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—
Lathe Controller

Milling Controller
—



NEXT
GENERATION
CNC CONTROLLER
—

Trusted technical service



Profile

SYNTEC has been devoted to the machine tool industry with 100% owned controller technologies cultivated to be innovated in both hardware and software. In addition to the well known reputation in machine tool controllers, SYNTEC extended our businesses to servo products, drive, motors, and encoder in order to provide not only higher servo products performance but also one-stop solution service of a tool machine. SYNTEC has earned our customer trust by comprehensive after-sales service and has become one of the most influential and development potential brands in the Asia-Pacific market. SYNTEC now is taking "Industry 4.0" as the main goal of technological development.



Next Generation Controller	<u>01</u>	Integrated Cloud and Drive	<u>15</u>
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01 Next Generation Controller

The latest design, advanced communication control and powerful performance.



Brand new design - Next Generation Controller

01

- Fully-flat screen with attractive appearance
- Provides touch screen option to make operations easier
- Two screen sizes 10" and 15" are provide
- Right row button added in 15" controller for user friendly operating shortcut
- Applies to 5-axis machine, vertical machining center, and turn-mil machine
- Modular hardware design and auto backup system that could improve maintenance efficiency and make it easy to repair
- 10" screen controller is compatible to classic model 8" screen controller.
- Improves the reliability and stability by enhances the oil-proofness, dust-proofness, and heat dissipation

Powerful and Diversified Communication Interfaces

02

02

Serial connect, high speed and high reliability.



Factory Cloud Connected

With dual-RJ45, connect to cloud and tune on-site in the meantime.

Syntec SRI Interface

Unique SRI PROTOCOL (Syntec Remote Interface) for extra IO (max:4096), AD DA, and support modbus RS-485 to connect with Inverter or PLC module.

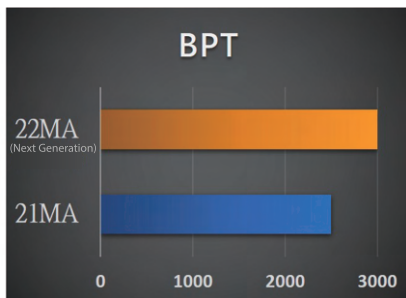
Universal CNC controller

Support various serial communication interfaces, such as Mechatrolink-III, EtherCAT and RTEX.



High Performance

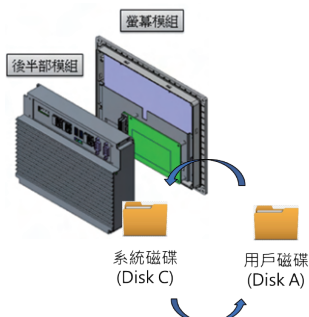
03



Higher performance due to both hardware and software being upgraded.

- CPU promoted, BPT elevated 20%, fluent HMI.

Special design for 24-hour factory 04



High reliability and considered repairing design can solve controller breakdown and restore system datas immediately by changing module.

- Module design to remove damaged module only.
- AB backup to restore datas quickly after repairing.

Best Partner: Syntec Servo Products 05



Diverse servo products for tool machine.

- Collaborated with well-known manufacturers, offer diverse servo products.
- Professional tuning and service, Syntec is your best partner.

SYNTEC have the right to modify product specification if necessary

Panel Layout

SYNTEC Lathe Controller

The SYNTEC controller is well designed and integrated, significantly reducing wiring and space requirements. With latest M3 serial communication, SYNTEC controller provides better performance and integration to CNC machines.

15 inch Lathe Controller

Keyboard VK15
 Panel: ST4022T



10 inches Lathe Controller

Panel: ST4022T



Keyboard VK10
 Panel: 3025T



Keyboard HK-900
 Panel: 4425T2



Controller Type	Standard		Turn-Mill Machine				Multi-Path Turn-Mill Machine				
	6TA-E *	7TA **	2ITA-E	21TB-E	22TA	22TB	210TB-E	210TB-E5	220TB	220TB-5	
Axis No.	3(5)	3(4)	4	6(8)	4	6(8)	12(18)		12(18)		
DA	2	—	2		—		2		—		
I/O	RIO	—	64/64								
	SRI	○									
	Direct I/O	32/32	—	32/32		—		32/32		—	
Type & Size	With Panel	8"	8"	8"/10.4"		8"/10.4"/15"		8"/10.4"	10.4"	10.4"/15"	
	With Panel (Flat)	—	—	—		10.4"/15"		—		10.4"/15"	
	Stand Alone	—	—	○		—		○	—	—	
Servo	M3/EtherCAT										
VGA	—	—	○ ***		—		○ ***		—		
Connection	Ethernet/RS485/SRI		Ethernet/RS485/SRI		Ethernet/RS485/SRI		Ethernet/RS485/SRI		Ethernet/RS485/SRI		
Multi-Path	1	1	2		2		4		4		
Storage	512MB	4GB	512MB		4GB		4GB	4GB	4GB	4GB	
Titled Working Plane Machining	—	—	△				△				
RTCP	—	—	—				△				

Marks: * Provided in Overseas and China / **Only provided in China / ***Only provided for the stand alone with VGA / ○ Standard Function / △ Optional Function / - Not Available Function

8 inches Lathe Controller

Panel: 4018T3



Keyboard VK8-900

Panel: 2625T



Panel: 4012T2



Panel Layout

SYNTEC Milling Controller

The SYNTEC controller is well designed and integrated, significantly reducing wiring and space requirements. With latest M3 serial communication, SYNTEC controller provides better performance and integration to CNC machines.

15 inches Milling Controller

Keyboard VK15
Panel: ST4022M



8 inches Milling Controller

Panel: 4012M

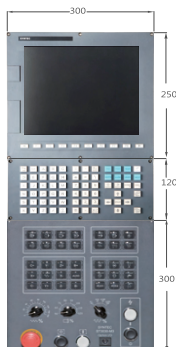


10 inches Milling Controller

Keyboard VK10
Panel: 3030M5



Keyboard VK
Panel: 3030M3



Panel: 4025M

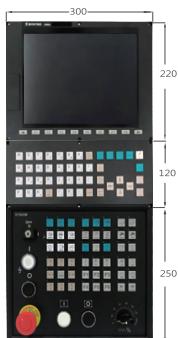


Controller Type	Standard		Multi-FunctionMilling		Composite Milling				Five-Axis			
	6MA-E	6MB-E	21MA-E	22MA	210MA-E	210MB-E	220MA	220MB	210MA-E5	210MB-E5	220MA-5	220MB-5
Axis No.	3	4(5)	6	6	8(9)	12(18)	8(9)	12(18)	8(9)	12(18)	8(9)	12(18)
DA	2		2	△	2		△		2		△	
I/O	RIO	64/64										
	SRI	○										
	Direct	32/32	32/32	32/32	—	32/32	32/32	—	32/32	32/32	—	—
Type & Size	With Panel	8"	8"/10.4"/15'	8"/10.4"/15'	10.4"		10.4"/15"		10.4"		10.4"/15"	
	With Panel (Flat)	—	—	10.4"/15"	—		10.4"/15"		—		10.4"/15"	
	Stand Alone	—	○	—	○		—		○		—	
Servo	M3/ECAT/RTEX											
VGA	—	○*	—	—	○*	—	—	—	○*	—	—	—
Connection	Ethernet/RS485/SRI											
Multi-Path	2	2		4		4		4		4		
Storage	4GB											
RTCP	—	—		—		—		—		△		
4-Axis RTCP	—	△		—		△		—		△		
Titled Working PlaneMachining	—	△		—		△		—		△		
HPCC	—	○		—		○		—		○		

