to Table Surface | in (mm) | 3.9 ~ 35.4 (100 ~ 900) |
| Spindle Center to Column Surface | in (mm) | 36.93 (938) |
| T-Slot Width | in (mm) | .708 (18) |
| Number Of T-Slots | qty | 7 |
| Distance between T-Slots | in (mm) | 3.937 (100) |
| Maximum Load | lbs. (kg) | 3307 (1,500) |
| Table Surface to Floor | in (mm) | 42.72 (1,085) |
| **Dimensions / Weight / Capacities / Power** | | |
| Floor Space with Chip Conveyor | in (mm) | 183.5 x 184.8 (4,660 x 4,694) |
| Machine Weight | lbs (kg) | 41,888 (7,450) |
| Maximum Machine Height | in (mm) | 127.7 (3,243) |
| Coolant Tank Capacity | gal (l) | 132.1 (500) |
| Coolant Motor (60hz) | hp (kw) | .74 (.55) |
| Coolant Flow (Nozzle) | gpm (lm) | 29 (110) |
| Coolant Pressure (Nozzle) | psi (Kg/cm2) | 24.2 (1.7) |
| Machine Power Capacity | kva / amp | 25 / 100 |
| Machine Voltage & Phase | volts / phase | 220 / 3 |
| **Specifications subject to change without notice** | | |

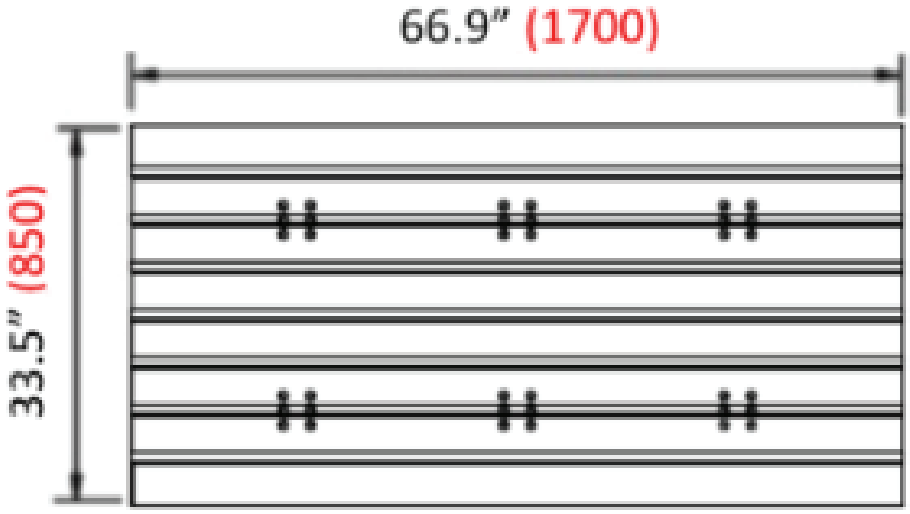
# Spindle Power & Torque Diagram

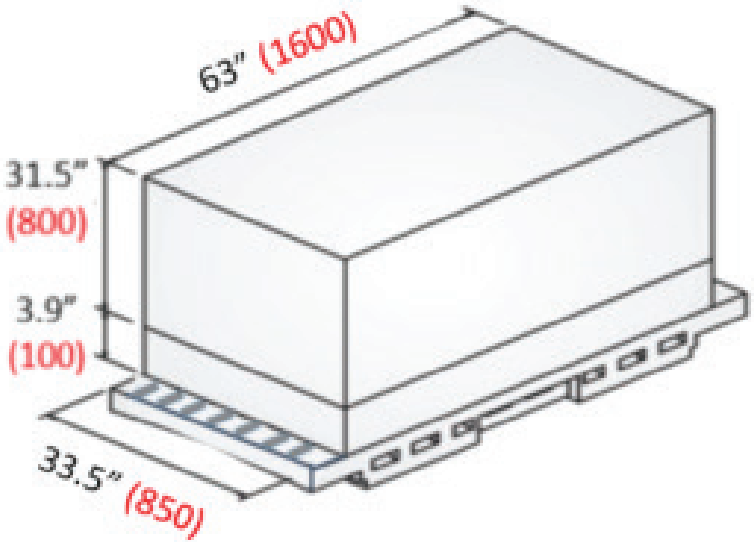
**Power/Torque characteristic of FANUC αilT 15/15000 for spindle 15000rpm - Low-speed winding**




