Miyano
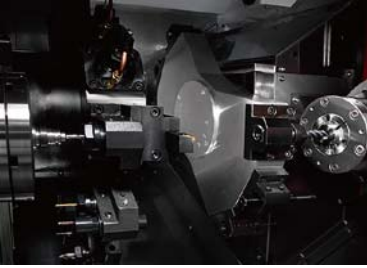
BNJ-34S3/42S3/34SY3/42SY3/51SY3

CNC Turning Center with 2 Spindles, 2 Turrets and 1 Y-axis Slide

Miyano Evolution Line

BNJ

Cincom Miyano

"Evolution and Innovation" is the Future

What could not be done can be done

X-axis movement is added to the traditional self loading mechanism which the main spindle is fixed and the opposed sub spindle can move to the Z-axis direction to receive the workpiece.

Wide space appears immediately after the back working turret is indexed at the concave position, then sub spindle passes.

The state-of-art technology of starting full capacity machining immediately after turret index completion reduces idle time and make it possible to do complete machining including eccentric machining and multiple machining, which other machines cannot do.
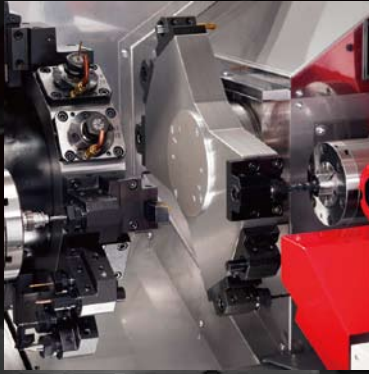
Simultaneous machining by main and back-working turrets

Simultaneous machining of work pieces on the L-spindle with the main turret and work on the R-spindle with the back working turret is the key to high efficiency.
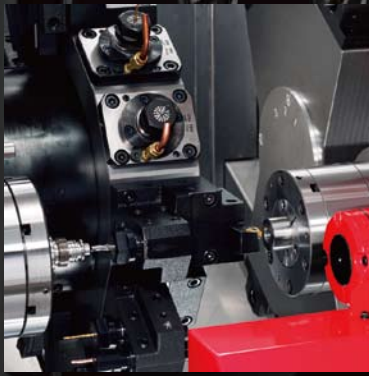
Simultaneous, overlapping machining for the front and back operations

Overlapping control, which enables the R-spindle to precisely follow the movement of the main turret, reduces machining time for operations such as turning operation and combined machining with the Double sided revolving tool.
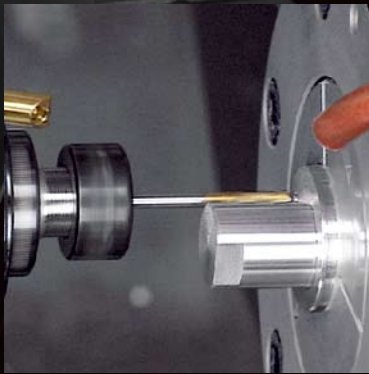
Off-center machining on the R-spindle

The off-center collet on the R-spindle enables off-center machining including combined machining such as crank machining which other machines are not capable of.
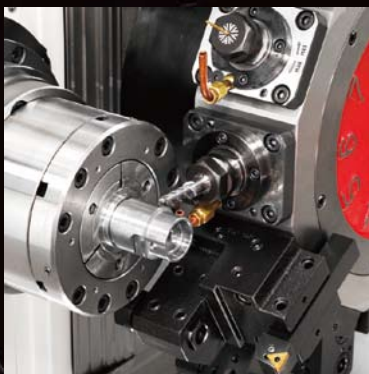
Combined machining on the Y-axis

