SPEEDIO

S300 Xd1
S500 Xd1
S700 Xd1

Compact Machining Center

Machine Tools Sales Department,
Machinery Business Division,
Brother Industries, Ltd.

SPEEDIO S-Series

Introducing the **S300**Xd1 / **S500**Xd1 / **S700**Xd1

1. **Description of *SPEEDIO***

2. **S300**Xd1 / **S500**Xd1 / **S700**Xd1 **Features**

Cutting Out the Waste

Times are changing. Are you ready?

You need a machine that's fast and compact.

With the ability to make any cut.

In this world, only the strong survive.

Make it better with SPEEDIO.

SPEEDIO

SPEEDIO

SPEEDIO is a brand of No. 30 machine for customers who demand high productivity, which has high machining ability while having compactness and speed not found in No. 40, and is eco-friendly
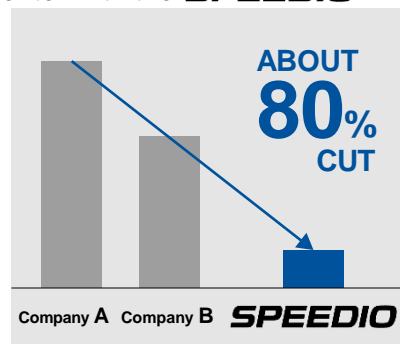
brother
at your side

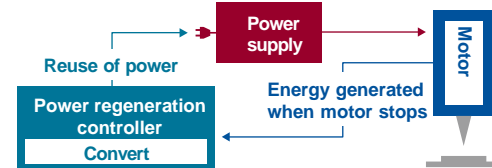# *SPEEDIO* for the Environment
Looking to Achieve Carbon Neutrality

While retaining the #30 spindle, and based on Brother's original technology, the *SPEEDIO* strives for industry-leading environmental performance, in addition to overwhelming high productivity, machining capabilities, and usability.

When machining is performed by replacing a general #40 machining center with the *SPEEDIO*

ABOUT
80% CUT

Company A   Company B   *SPEEDIO*

Power-Saving Functions

Power Regeneration system

Reuse of power

Power supply

Motor

Power regeneration controller
Convert

Energy generated when motor stops

Power consumption application

- LED work light
- Coolant automatically turns OFF
- Standby mode
- Machine light automatically turns OFF
- Display automatically turns OFF
- High efficiency pump, etc.

SPEEDIO

C A R B O N
N E U T R A L

SPEEDIO

S

S300 Xd1
S500 Xd1
S700 Xd1
Compact Machining Center

R Compact Machining Center
Equipped with Pallet Changer

R450 Xd1   **R650**Xd1

W Wide Stroke
Compact Machining Center

W1000 Xd1

U Universal
Compact Machining Center

U500 Xd1

M Compact Multitask Machine

M200xd1   *M300X3*

F High Rigidity
Compact Machining Center

F600X1

Special Options
T-200Ad / **BV7-870A**d
T-200A

Compact Machining Center *SPEEDIO*

S300Xd1 / S500Xd1 / S700Xd1

Best Selling Model *SPEEDIO*

More Advanced, Surpassing the Limits of the BT30 Machining Center

2. **S300**Xd1 / **S500**Xd1 / **S700**Xd1 Features

Range of Specifications Available for a Variety User Applications

Compact Machining Center
SPEEDIO

	S300 Xd1 **S300**Xd1-5AX	**S500**Xd1 **S500**Xd1-5AX	**S700**Xd1 **S700**Xd1-5AX
Travel range for X- / Y- / Z-axes	300 mm / 400 mm / 300 mm	500 mm / 400 mm / 300 mm	700 mm / 400 mm / 300 mm
Maximum spindle speed	10,000 min^{-1} (Option) 16,000 min^{-1},10,000 min^{-1} high-torque , 27,000 min^{-1}		
Tool quantity	14 tools (Option) 21 tools / **28 tools**		
Spindle option	BT dual contact system, Coolant-through-spindle (CTS) withstand pressure 3.0 MPa / **withstand pressure 7.0 MPa**		
Simultaneously controlled axes (Interpolation)	S300/500/700Xd1 : Linear, 4 axes (X, Y, Z, 1 additional axis) ; Circular:,2 axes **S300/500/700Xd1-5AX : Linear, 5 axes (X, Y, Z, 2 additional axes) ; Circular:,2 axes**		

