Higher accuracy produces greater profitability

YASDA MICRO CENTER

YMC430

Ver.II

Linear Motor Drive

New technologies for micro high speed machining
targeting sub-micron accuracy
Reliable spindle and construction to avoid thermal distortion

YASDA

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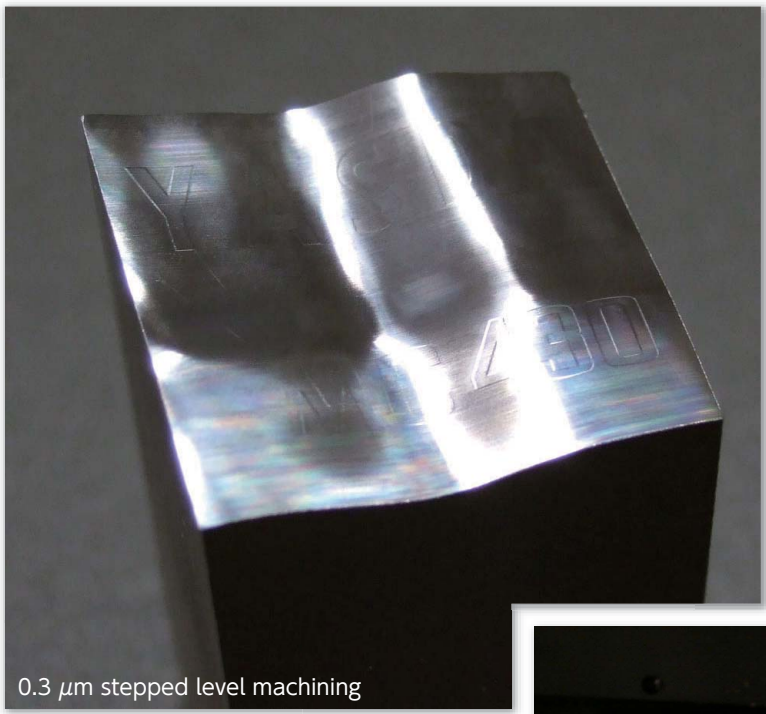
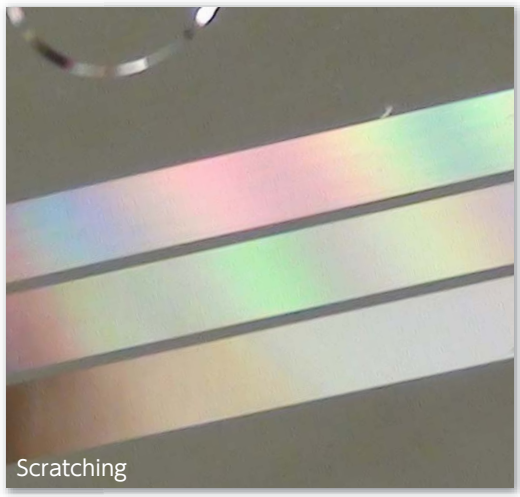
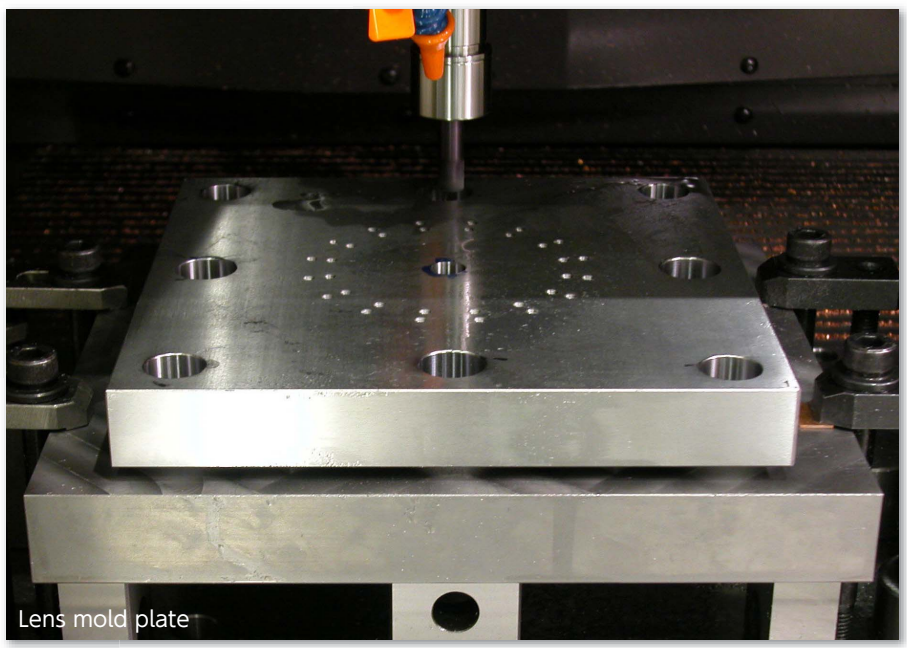