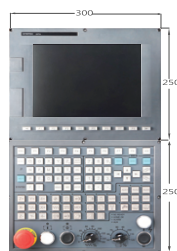
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10 inches Milling Controller

Keyboard VK10
Panel: 3025M



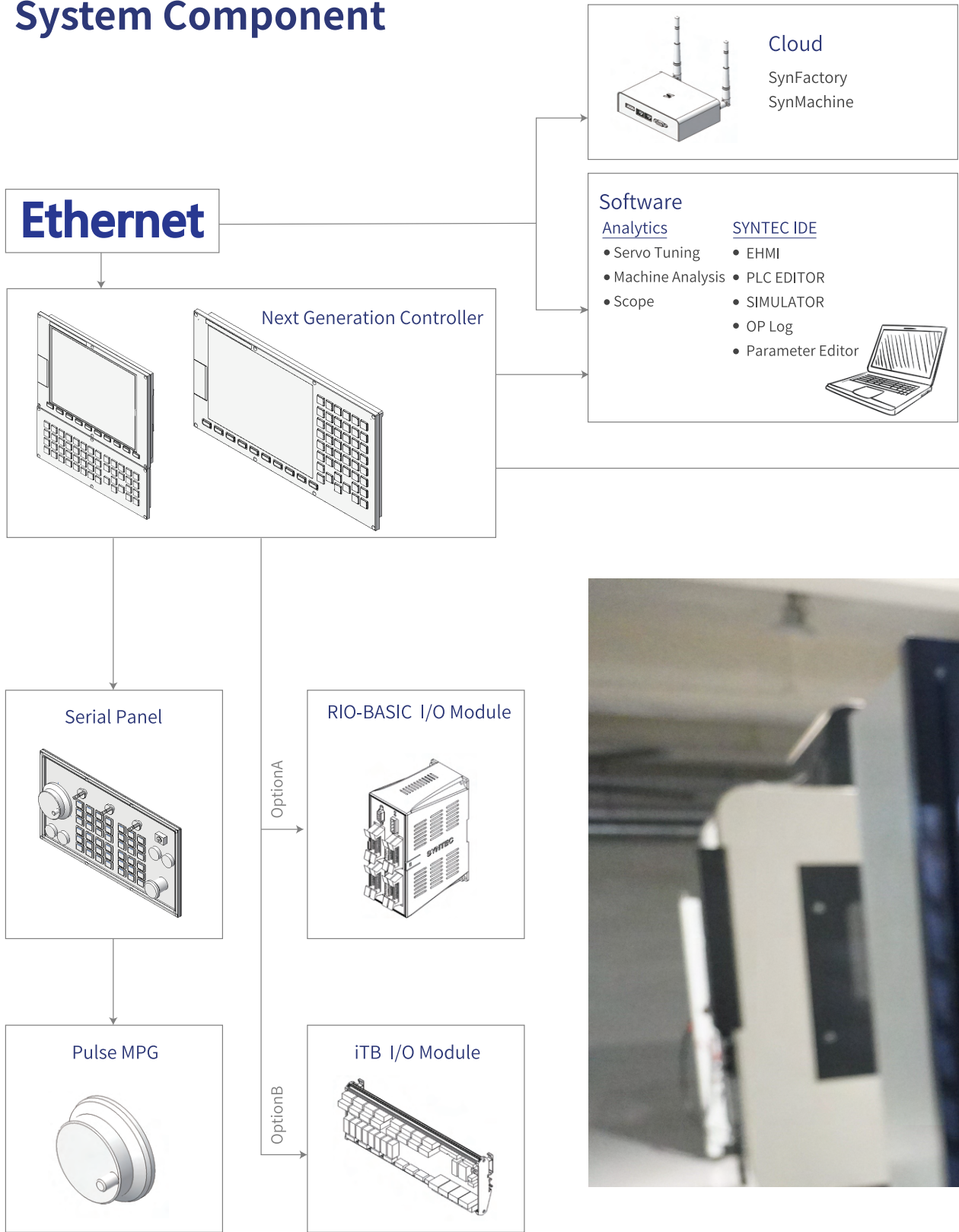
Panel: SK6M

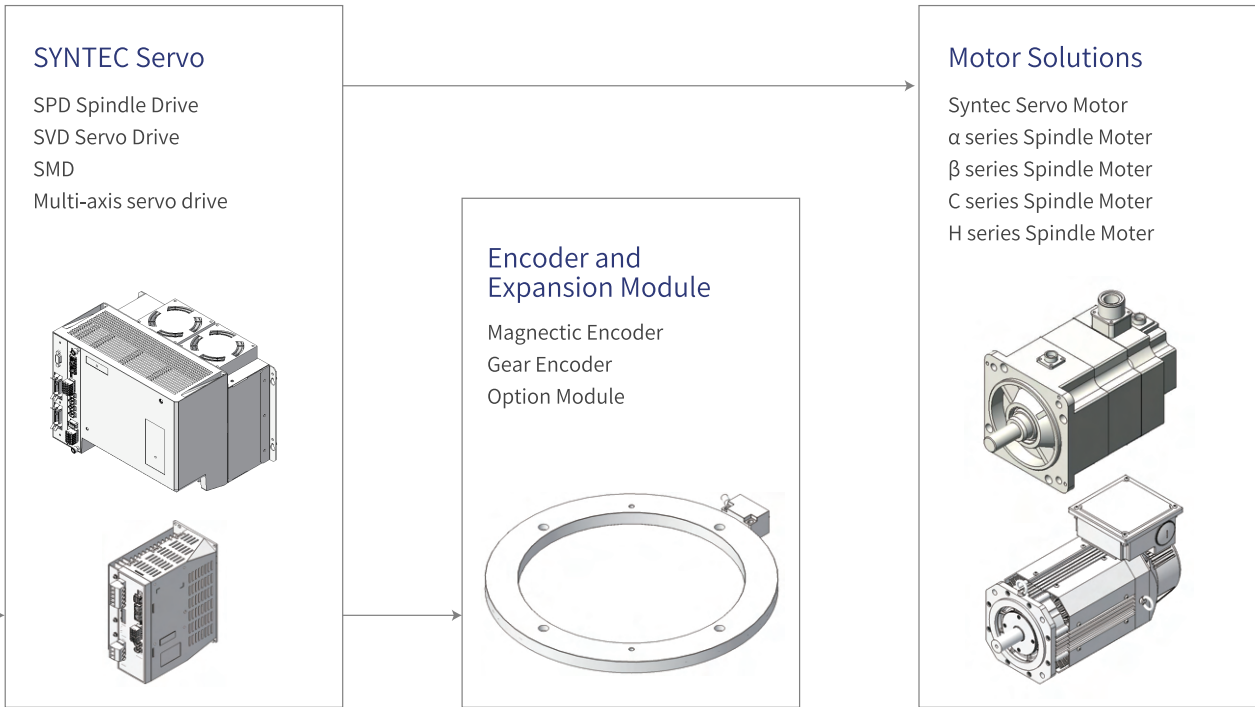


Keyboard HK-900
Panel: 4421M2

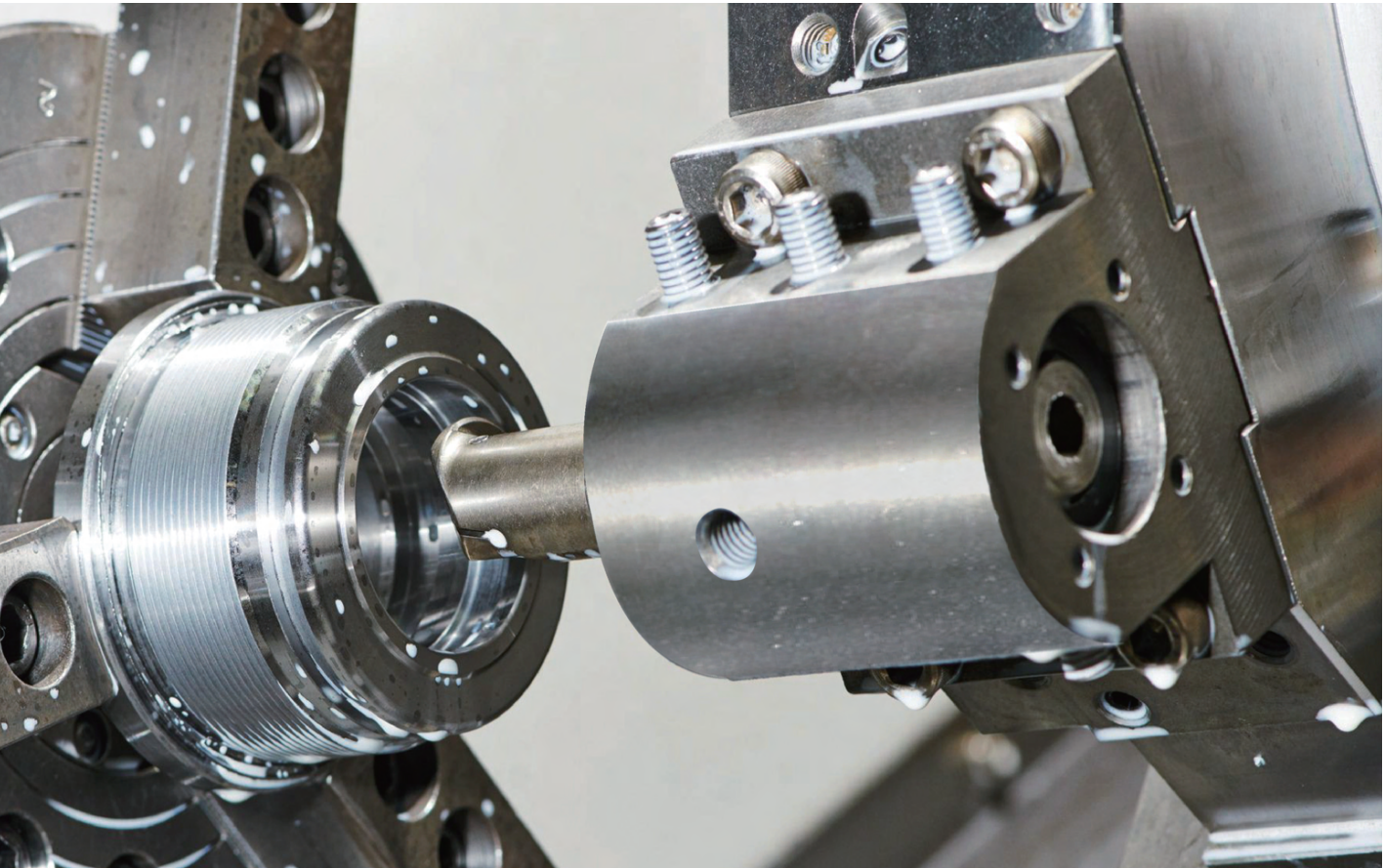


System Component



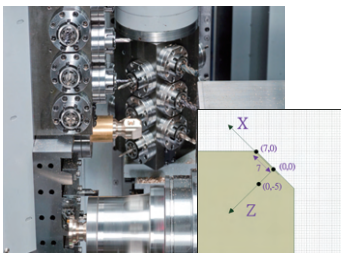


SYNTEC have the right to modify product specification if necessary



Titled Working Plane Machining

- Intuitive to program NC by rotary absolute coordinate.
- Easy to program NC without using complex CAD/CAM processing.



New Multi-Program Interface

- Up to four paths display simultaneously.
- Support coordinate display and graphic simulation in each path.
- Optional extension-path function can assign arbitrary plural paths to machine or not.
- Execute independently in each channel to reach optimized efficiency.



Tool Life Management Function

- Succinct interface with whole tool information.
- Completed functions including tool life count (time and count), tool life count of multi-group path, tool group, life-end alarm setting, tool-in-formations arrangement..etc.



SYNTEC have the right to modify product specification if necessary

Milling Controller

High performance Milling Controller with Multiple high speed and high precision functions.

- Powerful computing performance with the ability to process 3000 blocks per time
- High speed and high precision functions include servo lag compensation, high precision contour control, machining conditions selection, which increase machining quality effectively.