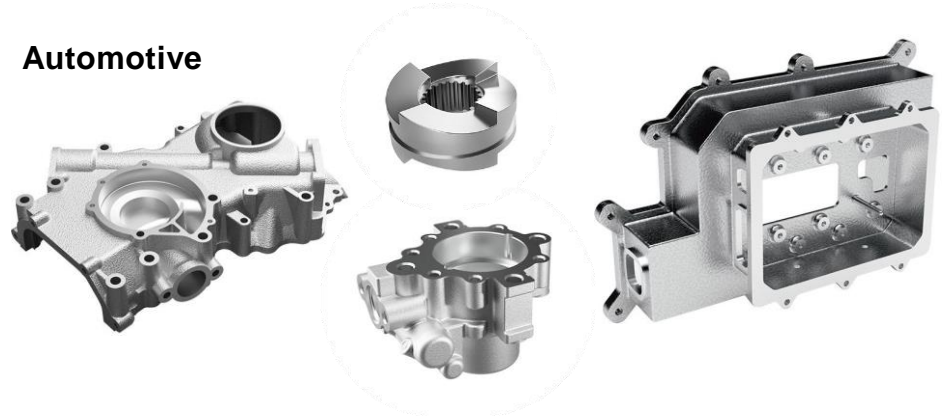*CTS withstand pressure is a piping specification.
*CTS cannot be selected for the 27,000 min^{-1} spindle.

Sample of Standard Machine Workpieces Covering Various Fields

Semiconductor
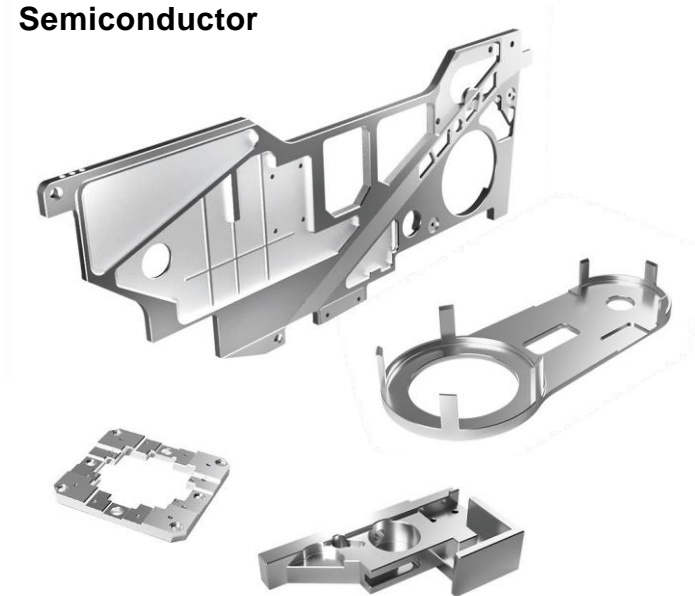
Automotive

Precision components

New Design and New User Interface in S-Series

S300 Xd1

S500 Xd1

S700 Xd1

CNC-D00

iF DESIGN AWARD 2021

Advanced New Model with Better Versatility

① Tool magazine

Added 28 magazine option
(Select from 14, 21 or 28 magazines)

② Machine base / column

Revised base and rib structure
Increased column width by 20%

③ Spindle

Withstand pressure 7.0MPa CTS option

④ Machining support

Increased max. tool weight
3 kg → 4 kg*1

⑤ Jig support

Increased max. table load weight 300 kg → 400 kg*1

⑥ Simultaneous 5-axis control

*1 Parameter setting required.