**Power/Torque characteristic of FANUC αilT 15/15000 for spindle 15000rpm - High-speed winding**





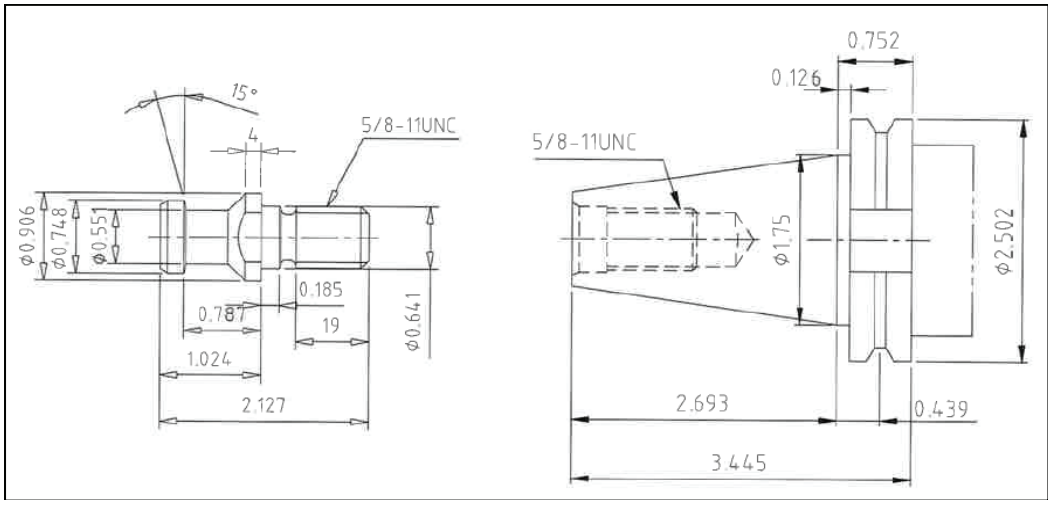




Dim. shown in mm

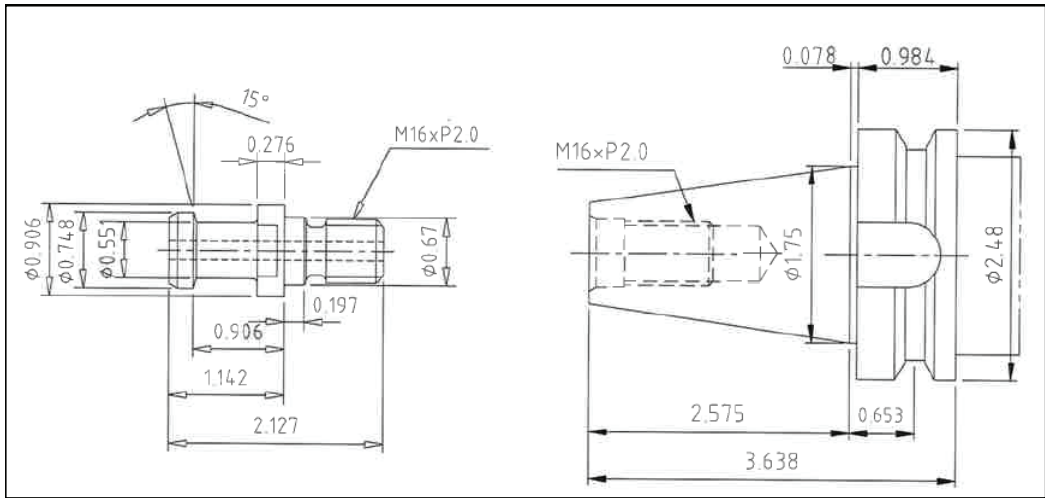
# Tooling Diagram

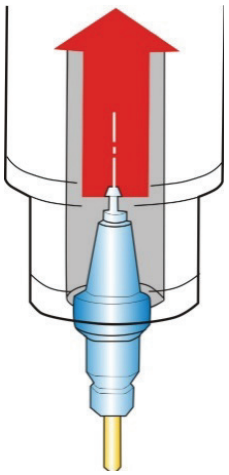
Dim. shown in mm

## Big Plus CAT40 Tooling




## Big Plus BBT40 Tooling



## Tool Clamp Force

2,205 lbf +/- 220 lbf
(1000 kgf +/- 100 kgf)

