

Exquisite Products of Taiwan. Extreme Ingenuity

# TJR CNC Rotary Table



## TJR Global Sales

Innovative Product

Integrity Business

Responsible Service



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The 16a<sup>th</sup> Edition

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Taiwan  
NO.1

*TJR rotary table can surpass Japanese-made one*

Driven by Direct Drive Motor

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

Bearing determines rigidity  
Radial & Axial bearing



Dual lead  
Alloy steel worm



Alloy steel worm gear

Alloy steel  
ion nitrided worm gear  
(1) Anti-wearing HRC85<sup>+</sup>  
(2) High torque  
(3) Auto self-locking



**FAD-300F-HS**

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



**AD-170**

**AD-260iB**

Speed: 200 rpm



**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



**FHD-650-ID650**

(2 DD Motors)

Rotary: speed 210 rpm.  
Tilt: speed 120rpm.



*Overwrite the image of  
rotary table speed*



Driven by roller gear cam

**Made by Japanese  
Roller Gear Cam Master**



**FHR-350F-2W-RC320-2A**

① Dual A axis synchronization driven  
by roller gear cam  
② Dual C axis driven by alloy steel  
worm & gear  
(Two C axes can rotate in the same or  
opposite direction)



**FAD-170F-RC210**

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



**HRC-400**











Swivel spindle head(B axis)  
HRC-400SP  
(driven by roller gear cam)  
HHRs-400SP  
(driven by alloy steel worm & gear)

The 16a<sup>th</sup> Edition



There are **four common transmission mechanisms** of rotary table as bellow:

You can find **all types of mechanism in TJR.**

Transmission Mechanism	
<b>A</b>  Driven by <b>alloy steel</b> worm gear	 Strength: ① Much more <b>anti-wear</b> than <b>bronze</b> worm gear ② <b>High torque</b> ③ Because the tilting axis needs to bear heavy load, alloy steel worm gear can significantly enhance wear resistance.
<b>B</b>  Driven by <b>roller gear cam</b> (speed: 80 rpm) <b>Made by Japanese roller gear cam master</b>	 Strength: ① Almost no backlash during the clockwise / anti-clockwise rotation ② <b>Almost no abrasion</b> for the transmission mechanism ③ High speed
<b>C-1</b>  Driven by <b>super high speed direct drive motor</b> (super high speed: <b>2000 rpm</b> )	 Strength: <b>can work as a lathe concurrently</b> 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 <b>horizontal</b> or <b>vertical lathe</b> concurrently. ② The super high speed of rotary axis: <b>2000 rpm</b> . ③ Truly <b>zero backlash</b> during the clockwise / anti-clockwise rotation. ④ Truly <b>zero wear</b> for the transmission mechanism. ⑤ Long-lasting high precision (The actual precision depends on the selected angle encoder)
<b>C-2</b>  Driven by <b>direct drive motor</b> (speed: <b>200 rpm</b> )	 Strength: ① Truly <b>zero backlash</b> during the clockwise / anti-clockwise rotation. ② Truly <b>zero wear</b> for the transmission mechanism. ( <b>No abrasion at all</b> ) ③ High speed: <b>200 rpm</b> ④ Long-lasting high precision (The actual precision depends on the selected angle encoder)
<b>D</b>  Driven by <b>Japan-made worm &amp; worm gear</b> (speed: 25 - 44 rpm)	 Strength: ① The major and cost-effective solution. ② 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.

