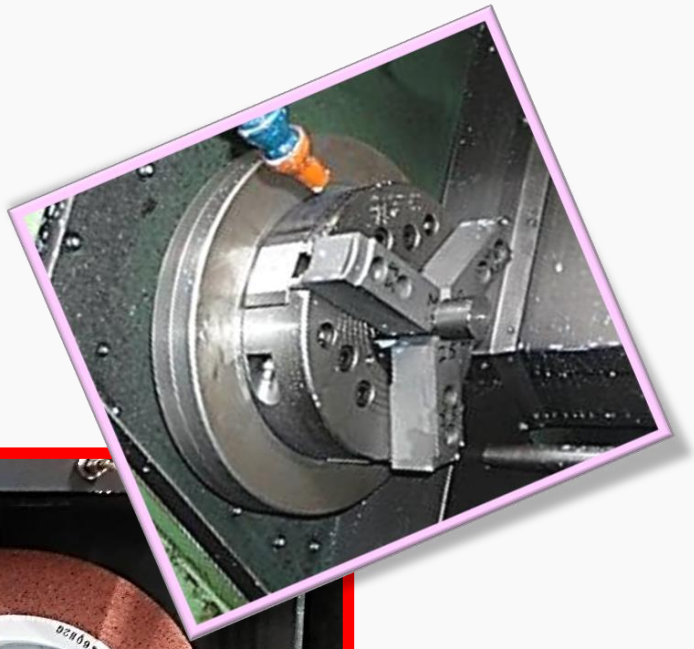
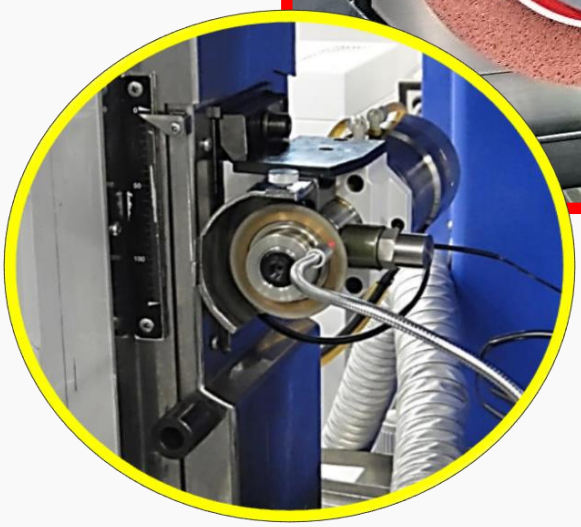
To the world of infinite ZERO

Ultra-precision auto balancing device

《 ZERO SHIN 》

In quest for Innovative reform and infinite possibilities
Achieving high performances !
For various rotation fields!





world's first! Achieves ultimate zero-core rotation and zero-core processing

Auto balancing device "ZERO SHIN"

※ Balancer patent

Patent registration No. 4522493(Japan)

(International Patent registered: USA, China, India, Indonesia, etc.)

Just by changing from the conventional fixed balance rotating part that deteriorates and wears to the auto balancing device "ZERO SHIN", there is no need for correction that takes time for electricity, magnetism, and time, maintaining ZERO SHIN rotation that does not deteriorate and wear, and suppressing vibration noise. .. There is also a positive effect of energy saving of about 30%.

We propose the installation of the auto balancing device "ZERO SHIN" to help companies who are having trouble with the runout of the rotating part and companies who want to improve the accuracy.

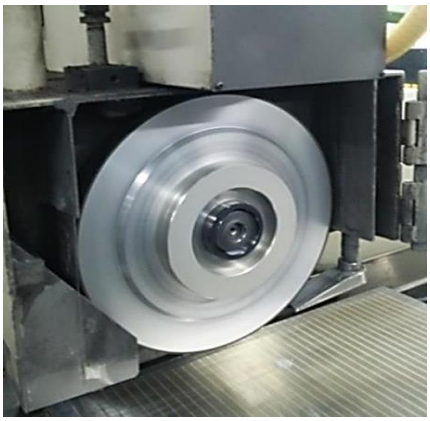
[Technical features]

1. Simply by attaching the auto balancing device "ZERO SHIN" to the rotating part, the three weights in the balance device instantly balance, eliminate core shake, and extend machining accuracy.
2. By using the auto balancing device "ZERO SHIN", it prevents deterioration over time, extends the service life, and suppresses processing vibration. There is also a positive effect of energy saving of about 30%.
3. Rotational machining vibration and increase in machining noise all cause uneven wear, leading to deterioration over time. However, by installing the "ZERO SHIN", the core shake zero rotation is maintained, improve unstable factors, and ideal machining can be maintained.

[Examples of achievements using technology]

1. Installed on wheel flanges for grinding machines
2. Installed on tooling for machining centers
3. Installed on various types of rotating spindles
4. Installed on chucks for lathes
5. Installed on aluminum wheels
6. Installed on power generators
7. Installed on stabilizers

Example of mounting the auto balancing device "ZERO SHIN"



No electricity, No magnetic power required!

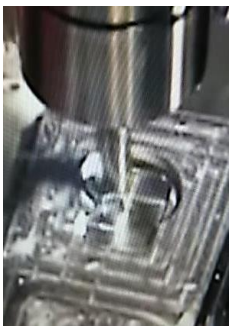
"ZERO SHIN" only needs rotational force

"ZERO SHIN" changes the rotational force into a centripetal force and brings the core runout closer to "zero".

Pursuit of dynamic runout accuracy

Are you looking for static runout with no load? Or are you looking for dynamic runout accuracy under machining load conditions?

"ZERO SHIN" automatically balances the patented mechanism and centripetal movement against changes in machining load.



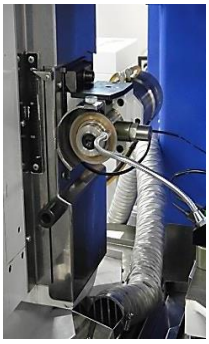
Aut balancing device "ZERO SHIN" wearing use

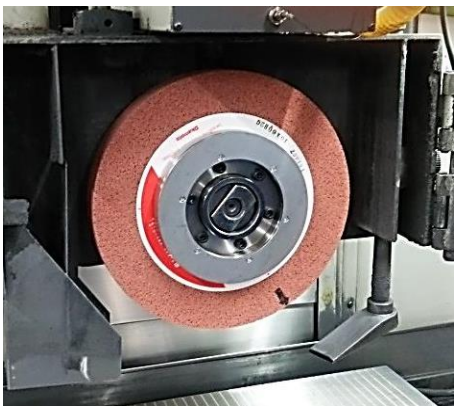
For the machining

With the tool with auto balancing attached to the machining tool, the runout of the blade approaches zero as the rotation increases.

For the polishing machine

The more rotation of the flange of the grind stone equipped with "ZERO SHIN" increases, the closer to runout zero of the stone .





Possibilities for all turning, Rotating devices

By installing an auto balancing device, by increasing the rotation, the blur around the rotation becomes as close to zero as possible, the balance is balanced against the fluctuation of the rotation load, the ideal rotation is approached, and the ideal wear is performed.

shocking

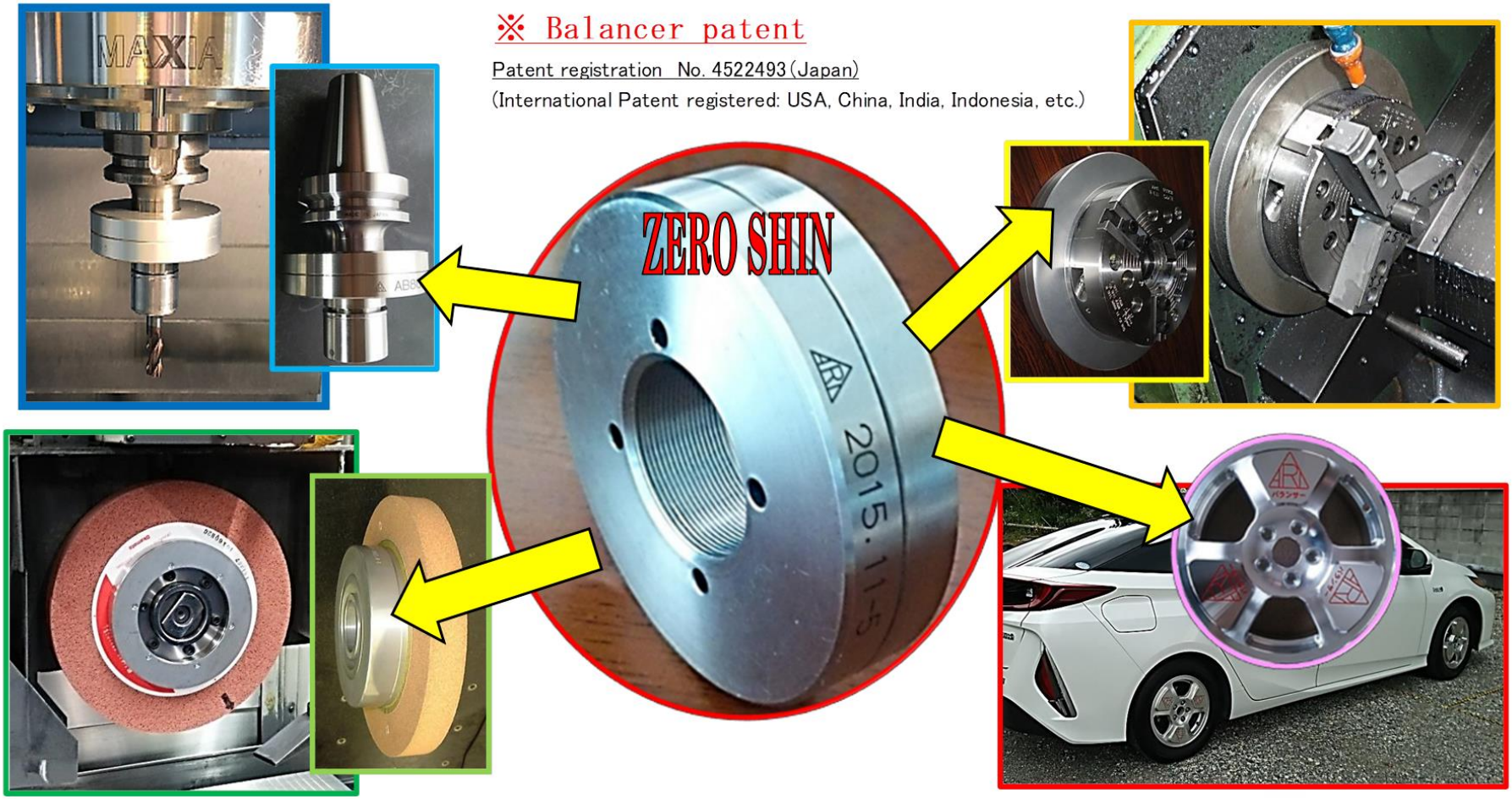
The balance of all the rotation bodies is improved.