0.3 μm stepped level machining

Beautiful high quality surface


Scratching

Always consistent positioning accuracy


Lens mold plate


Filter mold

Accuracy of ±1 μm backed by years of accumulated technology

Excellent high quality surface finish and superior high accuracy machining achieved

The best solution for the next generation of more sophisticated and diversified machining needs

YMC430

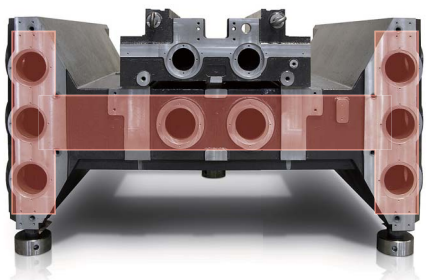
YASDA Micro Center YMC430 is the state-of-the-art high-end machine that answers the demand for ultra-high precision and high quality in the always advancing “high precision micro machining” fields. All-axis (X, Y, Z) controlled high-speed linear motor drives and highly rigid symmetrical frame structure as well as a thermal distortion stabilizing system that achieves consistent high-precision machining in long cycle time operation -- Ensuring unsurpassed, extremely high accuracy, the YMC430 provides the best solution that the times demand.

Symmetrical frame design offers high rigidity

High rigidity based on four-direction symmetrical H-shaped column and stability based on low center of gravity structure

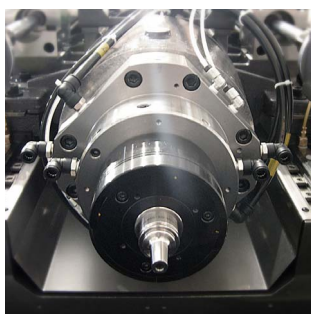
Symmetrical H-shaped column

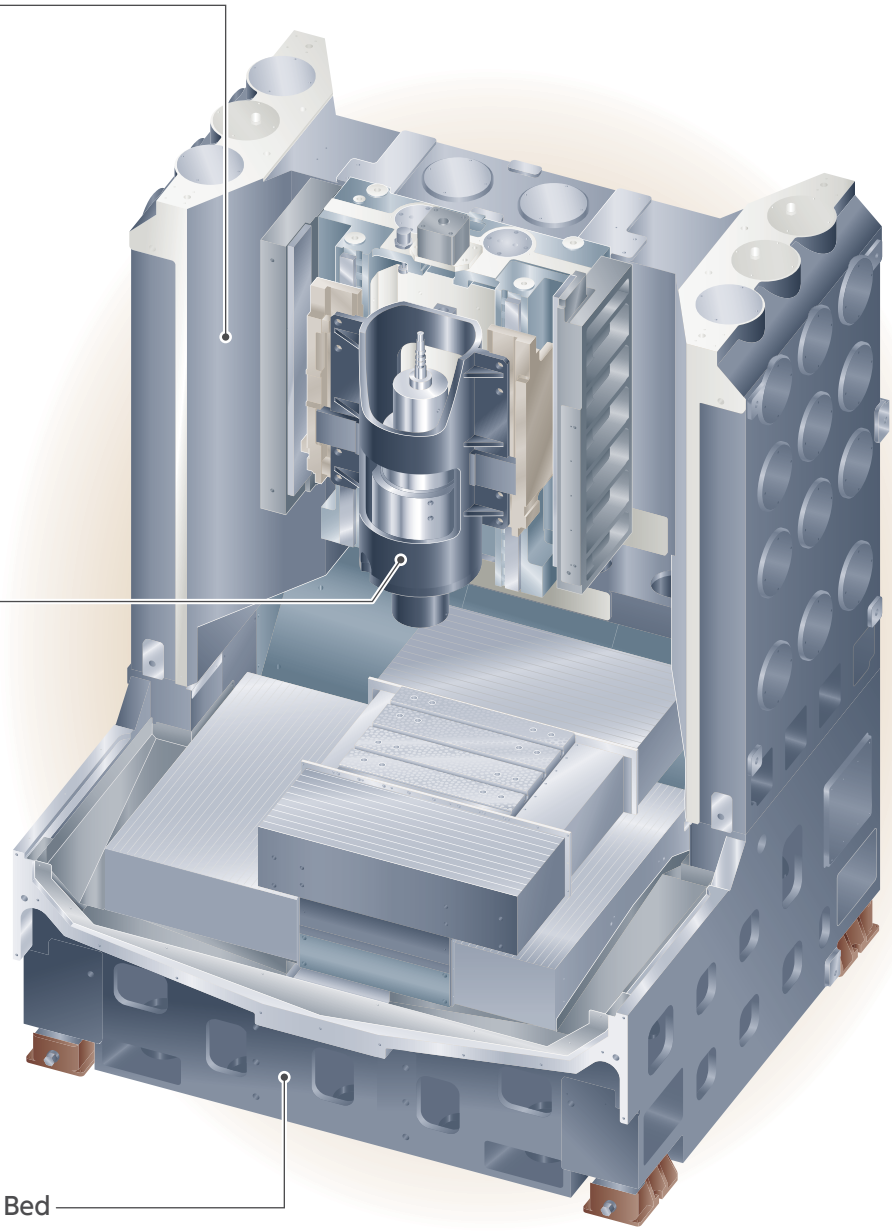
The highly rigid frame structure is representative of the YASDA machining center series. YMC430 adopts an innovative H-shaped column analogous to a double column design.



