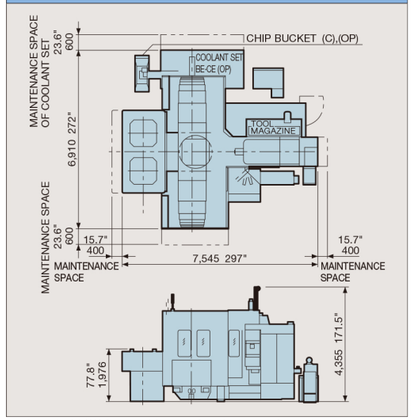
General view



Note : ATC 90 tools, Coolant set BE (options)

Standard Accessories

- Special assembly and operation tools 1 set
- Installation parts 1 set
- Hydraulic unit 1 set
- Spindle head lubricant oil cooler (proportionate to machine temperature) 1 set
- Spindle oil air lubricant system 1 set
- Operator call lamp (yellow) 1 set
  This lamp is illuminated when M00, M01, M02 or M30 has been executed or when M60 starts with the SET UP lamp turned off, or when an alarm of level 2 or over has generated.
- Work light 1 set
- Automatic NC power OFF 1 set

Options

- Splash cover
- Coolant set BE
- Coolant set CE
- Coolant set DE
- Coolant set EE
- Chip bucket C (bucket capacity: Approx. 0.18 m^3)
- Automatic tool changer (ATC) 60, 90, 120 and 180 tools
- High speed spindle 40~10,000min^{-1} MAS P50T-2
- Type of retention knob
- Coolant through the tool unit
- DIN specification, Type B coolant through the spindle unit
- High pressure coolant
- Coolant air blow unit
- Chip blow air unit
- Intermittent coolant unit
- Automatic measuring system
- Calibration block for automatic measuring system
- Automatic tool length measurement
- Reference tool for automatic tool length measurement
- Test bar (ø60 × L310)
- Residual current operated protective device
- Automatic main power OFF
- Preheat timer
- Work counter
- Linear scale feedback (X, Y and Z-axis)
- Rotary scale feedback (B-axis)
- T-slot pallet table
- Customer's specified painting color
- Z-axis thermal displacement compensation function
- External M code output (8 kinds)
- Operator call lamp (3-colored: red, yellow and green)
- Mist collector unit (HVS-220)

Note : Use a fire-resistant water-soluble coolant.

Machine Specifications				BMC-1000 (5)
Travel	X axis travel (Longitudinal movement of pallet)		mm (in)	1 500 (59.0)
	Y axis travel (Vertical movement of spindle head)		mm (in)	1 500 (59.0)
	Z axis travel (Cross movement of column)		mm (in)	1 250 (49.2)
	A axis tilting angle (Tilting angle of pallet)		deg	10~–100
	B axis rotating angle (Rotating angle of pallet)		deg	360
	Pallet horizontal (A=0°)			
		Distance from pallet surface to spindle center (Y)	mm (in)	–550~+950 (–21.6~+37.4)
		Distance from pallet center to spindle gage plane (Z)	mm (in)	250~1 500 (9.8~59.0)
	Pallet vertical (A= –90°)			
		Distance from pallet center to spindle center (Y)	mm (in)	–550~+950 (–21.6~+37.4)
		Distance from pallet surface to spindle gage plane (Z)	mm (in)	50~1 300 (1.97~51.2)
Pallet	Pallet working surface		mm (in)	1 000×1 000 (39.4×39.4)
	Pallet loading capacity			
	(Pallet horizontal)		kg(lbs)	2 500 (5 500)
	Loading moment (Pallet tilted)		N•m{kgf•m} (ft•lbs)	4 900 {500} (3 615)
	Pallet surface configuration			36–M20 tapped holes
	Locating method of work piece			Edge-locator
Spindle	Spindle speed range		min^{-1}	15~5 000
	Type of spindle taper hole			7/24 taper No. 50
	Spindle drivemotor (30-min/cont.)		kW(HP)	22/18.5 (30/25)
Feedrate	Rapid traverse rate	Linear-Axis X	m/min(ipm)	10 (400)
		Linear-Axes Y, Z	m/min(ipm)	12 (480)
		Rotary-Axis A	deg/min	720
		Rotary-Axis B	deg/min	1 000
	Feedrate	Linear-Axes X, Y, Z	mm/min(ipm)	1~5 000 (0.04~200)
		Rotary-Axis A	deg/min	0.1~360
		Rotary-Axis B	deg/min	0.1~720
Automatic pallet changer	Number of pallets			2
	Method of pallet change			Parallel shuttle
Automatic tool changer	Type of tool shank			MAS BT50 (CT50 or DIN50)
	Type of retention knob			MAS P50T–1 (45°)
	Tool storage capacity			38 [60, 90, 120, 180] tools
	Maximum tool diameter	When pots are full:	mm (in)	125 (4.9)
		When adjacent pots are empty:	mm (in)	250 (9.8)
	Maximum tool length		mm (in)	550 (21.7)
	Maximum tool mass		kg(lbs)	25 (55)
	Maximum tool moment		N•m{kgf•cm} (in•lbs)	30.4 {310} (270)
	Method of tool selection			Pot address random short cut
Accuracy	Positioning accuracy	Absolute encoder (X, Y and Z-axis)	mm (in)	±0.008/per full length (±0.0003)
		Linear scale feedback (X, Y and Z-axis)	mm (in)	±0.006/per full length (±0.0002)
		Rotary scale feedback (A axis)	arc-sec	±10
		Absolute encoder (B axis)	arc-sec	±5
		Rotary scale feedback (B axis)	arc-sec	±4
	Repeatability	Absolute encoder (X, Y and Z-axis)	mm (in)	±0.003 (±0.0001)
		Linear scale feedback (X, Y and Z-axis)	mm (in)	±0.002 (±0.00008)
		Rotary scale feedback (A axis)	arc-sec	±3
		Absolute encoder (B axis)	arc-sec	±3
		Rotary scale feedback (B axis)	arc-sec	±2