Auto balancing device "ZERO SHIN" mounting example

※ Balancer patent

Patent registration No. 4522493 (Japan)

(International Patent registered: USA, China, India, Indonesia, etc.)



※ Balancing against fluctuations in operating load and reduce rotation center runout to zero as much as possible

Installation example of auto balancing device "ZEROSHIN"

Auto balancing device "ZERO SHIN" mounting example

Realization of ultimate processing from general-purpose machines to MC processing

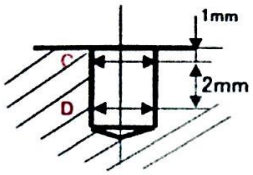
ZS166 type auto balancing device "ZERO SHIN"

Ultimate pathless mirror machining

Auto balancing device "ZERO SHIN" mounting processing test

Machining test 1-1

At 40,000r.p.m. with drilling machine / made by S company
Dia. 0.8mm drill at 40,000r.p.m. / driling



Tool	Drill	Diameter C	Diameter D
Shrinkage fitting tool	dia. 0.8mm	0.809mm	0.804mm
Auto Balancer	dia. 0.8mm	0.801mm	0.796mm

* Deflections without load using shrinkage fitting tool was 1-2microns and 2-3microns using auto balancer. But when it is loaded as the material is drilled, auto balancer has better results than that of shrinkage fitting tool.
* Remarks : The actual drill size should be little smaller than 0.8mm as we see the size 0.796mm at D.

Machininng center / made by A company
Dia. 1.0mm drill at 6,000r.p.m. / continuous drilling

【TEST A】
Drill : dia. 1.0mm L=16mm high speed drill
Material : SKD11 t=8mm
Parameter : 6,000r.p.m
Conditions : Through hole

【TEST B】
Drill : dia. 1.0mm L=16mm high speed drill
Material : SKD11 t=20mm
Parameter : 6,000r.p.m
Conditions : Blind hole 15mm

Same drill used for test A and B.
Test A = We found no problem with or without Auto Balancer
Test B = Drill broke at d=11mm for the first blind hole without Auto Balancer.
8 holes were drilled without any problem with Auto Balancer.
Only slight wear of a drill found.

High Speed Machininng / made by A company
Dia. 0.62mm drill at 18,000r.p.m. / 840 holes continuous drilling

Parameters	Material	Processing
18,000r.p.m.	NAC80	Dia. 0.62mm drilling
Speed 10mm/min	HRC40	
Step 10microns	t=5mm	

Result	1st hole	840th hole
With Auto Balancer	dia. 0.635mm	dia. 0.660mm
Without Auto Balancer	dia. 0.633mm	dia. 0.640mm

Comparison of hole size between 1st hole and 840th hole shows 25microns bigger by standerd tool and only 7microns bigger by auto balancer. Also, you can see the difference of the shape of drill by above photos.

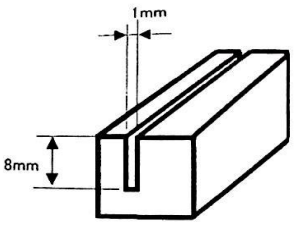
Auto balancing device "ZERO SHIN" mounting processing test

Machining test 1-2

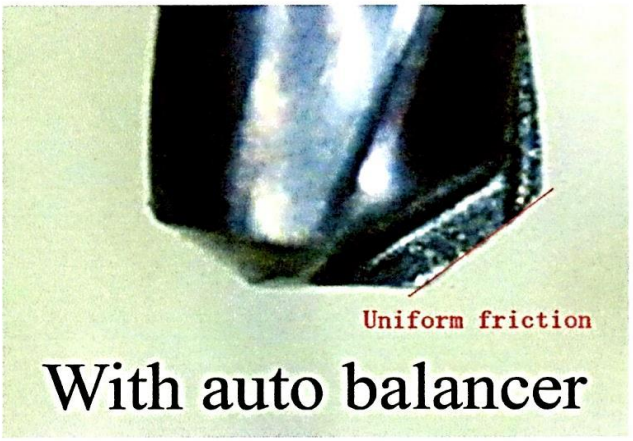
LINEAR MACHINING / made by A company

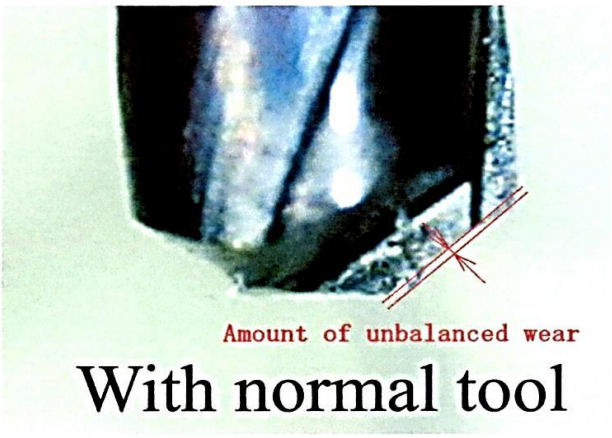
Cutting at 25,000r.p.m.

Material	NAC80 HRC40
Drill	NS MRT425 dia.1x8x1° 30"
Parameters	25,000r.p.m. Depth 8mm F 1,000mm/min
Processing time	28'30"



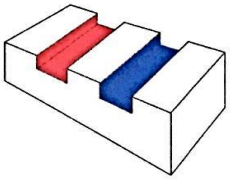
Drill with auto balancer and without auto balancer
You can see the drill with auto balancer shows evenly-wear and without auto balancer shows not.





PRECISE MACHINING / made by A company

r.p.m.	32,000r.p.m	Deflection	2microns without auto balancer
Depth of cut	d=0.05mm		8microns with auto balancer
Speed	200mm/min	Material	SK3
Cut depth	d=1.3mm	Cutter	dia. 0.5mm Carbide

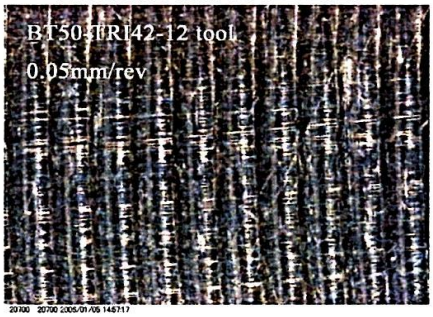


Auto balance device "ZERO SHIN" mounting processing test

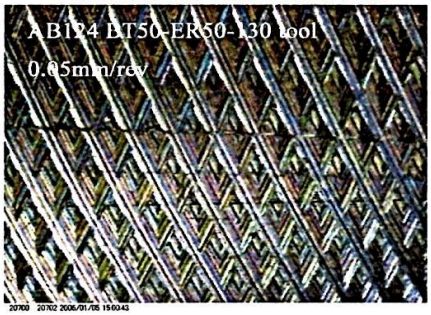
Machining test 1-3

MACHINING / made by A company
Dia. 25mm 4blades Carbide / Comparison of bottom surface

