**Worry no more for wear - longer lifetime -**

- Bearing determines rigidity
  - Radial & Axial bearing
- Alloy steel worm gear
  - (1) Anti-wear
  - (2) High torque
  - (3) Auto self-locking
- Dual lead worm

**Driven by direct drive motor (D.D.M)**

- D.D.M rotary table can be fully compatible with FANUC, Mitsubishi, Siemens, and other controller brands

**FAD-300F-HS**

- It can work as a horizontal lathe
- Super-High-Speed: 2000 rpm

**AD-170**

- Speed: 200 rpm

**AD-260iB**

**FHD-650-iD650**

- (2 DD Motors)
  - Rotary: speed 210 rpm.
  - Tilt: speed 120 rpm.

---

**Overwrite the image of rotary table speed**

**Driven by roller gear cam**

- Made by Japanese Roller Gear Cam Master

**FAR-170H-RC255-J-2W**

- The tilt axis of dual-axes rotary table can be driven by roller gear cam

**FAD-170F-RC210-J**

- Tilt: Driven by Roller Gear Cam (Pneumatic brake) Speed 80 rpm.
- Rotary: Driven by D.D Motor (Pneumatic brake) Speed 300 rpm

**RC-255N**

- (Hydraulic brake)
  - Speed: 50 rpm

The 15th Edition
There are four common transmission mechanisms of rotary table as bellow:
You can find all types of mechanism in TJR.

<table>
<thead>
<tr>
<th>Transmission Mechanism</th>
<th>Strength:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td>1. Much more anti-wear than brazed worm gear</td>
</tr>
<tr>
<td>Driven by alloy steel worm gear</td>
<td>2. High torque</td>
</tr>
<tr>
<td></td>
<td>3. Because the tilting axis needs to bear heavy load, alloy steel worm gear can significantly enhance wear resistance.</td>
</tr>
</tbody>
</table>

| **B**                  | Strength: |
| Driven by roller gear cam (speed: 80 rpm) | 1. Almost no backlash during the clockwise / anti-clockwise rotation  |
|                        | 2. Almost no abrasion for the transmission mechanism |
|                        | 3. High speed: 80 rpm |

| **C-1**                | Strength: |
| Driven by super high speed direct drive motor (super high speed: 2000 rpm) | 1. If the moving column vertical machining center or drilling & tapping center is equipped with our table, it can make the machine work as a horizontal or vertical lathe concurrently.  |
|                        | 2. The super high speed of rotary axis: 2000 rpm. |
|                        | 3. Truly zero backlash during the clockwise / anti-clockwise rotation. |
|                        | 4. Truly zero wear for the transmission mechanism. |
|                        | 5. Long-lasting high precision  |
|                        | (The actual precision depends on the selected angle encoder) |

| **C-2**                | Strength: |
| Driven by direct drive motor (speed: 200 rpm) | 1. Truly zero backlash during the clockwise / anti-clockwise rotation.  |
|                        | 2. Truly zero wear for the transmission mechanism. (No abrasion at all) |
|                        | 3. High speed: 200 rpm |
|                        | 4. Long-lasting high precision  |
|                        | (The actual precision depends on the selected angle encoder) |

| **D**                  | Strength: |
| Driven by Japan-made worm & worm gear (speed: 25 - 44 rpm) | 1. The price is the lowest |
|                        | 2. It’s very easy to adjust backlash after some abrasions  |
|                        | ※ Alloy steel worm gear and roller gear cam are options to drive tilt axis of dual-axis rotary table. |

Made by Japanese roller gear cam master
The future trend→ double column vertical machining center or horizontal machining center works as a horizontal or vertical lathe concurrently.

