

MC20III

MultiStationMachiningCell





MultiStationMachiningCell Achieves “Ko No Ryosan” (mass customization)

'Ko No Ryosan' (mass customization) is a new concept from Citizen that fuses two normally conflicting modes of production. Here, the Citizen MC20 is able to satisfy both the needs of mass production using standardization and modular design with the ability to satisfy high variety and low volume using flexibility of production methods.

By combining three machining modules in a multi-station configuration, the MC20 will support a variety of machining layouts to enable ultra-high productivity levels. Machining processes can also be optimised through the Cincom dynamic control software that supports highly flexible operations thus making 'Ko No Ryosan' (mass customization) a reality.



Modular Concept

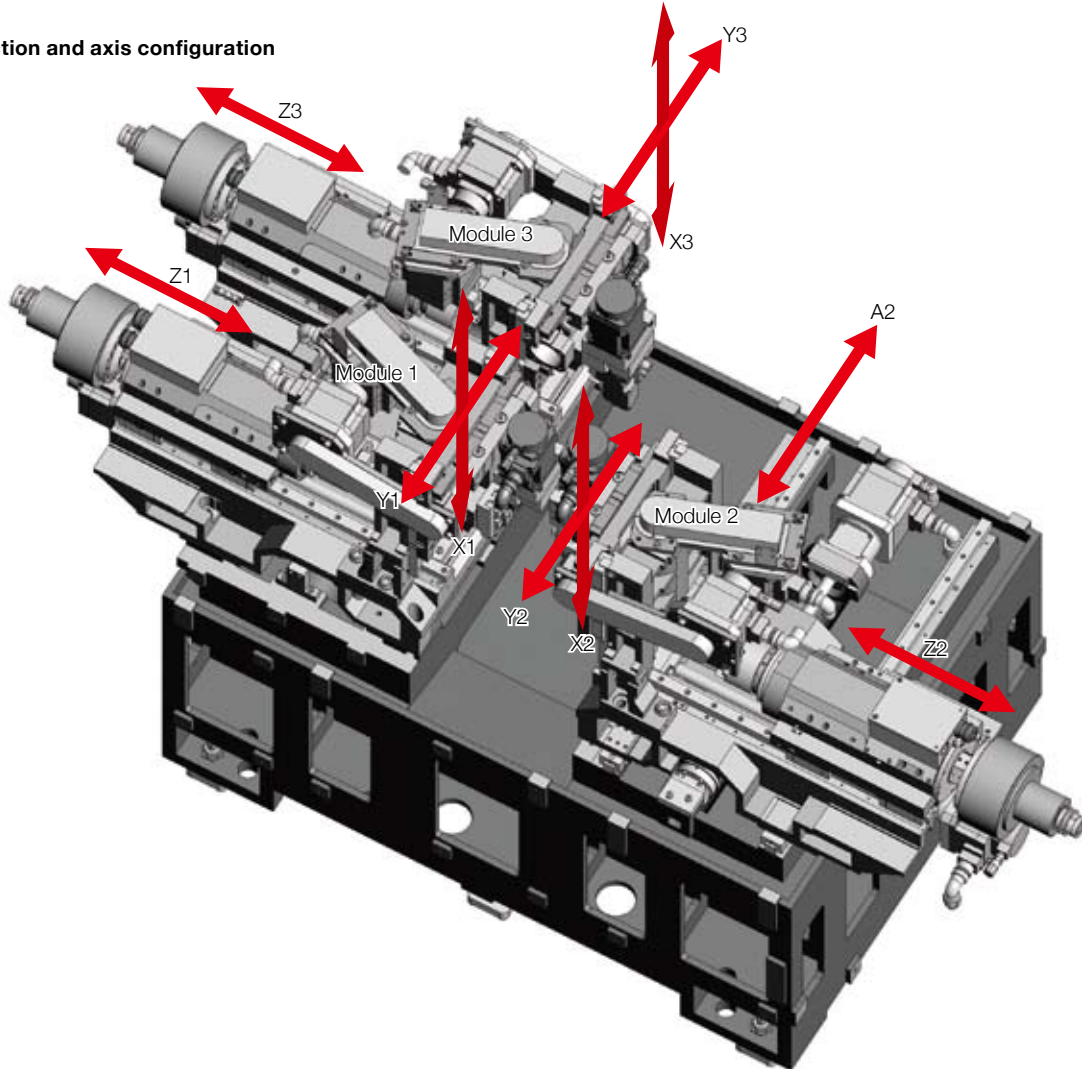
The Citizen MC20 comprises three similar modules able to provide a turnkey solution in a single dedicated machine with a high degree of flexibility to blend the customer's requirements with Citizen's technology.