Symmetrically cylindrical spindle head

The spindle head adopts a cylindrical shape, symmetrical in the longitudinal and horizontal directions. This makes the spindle head less vulnerable to thermal deformation in the X- and Y-axis directions providing a greater degree of mechanical rigidity. Synchronized with the machine temperature, cooling fluid is circulated in the spindle head, allowing stable high-precision machining to be sustained over a longer period of time.





Bed

The sides of the bed are raised allowing for sufficient thickness. The integrated design with the column ensures further rigidity.

“Low Vibration” and “High Accuracy” achieved by the X-Y table

YASDA’s pursuit for “infinitely flat” or “infinitely square,” as well as adoption of linear motor drives has lead to the development of the high-precision X-Y table

X-Y table

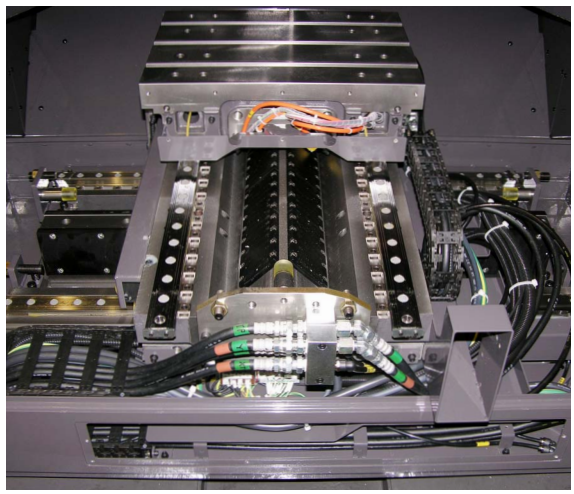
The moving element is mounted at a lower position of the bed center, and the light weight and low center of gravity design minimizes vibration caused by the reaction force during high-speed feeding. These mechanisms also contribute to high precision machining.

Ultra-precision linear guides

Adoption of ultra-precision linear guides significantly minimizes the effects from waving and improves assembly accuracy. Combined-adoption of these linear guides and linear motor drives realizes a high level of straightness and smoothness during axis feeding.

High-precision positioning

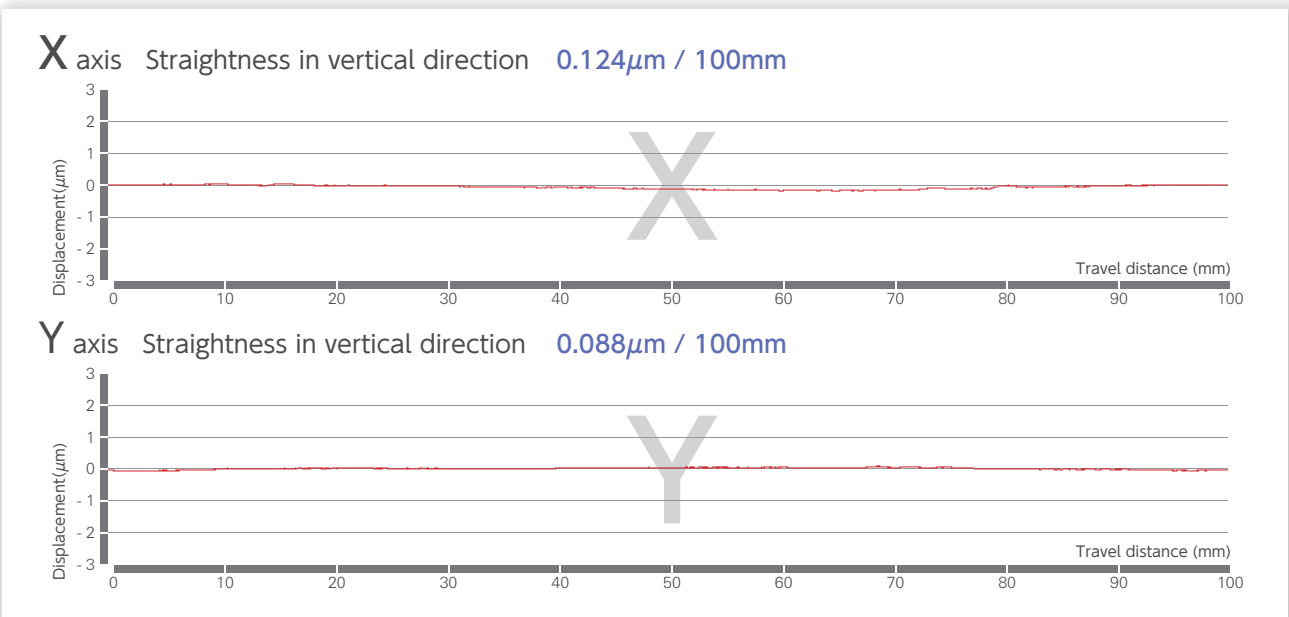
Two feedback scales mounted at the same height prevent any influence from temperature differences at the upper and lower level environment to accomplish high configuration accuracy.