**Bearing determines rigidity**  
**Radial & Axial bearing**

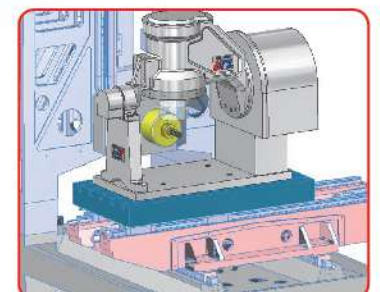
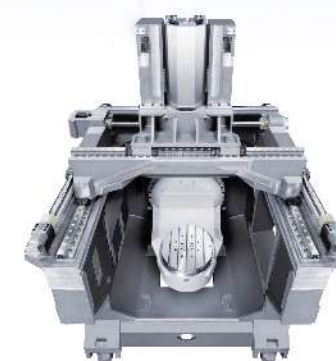
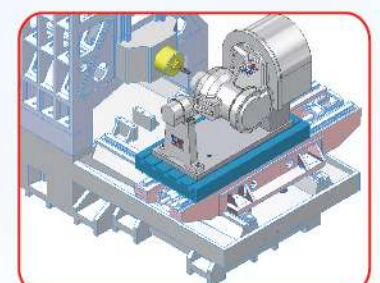
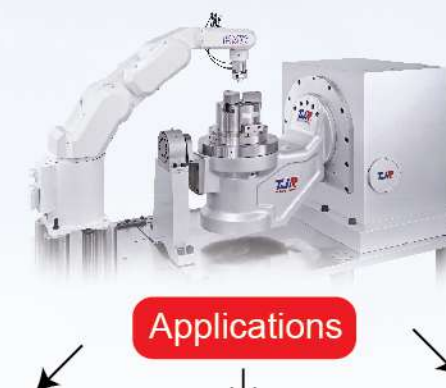


**Alloy steel ion nitrided worm gear**

- (1) Anti-wearing
- (2) High torque
- (3) Auto self-locking

**Dual lead Alloy steel worm**

**Alloy steel worm gear**





## Competitive Advantage

You can have the following 20 kinds of models when you choose any size of TJR 4<sup>th</sup> & 5<sup>th</sup> axis rotary table.

- ※ **A** goes with ① or ② or ③ or ④ or ⑤
- ※ **B** goes with ① or ② or ③ or ④ or ⑤
- ※ **C** goes with ① or ② or ③ or ④ or ⑤
- ※ **D** goes with ① or ② or ③ or ④ or ⑤

20 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 bronze worm & worm gear
- ⑤ Driven by alloy steel worm gear

### Tilt axis:

- A** Driven by 200 rpm DD motor
- B** Driven by roller gear cam
- C** Driven by bronze worm & worm gear
- D** Driven by alloy steel worm gear



## Horizontal DD motor rotary table



Mounted on the surface grinder, it can work for rotary surface grinding and side grinding. (the faceplate can be enlarged)

**HAD-170**  
(Driven by DD motor 200 rpm)



**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)



- ▲ Dynamic balancing Instrument. (400 rpm – 20000 rpm)
- Acceleration measurement range: 0.0001-20G

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

It takes **only 5 minutes** for adjustment to reach 1 $\mu$ m~5 $\mu$ m. It's possible to **reach Dynamic balancing highest level G 0.4 ~G 1.0** when all necessary conditions are carried out.



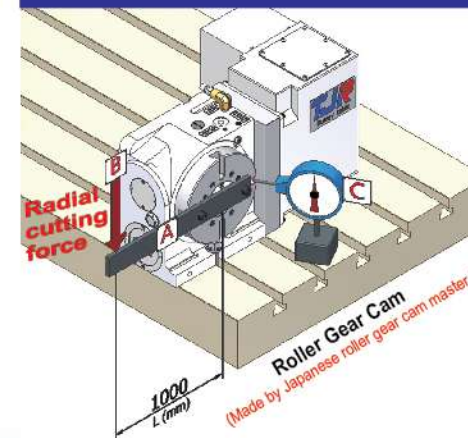
Why it's necessary to use dynamic-balance adjusting ring.

It's required to adjust dynamic balance every time whenever a different fixture or work-piece is mounted. However, by using the dynamic-balance adjusting ring, it's very easy to do even for a layman.

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

Taiwan patent number: M494043 M506667 **counterfeiting not allowed**  
China patent number: ZL 2012 2 0525527.2 ZL 2015 2 0243029.2 **counterfeiting not allowed**

## 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:

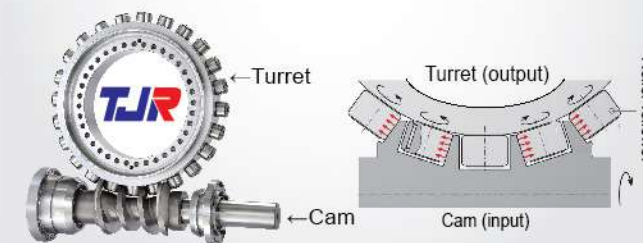
**Testing conditions:** Keep rotary table unclamped and servo motor electrified.