For 5-axis horizontal machining center

Tilt axis: driven by DD motor or roller gear cam
Rotary axis: faceplate size: Ø170~650mm
  speed: 200 or 2000 rpm as options

The base plate of the dual-axis rotary table can be integrated with the interface of linear guideway and ballscrew so as to be installed directly on the linear guideway of horizontal machining center

Mounted on the linear guideway, the dual-axis rotary table can be shuttled back and forth toward the spindle of horizontal machining center
  Rotary axis: ±1200° or 2000 rpm
  Tilt axis: +180° ~ -40°
  Work as a reverse turning lathe

For 5-axis vertical machining center

Tilting at 0°, it can work as a vertical lathe.
  (Ø170~650mm faceplate, 200 ~ 2000 rpm)

Tilting at 90°, it can work as a horizontal lathe

±110° tilt angle (for chip removal)

Ø650 R.T. driven by two DD motors

Applications

H.M.C. works as horizontal lathe

H.M.C. works as reverse turning lathe
Competitive Advantage

You can have the following 12 kinds of models when you choose any size of TJR 4th & 5th axis rotary table.

- **A** goes with 1 or 2 or 3 or 4
- **B** goes with 1 or 2 or 3 or 4
- **C** goes with 1 or 2 or 3 or 4

12 kinds of models in total

**Rotary axis:**
1. Driven by 200 rpm DD motor
2. Driven by 2000 rpm DD motor
3. Driven by roller gear cam
4. Driven by worm & worm gear

**Tilt axis:**
- Driven by 200 rpm DD motor
- Driven by roller gear cam
- Driven by worm & worm gear

Horizontal DD motor rotary table

**HAD-170**
(Driven by DD motor 200 rpm)
Mounted on the surface grinder, it can work for rotary surface grinding and side grinding. (the faceplate can be enlarged)

**HAD-210F-HS**
(2000 rpm)
Can work as a lathe concurrently

Make your dreams of “turning instead of grinding” and “mirror finish” come true

The first key of success:
Use the right and high-precision dynamic balancing Instrument.
Then, the secondary are cutting tools, cutting fluid, machine tool precision, and control system (incl. PLC)

High-speed and high-precision dynamic balancing rotary table.

It takes only 5 minutes for adjustment to reach 1μm.
It’s possible to reach Dynamic balancing highest level G 0.4 when all necessary conditions are carried out.

(The balancing piece mounted under the table)

Why it’s necessary to use dynamic-balance adjusting ring.

Time to say goodbye to the old and inefficient ways of dynamic balancing adjustment. (such as drilling, tapping, and screwing)

The adjustment method
Manually move the balancing piece. Require no drilling or screwing.

---

\[\text{Dynamic balancing Instrument.}
\text{(400 rpm – 20000 rpm)}
\text{Acceleration measurement range: 0.0001-20G}\]
How can we know the real quality of roller gear cam rotary table?

The simple rigidity testing on allowable cutting torque of roller gear cam:

Testing conditions: Keep rotary table unclamped and servo motor electrified.
1. The rigidity of roller gear cam can be indicated by the biggest allowable pressure kg-m exerted on point B to just keep the deformation within 0.01 mm measured by dial gauge C. If the rigidity of roller gear cam isn’t good enough, it cannot well support the 4th axis simultaneous machining or eccentric machining on a fixture plate.
2. The lower the sound volume and the temperature are when the rotary speed is high, the better the quality of roller gear cam is.

If you want to know what is the maximal W KGs and L mm which TJR roller gear cam can sustain while keeping the deformation within 0.01 mm, please contact us to ask for the detailed technical report.

Made by Japanese roller gear cam master

When a roller follower enters the spiral orbit of cam, the follower is preloaded to contact the orbit surface. Thus, there is no backlash between roller follower and cam. By using roller followers as transmission elements, follower’s rolling with sliding contact makes almost no abrasion so as to substantially extend product life.

Two transmission mechanisms are available for swivel spindle head

1. Driven by roller gear cam
2. Driven by direct drive motor

The Ø170 swivel spindle head (as below diagram shows) can be mounted on the engraving machine. Ø250 and Ø320 available as other alternatives

A simplified 4th & 5th axis rotary table

Tilt axis: roller gear cam or DD motor rotary table
Rotary axis: 90° indexer
No abrasion even table rotates & tilts for 24-hours per day. It can do five face machining without employing a standard 4th & 5th axis rotary table.