The Y-axis function of the main turret enables side milling which previously required both C-axis and end milling. This also enables large diameter threading and machining of work pieces with large pockets and bosses which were previously difficult to machine.
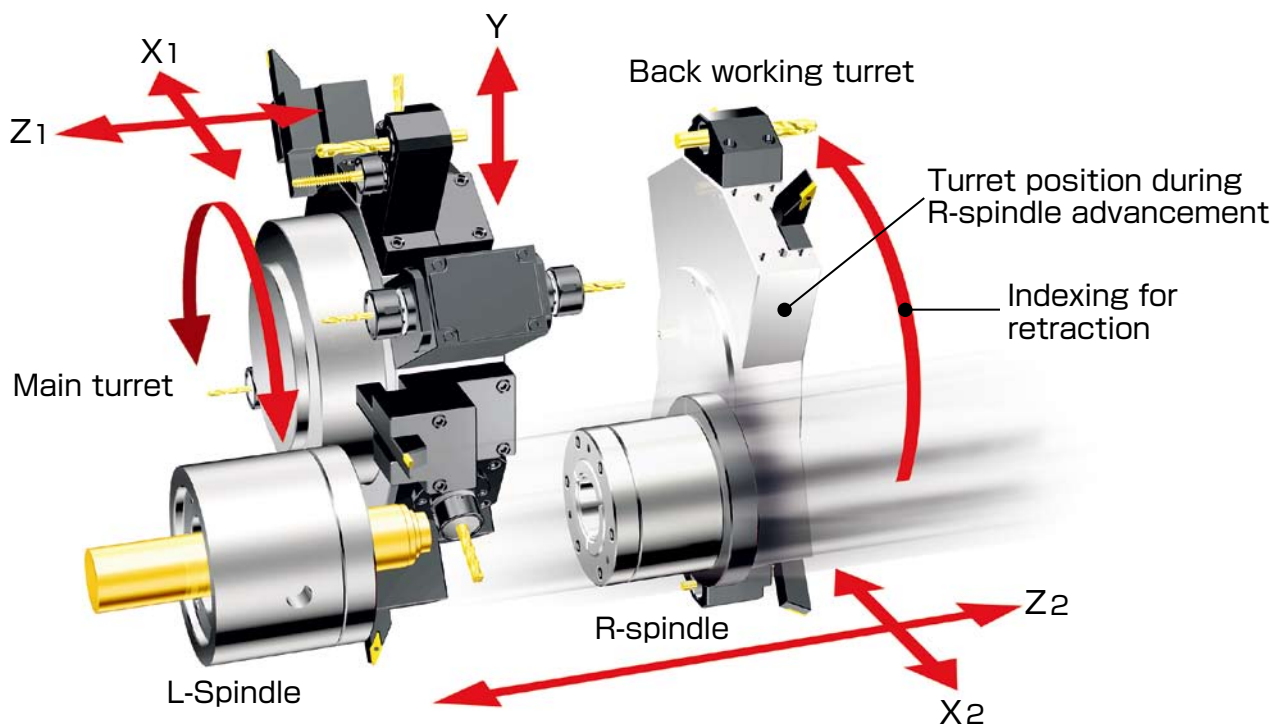
Machining at full capacity starts immediately after indexing the back working turret and the entire operation is completed in a single process as a result of combined machining.
Cranks and off-center bushes can also be machined.

Machining at full capacity starts immediately after indexing the back working turret

The backworking turret has two concave sections. Immediately after this turret is indexed to a concave section, clearance is created to allow the R spindle to gain access to rearward facing tools mounted on the main turret and/or to collect the workpiece from the L spindle. This new innovation results in reduced idle times.

Y

X₁

Z₁

Back working turret

Turret position during R-spindle advancement

Indexing for retraction

Main turret

L-Spindle

R-spindle

Z₂

X₂

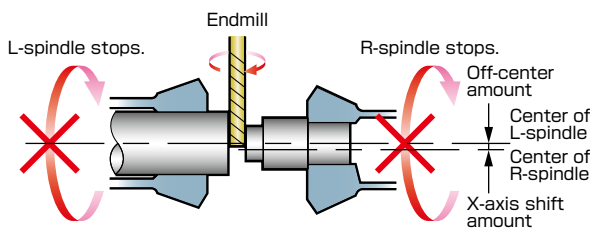## Off-center machining by X-axis shift

The off-center collet is installed in the R spindle and the R spindle is shifted horizontally in the X-axis direction by the off-center dimension. Then the chuck centers of the L and R spindle are aligned. The R spindle traverses to the left and chucks the workpiece that has been partially parted off. The workpiece is fully parted off by using an end mill to allow the operation to begin. Off-center machining on parts such as cranks, bushes can begin on the R spindle. Double off-center machining can also be carried out manually.

■ Examples of Machining

■ Cut-off with endmill

Endmill

L-spindle stops.

R-spindle stops.

Off-center amount

Center of L-spindle

Center of R-spindle

X-axis shift amount

■ Reference of off-center amount

Max. bar work diameter: 51

Off-center amount: e = R-spindle shift amount

$$\text{Off-center work amount} \leqq \frac{D - d}{2} = \frac{41 - d}{2}$$

R-spindle collet chuck

Max. φ41

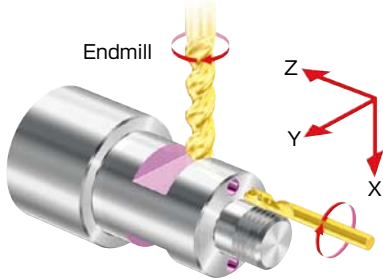Max diameter of collet D
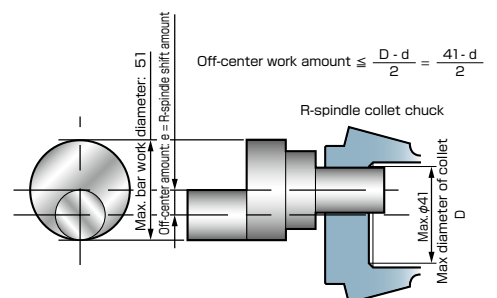
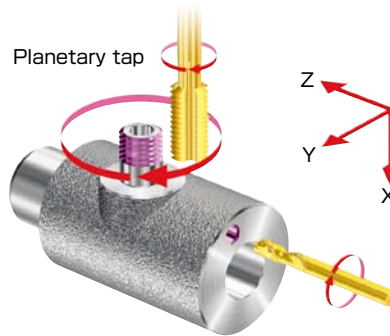# A wide variety of combined machining with revolving tools