## In Compliance with Quality Assurance Procedures and Standards

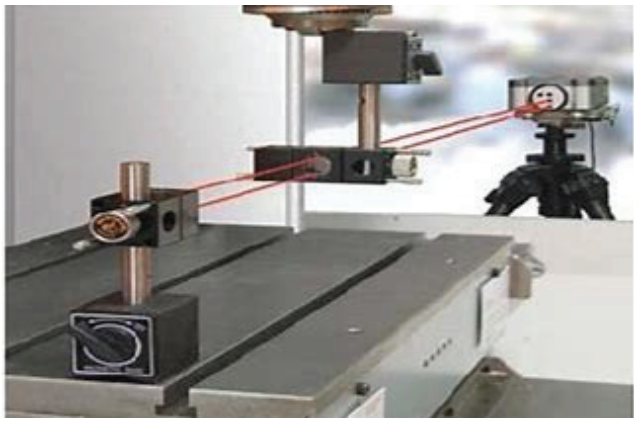
- Strict quality standards require that all manufacturing and inspection equipment is calibrated, monitored and controlled using recognized and traceable systems and methods

## All MV 1600H Machines are fully Lasered and Ballbared

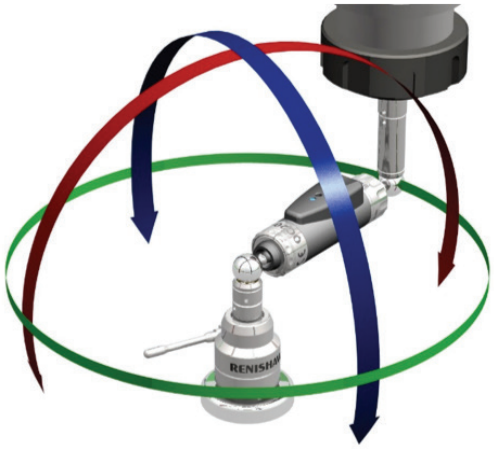
- Laser interferometer and Ballbar measurement systems assess, monitors and can help to improve the static and dynamic performance of the machine

- Ballbar testing provides an important, rapid check of a CNC machine tools positioning performance accuracy as it relates to circularity and circular deviation positioning accuracy. This test is recognized by international standards such as ISO 230-4 and ANSI/ASME B5.54

### Laser Interferometer



### Ballbar



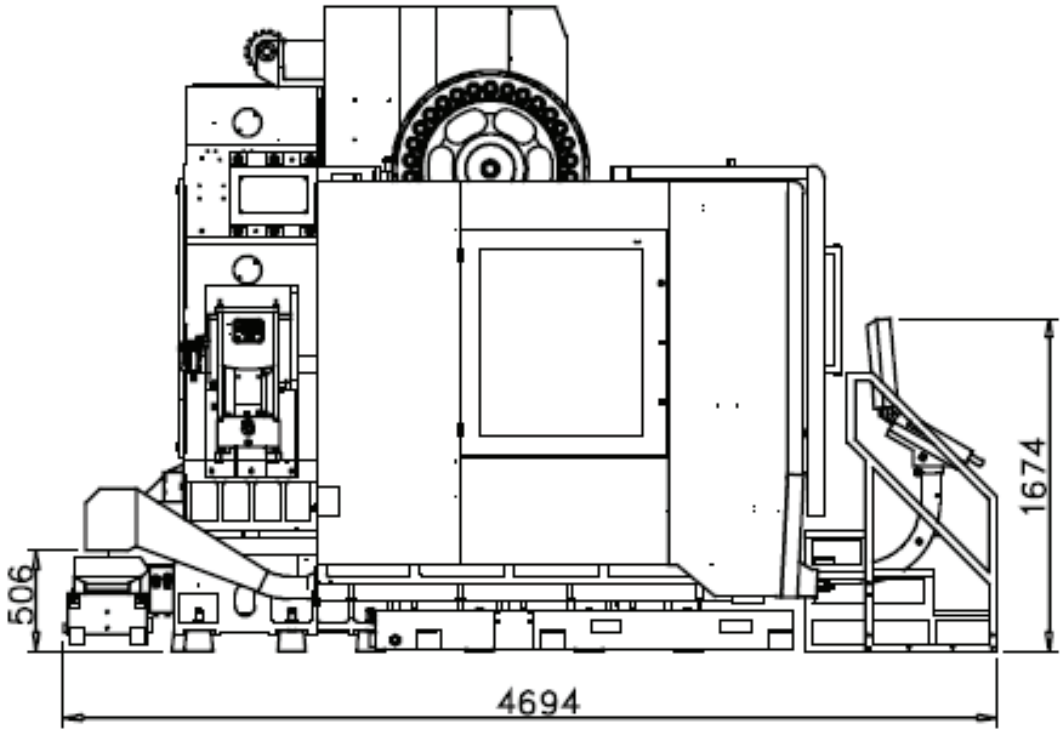
| METHODS MACHINE ACCURACY - WITHOUT SCALE | | | |
|---|---|---|---|
| **Models** | **MV 800H ~ MV 2000H (Box Way Z, Linear Roller X/Y)** | | |
| **Standards** | **VDI 3441** | **ISO 10791-4**<br>**ISO 230-2** | **JIS B66338** |
| **X/Y-Axis Positioning Accuracy** | .00047”<br>(12um) | .00047”<br>(12um) | .0002” / 11.81”<br>(5um / 300mm) |
| **X/Y-Axis Repeatability Accuracy** | .0002”<br>(6um) | .0002”<br>(6um) | ± .0001”<br>± (3um) |
| **Z-Axis Positioning Accuracy** | .00059”<br>(15um) | .00059”<br>(15um) | .00022” / 11.81”<br>(5.5um / 300mm) |
| **Z-Axis Repeatability Accuracy** | .00027”<br>(7um) | .00027”<br>(7um) | ± .00014”<br>± (3.5um) |

