Linear Motor Drive
New technologies for micro high speed machining targeting sub-micron accuracy
Reliable spindle and construction to avoid thermal distortion
Always consistent positioning accuracy

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

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.
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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 minimize 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 warping 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 of the upper and lower level environment to accomplish high configuration accuracy.

Straightness (Measured value)

<table>
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<tr>
<th></th>
<th>X</th>
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* Measurement by a 100 mm optical flat
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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.

Positioning accuracy and circularity (Actual value)

- **Positioning accuracy (ISO 230-2:1997)**
  - Y: 0.356μm
  - X: 0.508μm
  - Z: 0.316μm

- **Motion performance data (X-Y axis)**
  - Circularity: 0.60μm

X- and Y-axis thermal distortion measurement
- **Measured value in full rotation range (~40,000 min⁻¹)**

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.

![Diagram showing the thermal distortion stabilizing system](image_url)

YASDA MICRO CENTER YMC430 Ver.2 Linear Motor Drive
Spindle that produces high accuracy and high quality

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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

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X- and Y-axis thermal distortion measurement

Measured value in full rotation range (~40,000 min⁻¹)

Thermal distortion offset invalid

Before

After
YASDA’s machine option design details

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

Option

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

YMC 430 + RT 10

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)

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<tr>
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<th>A</th>
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<th>C</th>
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Circularity of tilted cone shape machining

C-axis bidirectional positioning and repeatability

Various chucking systems

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.

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

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 sliding way lubrication system is also equipped as standard to improve maintainability.

Automatic sliding way 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.

System 45 macro chuck

KOEWA 75 chuck
YASDA’s machine option design details

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

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 slideaway lubrication system is also equipped as standard to improve maintainability.

Option

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

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Circularity of tilted cone shape machining

- EZ-Me (Equipped with auto measuring system)
- Flat checker (Equipped with tool length/radius compensation and breakage sensor)

Various chucking systems

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

With the use of the “YASDA auto measuring system,” the 1-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.
**Specifications**

### 1. Base machine specifications

1. **Travel**
   - Axis travel (Cross movement of table): 420mm
   - Axis travel (Longitudinal movement of table): 300mm
   - Axis travel (Vertical movement of spindle head): 250mm
   - Distance from table surface to spindle nose face: 30~40mm

2. **Spindle**
   - Spindle speed range: 2000~40,000 rpm
   - Spindle drive motor: 7.5 kW AC (Continuous)
   - Spindle taper: HSK-E32
   - Table working surface: 600mm x 350mm
   - Table loading capacity: 1000kg
   - Table surface configuration: 11 slots, width 14 mm, pitch 100 mm
   - Rapid traverse rate: 20,000 mm/min
   - Cutting feed rate: Max. 5,000 mm/min
   - Least input increment: 0.0001mm

3. **ATC**
   - Tool magazine capacity: 32 tools

4. **CNC standard options**
   - Least input/travel increment: 0.0001mm
   - Display: 10.4 inch color LCD
   - Program storage length: 320m (128KB)
   - Custom macro: Common variable: 100
   - Number of registerable programs: 250
   - Automatic corner override: 0.7
   - Tool offset pairs: 32 pairs
   - Tool offset memory: Memory C
   - Run hour and parts count display:
   - Extended part program editing:
   - USB memory interface: Data input/output

### 4. Optional equipment

1. High-speed spindle (HSK-E25)
2. 105/AC (2 mm), Max. 50,000 rpm
3. Number of additional stored tools: 90 tools
4. Shock absorber (Multi-axis shock absorber)
5. Red, yellow, green
6. Cutting liquid temperature control unit
7. Oil skimmer: Oil Pure
8. Cutting oil unit (AA type): 2 nozzles
9. Mist collector: Mistense
10. Automatic tool length compensation and tool breakage sensor
11. Tool length compensation and tool breakage sensor
12. Automatic measuring system
13. Thermal distortion stabilizing system
14. Weekly timer
15. Individual data
16. AWC door
17. Robot interface: Compatible with System 3R and EROWA