Example: Five-face machining for cell phone case

1. Machine the front side at 0°.
2. Rotate the fixture plate 90° clockwise, and then machine the left side.
3. Rotate the fixture plate 90° counterclockwise, and then machine the right side.
4. Rotate the fixture plate 180° counterclockwise, and machine the down side.
5. Rotate the fixture plate 90° counterclockwise, and then machine the up side.
6. Machine the up side.
This is the only way to lead the trend.

D.D.M. (Direct Drive Motor) type dual-axis rotary table.

- FAD-300iwlj-30D-HS can be equipped with a base plate and then directly placed on the alternative machines as follows:
  2. Large-working-table vertical machining center
  3. Bridge type machining center

- FAD-300iwlj-30D-HS can be directly placed on the bridge type machining center by fastening the tilt axis on the machine base. (An additional supporting tailstock is optional)

Quintuple-purpose machine

One machine is able to be installed with FIVE different kinds of rotary tables.

For vertical machining center with auto pallet changer (3-axis moving column type)
- Features: Two functional positions (180° to and fro)
  - One position: machining
  - Another position: loading & unloading

For 5-axis vertical machining center (3-axis moving column type)
- Features:
  - Less interruption
  - Clear at a glance no matter how the table tilts
To enjoy the freedom of processing and molding
To experience the smoothness of heavy duty cutting.

Do you pick the right rotary table?

**Added value at no extra cost:**
The tilt axis of the dual-axis rotary table which needs to bear a heavy load employs Japan-made worm and gear as a standard component.

**Made in Japan**

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**4 Features of TJR Tilting Rotary Table**
1. Max. tilt angle: ±110° (can be further customized or enlarged)
2. TJR employs 3 independent encircling hydraulic braking systems for tilt, rotary, and supporting axis (3 brakes on 2 sides).
3. The tilt axis employs Japan-made worm and worm gear as the standard components.
4. Always use radial & axial preloading bearings for tilt and rotary axes.

**Other Tilting Rotary Table**
1. Max. tilt Angle: -30° ~ +110°
2. There is no brake for supporting axis. (2 brakes on 1 side)
3. A home-made worm & worm gear is installed in the tilt axis.
4. Use normal bearings for tilt and rotary axes.
Do you still buy products which use 20-year-old designs and technologies?

If you prefer new car on market, why do you still buy rotary table of 20-year-old design.

**CHECK!**

How can we know if the product we purchase today is exactly the same as the one sold 20 years ago?

**The answer:**
If the exterior does not change for 20 years, the wooden mold might be the same. Hence, the interior structure has not been upgraded.

---

**20-year-old model**

Other manufacturer:
- Smaller Through Hole → Smaller Bearing
- Smaller Bearing → Lower Rigidity

Other rotary table manufacturers employ as follows:
- Small diameter
  - for hydraulic clamping
  - for pneumatic clamping

---

**Redefine “RIGIDITY”**

Larger Through Hole → Bigger Bearing
Bigger Bearing → Higher Rigidity

**Devised by German**

Specialized for Rotary Table, the Radial & Axial bearing can fully support heavy-duty cutting in both radial and axial directions.

---

Wow~ can’t hold it any more without upgrade.

The small bearing sustains the center area of table so that it can not support heavy duty cutting. Therefore, small diameter indicates lower rigidity.

**Axial cutting**

TJR employs large-diameter bearings which sustain outer circle periphery of table and accordingly better support heavy duty cutting. Therefore, bigger bearings significantly increase overall rigidity.

---

**The most important characteristics for a rotary table to have are:**
1. PRECISION
2. RIGIDITY

**Made in Japan**

The **PRECISION** depends on worm wheel
The **RIGIDITY** depends on spindle bearing

---

**Less deformation δ (see the right chart)**

Total weight (sag)
Refine the rigidity.
Push boundaries of cutting.

Stop searching!
Only in TJR, you can pay the price of small-through-hole rotary table for the large-through-hole rotary table.

Truly good value for money TJR

Value Added

TJR Ø255 Rotary Table with Ø80 central through hole can accommodate 8-oil-hole distributor.