- Flexible axis quantity selection with maximum 18 axes, which provides the best solution for machining center, tapping center, 5-axis machining center and multi-path milling machine.

Servo motor automatic tool changer

Makes tool stable with shorter time

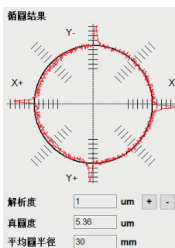
- Servo magazine is controlled by the ROT axis, and servo ATC is controlled by ATC axis; both of these specific axes don't occupy the system axis.
- Release and clamp tools in advance in order to save tools changing time.
- The system plans smooth motion to reduce impact and extend machine life.
- The rotation speed can be specified according to tool size and weight, which makes tool change steady and stable.
- Tool arm position can be controlled by MPG easily, no need to restore position by handling mechanism.
- The function contains diagnose screen which provides useful and clear information.



Friction Compensation

Improves surface finish quality under axis reversal condition

- Convenient Ballbar Tuning interface with auto tuning functions.
- Different compensation modes can meet different machining conditions.



Reversal spike
without compensation
5 μm



Reversal spike
with compensation
1.5 μm



Machine Condition Selection

Optimize parameters case by case under various machining conditions

- 9 groups of parameters, satisfy all kinds of machining situations.
- Select corresponding parameters by G-code or GUI.