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 4<sup>th</sup> 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**

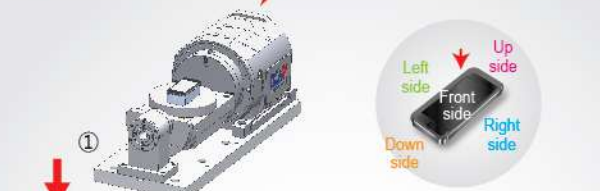
The Ø170 swivel spindle head (as below diagram shows) can be mounted on the engraving machine.

Ø250 · Ø320 and Ø400 available as other alternatives



## Example: Five-face machining for cell phone case

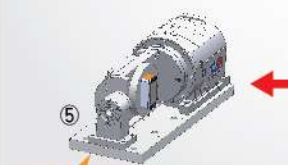
- ① Machine the front side at 0°.



- 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.



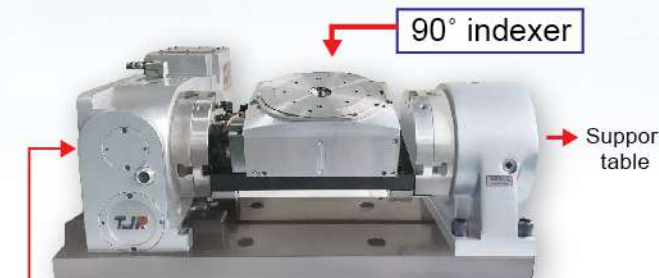
- ⑤ Rotate the fixture plate 180° counterclockwise, and machine the down side.

- ④ Rotate the pneumatic index table 90°, and then machine the up side.

## 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.



### Tilt axis

Tilt axis can be driven by the following transmission mechanisms (please see page 1 for more details)

- A-2: Driven by 200 rpm D.D. motor (**No abrasion**)
- B: Driven by roller gear cam
- C: Driven by worm & worm gear + angle encoder



## So Elegant So Strong

Streamline model shows the elegance of power and beauty.



FHR-630S



FHR-630SN  
(Reduced type for Siemens control)

**This is the only way to lead the trend.**

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

- ◀ FAD-300iwj-30D-HS can be equipped with a base plate and then directly placed on the alternative machines as follows:
- ① C type 3-axis-moving-column vertical machining center.
  - ② Large-working-table vertical machining center
  - ③ Bridge type machining center

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

As below

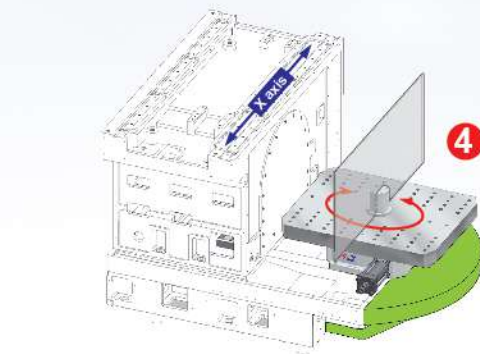
Only TJR large-diameter radial & axial bearing can deliver enough rigidity to well support tilt axis of single-arm type dual axis rotary table.

machine base

4<sup>th</sup> & 5<sup>th</sup> axis rotary table and Bridge connection plate set are applicable.

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  
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.



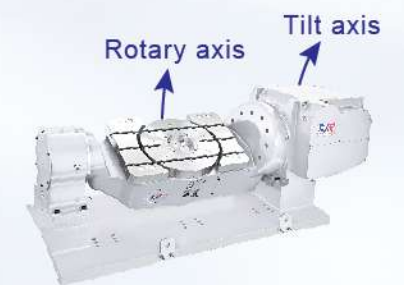
## Do you pick the right rotary table?