OH, My God!!

8-Oil-Hole Distributor

The TJR through hole diameter can be easily adjusted by retrofitting the mandrel sleeve. But, it's no way to enlarge the small-through-hole design of others.

Rigidity comparison between radial & axial bearing and taper roller bearing

Take Ø255mm Rotary Table as an example

TJR Models | Deformation δ | Static loading without clamping
---|---|---
HR 255 | 0.01 mm | 586 Kg
HR 320 | 0.01 mm | 631 Kg
HR 500 | 0.01 mm | 915 Kg
HR 630 | 0.01 mm | 1,668 Kg

1 set of radial & axial bearing employed for 1 rotary table by TJR.
2 sets of taper roller bearing employed for 1 rotary table by the others

586Kg

150Kg

3.9 times better

Static loading without clamping (Kg) vs Deformation δ (mm)
It is no longer required to buy Japanese brand in order to acquire Japanese quality. TJR can achieve Japanese quality with lower cost.

Comparison of braking system

**TJR Encircling braking system**
- Bigger contact area; higher clamping force
- Brake mechanism tightly encircles the work table and thus provides high rigidity

**Disk braking system**
- Smaller contact area; lower clamping force
- Disk brake mechanism stays far from the work table and thus causes run-out and low rigidity

The brake system for rotary table is too important to be compromised!

Bad brakes cause car accident all the time.

A rotary table without good brakes causes tooling vibration.

1. Tooling vibration occurs while processing bar-shape work pieces
2. Middle plate vibration occurs while machining with fixture plate and therefore damages worm gear, leading to bad precision.

The 7th level “tooling vibration”
Desired beauty of true machinery

Treasure for top talent scout

Sophisticated, perfect, excellent in all details

255x255 / 320x320 / 400x400 – Horizontal application,
Specially for small vertical machining center and small drilling & tapping center

Don’t worry about recession as long as you keep following up

The benefits of converting vertical machining center into horizontal one.

1. Less suppliers cause less competition
2. Cutting waste is not easy to fall into groove or slots of workpiece
3. More space for adjusting cutting tool and more convenient for setting up fixture column.
4. Because several work pieces can be mounted on the four faces of the fixture column, multi-operations can be performed by one operator so as to save human resource cost.
5. The same machine base can be applied to either vertical or horizontal machining center. The occupied floor space can be kept the same.
6. By only changing ATC and erector column, you can simply convert vertical machine into horizontal one.

VERTICAL drilling & tapping center

Transform VERTICAL into HORIZONTAL

small HORIZONTAL drilling & tapping center

CTU Hook type auto pallet changer

The location of CTU can vary, depending on the machine design and dimensions.

In the metal cutting industry, employing the 4th axis can easily solve the labor shortage crisis.

Application example:
retrofitting CTU to drilling & tapping center or vertical machining center.
A living legend
Create a surprising exchange mechanism

Beyond the rotational inertia
Reach unimaginable stability

Comparison of position cones

Ball locking mode

1. Larger contact surface
2. One piece design without reposition requirement
3. Big contact surfaces
4. Dust sheet automatically cover
5. Thicker wall

90% Japanese horizontal machining center use the Ball locking mode.

Grippers locking mode

1. Smaller contact surface easily cause indentations, accordingly losing accuracy
2. Because gripper employs spring to reposition, the elastic fatigue may occur and get pull rod stuck
3. When the piston moves up and down, it is easy to cause inclination interference and accordingly get piston stuck due to the small contact surfaces
4. It’s required to keep tiny clearance in order to match the dust sheet. When the pull rod departs with slightly eccentric bias, the tiny clearance may get the dust sheet come off with pull rod and accordingly turn over the worktable
5. The wall is too thin to deliver enough rigidity. It’s easy to get deformed or broken

Application diagram: Retrains horizontal machining center with CTH+CHI
Positioning cones: Powerful hydraulic clamping
The comparison of Clutch

The worktable will not lift up when rotating.

Complete waterproof because of no seam at all.