High Precision Contour Control (HPCC)

Solve machining problems caused by discontinuous small blocks which generated by CAD/CAM

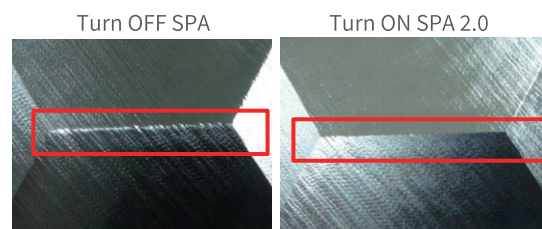
- The HPCC function fits small blocks to a continuous curve, which makes the motion plan smoother and avoids unwanted velocity ripple.
- Reduces machine vibration, extends machine life, and allows higher cutting feedrate.
- The parameters are simplified which makes it easier for the user to tune before machining.



The Smooth Precision Advance function (SPA) 2.0

Solve workpiece size problem caused by servo lag

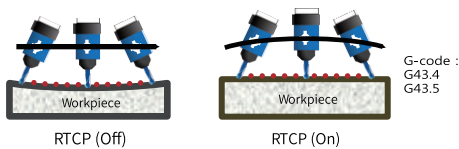
- Enhance machining precision and reduce machining overcut.
- Increase arc path accuracy under high speed machining.
- Higher machining efficiency with the same quality.



5-Axis CNC Solution (Optional)

Rotation Tool Center Point

01


Scenario:

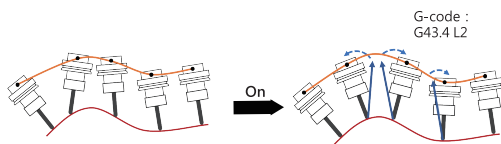
Workpieces with curvature, 5 axis CNC machine centers, 5 axis CNC woodworking machine ,5 axis CNC saw machine etc.

Instruction:

The RTCP (Rotation Tool Center Point) function provides high machining precision and efficiency by transferring the controlled target from tool holder to tool tip through five-axis compensation.

Smooth Tool Vector

02


Scenario:

Machining problems caused by unexpected block variations of the tool vector, which is generated by CAM.

Instruction:

The controller can adjust the orientation of the tool and smooth the path of tool tip generated by CAM to improve quality and to reduce the jerk of the tool tip.

Feature Coordinate

03

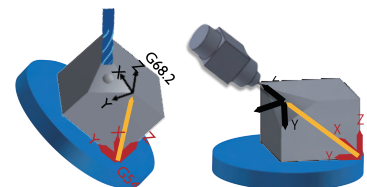
Scenario:

Machining on a workpiece of characteristic coordinate system.

Instruction:

Characteristic coordinate system, which is also called tilted working plane coordinate, can be applied to machines on any working plane without using complicated CAM.

G-code :
G68.2 X_ Y_ Z_ I_ J_ K_
G68.3 X_ Y_ Z_ R_
G68.3 P1 X_ Y_ Z_



Measurement function

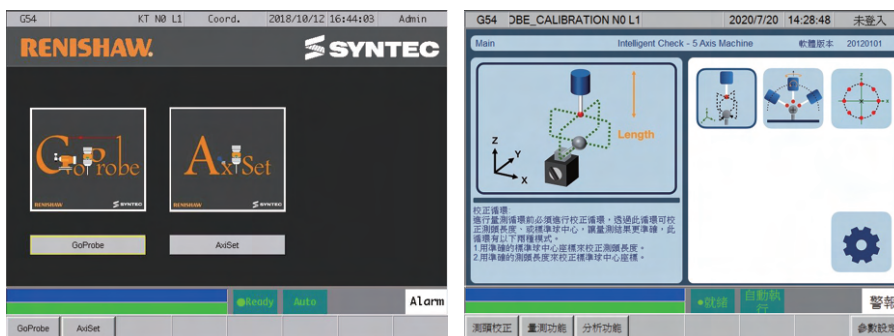
04

Available scenario:

Measure and compensate for the rotation axis of a five-axis machine with RTCP function.

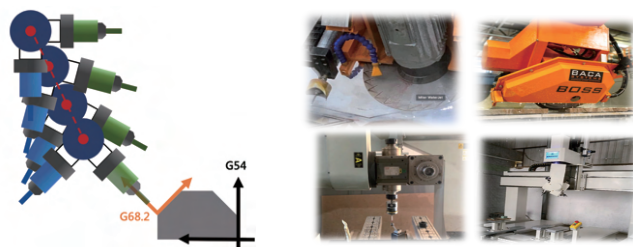
Instruction:

The controller integrates the automatic measurement function which can reduce the difficulty of calibration through GUI, and achieve high precision requirements.



Multi-Kinematic Chain

05



Scenario:

Cross head mechanism, stone machine, and machines with multiple mechanism chains.

Instruction:

A five-axis machine with multiple mechanism types can set Multi-kinematic chain parameters that the user can switch and activate the RTCP function according to the mechanism.

Intelligent Peripheral Products

Syntec Servo Solutions

01

SVD/SPD Single-Axis Servo Driver

- Various serial communications of encoder are supported
- Completed eletromechanical integration.
- Power: 1~30 (KW)



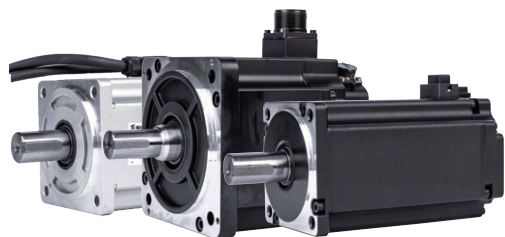
SMD/SMH Multi-Axis Servo Driver

- Suitable for machine tool.
- Maximum 3+1 axis control.
- Compact eletromechanical integration, such as tool auto retract function, friction compensation, etc.
- Axial power: 1~3 (KW); Spindle power: 7.5~18.5 (KW).



Axis Motor

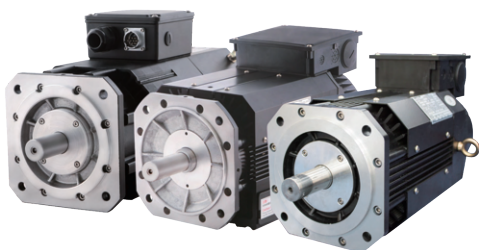
- IP67 for high-level waterproof and dustproof protection.
- Support Power: 0.1~7.5 (KW)
- Max torque: 0.32 ~120.9 (NM)
- Max Speed: 2,000 ~ 6,000 (RPM)





Spindle Motor

- With SYNTEC high resolution encoder, SYNTEC spindle motor is more precise and stable.
- IP54 for high-level waterproof and dustproof protection.
- Support power (S2) : 5.5~ 37.5 (KW)
- Max torque: 10.4 ~ 355 (NM)
- Max speed: 6,000 ~24,000 (RPM)



Syntec Encoder

- Support side and top connection
- High precision, high resolution and available in harsh environment.
- Resolution: 262,144~1,335,296 (Pulse)
- Ploes: 64、82、102、124、162、242、326



Integrated Controller and Drive

02

Syntec provides a series of integrated functions for Syntec controller and servo. Servo information can synchronously display in controller by Mechatrolink-3 communication, in order to make the integrated solution more intelligent.