■ Basic combined machining

In addition to conventional cross drilling, tapping and face tapping on the main spindle's center axis, a Y-axis allows for off-center drilling, tapping, and milling.
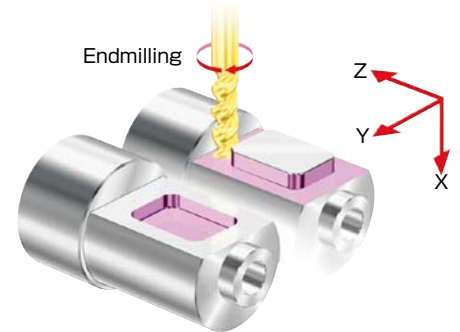
Endmill

Z
Y
X

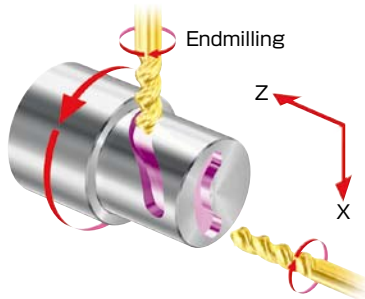## ■ Large Diameter Helical Threading
(Option)

Planetary tap

Z
Y
X

■ Milling of large pockets and bosses

Linear and circular interpolation makes it possible to machine large OD pockets and bosses on the Y-Z plane.

Endmilling

Z
Y
X

■ Contour Milling

Combining the C-, X-, and Z-axes makes it possible to do contour milling with simultaneous 3-axis control.

Endmilling

Z
X

■ Contouring milling + Off-center machining

One side is machined off-center by contour milling and the other side is machined off-center on the off-center chuck. Double off-center machining can be performed on the machine.
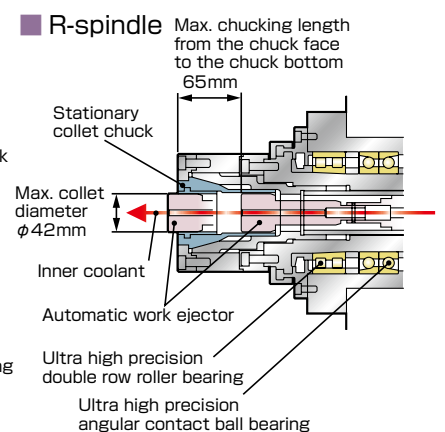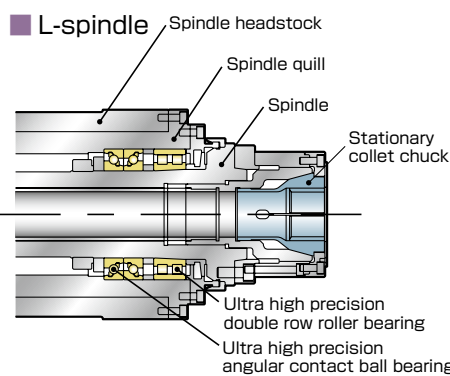
OD cutting tool

Z
X

Off-center
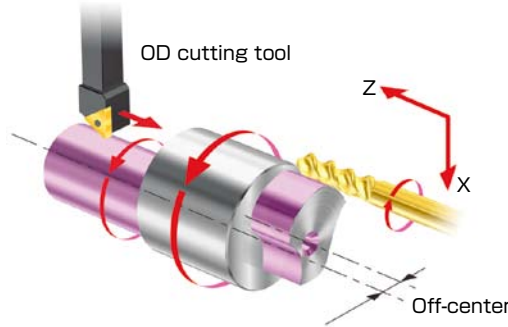
■ High precision milling

Accurate positioning by the C-axis and high precision combined machining by the Y-axis allow for a wider range of machining.
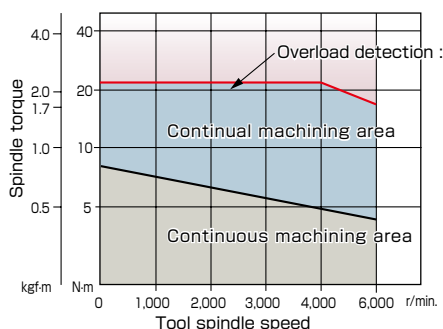
Endmilling