### 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 or alloy steel worm gear as a standard component.



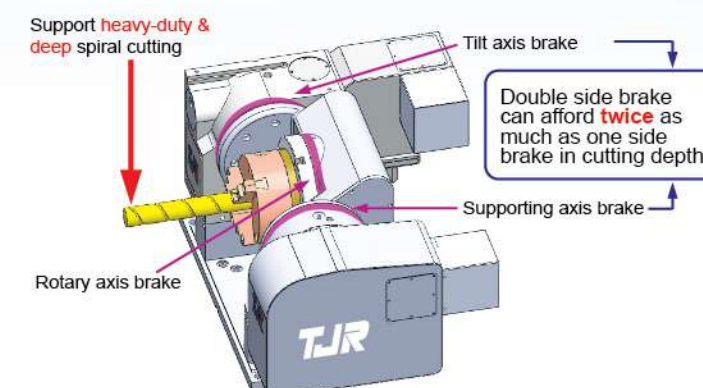
Alloy Steel Worm Gear ▲



▲ FHR-350 dual-arm type dual-axis rotary table

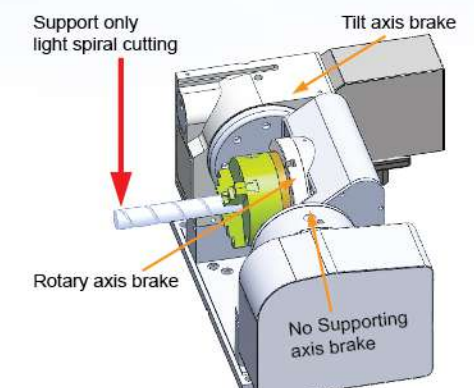
### 4 Features of TJR Tilting Rotary Table

- ① Max. tilt angle:  $\pm 110^\circ$  (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 or alloy steel 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:  $-30^\circ \sim +110^\circ$
- 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?



Old technology

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:**

2If the exterior does not change for 20 years, the wooden mold might be the same. Hence, the interior structure has not been upgraded.



Trend



modern upgrade

20-year-old model

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

Other rotary table manufacturers employ as follows



for hydraulic clamping for pneumatic clamping

Trend

The latest upgraded model

**Redefine "RIGIDITY"**

Larger Through Hole → Bigger Bearing  
Bigger Bearing → Higher Rigidity

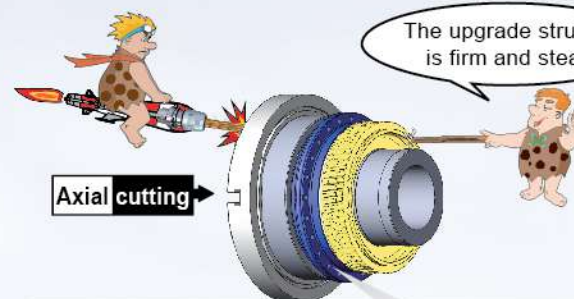
Large diameter



Devised by German

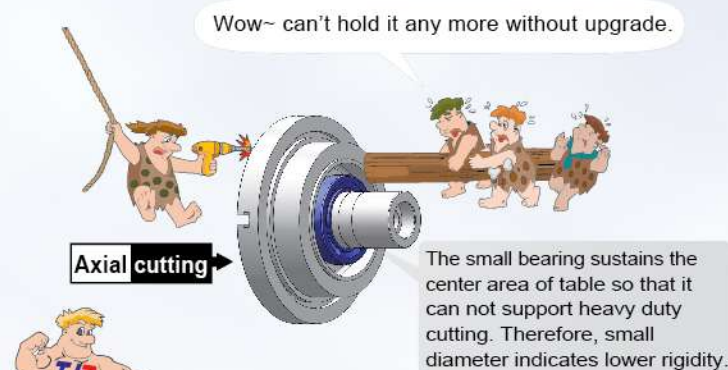
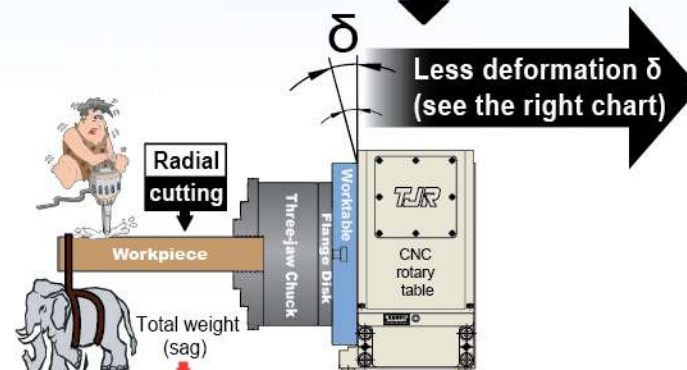
Specialized for Rotary Table, the Radial & Axial bearing can fully support heavy-duty cutting in both radial and axial directions.

The upgrade structure is firm and steady.



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.