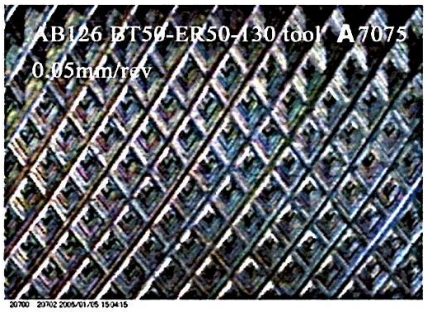
Standard tool 700mm/min



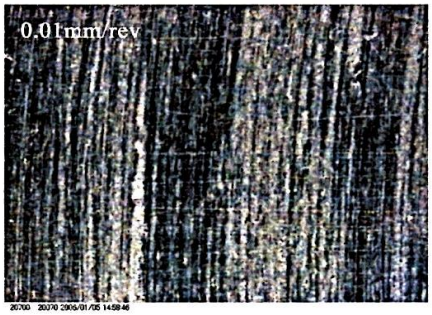
Auto balancer
700mm/min Stainless Steel



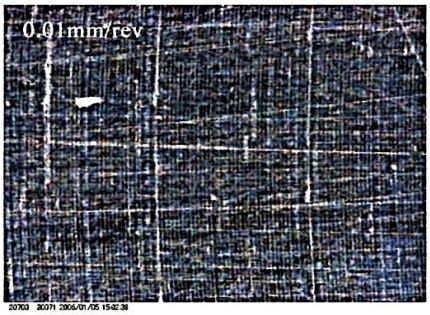
Auto balancer
700mm/min Durelumin



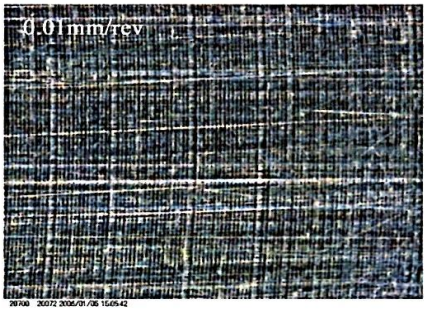
Standerd tool 70mm/min



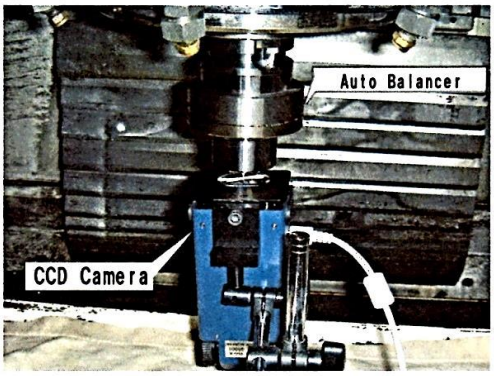
Auto balancer
70mm/min Stainless steel



Auto balancer
70mm/min Duralumin



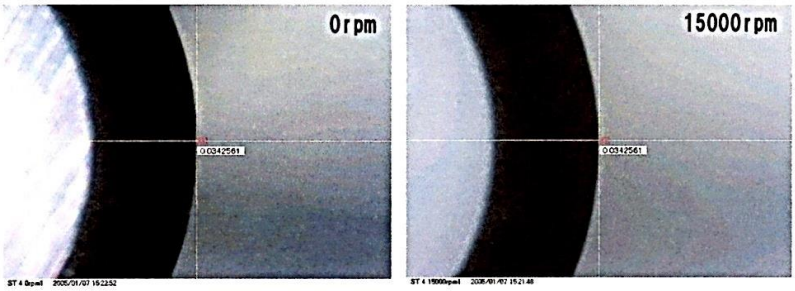
DEFLECTION MONITORED BY CCD (x150)



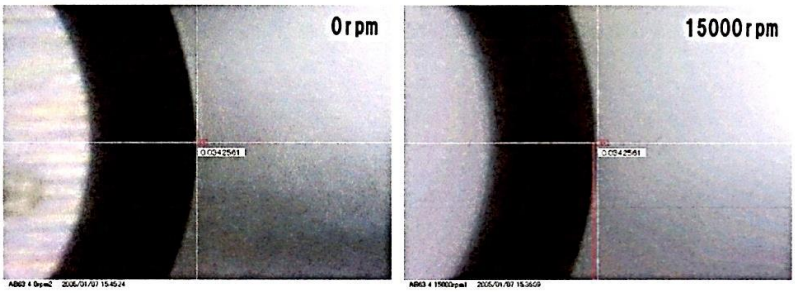
Normal tool shows deflection does not change from 0r.p.m. to 15,000r.p.m. without load.

Auto Balancer shows deflection becomes smaller from 0r.p.m. to 15,000r.p.m.

Normal tool / Outer edge of reference pin (x150 CCD)



Auto Balancer / Outer edge of reference pin (x150 CCD)



Auto balancing device "ZERO SHIN" mounting processing test

Machining test 1-4

Test processing at a machining center / made by A company

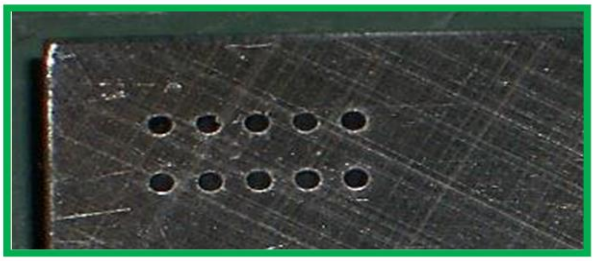
AB80 ZERO SHIN
New bay chuck Under neck length 174

STANDARD CHUCK
New bay chuck Under neck length 50

AUTO BALANCER AND STANDARD TOOL

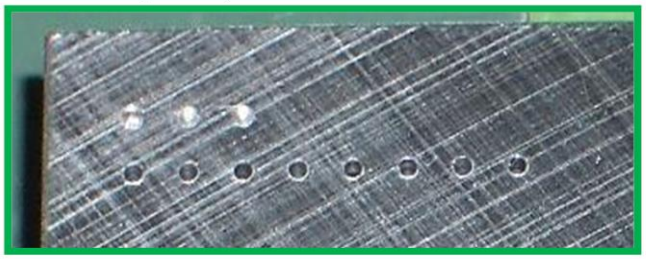
※St: Standard tool without Autobalancer/ AB: auto balancer tool

[Test A] Drill: ϕ10 Blade length 16mm high speed steel
Material: SKD11 t=8
RPM: 6000rpm Through hole (with pilot hole)
Top: ST tool, Bottom: AB holder



Processed using the same blade. There is no particular problem, and both ends when 6 holes are made.

[Test B] Drill: ϕ10 Blade length 16mm high speed steel
Material: SKD11 t=20
RPM: 6000rpm 15mm blind hole (with pilot hole)
Top: ST tool, Bottom: AB holder

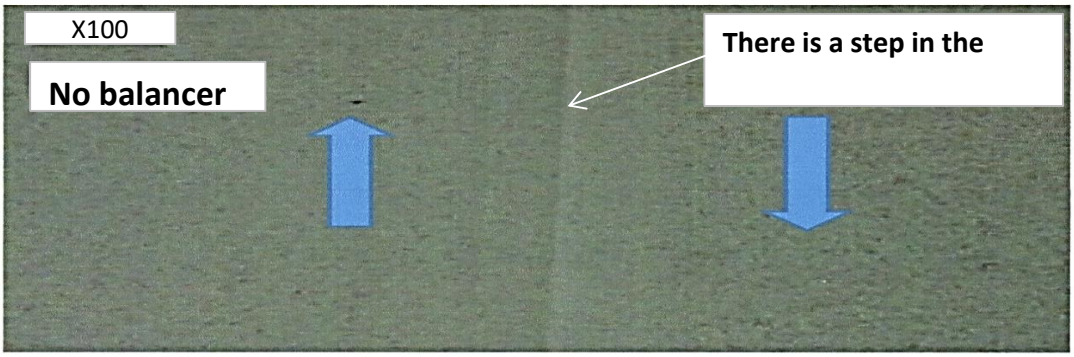


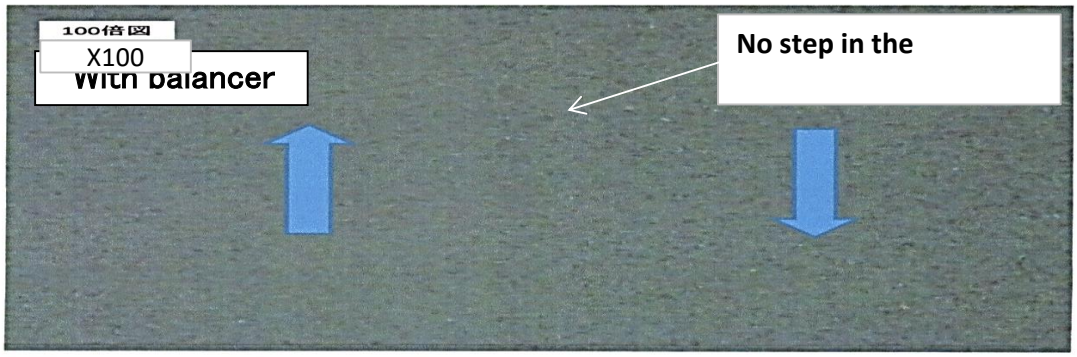
Processed using the same blade. When processing with the ST tool, the first hole broke at a depth of about 11 mm. The AB holder was machined up to the 8th hole, and the difference was confirmed, so I stopped it. There is some sagging on the cutting edge, but there is no particular problem.