### 5. CNC Options

1. Part program storage: Total 256 KB, 32 KB, 1 MB, 2 MB, 4 MB, 8 MB
2. Extension of registerable programs: Total 50, 150, 250, 400, 800
3. Background editing:
4. Helical interpolation: G02, G03
5. Conical interpolation (G02, G03)
6. Inch/metric conversion: G20, G21
7. Scaling: G50, G51
8. Coordinate rotation: G68, G69
9. Programmable mirror image: G50.1, G50.7
10. Rigid tap: M39 (G40.4, G40.8)
11. Optional block skip: Total 9
12. Tool offset pairs: Total 64, 99, 203, 403, 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, G43.1
17. C's contouring control:
18. High-speed smooth TCP: G43.4, G43.5
20. Work setting error compensation: G54.4, G54.4 Ph
21. Ethernet function: FUCHS/Ethernet
22. Data server function: Fast data server, Capacity: TGB

### RT10 main specifications

1. Table rotational axis travel (C-axis): 360 deg. (Continuous)
2. Table tilting axis travel (B-axis): –10~100 deg.
3. Distance from tilting axis center to spindle nose face: 80~330mm
4. B-axis maximum rotation speed: 1000 rpm
5. C-axis maximum rotation speed: 2000 rpm
6. Chucking system: System 3R macro chuck
7. Chucking system: EROWA 15S chuck
8. Loading capacity: 15 kg (200N)
9. Maximum swing diameter: ø250mm
10. Least input increment: 0.0001 deg.

### RT10 dimension

**B-axis tilting range**

**Maximum workpiece dimensions**

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*Images of YMC430 Ver. II and RT10 specifications.*
### YMC 430 Ver.II SPECIFICATIONS

1. **Base machine specifications**
   1. **Travel**
      - X-axis travel (Cross movement of table) 400mm
      - 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 2000–40000rpm
      - Spindle drive motor 7.5 kW AC (Continuous)
      - Spindle taper HSK-E32
   3. **Table**
      - Table working surface 600mm x 350mm
      - Table loading capacity 1000kg
      - Table surface configuration 3 slots, width 14 mm, pitch 100mm
   4. **Feedrate**
      - Rapid traverse rate 20000mm/min
      - Cutting feed rate Max. 5000mm/min
      - Least input increment 0.0001mm
   5. **ATC**
      - Tool shank type HSK-E32
      - Tool storage capacity 32 tools
      - Maximum tool da./length : max 6:1, 10:1, 15:1
   6. **Mass of machine**
      - Approx. 8000kg
   7. **Electric power requirement**
      - 3kw
   8. **CNC unit**
      - FANUC 31i-BE

2. **Standard equipment**
   1. Optical scale head X, Y and Z axis 0.001mm resolution
   2. Washing gun 1 (Operator position), Standard tank capacity: 110L
   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 320m (128KB)
   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

### RT 10 SPECIFICATIONS

1. **Table rotational axis travel (C-axis) 360 deg. (Continuous)**
2. **Table tilting axis travel (A-axis) 0–100 deg.**
3. **Distance from tilting axis center to spindle nose face 400–330mm**
4. **B-axis maximum rotation speed 10000 rpm**
5. **C-axis maximum rotation speed 2000 rpm**

5. **CNC Options**
   1. Part program storage Total: 256KB, 128KB, 2MB, 4MB, 8MB
   2. Extensive number of registerable programs Total: 500, 1000, 2000, 4000
   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, T, T01
   10. Rigid tap M39, G64, G74
   11. Optional block skip Total: 9
   12. Tool offset pairs Total: 64, 99, 203, 403, 499, 999 sets
   13. Custom macro common variable Total: 600
   14. Addition of workspace coordinate 48 sets, 300 sets
   15. Tool management
   16. Normal direction control G40.1, G41.1, G43.1
   17. C3 contouring control
   18. High-speed smooth TCP G43.4, G43.5
   19. Tilted working plane command with guidance G68.2, G69, G31
   20. Work setting error compensation G54.4 Pn
   21. Ethernet function FUCAS2/Ethernet
   22. Data server function Fast data server, Capacity: TGB
Higher accuracy produces greater profitability

YASDA MICRO CENTER

YMC 430

Linear Motor Drive

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