Straightness (Measured value)

	X	Y	Z
Horizontal direction	0.448μm	0.220μm	0.373μm
Vertical direction	0.124μm	0.088μm	0.464μm

* Measurement by a 100 mm optical flat



Spindle that produces high accuracy and high quality

Irrespective of the tool type or rotation speed, YASDA's spindle accomplishes stable, high-precision machining for longer periods of time

High stability

The 40,000 min^{-1} spindle, developed to counter low vibration and high reliability, has been assembled with high accuracy to accomplish constant, high-precision machining for long periods of time.

Large capacity

Even for the spindle taper HSK-E32, a large diameter tool can be used to deliver sufficient cutting performance.

(Example)

ϕ12 mm square end mill

S1600 min^{-1}, F320 mm/min

Ad0.5 mm, Rd12 mm

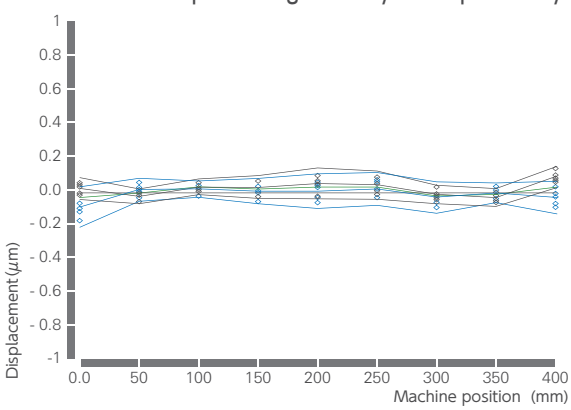
Material: NAK80 (40HRC)

Positioning accuracy and circularity (Actual value)

Positioning accuracy ISO 230-2(1997)

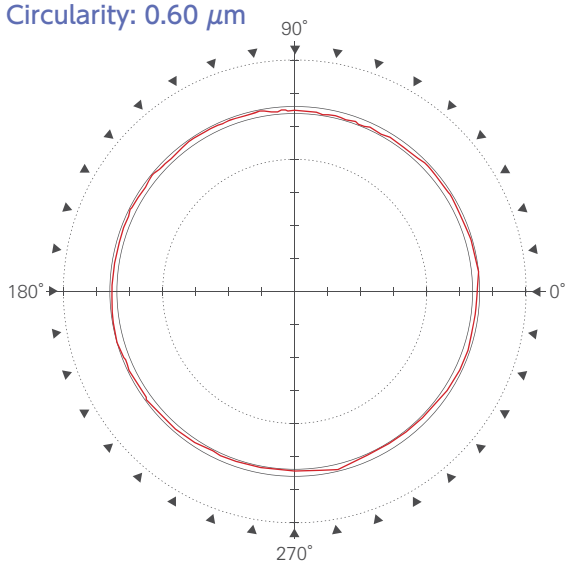
	Y	X	Z
Accuracy : A	0.356μm	0.508μm	0.316μm

X-axis bidirectional positioning accuracy and repeatability



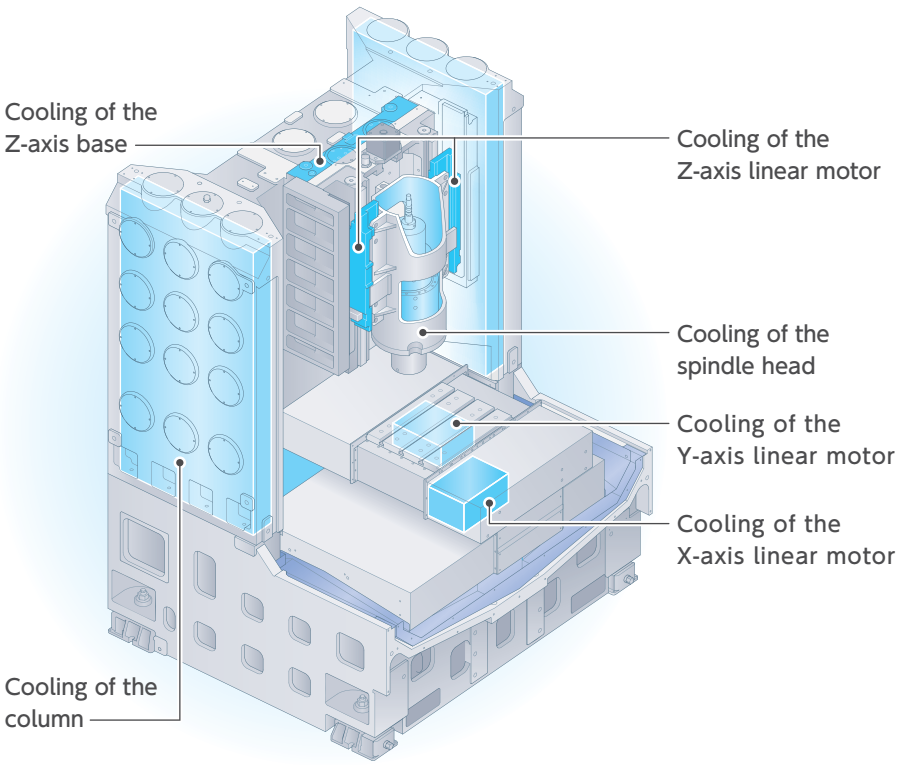
Motion performance data (X-Y axis)