Machining test 1-5

Processing test at company A

Quartz glass is processed with a diamond grindstone with a Φ30 axis at 6000 rpm 250 mm 0.01 mm.



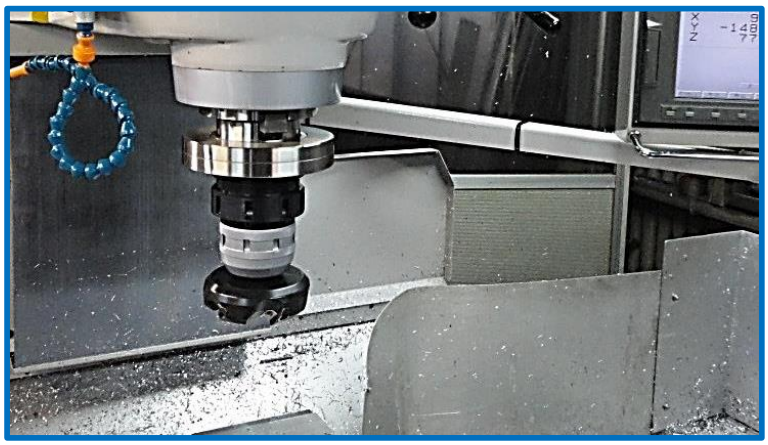


Auto balancing device "ZERO SHIN" mounting processing test

Machining test 1-6

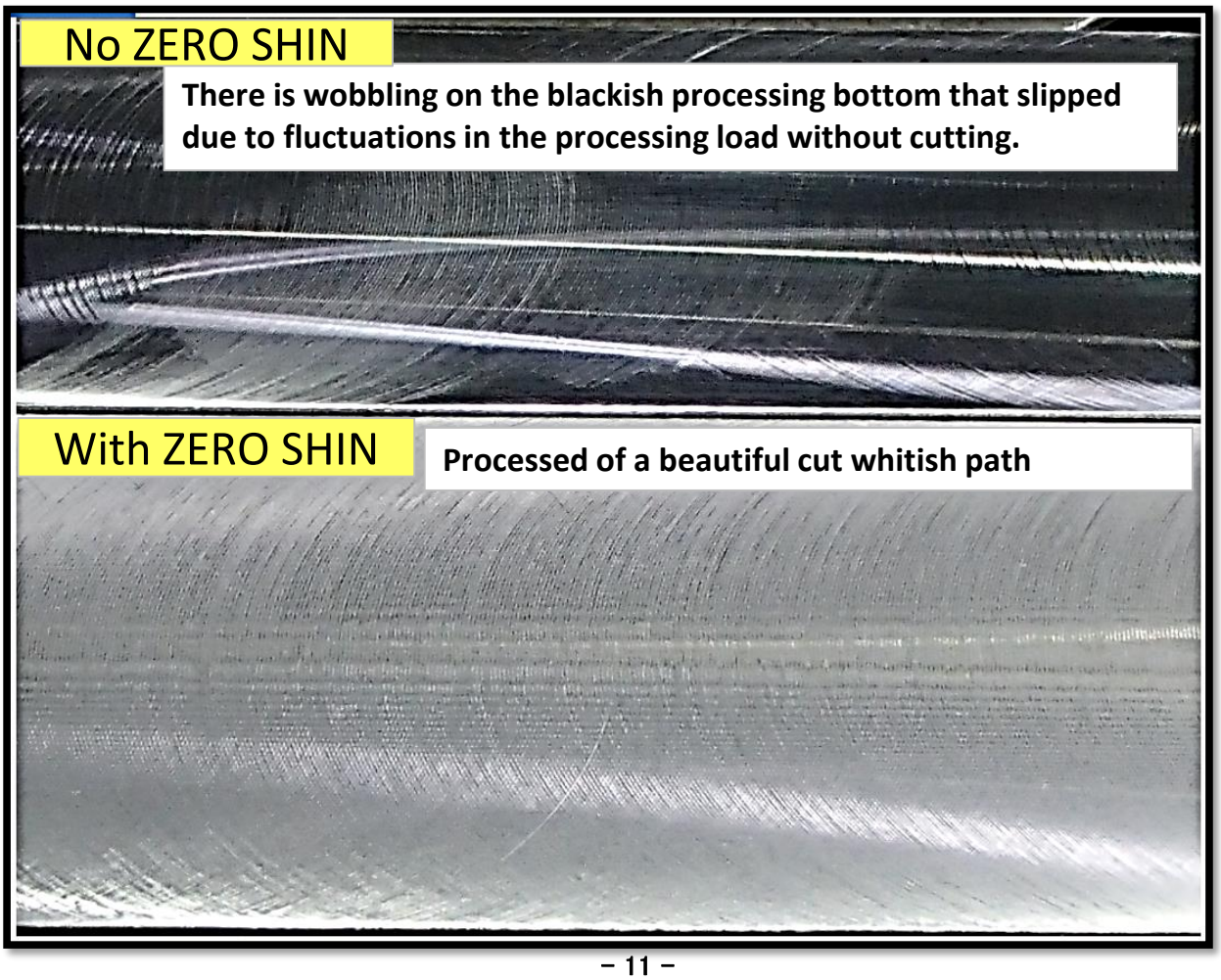
A front cutter is attached to a general-purpose milling machine.

Comparison of machined surfaces with and without auto-balancing device "ZERO SHIN"



※ Tools without "ZERO SHIN" will have a fluctuating bottom and will not cut smoothly.

※ The processing path of "ZERO SHIN" is uniform, and the processed surface is cut whitish.



Auto balancing device "ZERO SHIN" mounting processing test

Machining test 1-7

Created in 2018

Difference in core runout under the same machining conditions

Comparison of machined surfaces of "standard tool" and "Zeroshin tool"

Material SKD 11 HRC 59 ~ 61 20 mm square block/ machine made by company A: YMC430 type

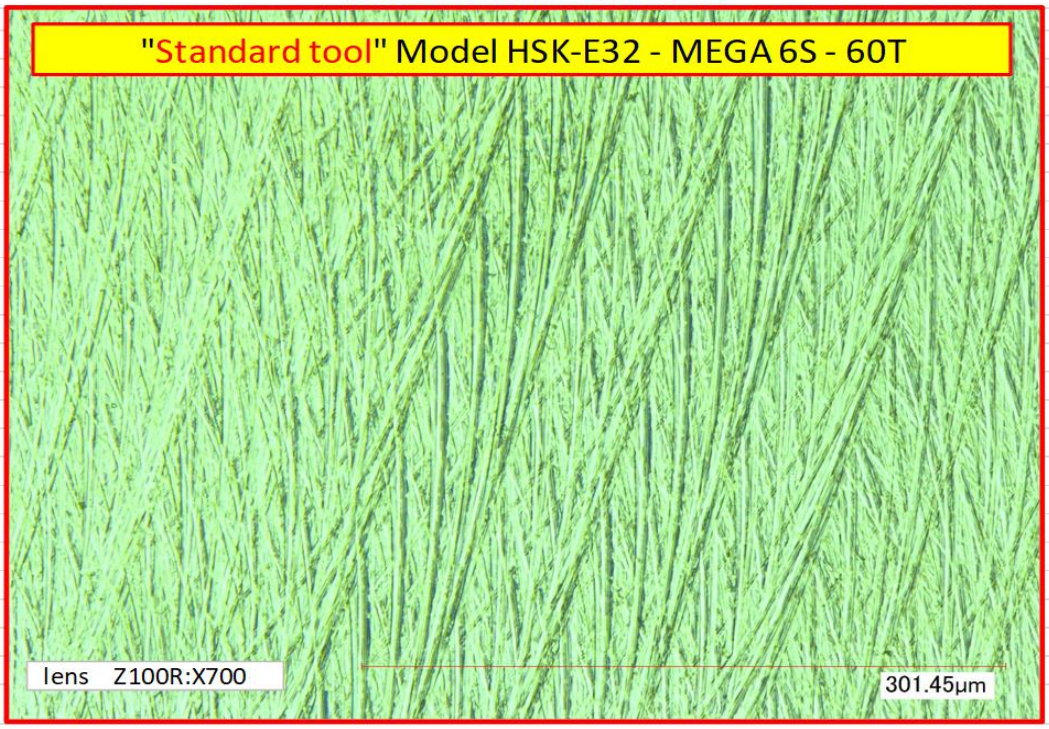
Processing conditions

Rotational speed S24000 Feeding speed F1500 XY pitch 0.05mm Shaving allowance 0.01mm