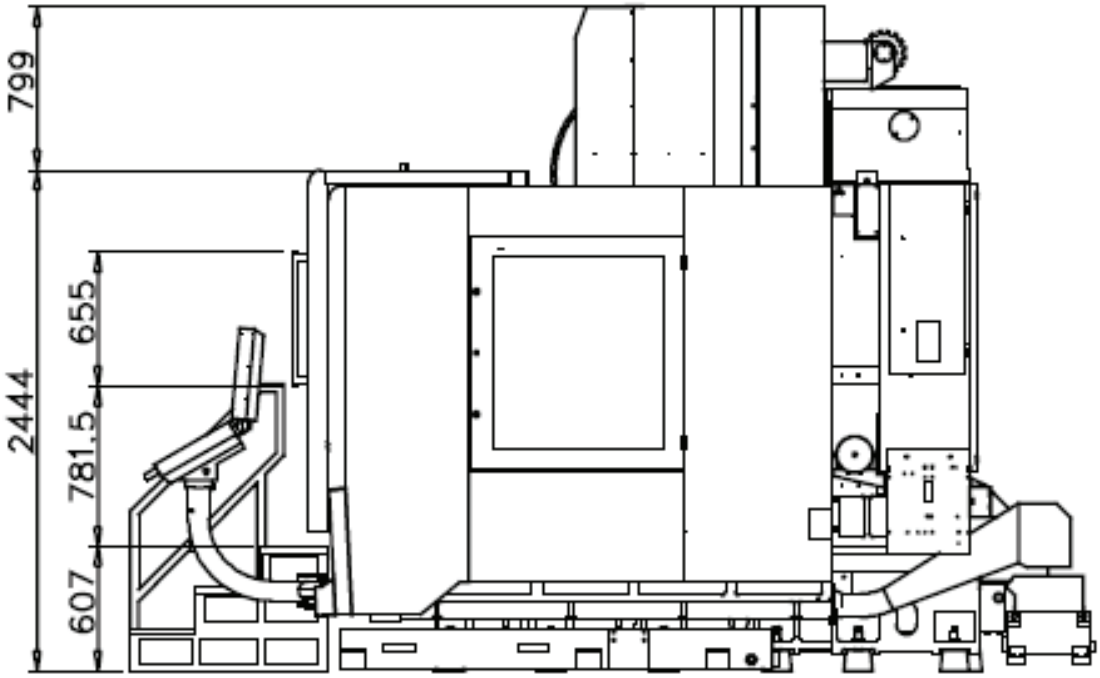
# FANUC Control Specifications

- 10.4” LCD color display
- AICC 200 Block look ahead
- Controlled axes 4 & 4+1
- 2.0 ms Block processing time
- 1280 meters of memory
- 400 tool offsets
- 3 Simultaneously controlled axes
- HRV 3 control
- Inch / metric conversion
- Machine lock
- Mirror image
- Rigid tapping
- Single direction position
- Exact stop mode
- Tapping mode
- Cutting mode
- Dwell
- Linear interpolation
- Circular interpolation
- Helical interpolation
- Skip function
- High speed skip function
- Reference point return
- Feed per minute
- 2nd reference point return
- Feed rate override
- Jog override
- Program Number search
- Sequence Number search
- Dry run
- Jog feed
- Manual reference return
- Optional block skip
- Program number
- Sequence number
- Absolute/incremental programming
- Plane selection
- Automatic coordinate setting
- Coordinate setting
- Custom macro B
- Programmable data input
- Circular interpolation by program
- Automatic corner deceleration
- Scaling
- Coordinate system rotation
- Canned cycles for drilling
- Tool compensation pairs
- Tool offset memory C
- Tool length compensation
- Cutter compensation C
- Tool life management
- Backlash compensation rapid traverse
- Stored pitch error compensation
- Tool length measurement
- Ethernet 100 mbps, USB, PCMCIA, RS232C
- Current position display
- Program display
- Self-diagnosis function
- Parameter setting display
- Run hour/part count display
- Actual cutting feed rate display
- Operator monitor screen
- Spindle setting screen
- Spindle information screen
- Machine alarm diagnosis
- Alarm history display
- Operator history display
- Graphic function
- Memory card interface
- Additional custom macro variables
- Sub program call
- Extended part program editing
- Additional workpiece coordinate
- Manual Guide i
- Manual absolute on and off
- Auto power off