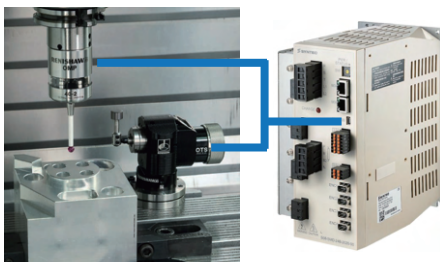
Intelligent power failure decision

- The drive will decelerate and pull-up gravity axis while in power failure, which can prevent machine and workpiece from unexpected collision.
- Controller only decelerates motors to zero speed as tapping and other special motions, in order to prevent machine damage.



High-Speed G31

- SYNTEC drive can latch the signal of probe or tool checker directly, which achieves faster response than general i/O scanning.
- Application: With SYNTEC drive and high-speed G31 function, users can increase feedrate of tool length measurement without losing accuracy, which improves efficiency.



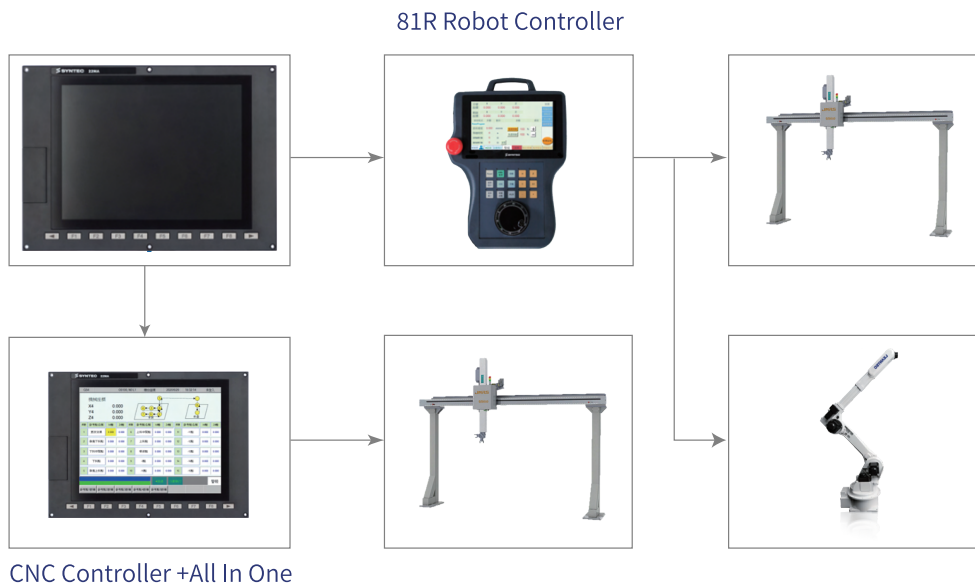
Syntec Tuning (One Step Tuning)

- Tuning is simple and fast. Servo tuning can be done directly through the controller HMI, without connecting computer.
- Functions: Inertia ratio, resonance suppression, velocity loop gain tuning.



Syntec Robot Solution

03



81R Robot Controller	
Feature	<ul style="list-style-type: none"> • Easy point-teaching with handheld controller • Friendly tray setting interface • Suitable for complicated pick and place-conditions
Applicable Model	<ul style="list-style-type: none"> • Robot arm for complicated movements • Any length of stroke • Robot arm attached to lathe

All In One	
Feature	<ul style="list-style-type: none"> • Control by G-code, M-code • Connected to CNC directly, decrease the usage-of external signal • Easy to customize
Applicable Model	<ul style="list-style-type: none"> • Gantry attached to machine • Short stroke gantry

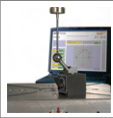



Feature Introduction



- Highly integrated machine and arms
- Friendly setting and programming GUI
- One controller could complete picking and placing and lathe processing simultaneously
- Support safety zone setting, reference point setting, etc.

SYNTEC have the right to modify product specification if necessary

SYNTEC cooperated with RENISHAW to develop inspection GUIs, which simplifies the process of probing and helps users to improve efficiency and yields of manufacturing.

-  Multi-Axis Machine Tool Calibration (AxiSet™ Check-Up)
-  Probing systems in CNC machining (Inspection Plus)
-  Contact tool setter
-  Non-contact tool setter

Probing Systems Solution

Multi-Axis Machine Tool Calibration

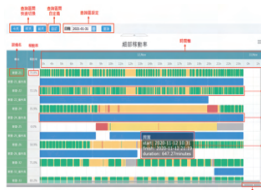
Tool Setting Solution

SynFactory SYNTEC Cloud Service Platform

05

Statuses Charts

Collects accumulated data of equipment states during the process and process change.



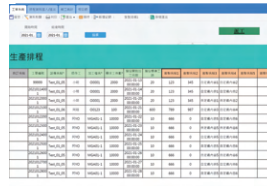
Equipment States

Automatically detects and monitors various equipment conditions



Planning and Scheduling

works new orders into production schedule



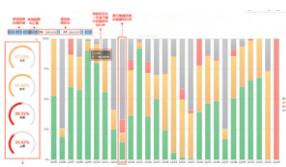
Reporting

extracts detailed records of equipment operation on work orders



Historical Utilization

calculates utilization rate, availability and accumulates all equipment statuses of floorshop



Alarms

shows historical records of alarms



Production dispatching:

manages the flow of production and dispatches production to equipment



Work Order Tracking

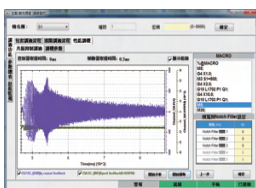
monitors real-time processing of work orders



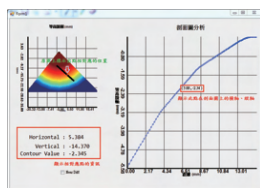
Mechatronics Analysis Platform

06

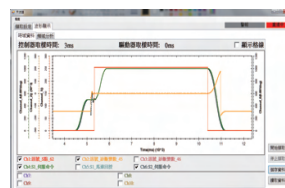
SYNTEC provides analysis software which is useful for servo tuning and CNC visualization, helping machine builders to develop and diagnose effectively.



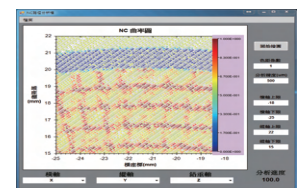
Servo tuning functions



Adjacent paths analysis



PLC signal scope sequence



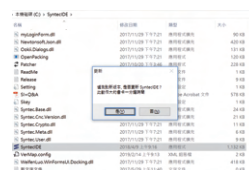
3D curvature analysis

SYNTEC IDE

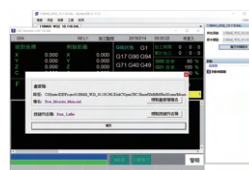
07



Integrated development tools such as HMI, PLC, simulator



Automatically update development tools and environment



Perfectly integrated with simulator, improve development efficiently

Syntec integrated developing environment (SYNTEC IDE) can automatically download and install application tools required for customization. With friendly project management, developers can easily switch between different projects or simulators.