Each module comprises a headstock that can be equipped with a variety of chucking systems and a gang tool post that can accommodate up to 6 tools. "Optimization of the machining

processes" is achieved by selecting the right combination of modules to shorten machining times and create ultra-high levels of productivity.

Using modules of the same type also lessens the burden on users by reducing any stocks of spares, shortening the time needed to learn and train machine setters and support staff.

Basic construction and axis configuration

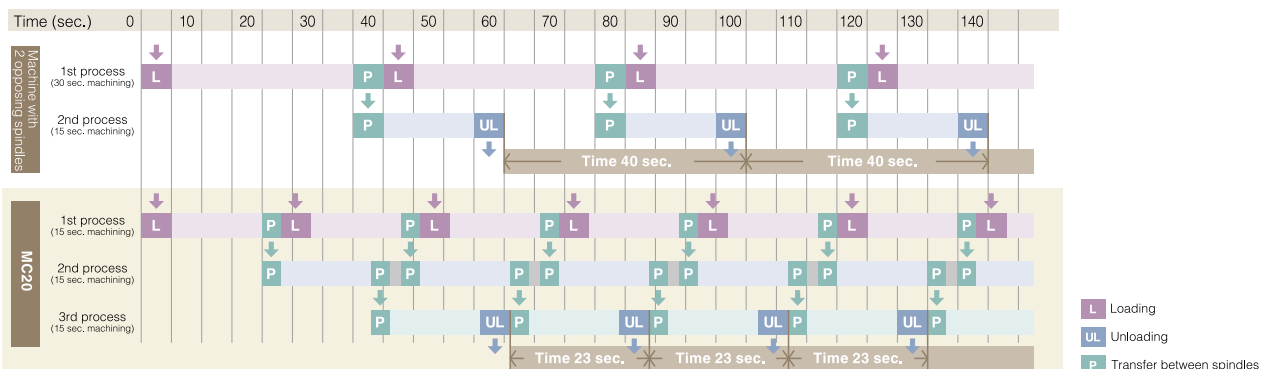


Comparison of Production Times with Machine with 2 Opposing Spindles

To shorten production times, more conventional machining can be integrated into the single MC20 unit using the three modules to combine processes that were previously shared between multiple machines. In the example below production time is reduced from

40 secs to 23 secs per workpiece.

The Citizen MC20 creates more freedom for plant layout, due to a dramatic improvement in the productivity achieved per unit area that results from space savings.



Workpiece Transfer Between Spindles and In-machine Loader

Workpieces are transferred between modules with spindles that are accurately aligned making gantry loaders of the type used in conventional machining lines unnecessary. Thus the problems of machining accuracy that can occur when transferring workpieces, and realising high-speed transfers are avoided.

Workpieces are supplied and unloaded with the in-machine loader in an area protected from chips and coolant. This minimizes the risk of misloading and deterioration of chucking accuracy.



Transfer between spindles (SP1 and SP2)



In-machine Loader



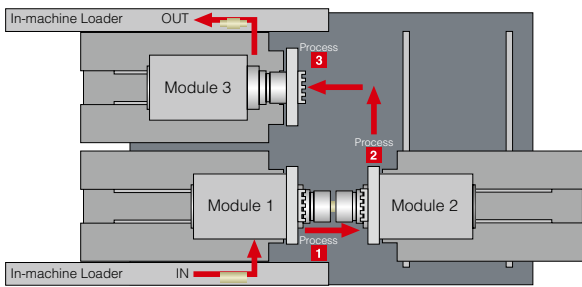
Optimization of Machining Processes

The entrance and exit for workpieces and the route between them can be set as required. Processes can be allocated to each module in the most appropriate way for specific workpieces, enabling the most efficient machining process flow to be selected. Variable process flows are also supported, including mixed

machining with separate collection of similar and/or different workpieces. Parallel machining of paired components, and even in-cycle processes such as press fitting and fastening of parts can be achieved.