Cutlery Φ 2 – R 0.2 Nissing tool CBN Radius end mill

700 times enlarged view

"Standard tool" Model HSK-E32 - MEGA 6S - 60T



700 times enlarged view

"Zero shin tool" Model ZS32 HSK - E32 - MEGA 6S - 60T

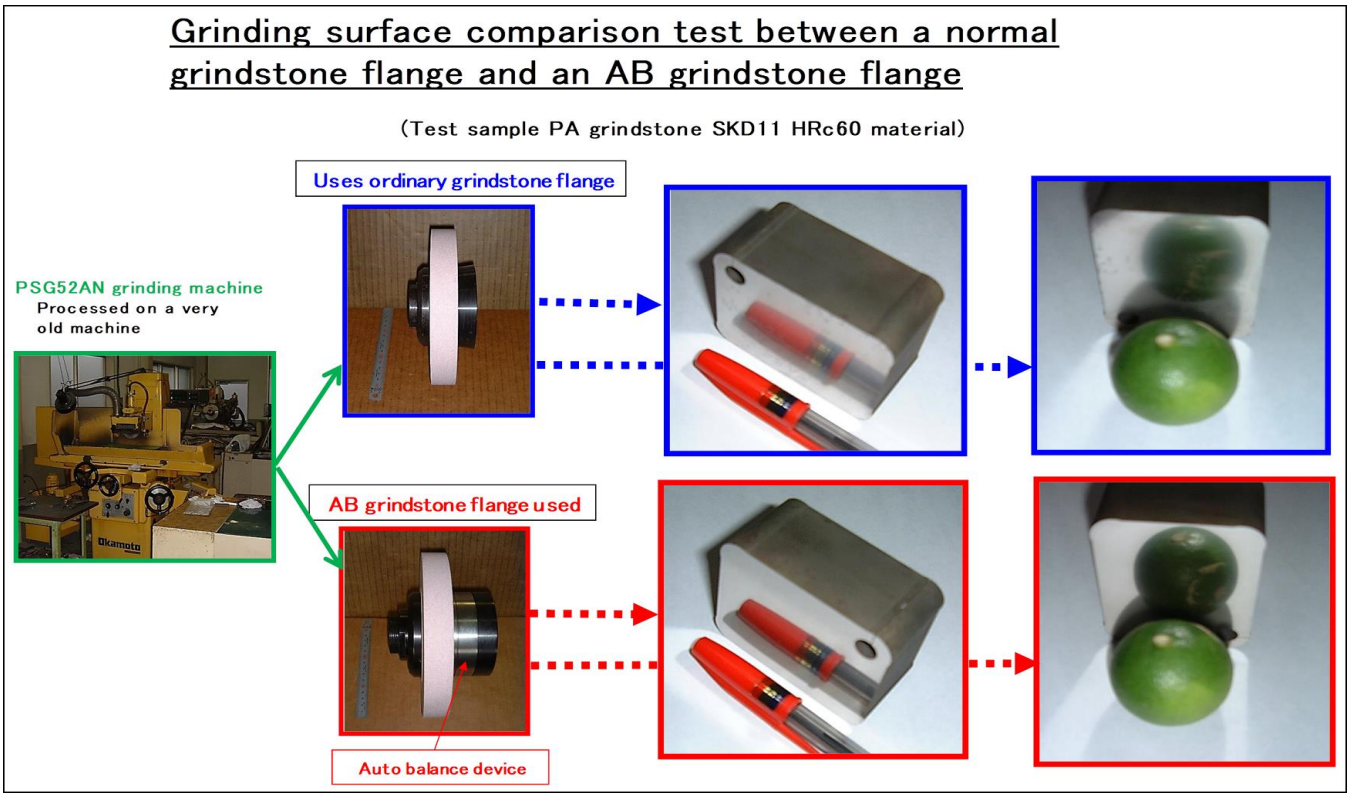
The zero-shin device maintains zero-core rotation against fluctuations in machining load!

Auto balancing device "ZERO SHIN" mounting processing test

Machining test 2- 1

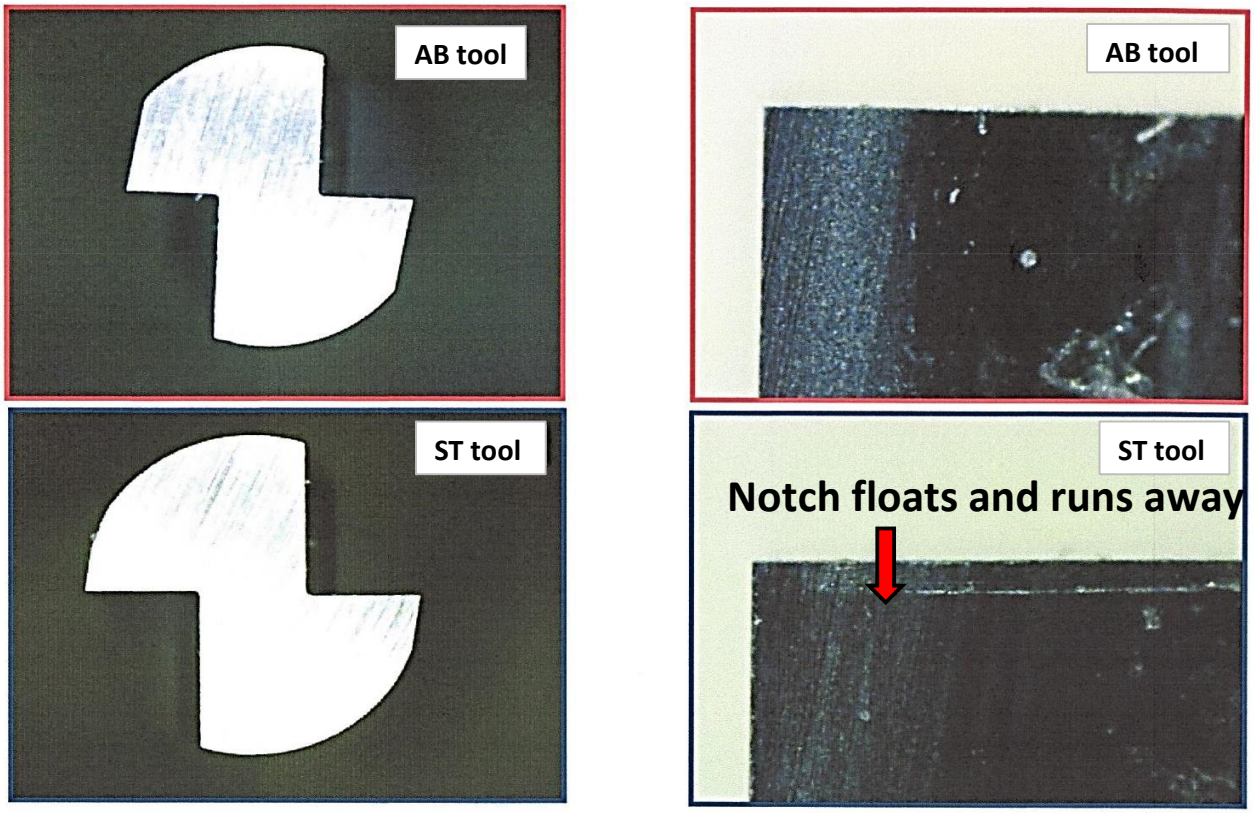
Grinding surface comparison test between a normal grindstone flange and an AB grindstone flange

(Test sample PA grindstone SKD11 HRc60 material)



Machining test 2-2

Grinding comparison test processing with blade on a tool grinding machine manufactured by Company A (φ3 Carbide blade tip)



※St: Standard tool without Autobalancer/ AB: auto balancer tool

Auto balancing device "ZERO SHIN" mounting processing test

Machining test 2-3

Results of test trials at the technical center

20th April 2018

Okamoto Machine Tool Works,Ltd. Made　PSG63DX surface grinding machine

Whetstone used　Φ355×38×Φ127(WA46)

Spindle runout　12μm

table　605×300　sliding surfaceV-V　Body weight　2.8t

Fixed balancer		Zero shin balancer	
Initial S P dynamic value	0.8～0.9μm	Initial S P dynamic value	0.86μm (Before dress)
After fitting the test piece	0.7μm		0.68μm (After dress)
Adjusted vibration value	0.251μm	No balance adjustment	0.68μm
Completion of normal fixed balance			

Vibration value during table processing	1.194μm	Vibration value during table processing	0.497μm

Test result	Test result

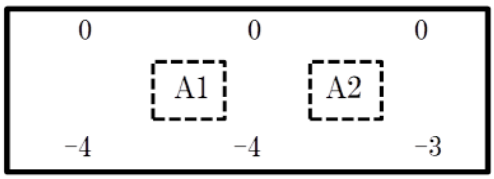
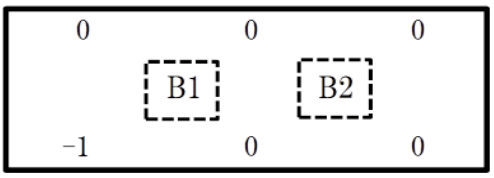
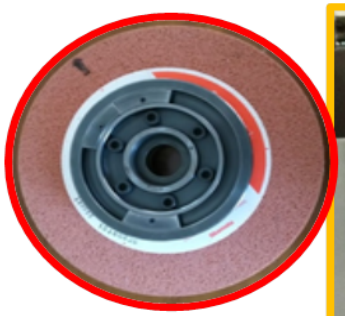

	