SYNTEC have the right to modify product specification if necessary

Specification Table

Category	Items	Units	Remark	Serial										
				6 Series*	7 Series*	21 Series		22 Series		210 Series		220 Series		
				6TA-E	7TA	21TA-E	21TB-E	22TA	22TB	210TB-E	210TB-E5	220TB	220TB-5	
Product Specification	Max. Controlled Paths	Path		1	1	2		2		4		4		
	Max. Controlled Paths	Path		1	1	1		1		3		3		
	Standard Axis	Axis		3	3	4	6	4	6	12		12		
	Max. Axis (Optional)	Axis		5	4	4	8	4	8	18		18		
	Max. Spindle	Axis		3	3	2	4	2	4	6		6		
	Axis Control	Axis		3	3	4	4	4	4	4	5	4	5	
	Min. Control -mm			0.0001										
	program coordinate	Set		100	100	100		100		100		100		
	Tools	Set		32	32	96	96	96	96	96	96	96	96	
	Function Group	Set		4										
Block Processing Tim			300		500		1000		1000		1000			
Hardware Specification	Storage(DISKA)	MB		512	4096	512		4096		4096		4096		
	I/O	RIO	Point	—	64/64									
		SRI												
		Direct I/O	Point		32/32	—	32/32		—	32/32		—		
	DA	Set		2	—	2		—	2		—			
	Type and Size	All-in-one Machine	Inch		8"	8" ^O	8"/10.4"		8"/10.4"/15"		8"/10.4"	10.4"	10.4"/15"	
		Full-plane All-in-one	Inch		—	—	—		10.4"/15"		—		10.4"/15"	
		Back Half Machine			—	—	—		—	—		—		
	USB	Set		2	2	2		2		2		2		
	RJ-45	Set		1	2	1		2		1		2		
VGA Output	Set	O Back side	—	—	O	1 ^{***}	—		1 ^{***}	—	—			
RS-485	Set		1	1	1		1		1		1			
USB	Set		—	2	0		2		—		2			
SRI	Set		1	1	1		1		1		1			
Servo Control	Mechatrolink III / EtherCat			O	O	O		O		O		O		

Remark: *6 series is only available in China and overseas; 7 series is only available in China

**Only supports power head spindle application

***VGA is available on the rear half only ○ indicates standard function △ indicates optional function - indicates no such function

				Serial									
				6 Series*		7 Series*		21 Series		22 Series		210 Series	
Category	Items	Units	Remark	6TA-E	7TA	21TA-E	21TB-E	22TA	22TB	210TB-E	210TB-E5	220TB	220TB-5
Compensation	Backlash Compensation			○	○	○		○		○		○	
	Putch Error Compensation			○	○	○		○		○		○	
	Angular Error Compensation			○	○			○		○		○	
	Temperature Error Compensation			○	○	○		○		○		○	
	2D Error Compensation			○	○	○		○		○		○	
Operation	MPG Simulation			○	○	○		○		○		○	
	Dry Run			○	○	○		○		○		○	
	Optional Stop			○	○	○		○		○		○	
	Single Block			○	○	○		○		○		○	
	Virtual MPG			○	○	○		○		○		○	
	Restart at Feedhold			○	○	○		○		○		○	
	Restart at Break Point			○	○	○		○		○		○	
	Tool Return			—	—	—		—		—		—	
	Fixture Offsets			○	○	○		○		○		○	
MPG Offsets			—	—	—		—		—		—		
Programming	Optional Skip			○	○	○		○		○		○	
	B-stop/Terminator Program			○	○	○		○		○		○	
	Absolute Zero Point Coordinate	G92/G92.1		○	○	○		○		○		○	
	Interrupt MACRO	M96/M97		○	○	○		○		○		○	
	M198 Call Subroutines			○	○	○		○		○		○	
	Expandable G Code			○	○	○		○		○		○	
HSHP	Constant Jerk Control			○	○	○		○		○		○	
	Multiblocks S-curve motion plan			○	○	○		○		○		○	
	Auto Declaration in Corner			○	○	○		○		○		○	
	Speed Limit for Round Radius			○	○	○		○		○		○	
	Multiple Sets of HSHP Parameters			—	—	—		—		—		—	
	Quick Parameter Setup			—	—	—		—		—		—	
	SPA Feature			—	○	○		○		○		○	
	Virtual Radius Function			○	○	○		○		○		○	
	HSHP Control Mode I	G05.1Q1		—	—	—		—		—		—	
	HSHP Control Mode II	G05P10000	OP11	—	—	—		—		—		—	
	NURBS Interpolation Ability			—	—	—		—		—		—	

SYNTEC have the right to modify product specification if necessary

Specification Table

Category	Items	Remark	Software Function	Serial									
				6 Series	7 Series	21 Series		22 Series		210 Series		220 Series	
				6TA-E	7TA	21TA-E	21TB-E	22TA	22TB	210TB-E	210TB-E5	220TB	220TB-5
Tool Management	Auto Tool Measuring			-	-	-	-	-	-	-	-	-	-
	Auto Tool Management	Works with Renishaw Hardware only		○	○	○	○	○	○	○	○	○	○
	Tool Life Management			○	○	○	○	○	○	○	○	○	○
Tool Magazine	ROT Servo Turret	PLC Element	OP32	○	○	○	○	○	○	○	○	○	○
Spindle	Support Syntec Spindle			- (**)	○	○	○	○	○	○	○	○	○
Facilitating Functions	Machine Lock (R bit)			○	○	○	○	○	○	○	○	○	○
	Software Limit			○	○	○	○	○	○	○	○	○	○
	Spindle Speed Arrival Check			○	○	○	○	○	○	○	○	○	○
	Axis Synchronize Feature			○	○	○	○	○	○	○	○	○	○
	Dynamic Axis Synchronize Feature			○	○	○	○	○	○	○	○	○	○
	Feedback Synchronize Feature			○	○	○	○	○	○	○	○	○	○
	Rapid Retraction for Rigid Tapping			○	○	○	○	○	○	○	○	○	○
	Virtual Axis Feature			○	○	○	○	○	○	○	○	○	○
	Axis Change Feature			○	○	○	○	○	○	○	○	○	○
	Axial Torque Limit			○	○	○	○	○	○	○	○	○	○
	Serial Bus Setting Feature (CNC Axis)			○	○	○	○	○	○	○	○	○	○
	Driver Information Display (CNC Axis)			○	○	○	○	○	○	○	○	○	○
	Spindle Application Feature (CNC Axis)			○	○	○	○	○	○	○	○	○	○
	Serial Bus PLC Axis			○	○	○	○	○	○	○	○	○	○
	High-Speed Spindle Positioning	Support Syntec Spindle			○	○	○	○	○	○	○	○	○
	Dipole Front and Back System				-	○	○	○	○	○	○	○	○
	Data Backup Recovery	Maker Backup			○	○	○	○	○	○	○	○	○
	Customized Opening Screen				○	○	○	○	○	○	○	○	○
	My Favorites	Only 8 key system supports			○	○	○	○	○	○	○	○	○
	Project Protection Feature				○	○	○	○	○	○	○	○	○
Limit Access Manager				○	○	○	○	○	○	○	○	○	
RemoteAPMonitor				○	○	○	○	○	○	○	○	○	
Righ-Angle All In One			OP20	△	△	△	△	△	△	△	△	△	
3D-Arc Interpolation				-	-	-	-	-	-	-	-	-	
Program Edit	Background Edit			○	○	○	○	○	○	○	○	○	○
	Edit Protection			○	○	○	○	○	○	○	○	○	○
	Immediate Grammar Check			○	○	○	○	○	○	○	○	○	
PLC	PLC Diagnosis Feature (FORCE I Point)			○	○	○	○	○	○	○	○	○	