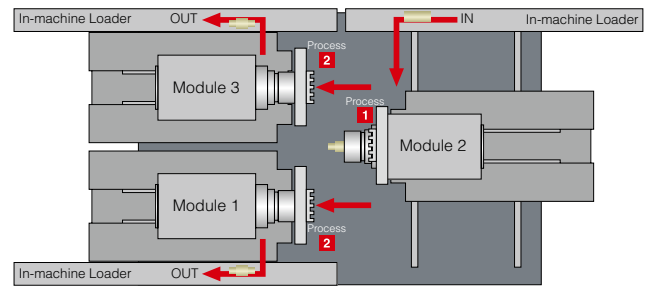
Sharing among 3 processes (1->2->3)

Simultaneous machining on 3 axis control groups where the machining processes are shared among 3 modules substantially increases productivity. The flow can also be reversed 3->2->1



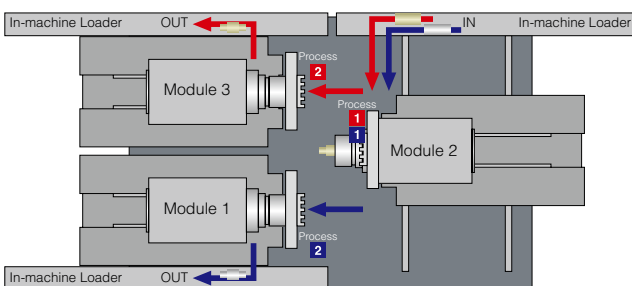
Sharing the 2nd process (2->1 / 2->3)

This type of flow is effective for workpieces with a long 2nd process machining time. Wasted time is minimized by performing the 1st process machining at module 2 and sharing the time-consuming 2nd process machining between modules 1 and 3.



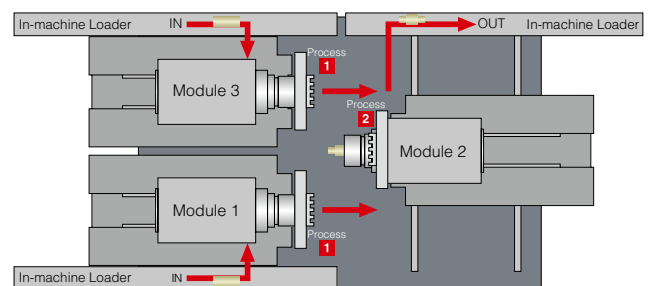
Mixed flow of similar but different components (component a: 2->1 / component b: 2->3)

Two types of workpiece with similar shapes are identified, and the appropriate workpiece flows and machining programs for each are automatically selected. The two types are consigned to separate stockers.



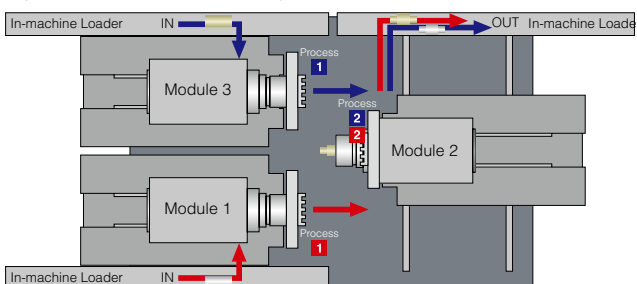
Sharing the 1st process (1->2 / 3->2)

This type of flow is effective for workpieces with a long 1st process machining time. Wasted time is minimized by sharing the 1st process machining between modules 1 and 3.



Machining paired components as a set (component a: 1->2 / component b: 3->2)

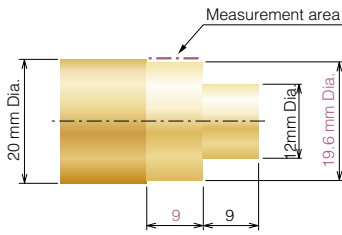
After machining each of the workpieces that constitute a pair, the pair is assembled, fastened or crimped between spindles, then finish machined. (This flow is not applicable to some workpieces. Consult Citizen in advance.)