Less deformation  $\delta$  (see the right chart)



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



The **PRECISION** depends on worm wheel



The **RIGIDITY** depends on spindle bearing

Refine the rigidity.  
Push boundaries of cutting.



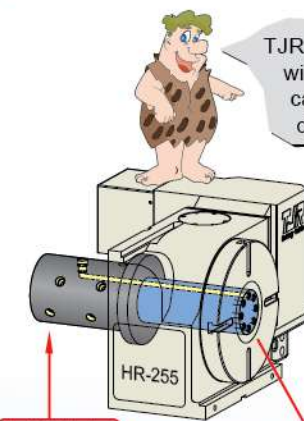
Stop searching !  
Only in TJR,  
you can pay the price of  
small-through-hole rotary  
table for the large-through-  
hole rotary table.

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



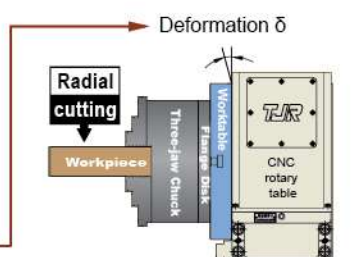
The TJR through hole diameter can be  
easily adjusted by retrofitting the mandrel sleeve.  
But, it's no way to enlarge the small-through-hole design of others.

## Rigidity comparison between radial & axial bearing and taper roller bearing

Take Ø255mm Rotary Table as an example



**3.9 times better**





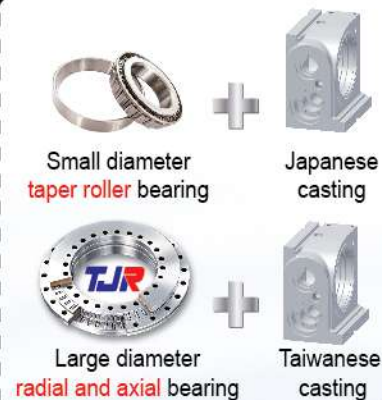
**It is no longer required to buy Japanese brand in order to acquire Japanese quality. TJR can achieve Japanese quality with lower cost.**

Ready to start saving money?  
Here's how to do it right!

Japanese rotary table employs



**Differences**



Japan Price

What a bargain!

TJR rotary table employs

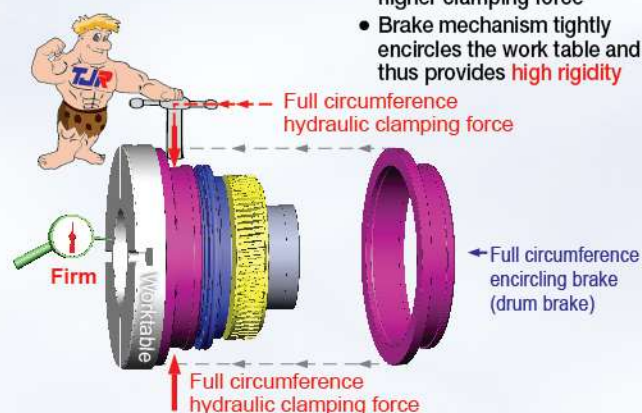


Taiwan Price

### 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**



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

Bad brakes cause car accident all the time.

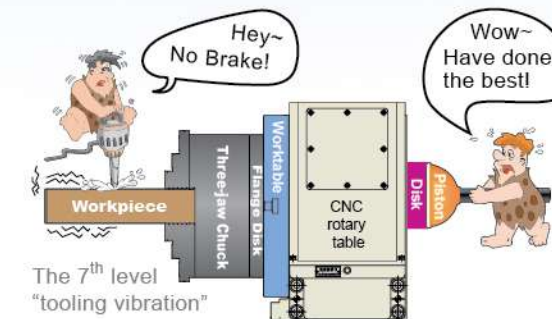
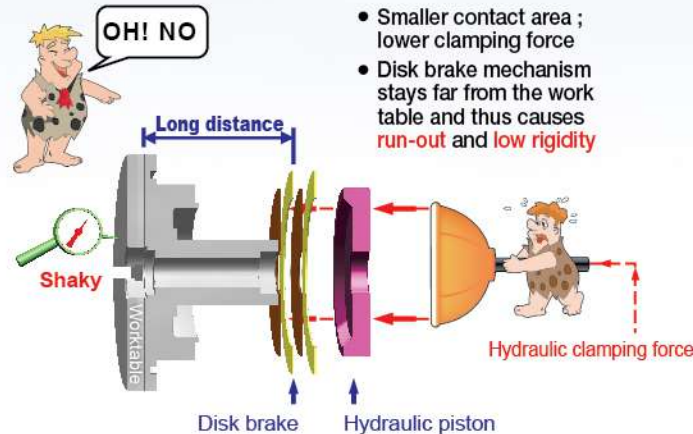


A rotary table without good brakes causes tooling vibration.

