

# BULOVA<sup>®</sup>

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TECHNOLOGIES MACHINERY LLC



# HIGH PERFORMANCE VERTICAL MACHINING CENTER

## MACHINE FEATURES:

- Constructed with high quality meehanite cast iron and heat treated to relieve stress thereby assuring maximum rigidity and accuracy.
- Box ways on all 3 axes greatly upgrades stability and dampening capability.
- Automatic lubrication unit with intelligent pressure failure detection function provides reliable supply for cost savings and for environmental protection.
- Oil-coolant separation design which meets the environment protection requirements allows centralized collection for all way oil.

The BTM VMC-4220B is designed for heavy cutting, long-term high accuracy, and superior surface finishes. Classic manufacturing methods and ultra rigid construction are combined with advanced technological features to provide exceptional value.

**Please note that features and specifications are subject to change and should be verified at the time of order.**

## STANDARD FEATURES:

- \* Fanuc OiM-D Control (Package B)
- \* AI APC Contour Control
- \* 12,000 RPM Spindle (Belt Drive)
- \* Powerful 20 hp (30 min) high torque spindle motor
- \* High Column (20.9" + 9.8")
- \* Cartridge Spindle Design
- \* CAT40 Big Plus Spindle
- \* 1000 PSI CTS Prep Only
- \* Spindle Air Blow
- \* Rigid tapping
- \* Custom Macro B (User Definable)
- \* Twin Arm 24 Tool ATC
- \* Tool Change Time (Tool To Tool) 2.5 sec.
- \* Tool Change Time (Chip to Chip) 6.0 sec.
- \* Portable Manual pulse generator
- \* Program and data protection key switch
- \* Massive One-piece Meehanite cast iron bed
- \* Chip Auger
- \* 4<sup>th</sup> Axis Prep Only (no amplifier)
- \* Low friction Turcite mating way surfaces
- \* Double Anchored Pretensioned Ballscrews
- \* Fast 1,181 IPM Rapid Traverse rate
- \* Full enclosure splash guard
- \* Flood coolant with large coolant tank
- \* Work light (2)
- \* Operator call lamp (red, yellow, green)
- \* Spindle load meter
- \* Assembly and operation tools
- \* Auto Power Off
- \* Heat exchanger for Electrical Cabinet
- \* Instruction manual, parts list, and electrical diagram
- \* Fanuc operator and maintenance manuals
- \* One-year Parts warranty: Parts and Labor
- \* Two-year NC Control Warranty: Parts and Labor

## **SPECIFICATIONS:**

### **CAPACITY:**

X axis travel	42 inches
Y axis travel	20.9 inches
Z axis travel	30.7 inches
Table loading area	41.3 x 20.9 inches
Allowable table load	2200 pounds
Table T Slots - width x slot spacing	.708" x 3.937" – (5)

### **SPINDLE:**

Spindle nose to table top	3.9 – 34.6 inches
Spindle Bearing Diameter	2.8"
Column to spindle center	23.2 inches
Spindle taper	CAT40 Big Plus
Spindle speed	12,000 RPM
A.C. spindle motor (30 min.)	20 HP
Spindle torque (30 min)	132 ft-lbs.
Spindle Driving Method	Belt Drive

### **AUTOMATIC TOOL CHANGER:**

ATC Type	Twin Arm Type
Number of Tools	24
Tool Shank	CAT40 Big Plus
Max. Tool Dia.	3.1 inches
Max tool Diameter (No Adjacent Tool)	5.9"
Max. Tool Length	9.8 inches
Max. Tool Weight	15.4 lbs.
Tool Change Time T – T	2.5 sec
Tool Change Time C – C	6.0 sec
Tool Selection	Random Bi-Directional

### **MOTION:**

X and Y axis rapid traverse rate	1,181 IPM
Z axis rapid traverse rate	1,181 IPM
Cutting feed rate	393 IPM
Slide Type	Box Ways
Least command increment	.001mm,
Positioning accuracy	+/- .00020" (full stroke)
Repeatability	+/- .00008"