Circularity: 0.60 μm



Advanced thermal distortion stabilizing measures cultivated from experience and technology

YMC430's thermal distortion stabilizing system for sustaining stable high-precision machining



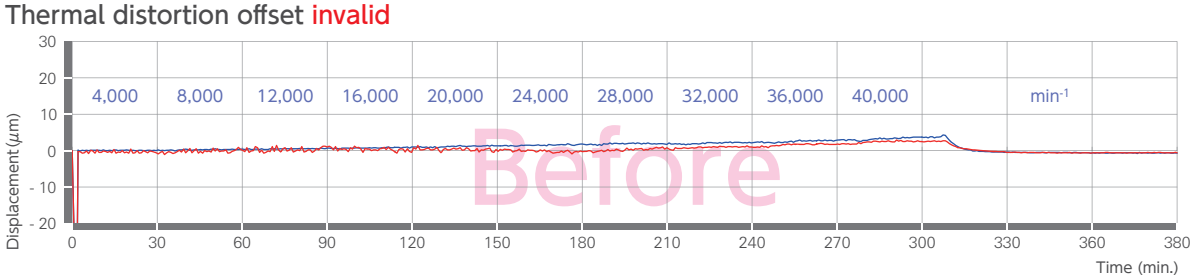
YMC430's thermal distortion stabilizing system (Option)

By circulating temperature-controlled heat exchange liquid through inside of the column and spindle head, the X-Y table, etc., YMC430 regulates thermal distortion of each axis for stable high-precision machining.
In particular, the column, due to the horizontally and vertically symmetrical H-shaped design, controls distortion caused by temperature change.

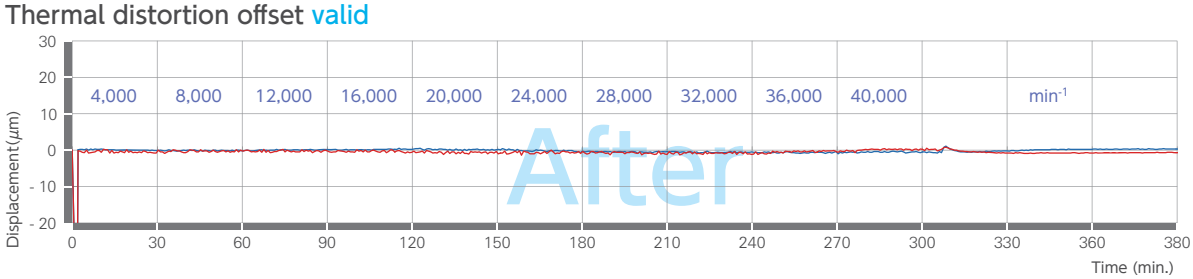
X- and Y-axis thermal distortion measurement

Measured value in full rotation range (~40,000 min^{-1})