- 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.

#### 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 7<sup>th</sup> level "tooling vibration"

## Desired beauty of true machinery

Sophisticated, perfect, excellent in all details

Treasure for top talent scout



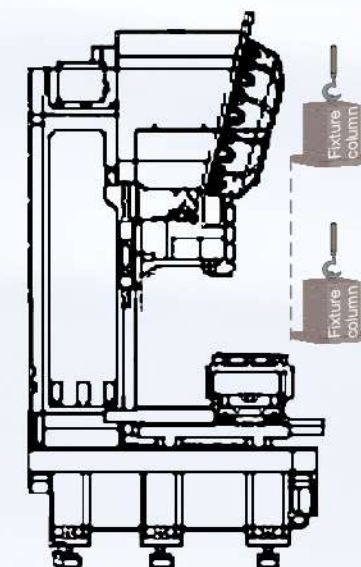
□255x255 / 320x320 / 400x400 – Horizontal application,  
Specially for small vertical machining center and small drilling & tapping center

New Thought Future way out

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

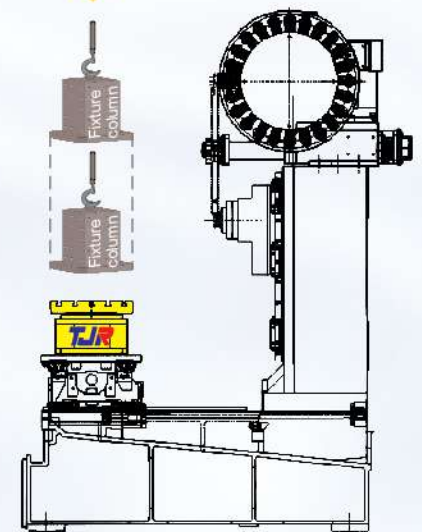
**The benefits of converting vertical machining center into horizontal one.**

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 erective column, you can simply convert vertical machine into horizontal one.

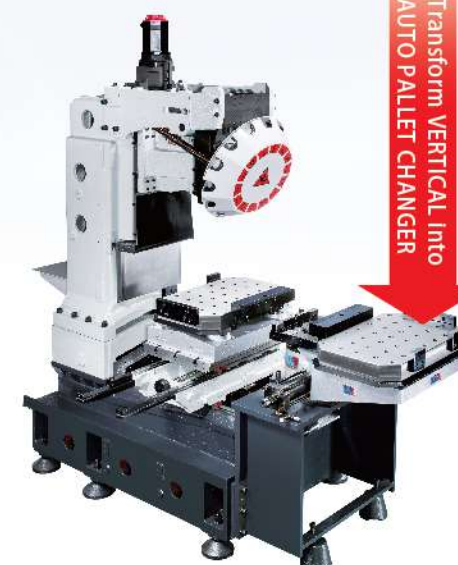


**VERTICAL**  
drilling & tapping center

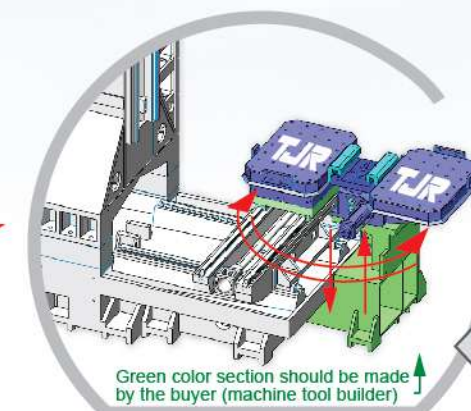
Transform VERTICAL into HORIZONTAL



small **HORIZONTAL**  
drilling & tapping center



Transform VERTICAL into  
AUTO PALLET CHANGER



▲ Application example:  
retrofitting CTU to drilling & tapping center or vertical machining center.