Remark: *6 series is only available in China and overseas; 7 series is only available in China

**Only supports power head spindle application

***VGA is available on the rear half only ○ indicates standard function △ indicates optional function - indicates no such function

Category	Items	Remark	Software Function	Serial									
				6 Series	7 Series	21 Series		22 Series		210 Series		220 Series	
				6TA-E	7TA	21TA-E	21TB-E	22TA	22TB	210TB-E	210TB-E5	220TB	220TB-5
Data Transfer	NETWORK			o	o	o	o	o	o	o	o	o	o
	FTP			o	o	o	o	o	o	o	o	o	o
	RS-485			o	o	o	o	o	o	o	o	o	o
	DNC(Network)			o	o	o	o	o	o	o	o	o	o
	DNC(USB)			o	o	o	o	o	o	o	o	o	o
Information Display	Operation CV Display			o	o	o	o	o	o	o	o	o	o
	Graphic Simulation			o	o	o	o	o	o	o	o	o	o
	Partial Graphic Simulation			o	o	o	o	o	o	o	o	o	o
	Dynamic Multi-Language Switch			o	o	o	o	o	o	o	o	o	o
5 Axis Feature	Feature Coordinate System (Inclined Plane Processing, The Second Axis Group supports Feature Coordinate System)	G68.2, G68.3	OP13	-	-	-	Δ	Δ	Δ	Δ	Δ	Δ	Δ
			OP28	-	-	-	Δ	Δ	Δ	Δ	Δ	Δ	Δ
	5 Axis RTCP	G43.4, G43.5	OP12	-	-	-	-	-	-	Δ	Δ	Δ	Δ
	4 Axis RTCP		OP29	-	-	-	-	-	-	-	-	-	-
	Multiple Mechanism-Chain	G10 L5000 P_Q_	OP27	-	-	-	Δ	Δ	Δ	Δ	Δ	Δ	Δ
	5-Axis Mechanism Chain Measurement	RENISHAW, SYNTEC		-	-	-	-	-	-	-	-	-	-
G Code Command	Spiral Interpolation	G02/G03		o	o	o	o	o	o	o	o	o	o
	Elliptical Cutting (clockwise)	G02.1		o	o	o	o	o	o	o	o	o	o
	Parabolic Cutting (clockwise)	G02.2		o	o	o	o	o	o	o	o	o	o
	Cylindrical Interpolation	G07.1		o	o	o	o	o	o	o	o	o	o
	Start Polar Coordinate Interpolation	G12.1		o	o	o	o	o	o	o	o	o	o
	Outer/ Inner Diameter Truning Cycle	G20		o	o	o	o	o	o	o	o	o	o
	Thread Turning Cycle	G21		o	o	o	o	o	o	o	o	o	o
	Thread Turning Middke Feed Cycle	G21.2		o	o	o	o	o	o	o	o	o	o
	End-Face Turning Cycle	G24		o	o	o	o	o	o	o	o	o	o
	Jumping Function	G31		o	o	o	o	o	o	o	o	o	o
	Thread Cutting	G33		o	o	o	o	o	o	o	o	o	o
	Variable-Pitch Thread Cutting	G34		o	o	o	o	o	o	o	o	o	o
	Polygon Cutting	G51.2		o	o	o	o	o	o	o	o	o	o
	Work Coordinate System Setting	G54-G59.9		o	o	o	o	o	o	o	o	o	o
	Mirror Function (Lathe)	G68		o	o	o	o	o	o	o	o	o	o
	Duplex Cutting Cycle	G72-G78		o	o	o	o	o	o	o	o	o	o
	Drilling Fixed Cycle	G80, G83-G89		o	o	o	o	o	o	o	o	o	o
	Absolute Zero Coordinate System Preset	G92.1		o	o	o	o	o	o	o	o	o	o
	Inverse Time Feed	G93		-	-	-	-	-	-	-	-	-	-
	Constant Surface Cutting Speed	G96		o	o	o	o	o	o	o	o	o	o
Spindle Synchronization Function	G114.1		-	-	o	o	o	o	o	o	o	o	
Spindle Bearing Function	G114.3		-	-	o	o	o	o	o	o	o	o	

SYNTEC have the right to modify product specification if necessary

Specification Table

				Standard Milling Machine		Functional Milling Machine		Compound Milling Machine								
				6 Series		21 Series	22 Series	210 Series				220 Series				
Category	Items	Unit	Remark	6MA-E	6MB-E	21MA-E	22MA	210MA-E	210MA-E5	210MB-E	210MB-E5	220MA	220MA-5	220MB	220MB-5	
Product Specification	Max. Controlled Paths	Path		2	2	2	2	4				4				
	Max. Controlled Paths	Path		1	1	1	1	3				3				
	Standard Axis	Axis		3	4	6	6	8	12		8	12				
	Max. Axis (Optional)	Axis		3	5	6	6	9	18		9	18				
	Max. Spindle	Axis		3	5	4	4	6				6				
	Max. Simultaneous Axis Control	Axis		3	4	4	4	4	5	4	5	4	5	4	5	
	Min. Control -mm			0.0001		0.0001	0.0001	0.0001				0.0001				
	Max. Number of program coordinate	Set		100		100	100	100				100				
	Max. Number of Table Tools	Set		96		96	96	96				96				
	Multi-Channel Function Group	Set		4		4	4	4				4				
Block Processing Time			600		2500	3000	3000	4000	3000	4000	3000	4000	3000	4000		
Hardware Specification	Storage(DISKA)	MB		4096		4096	4096	4096				4096				
	I/O	RIO	Point	—		64/64	64/64	64/64				64/64				
		SRI		O		O	O	O				O				
		Direct I/O	Point	32/32		32/32	—	32/32				—				
	DA	Set		2		2	—	2				—				
	Screen	All-in-one Machine	Inch		8"		8"/10.4"/15"	8"/10.4"/15"	10.4"				10.4"/15"			
		Full-plane All-in-one Machine	Inch		—		—	10.4"/15"	—				10.4"/15"			
		Back Half Machine			—		O	—	O				—			
	Servo Control	CF card	Set	Front Side	—		—	—	—				—			
		USB	Set		2		2	2	2				2			
		CF card	Set		—		—	—	—				—			
		RJ-45	Set		1		1	2	1				2			
		VGAOutput	Set		—		1*	—	1*				—			
RS-485		Set	1		1	1	1				1					
USB		Set	—		—	2	—				2					
SRI		Set	1		1	1	1				1					
Servo Control	Mechatrolink III / EtherCat		O		O	O	O				O					