The values in the specifications indicate the maximum capacity.
If a continuous operation is required at the maximum capacity, please contact us for consultation.

* We reserve the right to change any of specifications in this catalog without notice in order to effect improvements.

ISO 9001
GOTEMBA plant

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SM17033-500-SZ
Printed in Japan

BMC-1000(5)

Shibaura Machine

BMC-1000(5)

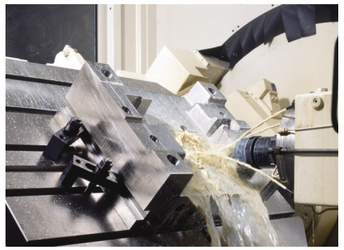
Horizontal Machining Center (5-Axis Control)

Catalog BMC10128-CED-05

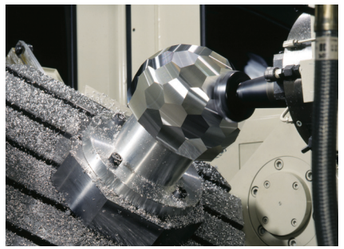
Simultaneous five-axis control for the single set-up machining of multi and sculptured surface type workpieces.

HIGH PRECISION AND HIGH RIGIDITY

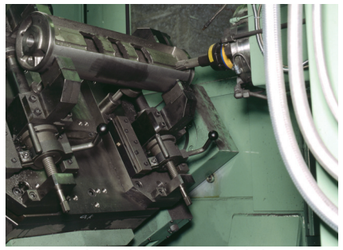
Highly accurate and efficient heavy-duty machining of such complex and multi-surface workpiece requiring a high degree of precision such as molds, ordinary machining, aircraft components, various types of blades and impellers.



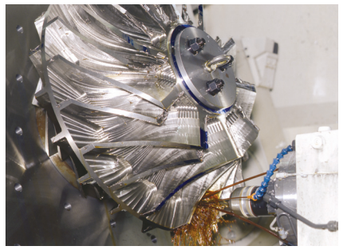
■ Inclined hole machining.



■ Multi-surface machining.



■ Complex shaped machining.



■ Sculptured surface machining.

Improved quality and accuracy of the machined workpieces
One set up

Machining of such complex and sculptured type workpieces can be accomplished in a single set-up operation, compared to a conventional 3 or 4 - axis controlled machining center which would require several set-up and special type work fixtures.