▲ CTU Hook type auto pallet changer

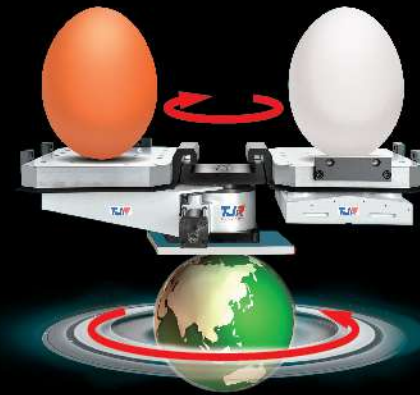
The location of CTU can vary, depending on the machine design and dimensions.

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

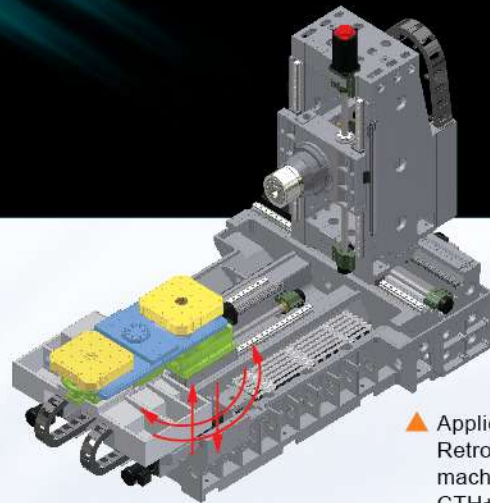


## A living legend

Create a surprising exchange mechanism



Beyond the rotational inertia  
Reach unimaginable stability



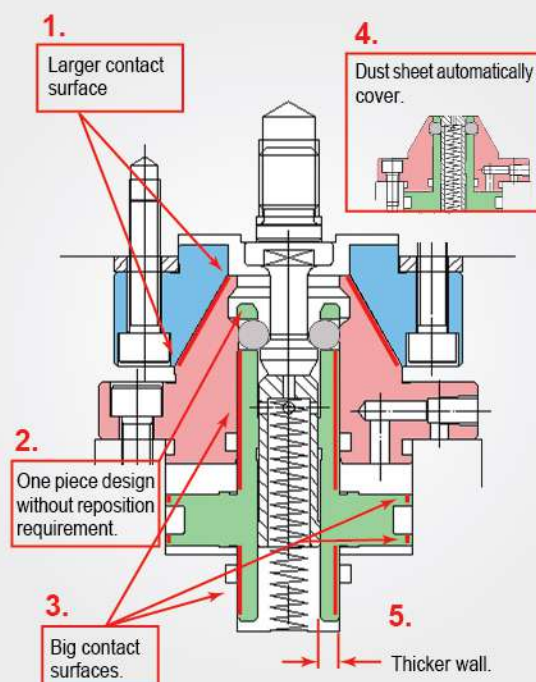
Application diagram:  
Retrofits horizontal  
machining center with  
CTH+CHI