Thermal distortion offset invalid

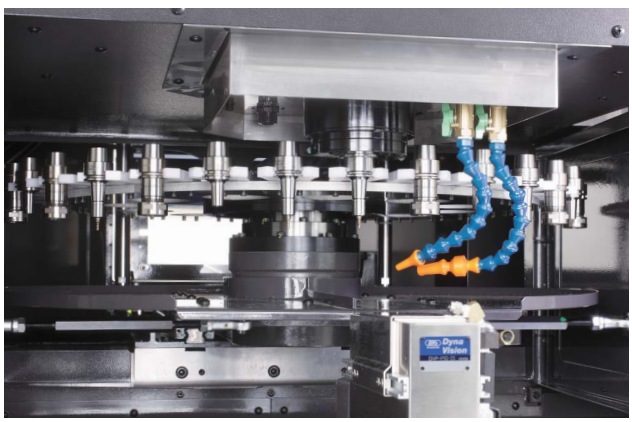


Thermal distortion offset valid



YASDA's machine option design details

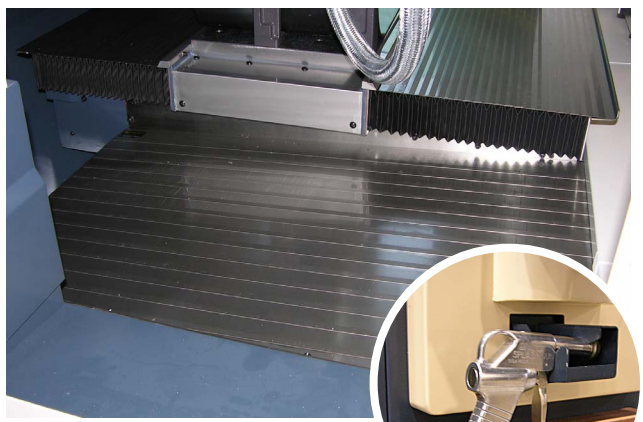
Highly reliable automatic tool changer (ATC) unit
Comfortable operability with excellent usability



Armless automatic tool changer (ATC)

The ATC unit adopts an armless type automatic tool changer that exchanges tools by the tool magazine moving along its stroke. Since a large capacity, compact 90-tool ATC (option) that can contain as many as 90 tools occupies the same installation space as that for a standard ATC unit, it can be installed without expanding machine space.

90-tool ATC
(Option)



Improvement in maintainability

A tilted slide cover to improve cutting chip discharge capacity as well as a standard-equipped washing gun helps maintain a clean work environment. An automatic slideway lubrication system is also equipped as standard to improve maintainability.

Automatic slideway
lubrication system

EZ-Me (Equipped with auto measuring system)

The EZ-Me easily performs work centering with the use of a manual pulse generator (MPG). The measurement accuracy is the same as the one obtained by automatic measurement.

Flat checker
(Equipped with tool length/radius compensation and breakage sensor)

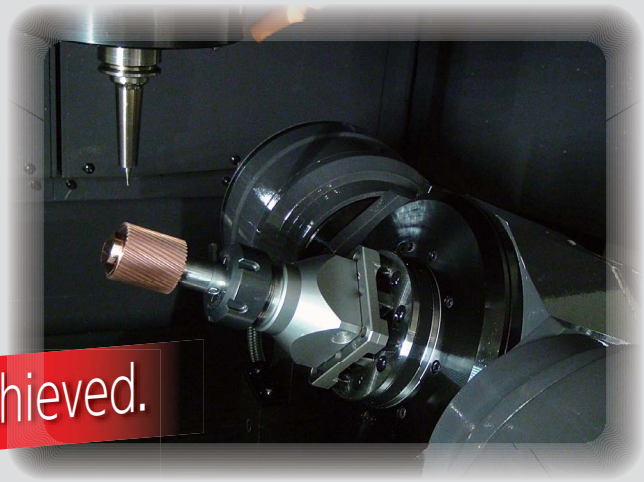
The flat checker is a system that performs repeated tool length measurement during high-speed spindle rotation, checks that there is no displacement in the Z-axis direction and automatically starts machining.

YASDA

With the YASDA rotary table mounted, high-precision, high-quality 5-axis machining is realized

YMC430 PLUS RT10

The high-precision, micro machining center YMC430 is equipped with a DD motor-driven, high-precision rotary tilting table. This combination enables multi-face indexing/machining as well as simultaneous 5-axis machining which requires high traceability, without re-chucking. Adoption of a DD motor to a tilted axis and a rotary axis has also realized backlash-free, high-speed, high-precision positioning.



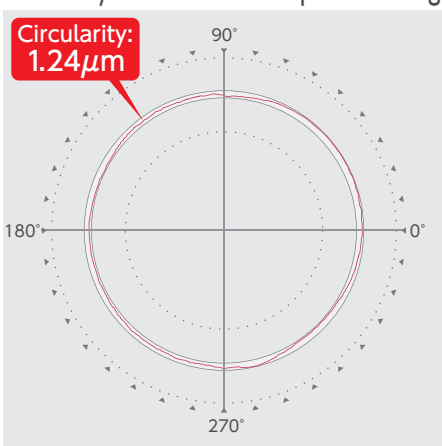
Helical gears of JIS grade 4 achieved.