Z
Y
X
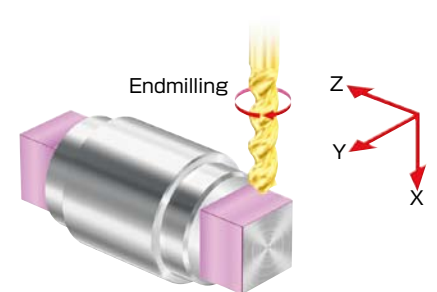
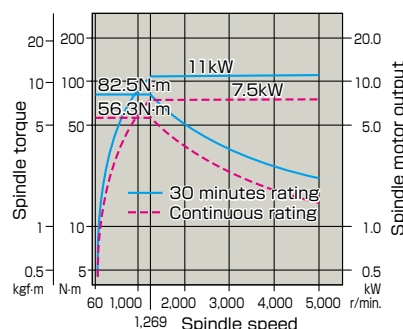# The L/R-spindles and tool spindles enable stable machining

Double row roller bearing and angular contact ball bearing used for the front bearing and double row roller bearing used for the back bearing are mounted in the quill housing for both L and R axes. This makes it possible to achieve sufficient rigidity, heat control, and flexible thermal distortion qualities to facilitate the production of high precision parts. Tool spindles are driven by a tough AC servo motor to achieve stable machining and overload protection.

■ L-spindle

Spindle headstock
Spindle quill
Spindle
Stationary collet chuck
Ultra high precision double row roller bearing
Ultra high precision angular contact ball bearing

■ R-spindle

Max. chucking length from the chuck face to the chuck bottom
65mm
Stationary collet chuck
Max. collet diameter φ42mm
Inner coolant
Automatic work ejector
Ultra high precision double row roller bearing
Ultra high precision angular contact ball bearing

■ Torque Diagram of Tool Spindle

Spindle torque (kgf·m / N·m)

Overload detection :

Continual machining area

Continuous machining area

Tool spindle speed (r/min.)

4.0 — 40
2.1 / 2.0 — 20
1.7 —
1.0 — 10
0.5 — 5

0 1,000 2,000 3,000 4,000 5,000 6,000

■ L-spindle Power Diagram

Spindle torque (kgf·m / N·m) — Spindle motor output (kW)

11kW
82.5N·m
7.5kW
56.3N·m

30 minutes rating
Continuous rating

20 — 200 — 20.0
10 — 100 — 10.0
5 — 50 — 5.0
1 — 10 — 1.0
0.5 — 5 — 0.5

60 1,000 2,000 3,000 4,000 5,000
1,269 Spindle speed (r/min.)

■ R-spindle Power Diagram

Spindle torque (kgf·m / N·m) — Spindle motor output (kW)