TJR use 3-piece clutch

Advantages:
1. The work plate does not lift up when rotating. So, there is no risk of intake of water and chips.
2. Bigger loading capacity.
3. 3-piece clutch can employ labyrinth seal.

Other suppliers of Rotary Table use 2-piece clutch

1. There is some risk of intake of water & chips when worktable lifts up.
2. The water-resistant seal of 2-piece clutch needs to sustain the constant friction while rotating up & down. Therefore, it gets worn easily and accordingly causes intake of water & chips.
3. Smaller loading capacity
4. 2-piece clutch cannot employ labyrinth seal.
The comparison of price advantage

Driven by TJR’s premium components and design, TJR price should be similar to the price of Japanese-made product. However, TJR price is actually similar to the price of Taiwanese-made one. It shows TJR is the most cost-effective choice.

The comparison of service attitude

The truly priceless value is the excellent customer service which TJR always persists in.

Others: It is regretting that rotary tables become useless when you buy rotary tables without good after-sales services.

The comparison of inspection facilities

<table>
<thead>
<tr>
<th></th>
<th>3D measuring equipment - Geometry precision testing -</th>
<th>Laser measuring equipment - Indexing precision testing -</th>
</tr>
</thead>
<tbody>
<tr>
<td>TJR</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Others</td>
<td>NO</td>
<td>Alternative methods</td>
</tr>
<tr>
<td></td>
<td>Fully utilized to test all kind of precision and runout.</td>
<td>1. Use the old-type measuring equipment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Use cheaper encoder or angle encoder</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Use the fixture with height gauge to measure 4 squareness</td>
</tr>
</tbody>
</table>

Ignoring little details will make your motor immersed in water.

Is the rim of your sheet metal sealed by waterproof glue? The waterproof glue will be brittle and accordingly permeable as the result of prolonged exposure to metal removal fluid.

Customized model

Pneumatic multi-spindle rotary table (4-wheel coupled): AR-125-4W

It is watertight by all rims sealed with O-ring. (IP65 water-resistant enclosure)

The long-last, anti-erosion, and silver pearl lacquer makes your rotary table look fresh.
Product Range

Longer service life due to TJR's dedication on quality

- **AR series** (Pneumatic brake) - back side motor
  - AR-125B-250B

- **AR series** (Pneumatic brake)
  - AR-126~250

- **HR series** (Hydraulic brake)
  - HR-210~800

- **AD-260iB** (Direct drive motor)

- **FAD-170F / FAD-210F**
  - (2DD motors, pneumatic brake)

- **FAD-170F-RC210**
  - (Rotary DD motor TIR: Roller gear cam)

- **FAR series** (dual axis, pneumatic brake)
  - FAR-170/210

- **FAR-170H-RC255-2W**
  - (dual axis, pneumatic brake)

- **FAD-300F-HS**
  - (2DD motors, pneumatic brake)

- **FHR series** (dual axis, hydraulic, 3 brakes)
  - FHR-255C (cradle type)
  - FHR-255CL (Extended cradle type)

- **FHR series** (dual axis, hydraulic, 3 brakes)
  - FHR-320C (cradle type)

- **FHR series** (dual axis, hydraulic, 3 brakes)
  - FHR-500C (cradle type)

- **FHR-400BCF** (Back side motor type)
  - (dual axis, hydraulic, 3 brakes)

- **FHR-400BCF** (Back side motor type)
  - (dual axis, hydraulic, 3 brakes)

- **FHR series** (dual axis, hydraulic, 3 brakes)
  - FHR-530C (dual axis, hydraulic brakes)

- **HHI-500x500** (Hydraulic brake)

- **FHR-530SN**

- **FHD-650-ID650** (Hydraulic brake)

- **CTU-400x600 / 500x700 (180° to & fro)**
  - Hook type auto pallet changer for C type vertical machining center

- **CTH+CHI-500/630** (Hirth coupling hydraulic brake)
  - Tray type auto pallet changer + dual pallets rotary table for horizontal machining center

- **CHC-700x1090 (180° to & fro)**
  - Flat type auto pallet changer for 3-axis moving column vertical machining center