Positioning cones:  
Powerful hydraulic  
clamping



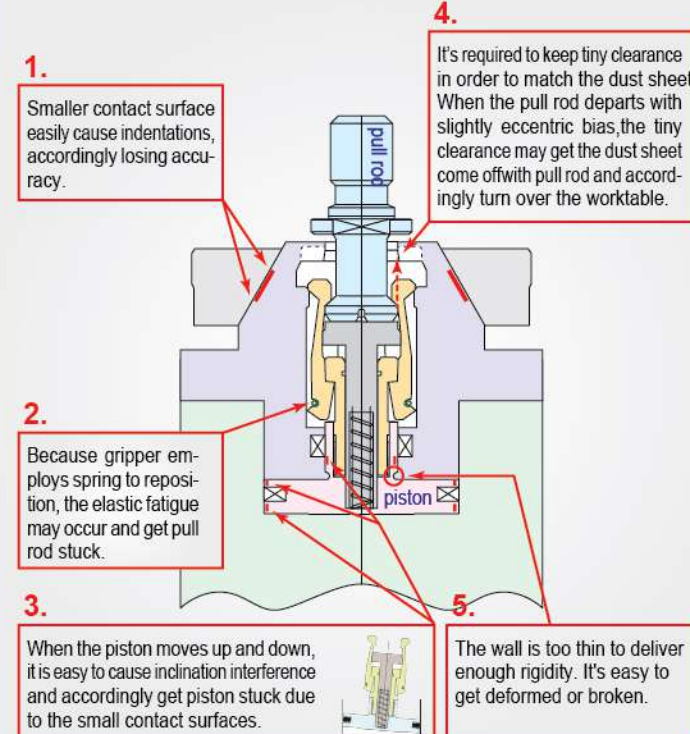
## Comparison of positioning cones

### Ball locking mode



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

### Grippers locking mode



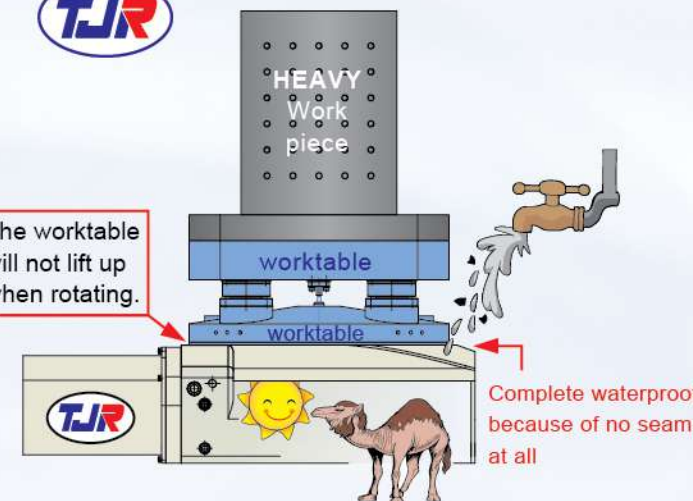
You will sleep better than a Panda if you choose "TJR" rotary table for your Horizontal Machining Center.



## The comparison of Clutch



The worktable will not lift up when rotating.



Positioning Accuracy:  $\pm 5$  sec  
(TJR does not use 2-piece clutch.)

### 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 manufacturer

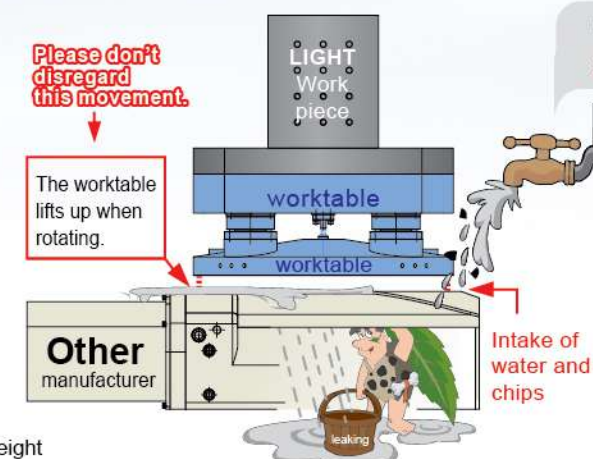
WOW~ can't lift up! So regret the wrong choice



Please don't disregard this movement.

The worktable lifts up when rotating.

Other manufacturer



### 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.



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

### The comparison of inspection facilities

	3D measuring equipment - Geometry precision testing -	Laser measuring equipment - Indexing precision testing -
	<b>YES</b>  Fully utilized to test all kind of precision and runout.	<b>YES</b>  Every rotary table needs to pass laser angular test before shipment
<b>Others</b>	<b>NO</b> 	<b>Alternative methods</b> 1. Use the old-type measuring equipment 2. Use cheaper encoder or angle encoder 3. Use the fixture with height gauge to measure 4 squareness

### 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.



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.

### Customized model



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

### Product Range

Longer service life due to TJR's dedication on quality



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



● AD-260IB (Direct drive motor)



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



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



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



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



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



● AR series (Pneumatic brake) AR-125~250



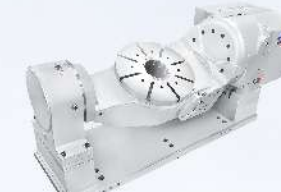
● FAD-170F / FAD-210F (2DD motors, pneumatic brake)



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



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



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



● FHR-630C (dual axis, hydraulic brakes)



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



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



● FAD-170F-RC210 (Rotary : DD motor Tilt : Roller gear cam)



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



● HHI-500x500 (Hydraulic brake)



● FHR-630SN



● FHD-650-ID650 (Hydraulic brake)



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