Category	Items	Remarks	Software Function	6 Series	21 Series	22 Series	210 Series	220 Series
Compensation	Backlash Compensation			○	○	○	○	○
	Pitch Error Compensation			○	○	○	○	○
	Angular Error Compensation			○	○	○	○	○
	Temperature Error Compensation			○	○	○	○	○
	2D Error Compensation			○	○	○	○	○
Operation	MPG Simulation			○	○	○	○	○
	Dry Run			○	○	○	○	○
	Optional Stop			○	○	○	○	○
	Single Block			○	○	○	○	○
	Virtual MPG			○	○	○	○	○
	Restart at Feedhold			○	○	○	○	○
	Restart at Break Point			○	○	○	○	○
	Tool Return			○	○	○	○	○
	Fixture Offsets			○	○	○	○	○
	MPG Offsets			○	○	○	○	○
Programming	Optional Skip			○	○	○	○	○
	B-stop/Terminator Program			○	○	○	○	○
	Absolute Zero Point Coordinate	G92/G92.1		○	○	○	○	○
	Interrupt MACRO	M96/M97		○	○	○	○	○
	M198 Call Subroutines			○	○	○	○	○
	Expandable G Code			○	○	○	○	○
HSHP	Constant Jerk Control			○	○	○	○	○
	Multiblocks S-curve motion plan			—	○	○	○	○
	Auto Declaration in Corner			○	○	○	○	○
	Speed Limit for Round Radius			○	○	○	○	○
	Multiple Sets of HSHP Parameters			—	○	○	○	○
	Quick Parameter Setup			—	○	○	○	○
	SPA Feature			○	○	○	○	○
	Virtual Radius Function			○	○	○	○	○
	HSHP Control Mode I	G05.1Q1		—	○	○	○	○
	HSHP Control Mode II	G05P10000	OP11	—	○	○	○	○
NURBS Interpolation Ability			—	○	○	○	○	

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△ Optional Function / - Not Available Function

Specification Table

				Standard Milling Machine		Functional Milling Machine		Compound Milling Machine								
Category	Items	Remark	Software Function	6 Series		21 Series	22 Series	210 Series				220 Series				
				6MA-E	6MB-E	21MA-E	22MA	210MA-E	210MA-E5	210MB-E	210MB-E5	220MA	220MA-5	220MB	220MB-5	
Tool Management	Auto Tool Measuring				○	○	○	○				○				
	Auto Tool Management	Works with Renishaw Hardware only			○	○	○	○				○				
	Tool Life Management				○	○	○	○				○				
Tool Magazine	ROT Servo Turret	PLC Element	OP32		△	△	△	△				△				
	ATC Automatic Tool Change				—	○	○	○				○				
Spindle	Support Syntec Spindle				—	○	○	○				○				
Facilitating Functions	Machine Lock (R bit)				○	○	○	○				○				
	Software Limit				○	○	○	○				○				
	Spindle Speed Arrival Check				○	○	○	○				○				
	Axis Synchronize Feature				○	○	○	○				○				
	Dynamic Axis Synchronize Feature				○	○	○	○				○				
	Feedback Synchronize Feature				○	○	○	○				○				
	Rapid Retraction for Rigid Tapping				○	○	○	○				○				
	Virtual Axis Feature				○	○	○	○				○				
	Axis Change Feature				○	○	○	○				○				
	Axis Torque Feature				○	○	○	○				○				
	Serial Bus Setting Feature (CNC Axis)				○	○	○	○				○				
	Driver Information Display (CNC Axis)				○	○	○	○				○				
	Spindle Application Feature (CNC Axis)				○	○	○	○				○				
	Serial Bus PLC Axis				○	○	○	○				○				
	Dipole Front and Back System					—	○	○	○				○			
	Data Backup Recovery	Maker Backup				○	○	○	○				○			
	Customized Opening Screen					○	○	○	○				○			
	My Favourites	Only 8 key system supports				—	○	○	○				○			
	Project Protection Feature					○	○	○	○				○			
	Limit Access Manager					○	○	○	○				○			
RemoteAP Monitor					○	○	○	○				○				
Right-Angle All In One			OP20		△	△	△	△				△				
3D-Arc Interpolation					○	○	○	○				○				
Program Edit	Background Edit				○	○	○	○				○				
	Edit Protection				○	○	○	○				○				
	Immediate Grammar Check				○	○	○	○				○				
PLC	PLC Diagnosis Feature (FORCE I Point)				○	○	○	○				○				

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Category	Items	Remark	Software Function	Standard Milling		Functional Milling		Compound Milling Machine							
				6 Series		21 Series	22 Series	210 Series				220 Series			
				6MA-E	6MB-E	21MA-E	22MA	210MA-E	210MA-E5	210MB-E	210MB-E5	220MA	220MA-5	220MB	220MB-5
Data Transfer	NETWORK			○	○	○	○	○				○			
	FTP			○	○	○	○	○				○			
	RS-485			○	○	○	○	○				○			
	DNC(Network)			○	○	○	○	○				○			
	DNC(USB)			○	○	○	○	○				○			
Information Display	Operation CV Display			○	○	○	○	○				○			
	Graphic Simulation			○	○	○	○	○				○			
	Partial Graphic Simulation			○	○	○	○	○				○			
	Dynamic Multi-Language Switch			○	○	○	○	○				○			
5 Axis Feature	Feature Coordinate System (Inclined Plane Processing)	G68.2、G68.3	OP13	—	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ
	The Second Axis Group supports Feature Coordinate System		OP28	—	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ
	5 Axis RTCP	G43.4、G43.5	OP12	—	—	—	—	Δ	—	Δ	—	Δ	—	Δ	
	4 Axis RTCP		OP29	—	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	
	Multiple Mechanism-Chain	G10 L5000 P_ Q_	OP27	—	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	
	5-Axis Mechanism Chain Measurement	RENISHAW、SYNTEC		—	—	—	—	Δ	—	Δ	—	Δ	—	Δ	
G Code Command	Spiral /Cone Interpolation	G02/G03		—	○	○	○				○				
	Spatial Arc Interpolation	G02.4/G03.4	OP19	—	○	○	○				○				
	High Precision Contour Control (HPCC)	G05 P10000	OP11	—	○	○	○				○				
	Smoothing Path Mode	G05.1		—	○	○	○				○				
	NURBS Interpolation	G06.2		—	○	○	○				○				
	Thread Cutting	G33		○	○	○	○				○				
	Auto Tool Measurement	G37		○	○	○	○				○				
	Tool Offsets	G45~G48		○	○	○	○				○				
	High Speed Peck Drilling Cycle	G73		○	○	○	○				○				
	Left Handed Tapping	G74		○	○	○	○				○				
	High Precision Boring Cycle	G76		○	○	○	○				○				
	Drilling Cycle	G81		○	○	○	○				○				
	Chopping	G81.1	OP44	—	○	○	○				○				
	Bottom Feed Hold Drilling Cycle	G82		○	○	○	○				○				
	Peck Drilling Cycle	G83		○	○	○	○				○				
	Tapping Cycle	G84		○	○	○	○				○				
	Boring Cycle	G85		○	○	○	○				○				
	High Speed Boring Cycle	G86		○	○	○	○				○				
	Back Boring Cycle	G87		○	○	○	○				○				
	Semi Automatic Fishing Boring Cycle	G88		○	○	○	○				○				
Bottom Feed Hold Boring Cycle	G89		○	○	○	○				○					
Multi-Group HSHP Parameter	G120.1		○	○	○	○				○					

SYNTEC have the right to modify product specification if necessary