Screw assembly between spindles

Accuracy

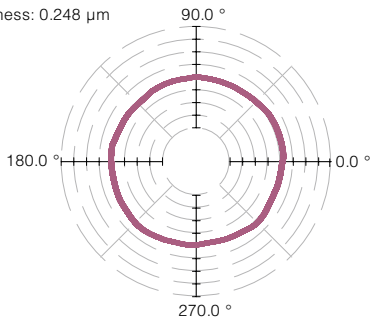
Test piece



Material : BsBM
Surface speed : 200 m/ min
Feed : 0.01 mm/ rev
Allowance : 0.2 mm
Tool nose radius : 0.1 mm

Roundness

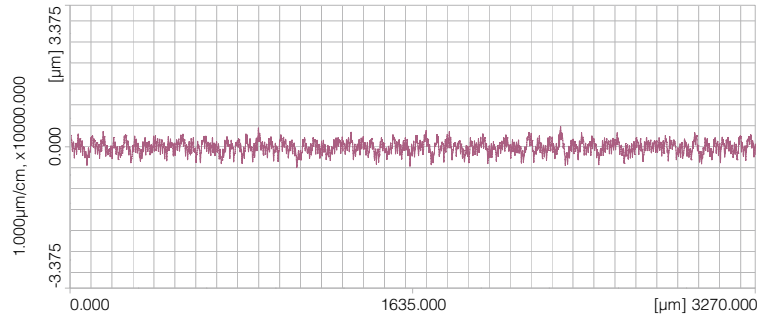
Roundness: 0.248 μm



x 5000 (2.000 $\mu\text{m}/\text{cm}$)

Surface roughness

Surface roughness: Ra0.116 μm



Operability Allowing Intuitive Use of Multiple Functions

The main operation panel is a touch panel that is simply organized in appearance with multiple functions.

A sub-operation panel without a display is provided for operations at the rear of the machine and a detachable tablet PC is available as an optional auxiliary device.

When the tablet is placed in its dedicated holder, the same level of operation as with the front operation panel is possible after the tablet PC is synchronized with the machine control system.

A single tablet PC can be paired with multiple Citizen MC20 machines.



Main operation panel



Sub operation panel

Options



Tablet PC

Used as a monitor for the sub operation panel through a LAN connection.



Bar feeder

Proven technology for protracted unattended bar work operation.

Machine specifications

Item	MC20 (MC20-1M3)
Chuck size	4-inch chuck
Max. through-spindle workpiece diameter	20 mm dia.
Max. workpiece length	60 mm
Max. drilling diameter with the spindle	7 mm dia.
Max. tapping diameter with the spindle (Cutting tap)	M6
Spindle speed	Max 8,000 min ⁻¹ (differs depending on the chuck type)
Revolving tools on the gang tool post	
Max. drilling diameter	5 mm dia.
Max. tapping diameter (Cutting tap)	M5
Spindle speed	Max 8,000 min ⁻¹
Number of tools to be mounted (standard spec.)	5 per module
Turning tools	2
Cross drilling tools	3
Number of tools to be mounted (turning / cross machining / end-face machining spec.)	6 per module
Turning tools	2
Cross drilling tools	2
End-face drilling tools	2
Number of tools to be mounted (full tooling capability)	9 per module
End-face sleeve	4
Cross drilling tools	1
End-face drilling tools	4
Tool size	
Turning tools	13 mm sq.
Sleeve	19.05 mm dia.
Rapid feed rate	
X axis	32 m/ min
Y axis	32 m/ min
Z axis	32 m/ min
A axis	40 m/ min
Motor	
Front spindle	2.2/ 3.7 kW
Revolving tools on gang tool post	0.75 kW
Coolant pump	0.18 kW × 3
Lubrication pump	0.003 kW
Loader axis motor	0.2 kW × 2
Center height	1,000 mm
Rated power consumption	16 kVA
Total load current	60 A
Main breaker capacity	80 A
Pneumatic device	Required pressure
Required pressure	0.5 MPa
Required flow rate	231 NI/ min
Machine dimensions	W 3020 × D 1190 × H 1750 mm
Machine weight	3,350 kg