5.5kW
40.6N·m
3.7kW
27.3N·m

30 minutes rating
Continuous rating

10 — 100 — 10.0
5 — 50 — 5.0
1 — 10 — 1.0
0.5 — 5 — 0.5

60 1,000 2,000 3,000 4,000 5,000 6,000 7,000
1,269 Spindle speed (r/min.)
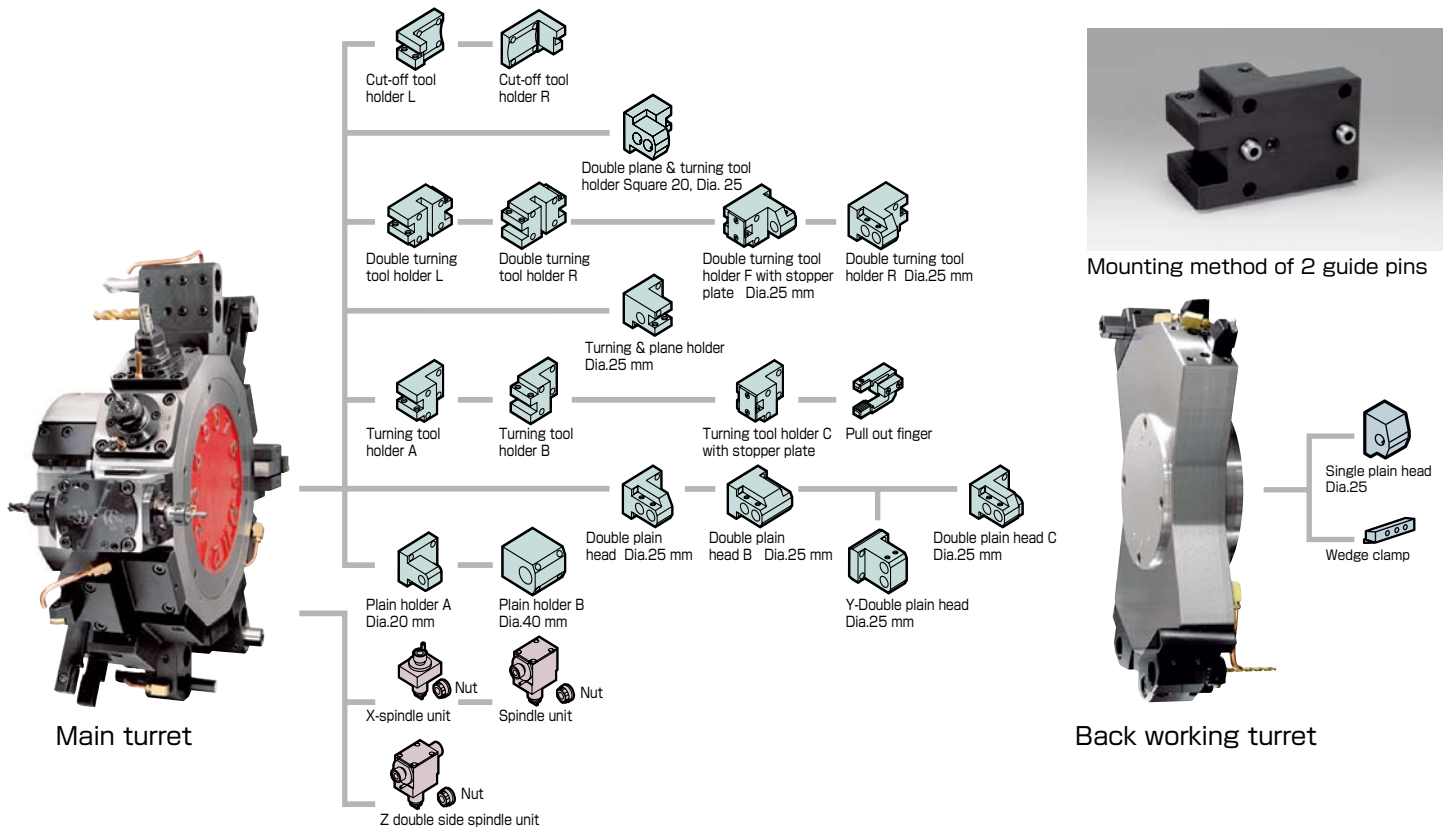Unusable range of ejector

A tooling system that is ideal for bar work machining and abundant options for a wide tooling zone.
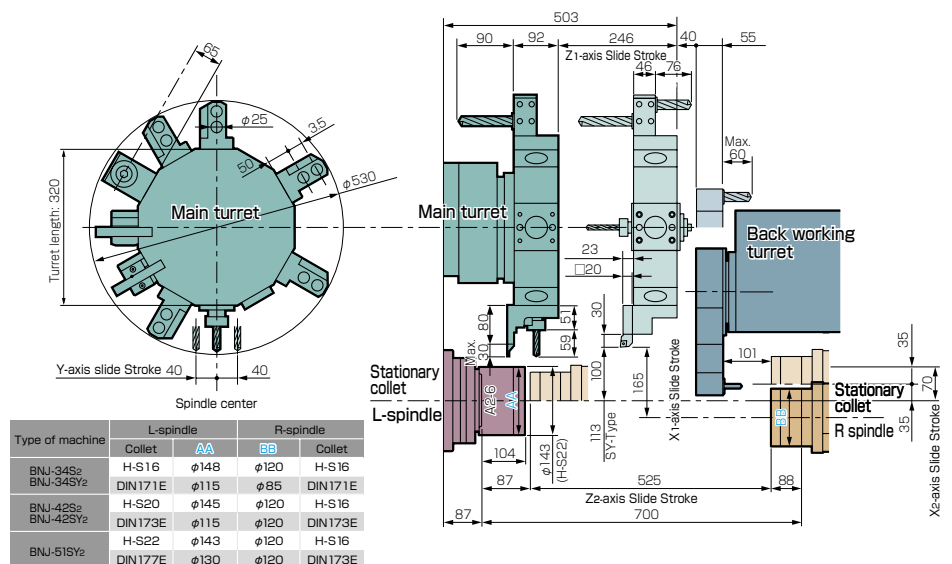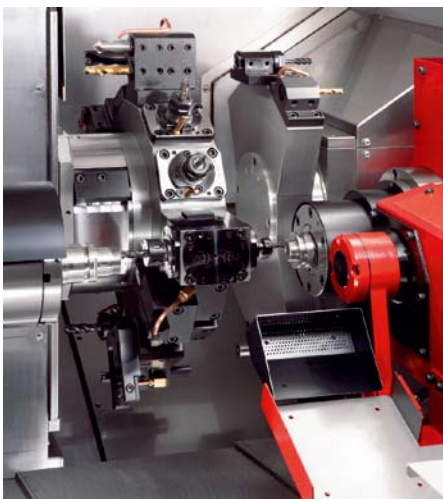
Tooling system

Since this model employs the same tooling system as the ABX series, the tool holders are completely compatible. Ideal tooling is achieved by selecting the most appropriate tool holders. When the bar feeder is not attached to the machine, a pull out finger chuck is available, which is commonly used for round bar, hexangular bar and square bar. The back working turret is a turret for back side machining. The OD cutting tool is directly mounted on the turret as a wedge and the ID cutting tool is mounted on the holder.