Pursuing High Productivity

Expanding Functionality

Advanced, New D00 Control

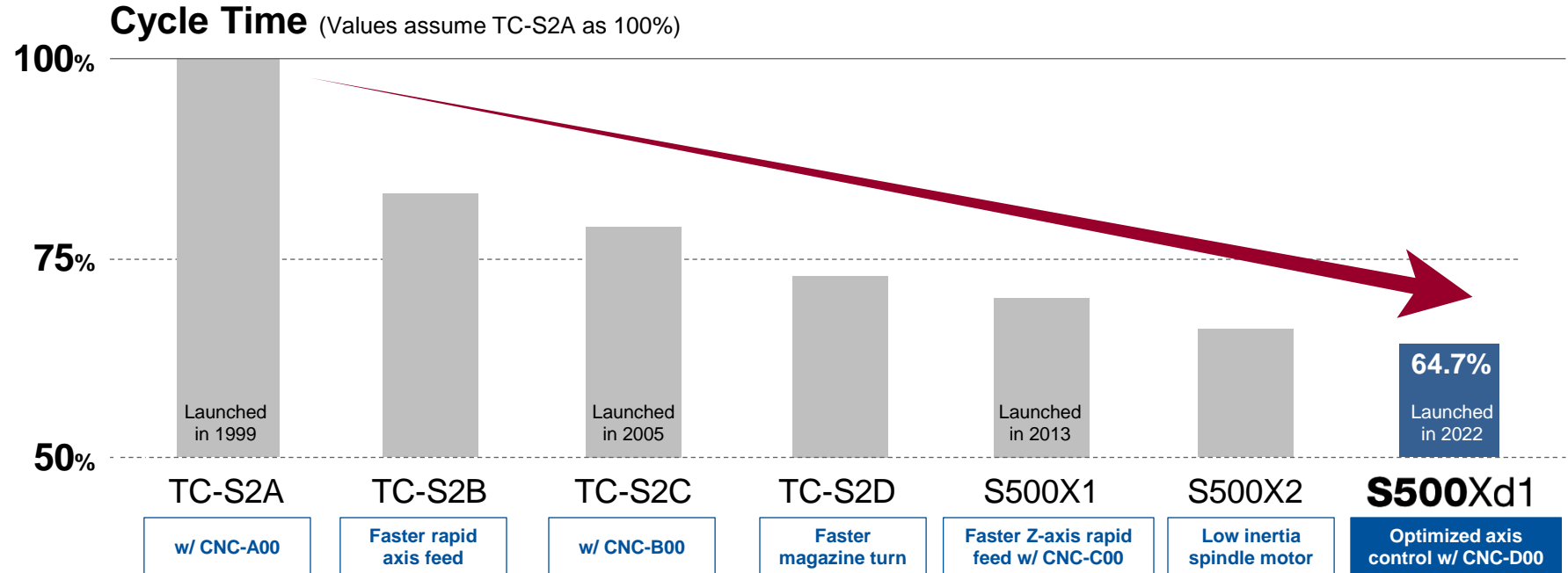**Constantly Improving Reliability**

Pursuing High Productivity

Expanding Functionality

Advanced, New D00 Control

Constantly Improving Reliability

Made Further Advancements for Better Total Productivity

Cycle Time (Values assume TC-S2A as 100%)

|						
TC-S2A	TC-S2B	TC-S2C	TC-S2D	S500X1	S500X2	**S500**Xd1
w/ CNC-A00	Faster rapid axis feed	w/ CNC-B00	Faster magazine turn	Faster Z-axis rapid feed w/ CNC-C00	Low inertia spindle motor	Optimized axis control w/ CNC-D00