# MV 1600H Dimensional Drawings

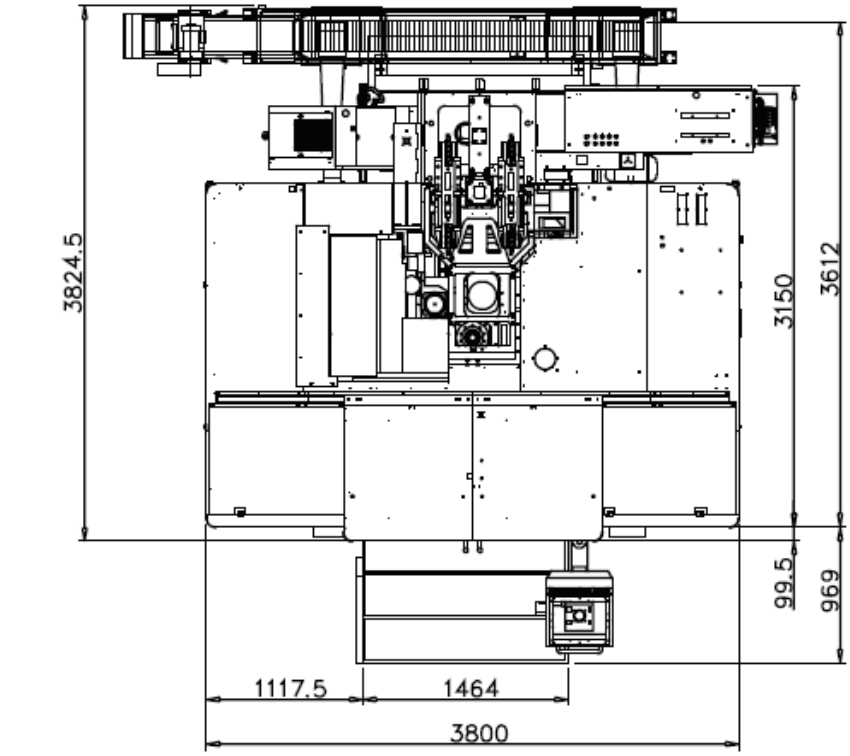
Dim. shown in mm

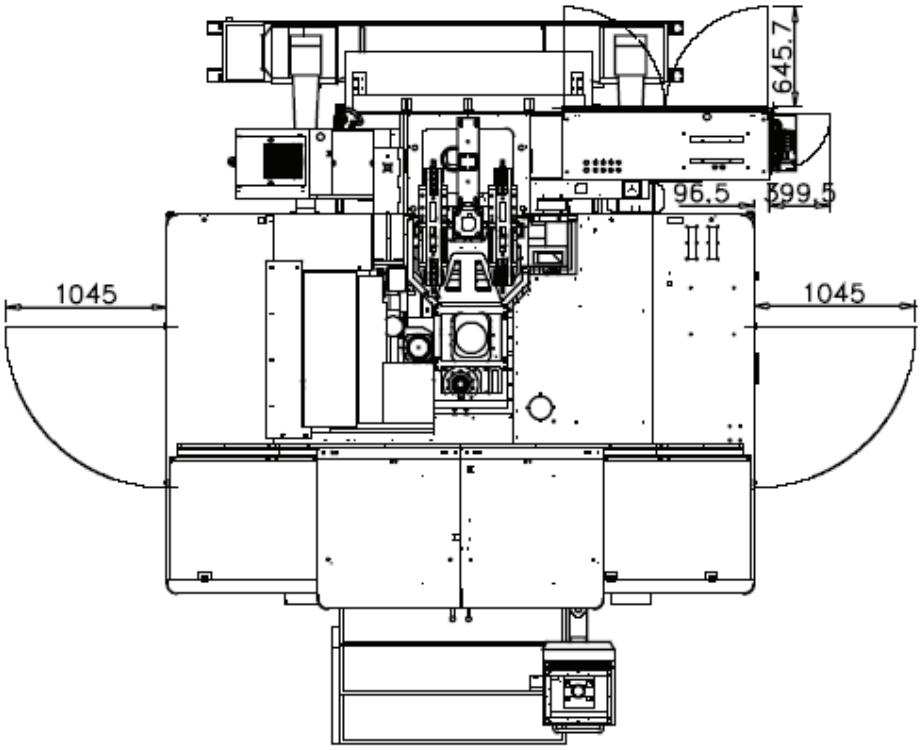


# MV 1600H Dimensional Drawings

Dim. shown in mm



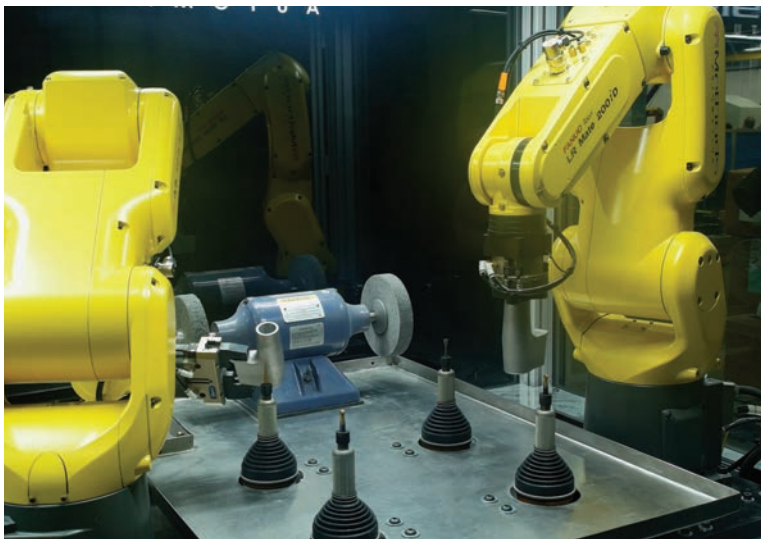



# Parts

Methods is a one stop supplier with the expertise and inventory to keep business running 24/7. The parts distribution center is 16,000 square feet and has a dedicated team of employees for parts and tooling across the United States. The company has one of the largest parts inventories in North America and maintains $35 million within their spare parts department.

# Service

To make sure every problem finds a quick solution, Methods has developed an 'umbrella' of support services. Methods sales and support centers work with an extensive national network of distributors and EDM dealers to offer the technology solutions demanded by machine shop owners. The unique blend of seasoned engineers and young talent and a 15 year average level of experience guarantees the service department's high level of customer satisfaction.



# Automation

Automated processing offers the highest potential for increased productivity. Methods automation department has automation engineers nationwide and provides highly innovative machine tool automation solutions. Methods automation group includes design engineers, control engineers, fluid engineers, integration/assembly engineers, field service/installation engineers, electrical/ mechanical engineers and machinists.


# Achieve More with Methods

Founded in 1958, with three employees and a few refurbished machines, Methods Machine Tools, Inc. has grown into one of the largest, most innovative precision machine tools importers in North America. With over 300 employees, eight sales and technology centers, and over 35,000 machines installed throughout the United States, Canada and Mexico, Methods supplies leading-edge precision machine tools and solutions. The founder Mr. Clement McIver, Sr., established principles from the company's beginning that continue to set Methods apart from conventional importers or distributors. "Anyone can sell a machine," said the company's late founder, "but not everyone provides the extra effort that makes a difference in the company's bottom line."

**Showrooms and Technical Centers**
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Los Angeles ■ Memphis ■ Phoenix ■ San Francisco

Methods
**877.668.4262 | methodsmachine.com**