Rotary axis indexing accuracy

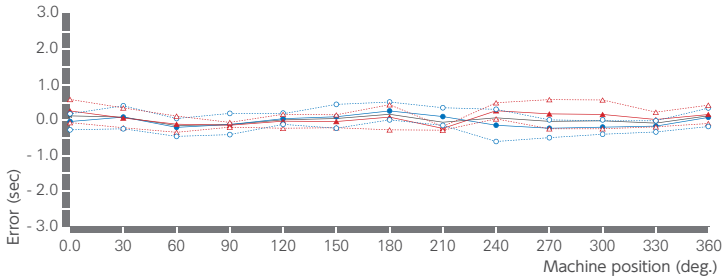
(Measured value)
ISO 230-2(1997)

Accuracy : A	B	C
	0.95sec	1.19sec

Circularity of tilted cone shape machining

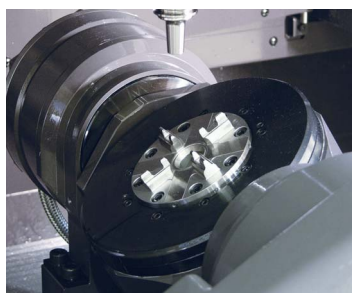


C-axis bidirectional positioning and repeatability



Various chucking systems

System 3R macro chuck



EROWA ITS chuck

i-CAL rotation center calibration function (Equipped with RT10 and auto measuring system)

With the use of the "YASDA auto measuring system," the i-CAL rotation center calibration function calculates the table rotation center coordinates, feeds the coordinates back to the NC, and promotes further high-precision 5-axis machining.

YMC 430 Ver.Ⅱ SPECIFICATIONS

1. Base machine specifications

1) Travel	X-axis travel (Cross movement of table)	420mm
	Y-axis travel (Longitudinal movement of table)	300mm
	Z-axis travel (Vertical movement of spindle head)	250mm
	Distance from table surface to spindle nose face	150~400mm
2) Spindle	Spindle speed range	200~40,000min^{-1}
	Spindle drive motor	7.5 kW AC (Continuous)
	Spindle taper	HSK-E32
3) Table	Table working surface	600mm×350mm
	Table loading capacity	100kg
	Table surface configuration	3T-slots, width 14 mm H7, pitch 100 mm
4) Feed rate	Rapid traverse rate	20,000mm/min
	Cutting feed rate	Max. 5,000 mm/min
	Least input increment	0.0001mm
5) ATC	Tool shank type	HSK-E32
	Tool storage capacity	32tools
	Maximum tool dia. / length / mass	ϕ50mm /120mm /500g
6) Mass of machine		Approx. 8,000kg
7) Electric power requirement		26kVA
8) CNC unit		FANUC 31i-B5

2. Standard equipment

1) Optical scale feed back	X, Y and Z axes 0.0001 mm resolution
2) Washing gun	1 (Operator position), Standard tank capacity: 110 L
3) Splash guard	Manual door with roof and one LED light
4) Spindle thermal displacement compensation	Standard data

3. CNC standard options

1) Least input/travel increment	0.0001mm
2) Display	10.4 inch color LCD
3) Program storage length	320 m (128 KB)
4) Custom macro	Common variable: 100
5) Number of registerable programs	250
6) Automatic corner override	
7) Tool offset pairs	32 pairs
8) Tool offset memory	Memory C
9) Run hour and parts count display	
10) Extended part program editing	
11) USB memory interface	Data input/output

4. Optional equipment

1) High-speed spindle (HSK-E25)	10 kW AC (2 min.), Max. 50,000 min^{-1}
2) Number of additional stored tools	90 tools
3) Signal tower (Multilayer signal lamp)	Red, yellow, green (Flashing)
4) Cutting liquid temperature control unit	
5) External mist coolant	Manufactured by Bluebe / 2 nozzles
6) Oil skimmer	Oil Pure
7) Cutting oil unit (AA type)	2 nozzles
8) Mist collector	Mistresa
9) Automatic tool length compensation and tool breakage sensor Manufactured by BLUM/NT-H type (Touch and laser)	
10) Tool length/radius compensation and tool breakage sensor Manufactured by BIG Daishowa / Dyna Vision Pro	
11) Automatic measuring system Manufactured by Renishaw / Touch probe OMP400	
12) High-speed machining function (YASDA HAS-3 system) Maximum feed rate	12,000 mm/min
13) Thermal distortion stabilizing system	With weekly timer
14) Weekly timer	
15) Spindle thermal displacement compensation	Individual data
16) AWC door	
17) Robot interface	Compatible with System 3R and EROWA