Cut-off tool holder L
Cut-off tool holder R

Double plane & turning tool holder Square 20, Dia. 25

Double turning tool holder L
Double turning tool holder R
Double turning tool holder F with stopper plate   Dia.25 mm
Double turning tool holder R   Dia.25 mm

Turning & plane holder Dia.25 mm

Turning tool holder A
Turning tool holder B
Turning tool holder C with stopper plate
Pull out finger

Double plain head   Dia.25 mm
Double plain head B   Dia.25 mm
Double plain head C Dia.25 mm
Y-Double plain head Dia.25 mm

Plain holder A Dia.20 mm
Plain holder B Dia.40 mm

X-spindle unit   Nut
Spindle unit   Nut

Z double side spindle unit   Nut

Main turret

Mounting method of 2 guide pins

Back working turret

Single plain head Dia.25
Wedge clamp

Tooling area

Type of machine	L-spindle		R-spindle	
	Collet	AA	BB	Collet
BNJ-34S2 BNJ-34SY2	H-S16	φ148	φ120	H-S16
	DIN171E	φ115	φ85	DIN171E
BNJ-42S2 BNJ-42SY2	H-S20	φ145	φ120	H-S16
	DIN173E	φ115	φ120	DIN173E
BNJ-51SY2	H-S22	φ143	φ120	H-S16
	DIN177E	φ130	φ120	DIN173E

Main turret
φ25
35
50
φ530
Turret length: 320
Y-axis slide Stroke 40   40
Spindle center

503
90 92 246 40 55
Z1-axis Slide Stroke
46 76
Main turret
Max. 60
Back working turret
23
□20
Stationary collet L-spindle
A216 AA
φ143 (H-S22)
Max. 80
30
59 51
30
100
165
SY-Type
113
X1-axis Slide Stroke
101
Stationary collet R spindle
35
70
35
X2-axis Slide Stroke
104
87
525
88
87
Z2-axis Slide Stroke 700

Various options

● Parts catchers and parts conveyors

Parts catcher & Parts conveyor is the requirement for bar work machining.
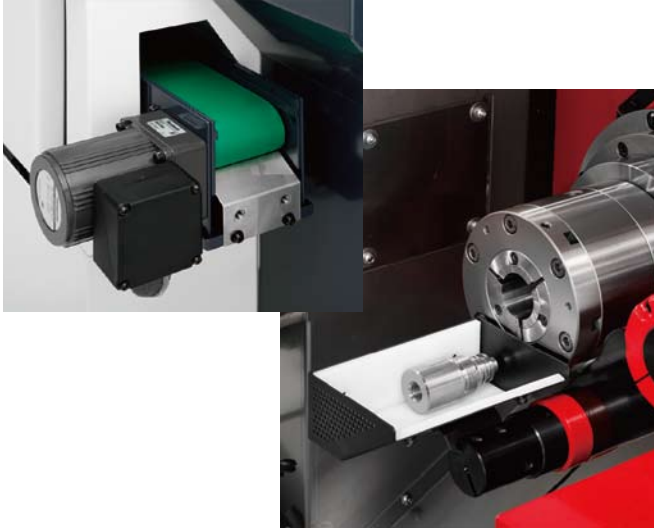
● Chip conveyor

This chip conveyor is a universal hinge type. It enables high precision machining by smoothly carrying out large volumes of chips and eliminating chip heat generated during prolonged machining. A chip conveyor is the indispensable for prolonged operation. Please consult with us when using special work piece materials for machining.

● Revolving tools

The standard tooling is a simple setup consisting of an X-spindle unit and a Z-spindle unit. The rigid tapping function (optional) is used for tapping. The tapping collet is mounted only in special situations.
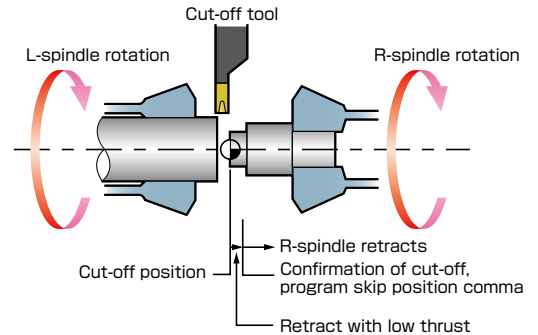
● Tool-break detection for drill

Drill breakage is detected by the swing cylinder.
The machine stops when breakage is detected, second accident can be protected.