Standard Accessories
Spindle chucking device
Machine transfer detect function
Coolant tank
Workpiece transfer device set
Spindle cooling unit
Door lock
Revolving tool device

Special Accessories
Revolving tool spindle drive device unit (gang tool post)
Chuck air blow
Air blow for workpiece separator hand
Coolant flow rate detector
Tablet
Chip conveyor

Standard NC Function
Preparation functions
Background editing
On machine program check function
High speed program check function
Axis feed motion overlap function
Spindle speed change detection
Corner chamferring/ Radius function
Tool nose R compensation function
Arc radius specification
Thread cutting canned cycle
Multiple canned cycles for turning
Parts counter 8-digit
Interference check function
Program storage capacity 160 m (Approx 64 KB)
Touch panel 10.4" color LCD
Automatic power shut off
I/ O interface (RS232C, Compact flash, USB)

NC Options
Program storage capacity 1200 m (Approx 480 KB)
Custom macro, Sub micron command
Sync tapping function, Canned drilling cycle
Principal-axis constant surface speed control
Differential speed rotary tool function
Tool life management function
Milling interpolation function
External memory program operation
Polygon function, Hobbing function
Helical interpolation function
Slant helical interpolation function
Geometric command function
Variable lead thread cutting function
Circular thread cutting function
2 system simultaneous thread cutting
Coordinate rotation command function
Custom macro G code call
Hi-speed sync tapping function
Optional block skip

CITIZEN MACHINERY CO., LTD.



JAPAN	CITIZEN MACHINERY CO.,LTD. 4107-6 Miyota, Miyota-machi, Kitasaku-gun, Nagano-ken, 389-0206, JAPAN	TEL.81-267-32-5901	FAX.81-267-32-5908
SOUTH ASIA	CINCOM MIYANO ASIA SALES CO.,LTD. 1230 Rama 9 Road, Kwang Suanluang, Khet Suanuang, Bangkok 10250 THAILAND	TEL.66-23-745-226	FAX.66-23-745-228
KOREA	CINCOM MIYANO KOREA CO.,LTD. Room No.105 BYUCKSAN DIGITAL VALLEY I 212-16, Guro-3dong, Guro-gu, Seoul, KOREA	TEL.82-70-4337-1325	FAX.82-70-8220-8539
TAIWAN	CINCOM MIYANO TAIWAN CO.,LTD. 10FL., No.174, Fuh Sing N. Rd., Taipei, TAIWAN	TEL.886-2-2715-0598	FAX.886-2-2718-3133
CHINA	CITIZEN (CHINA) PRECISION MACHINERY CO.,LTD. 10058, XINHUA ROAD OF ZHOUJUN, ZIBO, SHANDONG, P.R. CHINA	TEL.86-533-6150560	FAX.86-533-6161379
EUROPE-Germany	CITIZEN MACHINERY EUROPE GmbH Mettinger Strasse 11, D-73728 Esslingen, GERMANY	TEL.49-711-3906-100	FAX.49-711-3906-106
EUROPE-UK	CITIZEN MACHINERY UK LTD 1 Park Avenue, Bushey, WD23 2DA, UK	TEL.44-1923-691500	FAX.44-1923-691599
AMERICA	MARUBENI CITIZEN-CINCOM INC. 40 Boroline Road Allendale, NJ 07401, U.S.A.	TEL.1-201-818-0100	FAX.1-201-818-1877

URL:<http://cmj.citizen.co.jp/>

All specifications are subject to change without prior notice. This product is an export control item subject to the foreign exchange and foreign trade act. Thus, before exporting this product, or taking it overseas, contact your CITIZEN machine dealer. Please inform your CITIZEN machine dealer in advance of your intention to re-sell, export or relocate this product. For the avoidance of doubt products includes whole or part, replica or copy, technologies and software. In the event of export, proof of approval to export by government or regulatory authority must be evidenced to CITIZEN. You can operate the machines after the confirmation of CITIZEN. CITIZEN is a registered trademark of Citizen Holdings Co., Japan.