*Comparison using Brother sample program

Shortened Non-Machining Time

Developed a mechanically and electrically integrated

SPEEDIO to eliminate unnecessary ATC operation

and shorten the tool change time.

|	S500X2	**S500**Xd1
Tool to Tool	0.7 sec.	**0.6 sec.**
Chip to Chip	1.3 sec.	**1.2 sec.**

Optimized operation, eliminating unnecessary operation in magazine control

Highly responsive servo for smooth acceleration / deceleration
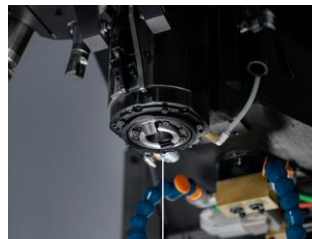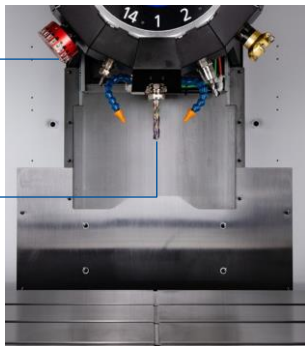
Revised spindle orient control to shorten indexing time

Cycle time comparison (when S500X2 is 100%)

Alternator

Crank case

| | 100% | 98.3% | | 100% | 98.3% |

S500X2 | **S500**Xd1 | S500X2 | **S500**Xd1
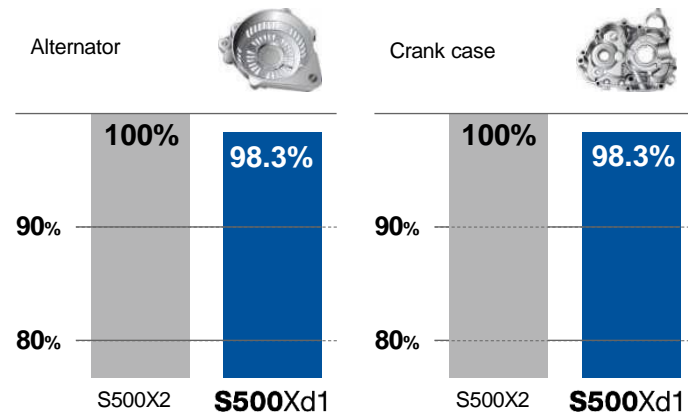
Compared to previous model, unnecessary non-machining time was cut further, shortening the cycle time by approximately 1%.

16

Pursuing High Productivity	**Expanding Functionality**
Advanced, New D00 Control	Constantly Improving Reliability

# Support for Machining Large and Complex Parts

Changing needs

① Larger size by consolidating the functions of automobile EV parts
② Complication of machined shape by consolidating the functions of parts
③ Increased jig weight due to large parts

Oil pan

Inverter case

In addition to the 14 magazine option, added 21 and 28 magazine standard options (②)

14 magazines

21 magazines

28 magazines

Max. tool weight : 4 kg (②)

*If standard weight exceeds 3 kg, then an ATC magazine load weight limit or speed adjustment is needed.

Coolant-through-spindle (CTS) w/ withstand pressure 7.0 MPa (②)

*CTS with withstand pressure 7.0 MPa only refers to the piping. Customers must make separate arrangements for the pump and tank.

Support for Machining Large and Complex Parts

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① Larger size by consolidating the functions of automobile EV parts
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Oil pan

Inverter case

Selection of coolant nozzle specifications (②)

Fixed to column
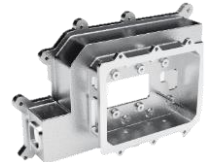Coolant can be supplied more easily to machining points even if the tool length varies.
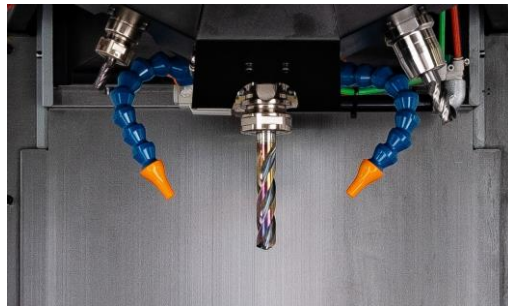
Fixed to spindle head
Coolant can be supplied more easily to machining points even if the machining height varies.