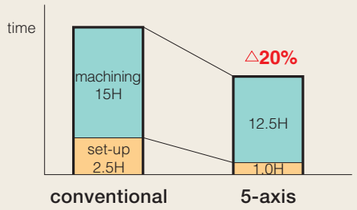
Reduction of fixtures fee

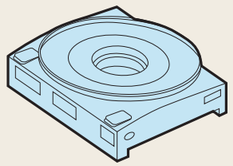
Improved productivity, reduces total cost and space
Process intension

Reduction of lead time
Process intension

Example for reduction of lead time

	Conventional machining	5-axis machining
No. of set up	4	2
Lead time	17.5 Hours	13.5 Hours





work piece : TABLE BASE for machining center
Material : High-tension cast iron

Special-type mechanisms and software designed specifically for five-axis controlled machining

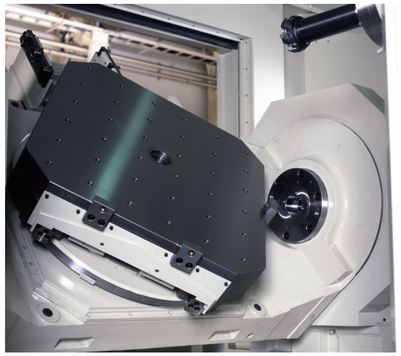
HIGH PRECISION AND HIGH RIGIDITY

A unique and extremely rigid table construction

Extremely high table rigidity is assured by the layered table structure in which the U-shaped table base sustaining the tilting table is supported by the saddle at both ends.

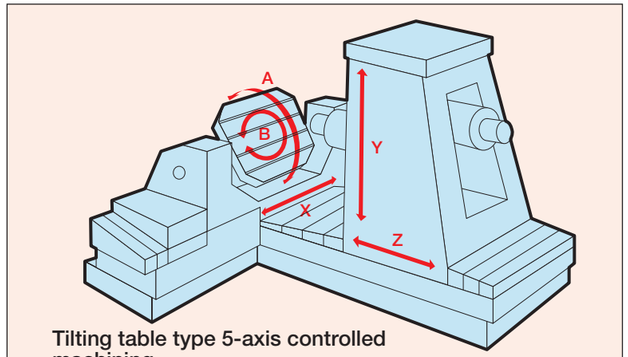
Two extremely rigid rotary axes (A and B axis)

For rotary axes indexing, a double pinion drive system is adopted to eliminate backlash and assure extremely rigid, continuous and accurate rotary movement.

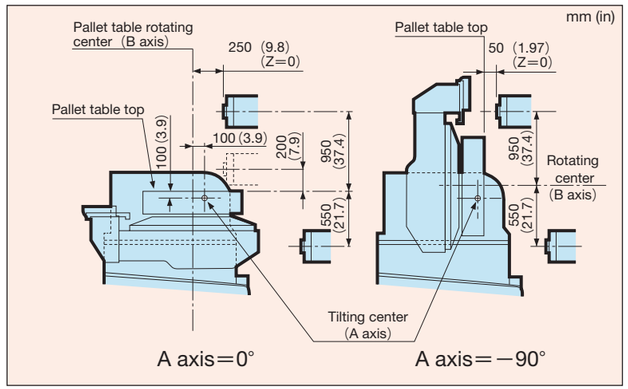


High precision and heavy-duty machining

In addition to the extremely rigid table construction, stabilized accuracy for heavy-duty machining and heavy work pieces is assured by two hydraulic counterbalance cylinders that are provided on both sides of the table base to compensate the load moment generated by the tilting table.



Tilting table type 5-axis controlled machining.



CNC system TOSNUC 999

User media (option set B)

Very useful device for managing long programs.

Outstanding operability contributes to high machine performance.

The TOSNUC 999 (Triple nine), equipped with many new and improved functions and devices is the most advanced, operator friendly CNC system, contributing to significantly improved operability.

● **Customized keys**

1. Operation procedure registration
By registering a series of operations in either of six exclusive keys [•] [:] [⁘] [::] [⁙] [⠿], it can be executed by just a press of the key.
2. Screen display registration
By just a press of the key, a preset combination of such NC standard displays as the main, sub and window, as registered in either of four dedicated keys [♠] [♥] [♦] [♣], can be called on the screen.