### **GENERAL:**

Floor Space Required (W x D X H)	125" x 96" x 120"
Machine Weight	13,700 lbs.
Standard Power Source Requirement - Fanuc	205-235 Volts / 3 Phase/60HZ
Power Capacity	53 Amps Minimum
Air Source Requirement	85 – 115 PSI

**\* Geometric accuracies are guaranteed only if machine is installed on foundation meeting the minimum requirements of the machine and local building codes. Contact Bulova Technologies Machinery LLC for the current machine requirements.**

## CONSTRUCTION:



- Balanced 12,000 RPM Spindle with spindle oil cooler 6000 BTU for High Speed Machining.
- Hardened and Ground C3 Double Nut Ballscrews ( $\text{\O}50$  mm) are pre-tensioned to minimize backlash, provide high precision movement, and reduce heat deformation on all axes.
- All solid box ways are coated with high grade Turcite-B. Hardened and ground slideways give an extra 40% wear resistance.
- 2 Solid Box Ways are on a one-piece base instead of two supporting ways connected to the main base, which provides more rigidity under heavy machining.
- Main frame is made of Meehanite casting for superior rigidity

## **BED, COLUMN, AND SADDLE**

The bed is a rigid one-piece casting with heavy ribbing to prevent deformation during heavy cutting. Fine grain Meehanite cast iron is used for its excellent dampening characteristics. Extra wide box ways provide excellent support for the saddle, regardless of the load distribution on the table. The table is fully supported by the saddle in all positions. There is no table overhang. The rigid box type column casting is heavily ribbed to prevent twisting or distortion.

## **SPINDLE, HEADSTOCK, AND COLUMN**

The high speed, 12,000 RPM, 40 taper spindle is a true cartridge type unit supported by precision class bearings that are permanently grease lubricated. The spindle is driven by a high torque 20 HP (30 min.) A.C. motor delivering an impressive 132ft/lbs. Power is transferred through a heavy-duty cogged drive belt eliminating slippage, promoting thermal stability, and minimizing vibration. An encoder is attached to the spindle to allow rigid tapping.

## **GUIDEWAYS**

Wide Box ways are used for unsurpassed long-term rigidity and accuracy. Each guideway is induction hardened and precision ground. Turcite is bonded to the mating way surfaces and then hand scraped to ensure perfect fit and tolerances. The Turcite resin with forced way lubrication provides a low friction surface and virtually eliminates guideway wear. All guideways are fully protected from chips and damage.

## **OIL JACKET SPINDLE CHILLER *(Standard)***

Machine accuracy is maintained by using a refrigeration system that circulates cooled oil around the spindle reducing the thermal effects of any heat generated.

## **AUTOMATIC TOOL CHANGER**

The high quality 24-position tool changer uses a fast random bi-directional twin arm with 2.5 second tool-to-tool change time, and 6 seconds chip to chip.

## **BALL SCREWS AND AXIS DRIVES**

Each axis is driven by a high precision double-nut ballscrew. The ballscrews are centered between the guideways. The ballscrews are supported on both ends by angular contact thrust bearings. This double anchored pretension design provides outstanding positioning repeatability with virtually no thermal growth. All axes have large diameter 50mm ball screws that are connected directly to oversize AC servo drive motors without gears or belts, to eliminate backlash. Each axis has a flexible coupling to protect the ball screw in the event of a sudden impact. These couplings can be quickly reset.

## **PORTABLE MANUAL PULSE GENERATOR**

The handheld "Manual Pulse Generator" lets each axis move in increments of 0.0001", 0.0010" or 0.0100" making fixture or part alignment quick and easy. The 10-foot cord gives full access to the machine.

## **PROGRAM AND DATA PROTECTION KEY SWITCH**

The keyed switch enables the protection mode for both the program and offset data. Removing the key limits access to only authorized personnel. In the unprotected position the key can not be removed and all data is available for edit.

## **290 PSI (20 BAR) THROUGH-SPINDLE-COOLANT SYSTEM *(Optional)***

A dedicated 290-PSI positive displacement pump delivers the coolant directly to the tool tip. The immediate benefit is more aggressive feeds and speeds can be maintained throughout the cutting process. There is also no need to stop and adjust coolant nozzles increasing the in-cut time and operator safety. Protecting the spindle and the vital rotary union from contamination is a canister filter with a replaceable 10-micron element.