Table front	Table front

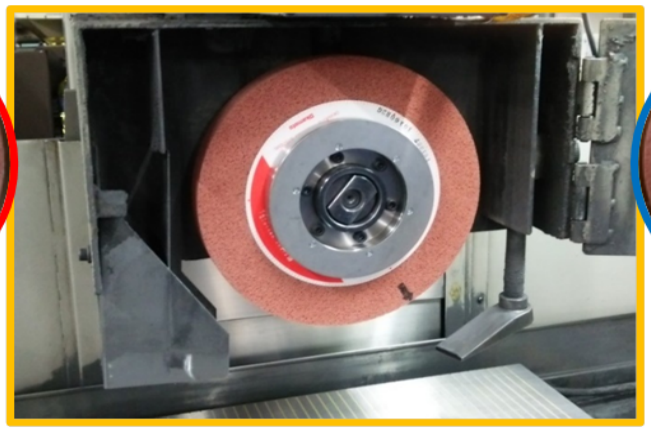
Front Hanging phenomenon (yes) Table front	3～4μm	Front Hanging phenomenon (almost none) Finally it can be scraped a little	0～1μm

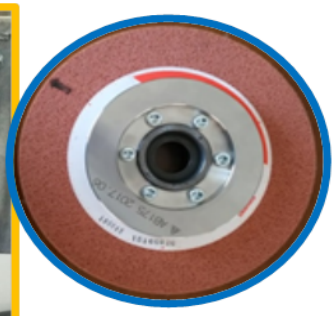
Surface roughness after table processing		Surface roughness after table processing	
Part A1	Ra0.19μm　Rz1.488μm	Part B1	Ra0.285μm　Rz2.226μm
Part A2	Ra0.2324μm Rz1.796μm	Part b2	Ra0.262μm　Rz1.911μm
Table surface	Impression on table **(image blur)**	Table surface	Impression on table **(clear)**

SKD11HRc60　Comparison of sample processing		SKD11HRc61　Comparison of sample processing	
Work dimension　30 × 50 × 15		Work dimension　30 × 50 × 16	
Test result	Ra 0.226μm　Rz 1.63μm	Test result	Ra 0.156μm　Rz 1.358μm
		Feed half	Ra 0.163μm　Rz 1.1189μm



Fixed balancer



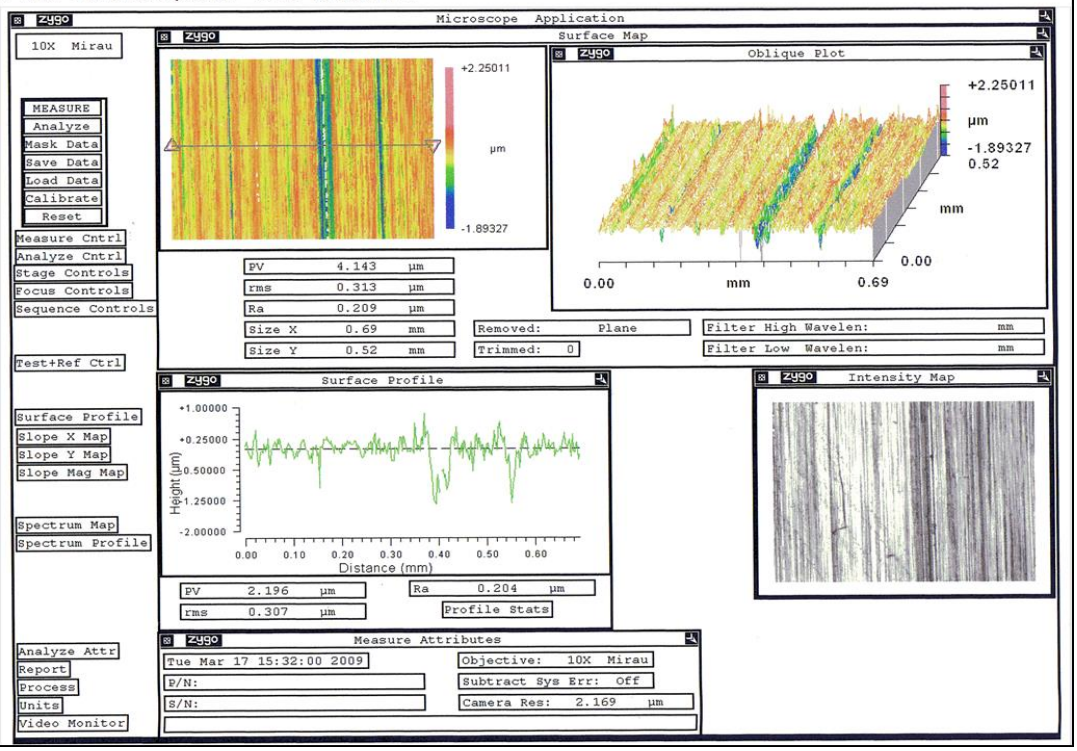


Zero shin balancer

Auto balancing device "ZERO SHIN" mounting processing test

Machining test 2-4

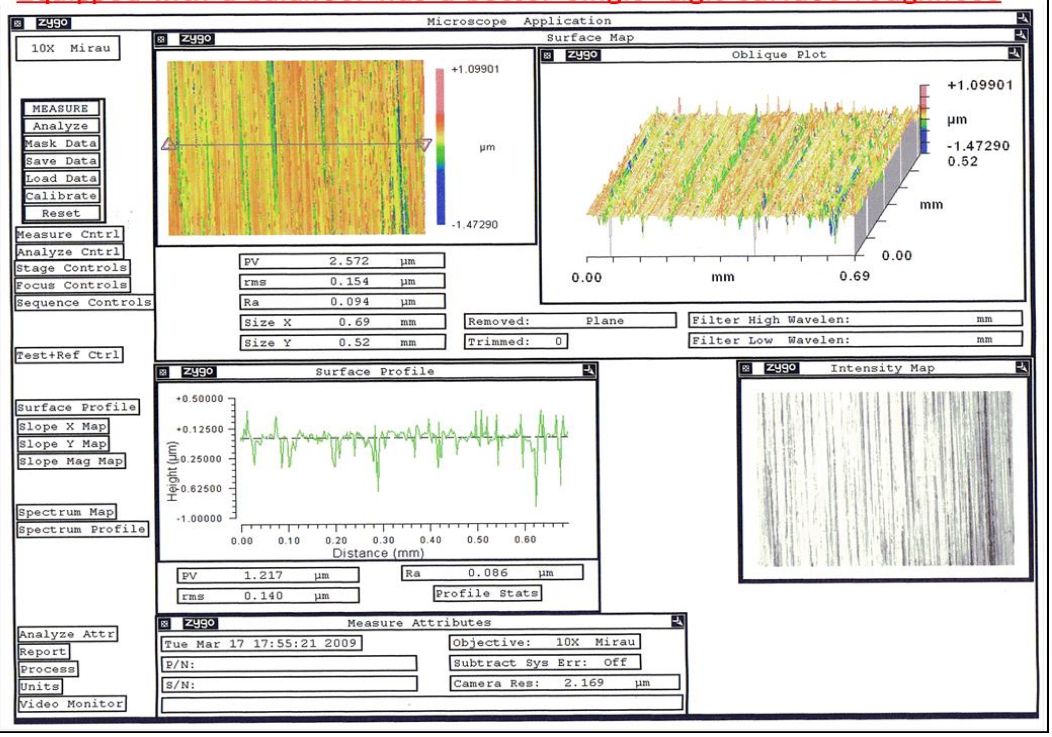
Test processing at company A **Standard flange processing**
Whetstone WPA60H Noritake
φ350 rotation speed 1800 rpm
Processed material S45C Raw material
Processed with a balance pector value of 0.01um



Machining test 2-5

Test processing at company A **Auto balancing device flange processing**
Whetstone WPA60H Noritake
φ350 rotation speed 1800 rpm
Processed material S45C Raw material
Processed with a balance pector value of 1.03um

Equipped with a balancer has a better single-digit surface roughness

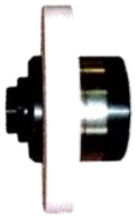


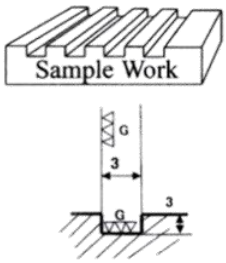
Auto balancing device "ZERO SHIN" mounting processing test

Machining test 2-6

GROOVING D=3mm BY GRINDING MACHINE TYPE 520 made by S company

Flange with auto balancer (double centering nut type)



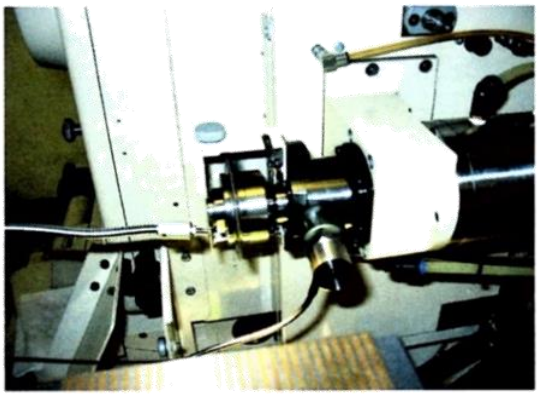


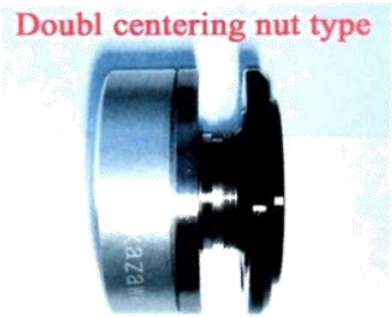
Normal flange = surface finished with another machine
Auto Balancer = No surface finished