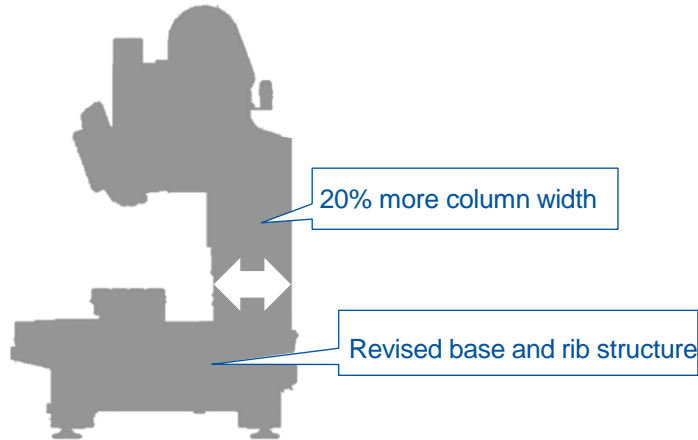## Max. table load weight: 400 kg (①, ③)

*When the table load weight parameter is set, the acceleration and positioning speed are automatically adjusted to match the load weight.

Better Machining to Support Shapes Needed in Growing Trends

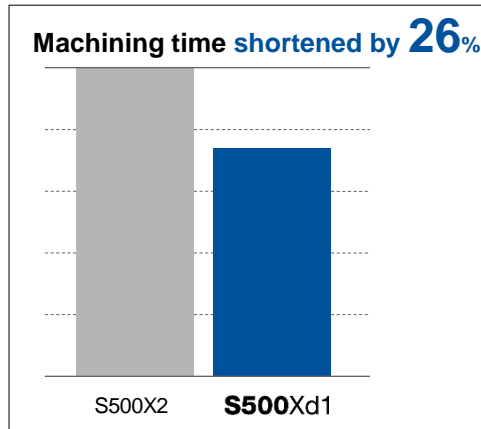■ **Improved support against vibration**

- **Increased column width by 20%**
- Topology design optimized for **high rigidity structure**

■ **New D00 control**

- **Block processing is 4 times faster**
- Look ahead blocks: 200 → **1000 blocks**[1]
- **Better deceleration control algorithm**

*1 High accuracy mode BII option setting

20% more column width

Revised base and rib structure

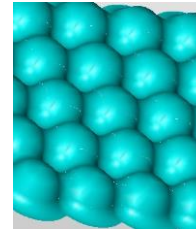**Machining time shortened by 26%**

S500X2   **S500**Xd1

Bone plate (Medical)

Support bracket (Semiconductor)

Watch case (Watch parts)

Simultaneous 5-axis control
(S300/500/700Xd1-5AX spec.)

Wants to produce products where continuous surface quality is required, such as medical equipment.

Wants to reduce machining time and improve quality by creating a simple program.

▼

Simultaneous 5-axis control plus tool center point control enables quality improvement and reduction of machining time.

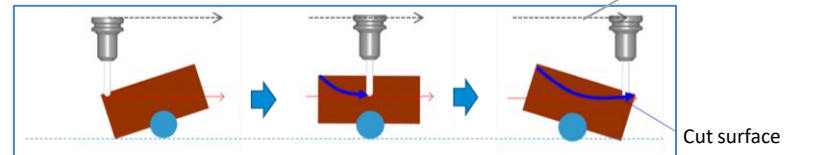The following functions are standard on the M200Xd1-5AX:

- Simultaneous 5-axis control
- Tool center point control (look-ahead 1,000 blocks)
- Memory capacity (3 Gbytes)
- Submicron command
- Feature coordinates setting
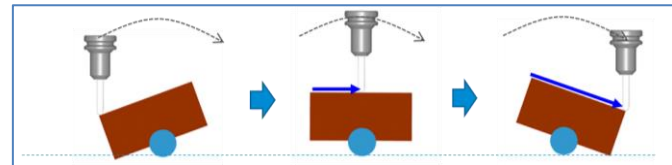
Effects of tool center point (TCP) control

As this function controls the tool so that the tool tip moves along the specified path even when the direction of the tool changes, minute division is not necessary when creating an NC program.
In addition, as the travel speed of the control point can be kept constant, the surface quality improves.

Without TCP control (simple 5-axis interpolation)

Control point path

Cut surface

With TCP control

Excerpted from Ai Solutions HP
http://www.ai-sols.co.jp/5axis/5ax_topic/

Pursuing High Productivity	Expanding Functionality
Advanced, New D00 Control	Constantly Improving Reliability

Global Standard User Interface

Received "iF DESIGN AWARD 2021"
one of the top 3 design awards in the world.

Increased screen size
12.1-inch → 15-inch

Our standardized touch panel is made for onsite work conditions
• **User operation like a smartphone**
• **Safe to use onsite**

Consolidated Access on New Home Screen

Home Screen

Previous Screen
Touch panel can be changed to previous screen that user is accustomed to

Cycle time
Remaining time can also be displayed

Workpiece counter
Workpiece counters enabled in program are displayed

Tool life
5-tool display, starting from tool with shortest tool life

Support application keys

Program

Shortcut keys

Advanced User Interface

Equipped with new "Support Applications"

to help the user with everyday tasks

More Visibility

Production
performance

Operational
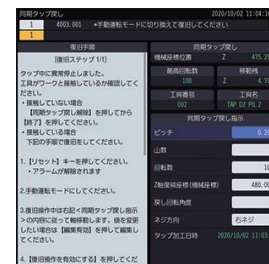performance

Power
consumption

Task support

ATC tools

Recovery support /
Check

Shorten cycle time
settings

Many New Convenient Functions Added

■ **Tap override**

Spindle and cutting **Override Enabled** during tapping operation

*Tap return recovery operation also enabled

*Excluding end mill tapping (G177/178)

■ **Cycle time log**

Keeps the most recent **20 records** for cycle time

■ **Tool log**

After selecting a record from the cycle time log,

the **cutting time of each tool** in that program **can be displayed**

■ **Additional functions**

- Accessories
- Multi-skip
- Program restart from (automatically) saved position
- Measure time for specified part

- Load monitor and predict overload display
- Multiple block support in MDI operation
- External sub program call
- Added new ST/FBD languages to internal PLC

Cycle time log

Tool log

Accessories

Load monitor

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Hardware Specifications Upgrade

■ **Faster block processing speed**
   Block processing is 4 times faster

■ **More look ahead blocks in high accuracy mode B**

Standard	40 →	**160**
Option	200 →	**1000**

■ **Increased memory capacity, more workpiece zero point settings**

   ◎ Memory capacity

Standard	100 MB →	**500 MB**
Option	500 MB →	**3 GB**

   (Up to 4000 record files for both)

   ◎ Extended workpiece coordinate zero setting combinations

   48 → **300**

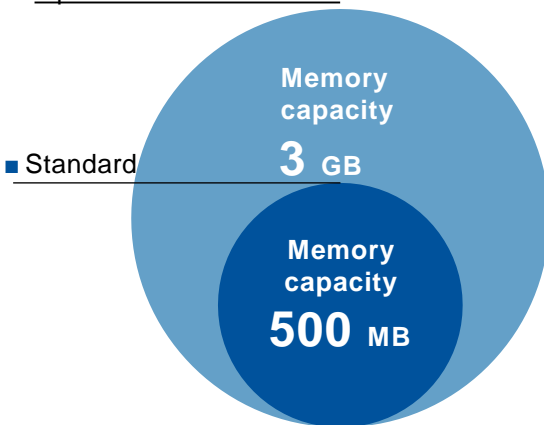■ **Doubled tool data capacity (NC only)**