CNC System Specifications TOSNUC 999

Standard Specifications

●Controlled Axes

Controlled axes 5 axes : X,Y,Z,A,B
Simultaneously controllable axes
♦5 axes for positioning (G00) and linear interpolation (G01)
♦2 axes for circular interpolation (G02, G03)

●Programmable Methods

Programming resolution Linear axis : 0.001 mm
Rotating axis : 0.0001°
Maximum programmable dimension Linear axis : ±99999.999mm
Rotating axis : ±9999.9999°
Data code Automatic recognition of ISO/EIA code
JIS B6311
ISO 6983/1
EIA RS-358-B
EIA RS-244-B
Data format Variable block with a decimal point word address format
Absolute/incremental programming G90/G91
Decimal point input Calculator type/Programming resolution type

●Interpolation

Positioning G00
Linear interpolation G01
Circular interpolation G02/G03: CW/CCW

●Feed

Feedrate F5-digit programming in mm/min
Dwell G04 (0 ~ 999.99 sec)
Handwheel feed (portable)
Linear axis : 0.001/0.01/0.1 mm (per division)
Rotary axis : 0.0001/0.001/0.01° (per division)
Continuous jog feed
Rapid traverse rate override 0 ~ 100 % in 10 % increments
Feedrate override 0 ~ 200 % in 10 % increments
Override cancel M48/M49
Automatic acceleration/deceleration
Linear acceleration or deceleration is effected on rapid traverse rate and jog feedrate.
Automatic acceleration/deceleration for feed G08/G09 G50/G51

●Part Program Storage and Edit

Program storage 150 m equivalent punched tape (To be reduced as per the attached functions.)
No. of registrable programs
128 (To be reduced as per the attached functions.)
Program edit Various editing operations are possible for stored programs.
Background edit
Program deletion, insertion and modification are possible in the background edit mode.
Program name $ (or O)8-digit programming (alphanumeric characters)
Program comment No. of displayed characters max. 32 (max. 197 for input)
Control in/out
Sequence number N5-digit programming
Sequence number search Bidirectional search is possible.
Program nesting list
Fixture offset list
T-code list
Calendar timer
Program creation date management, time display

●Operation and Display

Operation panel
Display section: 10.4 inch color TFT liquid crystal display
Operation section: Keyboard with membrane switches
Customizing keys
A series of key input operations (key pattern) can be registered. (6 types)
A combination of screens can be registered. (4 types)
Tool file
Tool information such as tool offset and tool name can be batch-displayed and edited.
Automatic operation Memory operation and DNC operation
MDI operation Entry of multiple blocks and restart of an already executed block are possible.
Manual numerical input command
S.F manual setting Setting of S and F codes in manual mode.
S.F auto setting
Automatic setting of S and F codes in manual mode.
Spindle drive motor load factor display
Load imposed on spindle drive motor is displayed.
Run hour display The NC working time is displayed.
Program record A record of programs already executed is displayed. (Date of program execution, actual time, etc.)
Customized display color tone (Plasma display)
Display gray scale of window frame, background and characters can be changed.

●I/O functions and Devices

RS232C interface port A
Operation via external device, loading and dumping of programs and data are possible.

●S, T and M Functions

Spindle speed function S5-digit programming
Spindle speed override 50 ~ 200 % (in 10 % increments)
Tool function T4-digit programming
Miscellaneous function M4-digit programming

●Tool Offset

Tool length offset G43/G44/(G49)
Tool offset G45/G46/G47/G48
Cutter compensation C G40/G41/G42, point of intersection calculation
No. of tool offsets 60 sets (tool length offset, cutter compensation)

●Coordinate System

Coordinate system setting G92
Machine coordinate system positioning command G73
Plane selection G17/G18/G19
Fixture offset G53/G57, 9 sets
(This function cannot be used together with fixture offset 2.)
Fixture offset 2 G53/G54/G55/G56 3 sets

●Operation Support Function

Single block A program can be executed block by block.
Optional stop
Optional block skip
A block containing a "/" code at the head is ignored.
Dry run
Machine lock
Auxiliary function lock
Z-axis feed cancel
Manual absolute ON/OFF
All clear
Reset
Feed hold
Cycle stop
Program restart
Program restart, block restart
Sequence number collation and stop
Manual interruption
Handwheel feed interruption

●Programming Support Function

Circular interpolation by radius R designation
Radius of a circle can be specified directly, using R code.
Circle cutting Inner circle cutting: G12/G13, G22/G23
Outer circle cutting: G222/G223
Canned cycle
G77 ~ G89, G98, G99, G100, G186
Subprogram call G72 (Nesting of up to five levels is possible.)
Macro programming Single call: G72
Modal call 1: G74/G76
Modal call 2: G75/G76
Automatic corner override
Inside corner automatic override and inside corner cutting speed change.
Pattern cycle G109 ~ G119 (Drilling pattern)
G121 ~ G132 (Milling pattern)
Programming format check function Program format check
Single block suppression G990/G991
Feed hold suppression G992/G993
Override suppression G994/G995
Handwheel feed interruption suppression G996/G997