	Normal flange	Auto Balancer
Roughness	0.4microns	0.3microns
Size	3mm +/-3 ~ 4microns	3mm +/-1microns

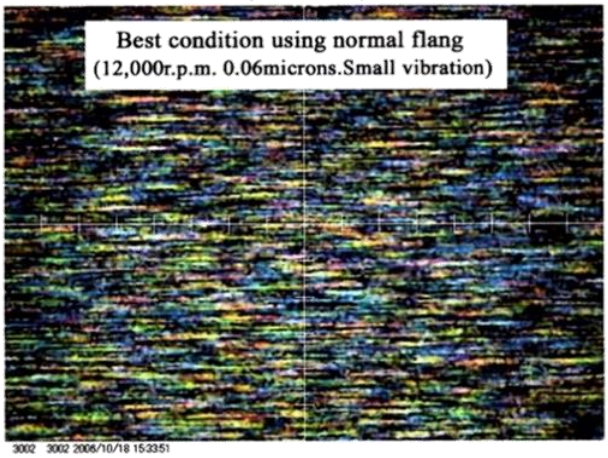
Machining test 2-7

HIGH SPEED PROFILE / A company
Dia 75mm diamond grinder / Carbide punched surface

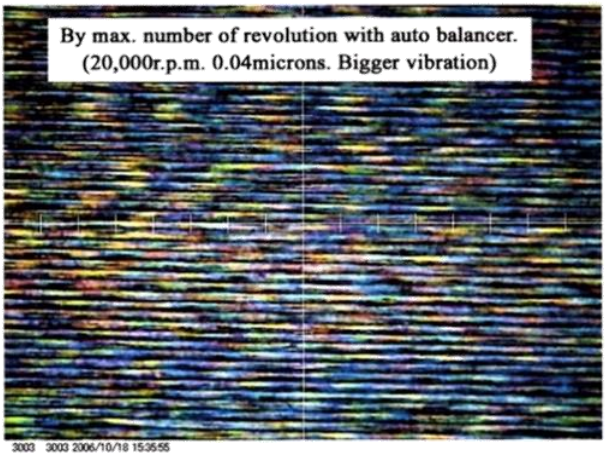




Not smooth (imbalance) cut surface



Smooth cut surface



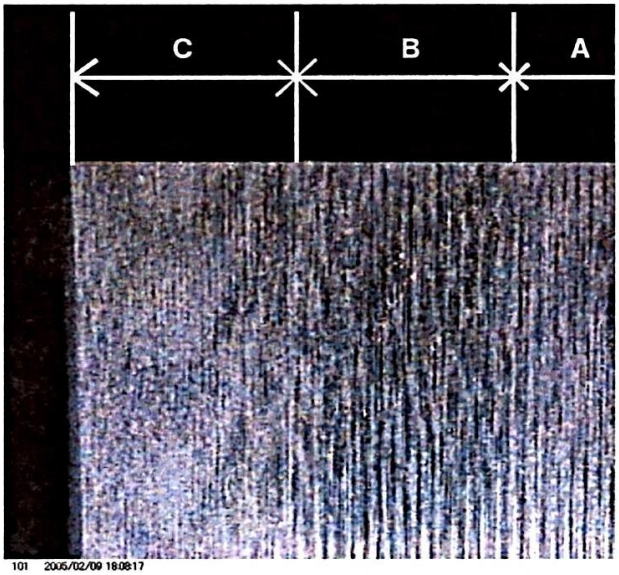
Auto balancing device "ZERO SHIN" mounting processing test

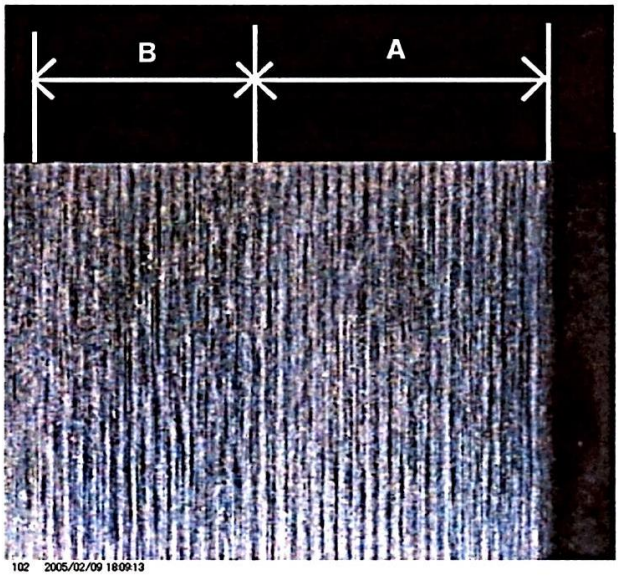
Machining test 2-8

CNC CONTOUR GRINDING MACHINE / made by A company

Material : Cermet chip
Grind stone : Meta Diamond #800 dia.150 nose r=0.15mm
Flange : With auto balancer

Part	r.p.m.	Processing speed	Depth of cut
A	3,075	0.5mm/min	0.02mm
B	3,075	0.8mm/min	0.02mm
C	3,800	0.8mm/min	0.02mm

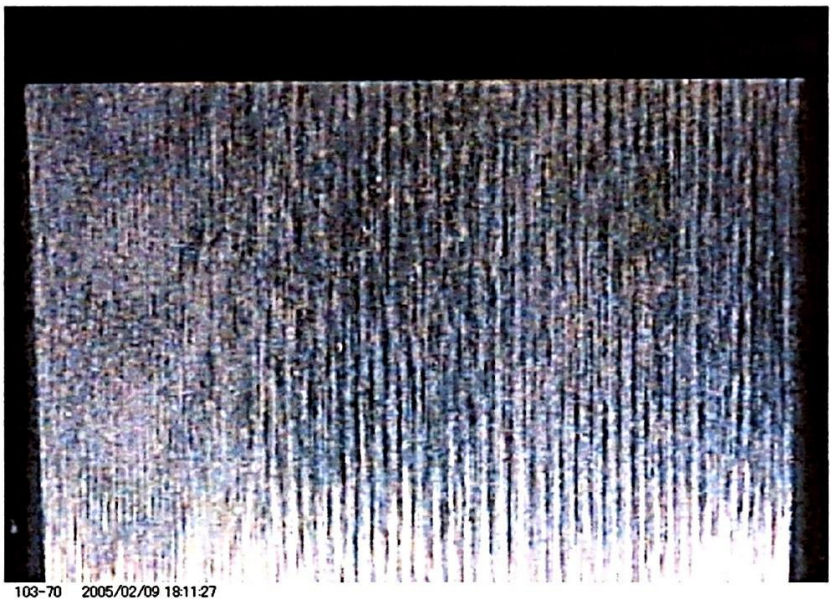




Without the auto balancer, the best revolution was 3,075 per minute and could not be zero shin d to 3,800r.p.m.

By adding the auto balancer, we could use faster revolution 3,800r.p.m. which makes the cut surface much smoother.

Kyutto will give you better results by just giving faster revolution to the tool.



Auto balancing device "ZERO SHIN" mounting processing test

Machining test 3-1

November 2013

AB350 auto balance device for NC lathe chuck mounting

Test result verification

Machine used: MAZAK quick turn nexus 300－Ⅱ
Matsumoto Machine made： 10 inch chuck
Work material: φ 100 aluminum (A 7075)
Machining contents: Inner diameter machining

○ **Purpose**

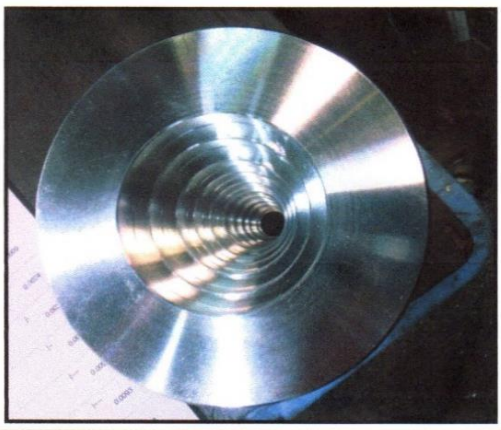
Accuracy confirmation of inner diameter machining by constant peripheral speed control
Inner diameter from φ55 to φ14, machined a staircase shape
As the processing diameter decreases, the rotation speed also increases,
Accuracy is not come out due to generation of vibration and chattering.