   99 → **198**
   Tool life unit can be set to seconds

3D machining workpiece example

■ Option

■ Standard

Memory capacity
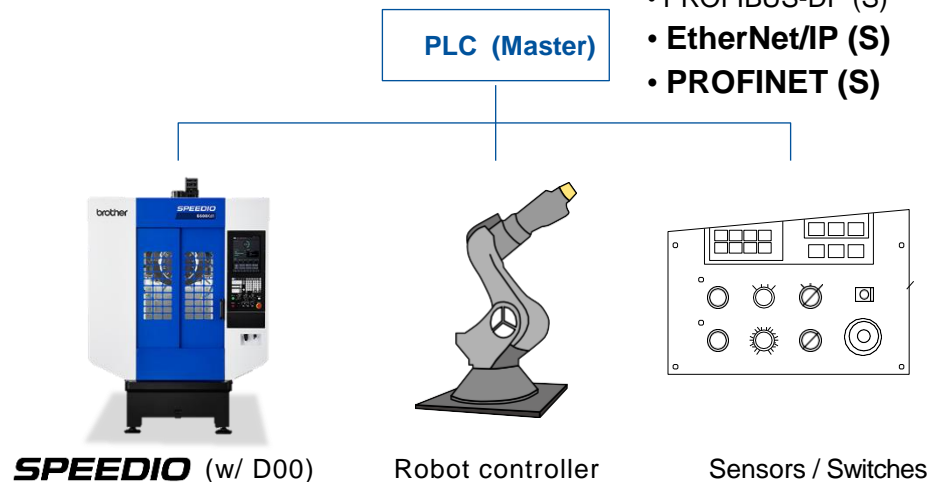**3 GB**

Memory capacity
500 MB

*Data comparison with CNC-C00

Added Compatible Standards

Added 2 types of industrial Ethernet:

Ethernet/IP and PROFINET to use on fieldbus networks, making the connection easier for users.

PLC (Master)

- CC-Link (M/S) *1
- Device Net (S)
- PROFIBUS-DP (S)
- **EtherNet/IP (S)**
- **PROFINET (S)**

SPEEDIO (w/ D00)   Robot controller   Sensors / Switches

Support also for OPC UA

Users can now connect directly to other companies' monitor software that is compatible with OPC UA.

OPC UA

*1   PLC (Master) is not necessary for CC-Link (Master).
*2   Only 1 type can be selected from all the options for the fieldbus network.

Pursuing High Productivity

Expanding Functionality
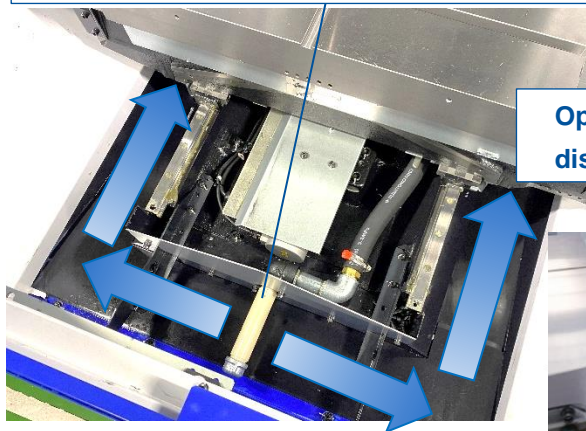
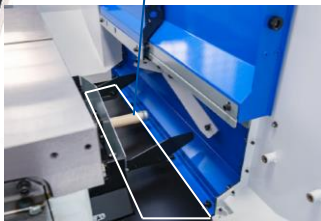Advanced, New D00 Control