●Mechanical Error Compensation

Backlash compensation
Pitch error compensation
Pitch error gradient compensation
Origin correction
X-axis shift from table center is corrected.
Unidirectional positioning G60
Straightness compensation
Non-linear type compensation control

●Automatic Support Function

Tool life management
・ Counting of tool working time
・ Tool wear coefficient function Tool life and workingtime are counted by multiplying a specified coefficient.
・ Spare tool selection

●Machine Control Support Function

Integrated PLC TC200
Axis feed interlock

●Safety and Maintenance

Emergency stop
Stored stroke limit
Axis interference area setting and axis interference check G24/G25, G26/G27
Self-diagnosis function
Door interlock

●Servo System

Servo motor AC servo motors
Position detectors
Absolute encoders (All axes: Absolute position detection)
Rotary scale (B-axis)

Special Specifications (Options)

Options - Set B

(1)Helical interpolation G02/G03 (arc + linear)
(2)Synchronous tapping M843, M844, M845
(3)Part program storage
300 m equivalent punched tape (No. of registrable programs: 256)
(4)User media
(User media + compact flash slot)
For loading and dumping of NC programs and tool offset data.
(5)No. of fixture offsets
99 sets (including the standard sets)
(6)Random angle chamfering & corner R
(7)Manual alignment function
Including manual tool length/diameter measurement and coordinate conversion (G10/G11).
(8)Teaching function
Automatic program creation by MDI and manual operations.

Other Options

● Controlled Axes

(1)One additional controlled axis

●Programming Methods

(2)Inch/metric selection G70/G71

●Interpolation

(3)Hypothetical axis interpolation (i.e., interpolation with sine curve) G07
(4)Cylindrical interpolation G67
(5)Involute interpolation G105
(6)Archimedes interpolation (Spiral interpolation) G102/G103

●Feed

(7)Synchronous thread-cutting
(8)Per-revolution feed G95
(9)Per-revolution dwell G05

●Part Program Storage and Edit

(10)Part program storage
600 m equivalent punched tape (No. of registrable programs: 512)
1200 m equivalent punched tape (No. of registrable programs: 1024)
3000 m equivalent punched tape (No. of registrable programs: 1024)
5400 m equivalent punched tape (No. of registrable programs: 1024)
7800 m equivalent punched tape (No. of registrable programs: 1536)
10200 m equivalent punched tape (No. of registrable programs: 1536)
(11)Mass memory
Selection of 256 MB, 512 MB or 1 GB.

●I/O Functions and Devices

(12)Remote buffer operation (including port C connection)
(13)High-speed LAN linkage
File transfer by connecting CNC and LAN.

●Tool Offset

(14)No. of tool offsets
No. of tool length offsets: 499 sets (including the standard sets)
No. of cutter compensations: 499 sets (including the standard sets)
(15)Three-dimensional tool compensation G30/G31

●Operation Support Function

(16)Foreground plotting function
A tool locus of active program is plotted.
(17)Additional number of optional block skips Max. 9

●Programming Support Function

(18)Programmable mirror image G62/G66
(19)Programmable data input
Updating of offsets by G58/G59.
(20)Scaling G64/G65
(21)Plane conversion G35~G39
(22)Three-dimensional coordinate conversion G14
(23)Figure copy function G721/G722
(24)Circle cutting compensation
(25)Machining time estimate & NC plotting function
Machining time estimate and tool path plotting for non-active program on the background.
(26)Pattern cycle division into NC statements

●Automatic Support Function

(27)Faulty cut detection & feedrate regulation function
Tool breakage and wear detection
Feedrate regulation
Note)Counting of tool working time and spare tool selection are included in the standard specifications.
(28)Program check & used tool list creation
Check of a program to be executed next and creation of a slated tool list.
(29)Cutting start detection Used for spot facing, etc.

●Safety and Maintenance

(30)Memory lock

●High-Accuracy Machining & Servo System

(31)Shape recognition preview positioning control
(32)NURBS interpolation

●Cable

(33)RS232C cable 10 m-long