○ **Measures**

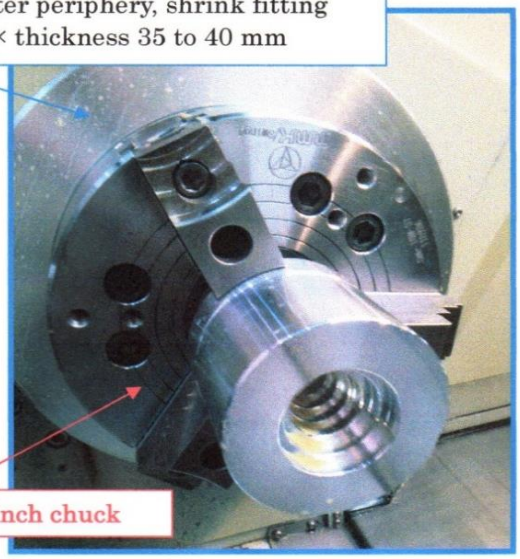
A balancer is attached to the outer periphery of chuck (Matsumoto made 10in), absorbing vibration, dynamic balance is taken, and improvement of processing accuracy is measured.

○ **Result**

As shown in the measurement data under exactly the same environmental conditions, in the case of the standard chuck, the accuracy was poor in machining of φ25 or less, but by changing only the chuck with balancer, all the accuracy was improved it became clear that.
Above all, the processing of φ20 has improved from 0.02 to 0.0065.
Further effects can be obtained by reviewing the rotation speed, blades, and machining conditions.



Workpiece with internal stepped machining



Balance device with/without ,"Concentricity measurement result"⇒See next page and photos ①②

Auto balancing device "ZERO SHIN" mounting processing test

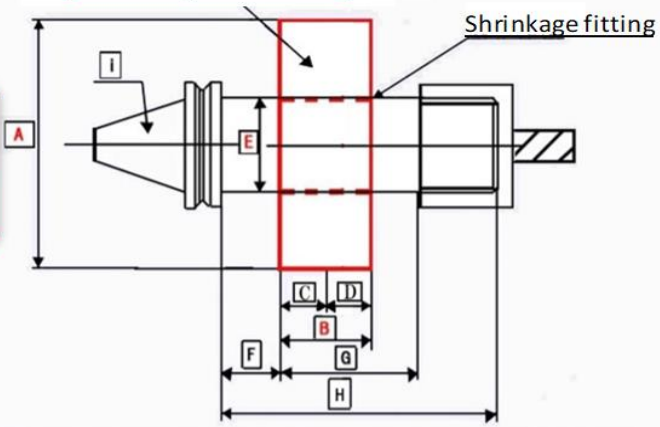
Zero shin specifications

Zero shin does not choose the manufacturer

BT / HSK axis

Auto balancing device "zero shin"

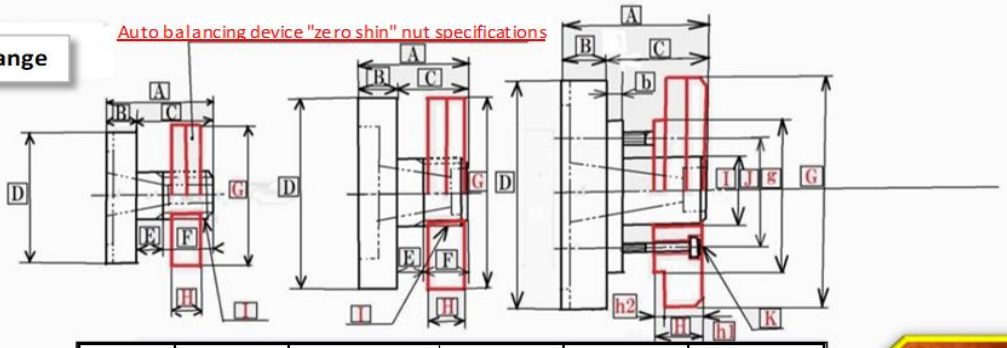
Shrinkage fitting



	BT30 ZS68 type	BT.HSK40 ZS80 type	BT.HSK50 ZS116 type	Special shape
A/mm	ϕ68	ϕ80	ϕ116	Upon request
B/mm	16	20	28	
C/mm	8	10	14	
D/mm	8	10	14	
E/mm	ϕ25	ϕ35	ϕ46	
F/mm	Upon request			
G/mm				
H/mm				
I	BT.HSK Others /Upon request			

Whetstone flange

Auto balancing device "zero shin" nut specifications



type	ZS44 type	ZS80 type	ZS175 type	ZS225 type	Special shape
A/mm	26	57	86	114	Upon request
B/mm	10	15	27	31	
C/mm	18	42	59	83	
D/mm	ϕ40	ϕ78	ϕ175	ϕ225	
E/mm	4	10			
F/mm	12	32			
G/mm	ϕ14	ϕ80	ϕ175	ϕ225	
g/mm			ϕ127	ϕ127	
H/mm	10	20	35	39	
h1/mm			25	31	
h2/mm			10	8	
I/mm	M24P1	M31.75P1.5left	ϕ74	ϕ80	
J/mm			PCD94-6	PCD105-6	
Other details, upon request					

Various examples of mounting the auto balancing device "ZERO SHIN"

1 BBT30 type tool device
ZS46 Auto Balance Device "ZERO SHIN"

2 HSK-A63 type tool device
ZS80 Auto Balance Device "ZERO SHIN"

3 BBT40 type tool device
ZS80 Auto Balance Device "ZERO SHIN"

4 BBT50 type tool device
ZS100 Auto Balance Device "ZERO SHIN"

5 NT50 type general-purpose tool
ZS166 Auto Balance Device "ZERO SHIN"

6 NT50 type quick holder device
ZS166 Auto Balance Device
"ZERO SHIN"

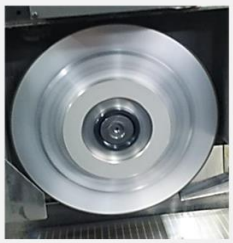
7 BT40 type shrink tool device
ZS80 Auto Balance Device
"ZERO SHIN"

8 BBT32 type tool device
ZS32 Auto Balance Device
"ZERO SHIN"

9 Whetstone for φ180-φ200
ZS80 Auto Balance Device "ZERO SHIN"
Nut specification flange mounted state

10 Whetstone for φ180-φ200
ZS80 Auto Balance Device "ZERO SHIN"
Nut specifications

11 φ350 CBN grindstone device
ZS175 Auto Balance Device "ZERO SHIN"
Nut specifications



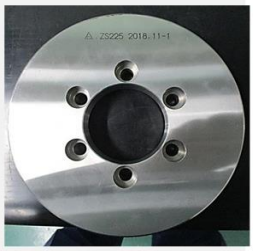
12 φ350 WA whetstone device
ZS175 Auto Balance Device "ZERO SHIN"
Nut specifications

13 For φ75V grindstone
ZS40 Auto Balance Device "ZERO SHIN"
Nut specifications

14 φ75V grindstone flange installed
ZS40 Auto Balance Device "ZERO SHIN"
Nut specifications

15 φ75V whetstone with another flange
ZS40 Auto Balance Device "ZERO SHIN"
Nut specifications

16 For φ500 whetstone
ZS250 Auto Balance Device "ZERO SHIN"
Nut specifications



17 15 inch wheel integrated
15 inch type auto balance device
"ZERO SHIN"

18 15 inch wheel installed
3-point mounting type auto balance device
"ZERO SHIN"

19 3-point mounting type auto balance device
ZERO SHIN
Same as above, 3 weights for mounting

20 Made of stainless steel for record mounting
φ80 type stabilizer (top)
Attach the same as above to the record player (bottom)

21 Made of aluminum for record mounting
φ80 type stabilizer (top)
Attach the same as above to the record player (bottom)

22 Main shaft gear mounting diagram
ZS240 Auto Balance Device
"ZERO SHIN"

23 For mounting the robot spindle
ZS55 Auto Balance Device
"ZERO SHIN"

24 Machining center spindle installed
ZS240 Auto Balance Device
"ZERO SHIN"

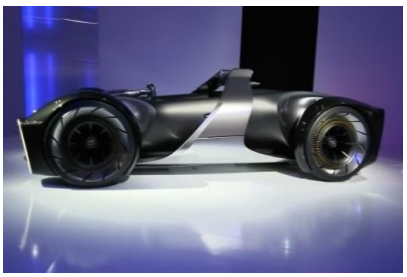
There are various other mounting examples

Proposal for balance improving with auto balancing device "ZERO SHIN"

The auto balancing device "ZERO SHIN" takes the dynamic balance, which is impossible with the conventional fixed balance, without adjusting the balance, and improves the rotation core shake.
We propose the world's first auto balancing device "ZERO SHIN" that solves various problems of various rotating parts and extends energy saving, resource saving, life, processing accuracy, etc.!

[Various industrial fields required]

To car rotation axis



To railroad rotation axis

To ship rotation axis

To aluminum wheels

To wheels and shafts

To propeller shaft

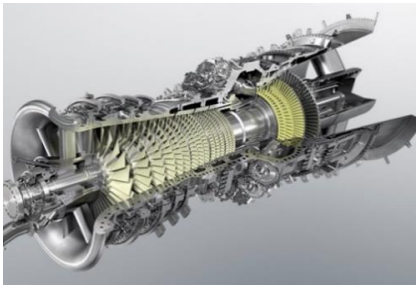
To wind power

To aircraft engine

To generator

To the rotating part

To engine shaft



To rotating shaft

※Some images are quoted from the internet.

Auto balancing device

（オートバランス装置）

Reform of the innovation

（革新の改革）

Infinite possibility

（無限の可能性）

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