5. CNC Options

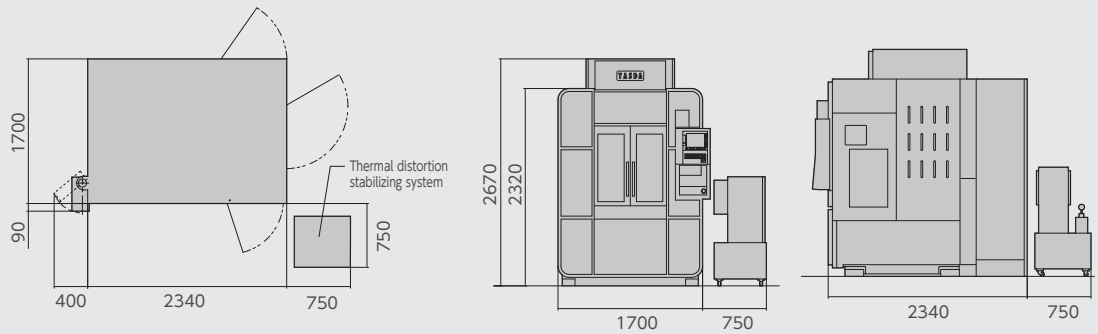
1) Part program storage	Total: 256 KB, 512 KB, 1 MB, 2 MB, 4 MB, 8 MB
2) Extensional number of registerable programs	Total: 500, 1,000, 2,000, 4,000
3) Background editing	
4) Helical interpolation	G02, G03
5) Conical/spiral interpolation	G02, G03 (Helical interpolation is required.)
6) Inch/metric conversion	G20, G21
7) Scaling	G50, G51
8) Coordinate rotation	G68, G69
9) Programmable mirror image	G50.1, G51.1
10) Rigid tap	M29 (G84, G74)
11) Optional block skip	Total: 9
12) Tool offset pairs	Total: 64, 99, 200, 400, 499, 999 sets
13) Custom macro common variable	Total: 600
14) Addition of workpiece coordinate	48 sets, 300 sets
15) Tool management	
16) Normal direction control	G40.1, G41.1, G42.1
17) Cs contouring control	
18) High-speed smooth TCP	G43.4, G43.5
19) Tilted working plane command with guidance	G68.2, G69, G53.1
20) Work setting error compensation	G54.4 Pn
21) Ethernet function	FOCAS2/Ethernet
22) Data server function	Fast data server, Capacity: 1GB

RT10 main specifications

1) Table rotational axis travel (C-axis)	360 deg. (Continuous)	6) Chucking system	System 3R macro chuck EROWA ITS chuck
2) Table tilting axis travel (B-axis)	−10～100deg.	7) Table loading capacity	15kg (20Nm)
3) Distance from tilting axis center to spindle nose face	80～330mm	8) Maximum swing diameter	ϕ250mm
4) B-axis maximum rotation speed	100min^{-1}	9) Least input increment	0.0001deg.
5) C-axis maximum rotation speed	200min^{-1}		

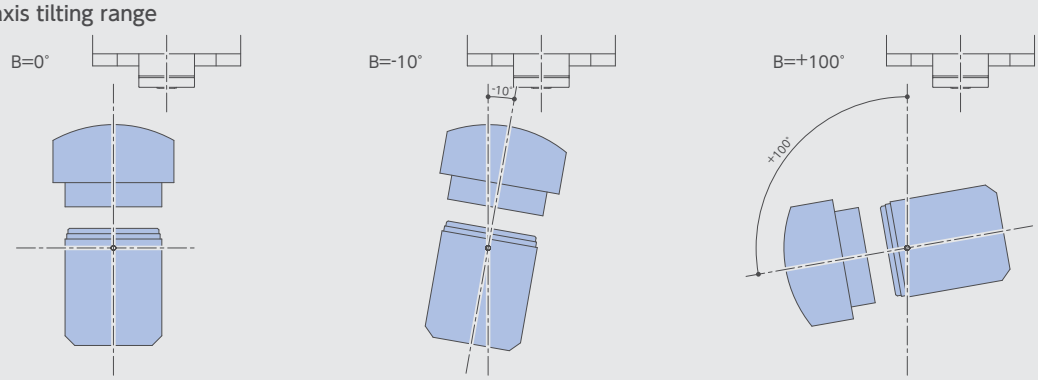
YMC430 Ver.Ⅱ OUTLINE

Unit : mm

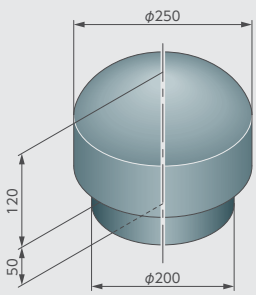


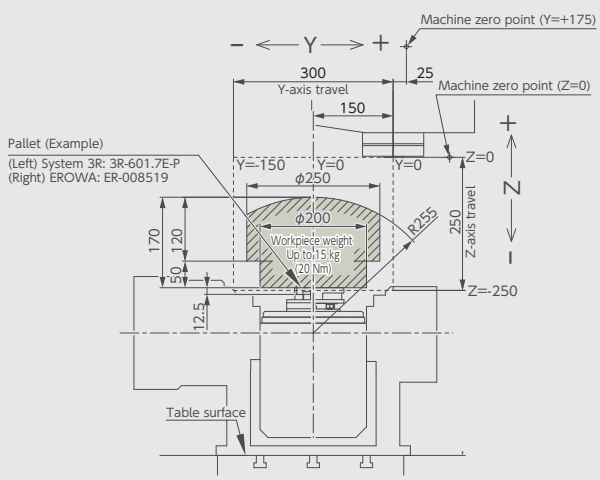
RT10 DIMENSION

B-axis tilting range



Maximum workpiece dimensions





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