● Cut-off confirmation

This is a function to confirm that cut-off of the work piece is completed and the R-spindle can traverse with low thrust to the retract position for cut-off confirmation and program skip. The safety and reliability of this function makes it easier to avoid mechanical troubles.

L-spindle rotation   Cut-off tool   R-spindle rotation

Cut-off position
R-spindle retracts
Confirmation of cut-off, program skip position comma
Retract with low thrust

NC SPECIFICATIONS   MIYANO-FANUC

● Simultaneously controlled axes	4axes / 2 paths, X1,Z1,Y1,Cs1,A1(Rev. tools) / X2, Z2, Cs2
● Min. input increment	0.001mm, 0.0001 inch, 0.001 deg.
● Min. output increment	X-axis:0.0005mm, Z-axis: 0.001mm
● Parts program storage capacity	512 kb, 1,280m (4,200 feet)Tape length
● Spindle function	Spindle speed S4 digits direct specify, Constant cutting speed control(G96)
● Rapid traverse rate	X1,X2, axis:18m/min. (708ipm) , Z1,Z2,axis:20m/ min.(787ipm) Y-axis 12m/min.(472ipm)
● Cutting feed rate	F3.4 digit direct specify
● Cutting feed rate override	0 ~150% (10% steps)
● Interpolation	G01, G02, G03
● Threading	G32, G92
● Canned Cycle	G90, G92, G94
● Work coordinate setting	Automatic setting, 64 sets by the geometry offset function
● Tool selection and work coordinate system selection	Tool selection 1 ~ 64 can be done by the first two digit of the T-4 digit code.
● Tool wear offset	Tool wear selection 1 ~ 64 sets can be done by the last two digit of the T-4 digit code.
● Direct input of tool positions	Measured value can be directly key in
● Input/Output interface	RS-232C, PC Card Slot.
● Automatic operation	Single/Continuous cycle operation. Single block operation, Block delete, Machine lock, Dry run, Optional block skip.

● Others
10.4" Color LCD, 800 storage parts programs, Decimal point input
Manual pulse generator, Memory protect, AC digital servo
Polar coordinate interpolation, Programmable data input(G10)
Cs-axis control(L/R Spindle)
● Basic Options
Chamfering/Corner R control, Tool nose R compensation, Background editing
Run hour/Parts count display, Synchronous mixing feed function
Multiple repetitive canned cycle(G70~G76), Drilling canned cycle
Continuous threading, Tool life management system
Continuous multi-lead thread cutting, Rigid tapping function(Spindle / Revolving Tools)
Cylindrical interpolation, Custom macro B
● NC Additional Function
Manual retrace function, Macro executer, Additional parts program storage (1Mbyte)
● NC Options
Helical interpolation