Constantly Improving Reliability

Constantly Improving Reliability

Better Chip Discharge

Increasing the diameter of the tip shower pipe under the Y-axis cover
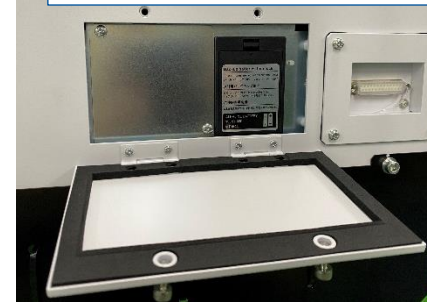
Optimization of chip discharge shape

More coolant flow cuts down chip buildup ensuring stable production

Better Control Unit Reliability

No loss of position information in servo motor caused by batteries expiring

NEW Battery replacement unnecessary, encoder does not use batteries

No loss of position data caused by batteries expiring → Less risk of machine stoppage

Support for Faulty Workpiece Detection & Machine Collision Avoidance
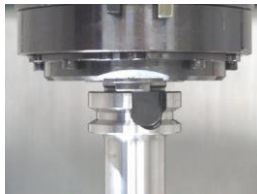
■ ATC monitoring function

Detects problems due to attachment errors or in the event that a tool is forgotten.

Mis-attachment to machine

Tool holder missing
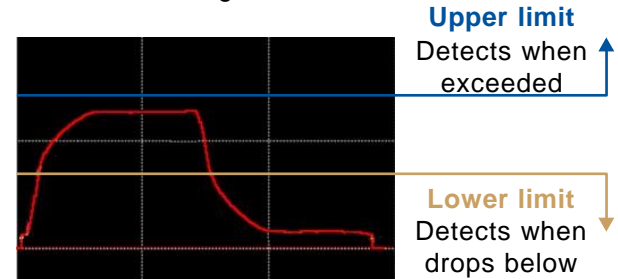
Alarm stop with ATC

▶ **Prevent outflow of defective workpieces**

■ Machining load monitoring function

Detects increase in machining load.
Prevents outflow of defective workpiece caused by double machining.

Upper limit Detects when exceeded

Lower limit Detects when drops below

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	Item		**S300**Xd1 **S300**Xd1-5AX	**S500**Xd1 **S500**Xd1-5AX	**S700**Xd1 **S700**Xd1-5AX
Spindle	Speed	min^{-1}	10,000 / 10,000 high-torque / 16,000 / 27,000		
	Tool	-	BT / BBT		
	Coolant-through-spindle withstand pressure		**3.0 MPa / 7.0 MPa***		
Travel range	X-axis	mm	300	500	700
	Y-axis	mm	400		
	Z-axis	mm	300		
Feed axis	Rapid feedrate X×Y×Z	m/min	50 × 50 × 56		
Table	Size of work surface	mm	600 × 400	600 × 400	800 × 400
	Max. load weight	kg	250（300）	250 **(400 *²)**	
Tool changer	Tool storage capacity	Qty.	14 / 21	14 / 21 / 28	
	Max. tool length	mm	160 / 250 (14 / 21 tools)	250	
	Max. tool diameter	mm	110		
	Max. tool weight	kg/tool	**3.0 (4.0 *²)**		
NC control unit		-	**S300/500/700Xd1 : CNC-D00 , S300/500/700Xd1-5AX : CNC-D00v(DB)**		

*1 CTS withstand pressure is a piping specification
*2 Speed parameter setting must be adjusted.

Best Selling *SPEEDIO* Model - Advancements in S-Series

- **New control unit w/ CNC-D00**
- **Added simultaneous 5-axis control spec**
- **Added 28 magazine option**
- **Revised base and column structure for better rigidity**

- **Added coolant-through-spindle (CTS) 7.0 MPa piping**
- **Maximum tool weight: 4 kg**
- **Maximum table load weight: 400 kg**