## **1,000 PSI THROUGH-SPINDLE-COOLANT *(Optional)***

Severe applications, holes with deep length to diameter ratios or tough materials require high-pressure coolant to evacuate chips and keep the cutting edge cool. The increased coolant and chip flow improves finishes and tool life, while allowing more aggressive feeds and speeds.

## **FULLY ENCLOSED GUARDING**

The fully enclosed guarding, including cut-out for filter mist, is made of heavy gauge sheet metal to contain both chips, coolant and coolant mist. The large dual sliding doors open to provide unrestricted overhead access for ease of lifting heavy fixtures or work pieces.

## **CHIP DISPOSAL AND COOLANT SYSTEM**

High volume coolant system washes chips down into the front of sheet metal enclosure for chip auger evacuation and provides flood coolant through adjustable head mounted nozzles along with four flushing nozzles mounted directly to spindle nose.

## **Control Specifications - Fanuc OiM-D Conversational Control**

8.4" color LCD screen

Color graphics

Simultaneous Controlled Axis

Least input Increment on X, Y, and Z is .001 mm

Least command increment on X, Y, and Z is .001mm

Inch/Metric Conversion (G20/G21)

Interlock on All Axes

Machine Lock on All Axes

Emergency Stop

Stored Stroke Check 1, 2, 3,

Mirror Image

Backlash Compensation

Unexpected disturbance torque detection

Stored pitch compensation

Automatic Operation (Memory)

MDI Operation

Search Function (Sequence, Program)

Program restart

Dry Run

Single Block

Buffer Register

Manual Handle Interrupt

Manual Jog Feed (Rapid, Jog, Handle)

Manual Handle Feed Rate (x1, x10, x100)

Feed Command (F Code Feedrate Direct Command)

Feedrate Override 0-200% (10% Unit)

Jog feed 0-5,000 mm/min (197 ipm)

Rapid traverse override (F0, F25%, F50%, F100%)

Override Cancel

Rapid Traverse Bell-Shaped Acceleration/Deceleration

Block Skip

Exact Stop Mode / Exact Stop (G61/G09)

Dwell (G04)

Helical Interpolation

Threading/Synchronous Feed

Manual Reference Point Return

1<sup>st</sup> Reference Point Return G28

Reference Point Return Check G27

2<sup>nd</sup> Reference Point Return G30

3<sup>rd</sup> and 4<sup>th</sup> Reference Point Return

Program stop, optional stop, end of pgm M00, M01, M02, M30

Tape Code EIA RS-244/ISO 840 (Automatic Recognition)

Optional Block Skip (9 ea)  
Maximum Programmable Dimensions +/- 9999.9999" (+/- 8 digits)  
Program Number O4 Digit  
Absolute and Incremental Command G90/G91  
Decimal Point Input  
Plane Selection G17. G18. G19  
Work Coordinate System Setting (G52 – G59)  
Work Coordinate Preset  
Additional Work Coordinate System 48 pairs  
Manual Absolute "On" fixed  
Programmable Data Input G10  
Sub Program Call 4 Levels of Nesting Custom Macro #100 to #199  
Addition to Custom Macro Common Variables #500 to #999  
Circular Interpolation by radius R  
Canned Cycle (G73, G74, G76, G80 ~ G89)  
Optional Chamfering / Corner R  
Skip Function (G31)  
Automatic Coordinate System Setting  
Coordinate System Rotation  
Programmable Mirror Image  
Single direction positioning (G60)  
External Data Input (Tool Offset, message, machine zero point shift)  
Cylindrical interpolation  
A1 Advance Preview Control (G5.1)  
Polar Coordinate Command  
Miscellaneous Function (M3 digits)  
Miscellaneous Function Lock  
Spindle Speed Command (S5 Digits, binary output)  
Spindle Speed Override (50% ~ 120%) 10% Unit  
Rigid Tapping  
Cutter Compensation C (G40-G42)  
Tool Length Measurement  
Tool Length Compensation (G43, G44, G49)  
Tool Offset Amount (+/- 6 Digits)  
Tool Offset Pairs (400 Pairs)  
Tool Life Management  
Reader/Puncher Interface RS232C  
Memory Card input/output  
Embedded Ethernet (100 Mbps)  
Part Program Storage Length: 320M  
Registered Programs 400 ea  
Memory Lock  
Back Ground Editing  
Extended Part Program Editing (Copy, Move, Change of NC Program)  
Self Diagnosis Function  
History Display of Alarm and Operator Message  
Help Function  
Run Hour / Parts Count Display  
Actual Cutting Feedrate Display  
Spindle / Servo Setting Screen  
Multi-language display (Selection of 5 Optional Language)  
Erase CRT Screen Display (Screen Saver)  
Bi-Direction Pitch Error Compensation  
Tool Management Function