MACHINE SPECIFICATIONS

Items	Model Name	BNJ-34S3	BNJ-42S3	BNJ-34SY3	BNJ-42SY3	BNJ-51SY3
Machining Capacity & Chucking System						
Max. Bar Capacity	L-spindle	Φ 34mm (1.34" Dia.)	Φ 42mm (1.65" Dia.)	Φ 34mm (1.34" Dia.)	Φ 42mm (1.65" Dia.)	Φ 51mm (2" Dia.)
	R-spindle	Φ 34mm (1.34" Dia.)	Φ 42mm (1.65" Dia.)	Φ 34mm (1.34" Dia.)	Φ 42mm (1.65" Dia.)	Φ 42mm (1.65" Dia.)
Type of Collet Chuck	L&R-spindle	Stationary	Stationary	Stationary	Stationary	Stationary
Standard Turning Length		100mm	100mm	100mm	100mm	100mm
Size of Power Chuck	L/R-spindle	5" / 4"	5" / 4"	5" / 4"	5" / 4"	6" / 5"
Spindle						
Spindle Nose	L/R-spindle	Sp. Flat/Sp. Flat	Sp. Flat/Sp. Flat	Sp. Flat/Sp. Flat	Sp. Flat/Sp. Flat	A2-6/Sp. Flat
Spindle Speed Range	L-spindle	80 ～ 7,000min⁻¹	60 ～ 6,000min⁻¹	80 ～ 7,000min⁻¹	60 ～ 6,000min⁻¹	50 ～ 5,000min⁻¹
	R-spindle	67 ～ 5,000min⁻¹	67 ～ 5,000min⁻¹	67 ～ 5,000min⁻¹	67 ～ 5,000min⁻¹	67 ～ 5,000min⁻¹
Spindle Motor (30min./Cont.)	L-spindle	7.5/5.5 kW	11/7.5 kW	7.5/5.5 kW	11/7.5 kW	11/7.5 kW
	R-spindle	5.5/3.7 kW	5.5/3.7 kW	5.5/3.7 kW	5.5/3.7 kW	5.5/3.7 kW
R-SP Slide Stroke	X2	70 mm	70 mm	70 mm	70 mm	70 mm
	Z2	525 mm	525 mm	525 mm	525 mm	525 mm
Main Turret						
Type of Turret Station		12 Station	12 Station	12 Station	12 Station	12 Station
Turret Indexing Time		0.25sec./1st.	0.25sec./1st.	0.25sec./1st.	0.25sec./1st.	0.25sec./1st.
Turret Indexing Methods		AC Servo & Curvic C.	AC Servo & Curvic C.	AC Servo & Curvic C.	AC Servo & Curvic C.	AC Servo & Curvic C.
Slide Stroke	X1	165 mm	165 mm	165 mm	165 mm	165 mm
	Z1	246 mm	246 mm	246 mm	246 mm	246 mm
	Y1	---	---	± 40 mm	± 40 mm	± 40 mm
Back-working Turret						
Type of Turret Station		6 Station	6 Station	6 Station	6 Station	6 Station
Turret Indexing Time		0.2sec./1st.	0.2sec./1st.	0.2sec./1st.	0.2sec./1st.	0.2sec./1st.
Turret Indexing Methods		AC Servo & Curvic C.	AC Servo & Curvic C.	AC Servo & Curvic C.	AC Servo & Curvic C.	AC Servo & Curvic C.
Revolving Tools (Main Turret / Option)						
No. of Revolving Tools Station		12	12	12	12	12
Tool Speed Range		60 ～ 6,000min⁻¹	60 ～ 6,000min⁻¹	60 ～ 6,000min⁻¹	60 ～ 6,000min⁻¹	60 ～ 6,000min⁻¹
Tool Motor		2.5 kW	2.5 kW	2.5 kW	2.5 kW	2.5 kW
Machining Capacity	Drill/Tap	Φ 13mm/M8xP1.25	Φ 13mm/M8xP1.25	Φ 13mm/M8xP1.25	Φ 13mm/M8xP1.25	Φ 13mm/M8xP1.25
Machine Dimensions						
Machine Height		1,720mm (67.7")	1,720mm (67.7")	1,720mm (67.7")	1,720mm (67.7")	1,720mm (67.7")
Floor Space		2,780mm x 1,536mm (109.5" x 60.5")	2,780mm x 1,536mm (109.5" x 60.5")	2,780mm x 1,536mm (109.5" x 60.5")	2,780mm x 1,536mm (109.5" x 60.5")	2,780mm x 1,536mm (109.5" x 60.5")
Machine Weight		5,500kg (12,125Lbs.)	5,500kg (12,125Lbs.)	5,500kg (12,125Lbs.)	5,500kg (12,125Lbs.)	5,500kg (12,125Lbs.)

Others

Splash Guard Interlock, Coolant, Pneumatic Unit, Machine Light, Regular Hand Tools Kits & Box

Options

Collet Chuck System, Power Chuck System, Cut-off Confirmation, High Pressure Coolant, Revolving Tools and Drive Unit, Work Ejector, R-spindle Inner Coolant and air blow
Spindle Brake System(L&R-spindle), Air Blow, Parts Catcher and Parts Conveyor, Coolant Level Switch, Drill Breakage Detector, Chip Conveyor, Chip Box, R-spindle Through Parts Carrier
Magazine Bar Feeder, Signal Tower(3 steps)

The specifications are subject to change without notice, Standard equipment package may vary by region.
Machines in photos may not look exactly the same as the actual products.

[Japanese patent No.4090748]

EXTERNAL VIEW
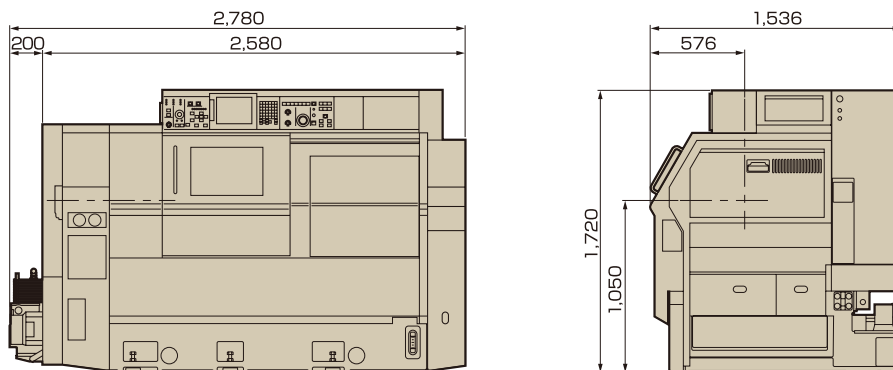
CITIZEN MACHINERY MIYANO CO., LTD.   (Miyano Company)

CITIZEN Micro HumanTech