Protection of Data at 8-Levels

Tool Monitoring Function (HWTM – Built-on Fanuc Type)

Fanuc Manual Guide i conversational programming

Alpha i AC digital servo system with 1,000,000 pulse encoders

Full MDI keyboard

PCMCIA data card slot on left side of LCD for program input / output – up to 2GB storage

Advanced Preview Control (Look ahead of multi-blocks – 20 blocks look ahead)

Automatic Acceleration / deceleration with Bell Shaped rapid acc / dec

3 axes simultaneous control std. (4 axis opt.)

Scaling

Custom Macro B

High speed skip signal



# Bulova Technologies Machinery LLC

## LIMITED WARRANTY

Bulova Technologies Machinery LLC ("BTM") warrants to the original purchaser, other than a purchaser for resale, (the "Purchaser") that BTM's machine tools shall be free of defects in materials and workmanship. For a period of one (1) year from completion of installation, or for a period of fifteen months from date of shipment, whichever is earlier, BTM will, at its sole and exclusive discretion, either replace or repair any part thereof defective in workmanship or material, at no charge to the Purchaser.

All warranty repairs must either be performed by or authorized by a BTM Authorized Service Organization. To obtain warranty service, Purchaser must contact their local BTM Authorized Service Organization. Purchaser must provide verification of the date of delivery/installation when requesting warranty service (dated installation report). Ground freight charges (UPS regular or common carrier truck) for all warranty replacement parts are paid by BTM. If machine is not operational, BTM will pay next-day air shipment charges for necessary parts weighing 100 lbs. or less. Materials or parts alleged to be defective shall be returned to BTM, at BTM's request, transportation charges prepaid. After the warranty repair or replacement of a defective part, BTM's warranty for such part shall continue for ninety (90) days or for the remainder of the original Limited Warranty, whichever is longer.

### WARRANTY LIMITATIONS

This warranty shall remain in effect only if the machine is used and maintained in accordance with all operating and maintenance instructions set forth in the manuals and instruction sheets furnished by BTM. BTM shall have no liability to repair or replace defective parts until the Purchaser has fulfilled its payment obligations. No allowance will be made for repairs or alterations made without BTM's prior written consent or approval. The limited warranty provided by BTM excludes the following:

1. Damage, malfunction, or failure caused by or resulting from improper maintenance, misuse, neglect, accident or any other cause beyond the control of the BTM.
2. Damage, malfunction, or failure caused by modification of the machine (mechanical or electrical) without written authorization by BTM.
3. Damage, malfunction or failure caused by installation or use of accessories or peripherals not purchased through or authorized in writing by BTM.
4. Paint, batteries, filters, fluids, fuses, light bulbs, or any commonly expendable item.
5. Damage to machines and/or components while being transported from BTM's warehouse or facility to destination.
6. Accessories or peripherals not manufactured by BTM, which shall be subject only to whatever warranty that is supplied by the manufacturer of such product.
7. CNC control, spindle and servo motors, spindle and servo drives, which are covered by a two (2) year manufacturer warranty.

No person, agent, distributor, dealer or company is authorized to change, modify or amend the terms of this Limited Warranty in any manner. BTM makes no warranties, guarantees or representations, express or implied with respect to the machine tool, or parts thereof, except to the extent such warranty is set forth herein. The equipment covered does not necessarily comply with any codes or standards unless specifically quoted, ordered, and so accepted.