TIMG®

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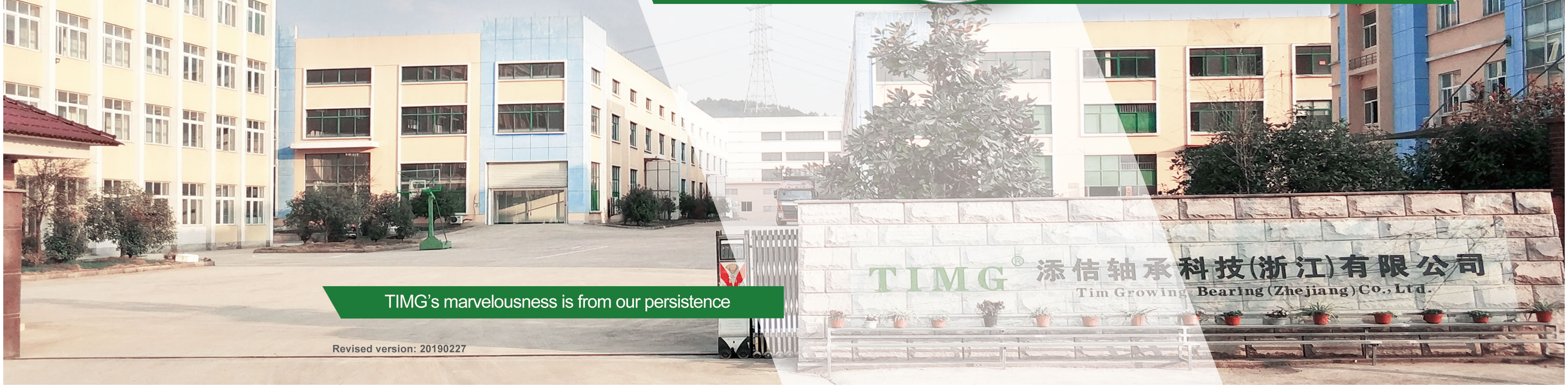
TIMG®

Devoted Our Mind On
Spindle Bearings's Development, Production, and Application
for Machining Center



TIMG's marvelousness is from our persistence

Revised version: 20190227

COMPANY PROFILE

Professional Quality is Determined by Core Technology;
Power of Brand is Never Relied On Prices.

Shanghai Tim Growing Bearing Co., Ltd. (TIMG®) was established in 2012. TIMG® is a science and technology enterprise which focuses on research and development, production and application of the spindle bearing in machining center. Tim Growing Bearing (Zhejiang) Co., Ltd. was established in 2017, which covers an area of 1, 6000 square meters, intending to achieve a breakthrough in production to meet our clients'demand in the machine tool industry. In 2018, a branch office was established in Taiwan, also we have set up sales representatives for Korea and European markets.

We insist on it, we make the extraordinary. TIMG® applies basic theory to product design, and manufacturing process relies on our core technology and detail management. We are honest to each test data, determined to create high-end bearing brand.

PATENTS CERTIFICATION

PRODUCT DESCRIPTION

All series does not require external forced cooling

7014 Series- 21 steel balls

(11.906mm) bearing for 10,000rpm spindles

The spindle not only has higher rigidity (preload), but also lower temperature rise.

7014 Series- 29 small steel balls

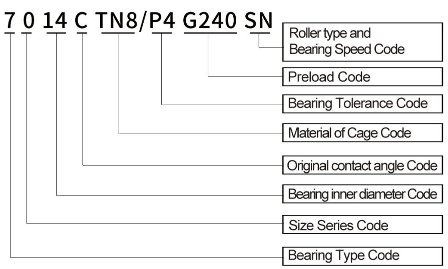
(7.938mm) bearing for 10,000rpm spindles

Lower temperature rise compared to other products of the same ball diameter.According to the parameters, it can be used as 10000rpm and 12000rpm speed.

7014 Series- 29 small ceramic balls

(7.938mm) bearing for 15,000rpm spindles

Lower temperature rise compared to other products of the same ball diameter.



7014 Series- 21 steel balls

(11.906mm) bearing for 8,000rpm spindles

With self-designed PEEK material cage, under the same rigid (preload) condition, the spindle temperature rise is lower than 20% under the condition of limiting speed, and the life is extended by more than two times.

7014 Series- 21 ceramic balls

(11.906mm) bearing for 12,000rpm spindles

(Technical Breakthrough): More load capacity, covering both high-speed cutting and heavy cutting; lower temperature rise, under the conditions of speed limit, the temperature is much lower than 15 ℃, without external forced cooling.

7014 Series- 29 small ceramic balls

(7.938mm) bearing for 12,000rpm spindles

Lower temperature rise compared to other products of the same ball diameter.

Item	Code	Connote
Bearing Type Code	7	Angular contact ball bearings
Size Series Code	0	dimension of bearing outer diameter
Bearing inner diameter Code	14	dimension of bearing inner diameter
Original contact angle Code	C	Angular contact is 15°
	17°	Angular contact is 17°
Material of Cage Code	TN8	PEEK (Poly-ether-ether-ketone)
Bearing Tolerance Code	P2	Tolerance grade is P2
	P4	Tolerance grade is P4
Preload Code	G240	Preload is 240N
	G90	Preload is 90N
	G70	Preload is 70N
Roller type and Bearing Speed Code	NO	Big steel ball bearing (8,000rpm)
	S	High-speed big steel ball bearing (10,000rpm)
	SN	High-speed big ceramic ball bearing (12,000rpm)
	H	Small steel ball bearing (10,000rpm)
	HSN	Small ceramic ball bearing (12,000rpm)
	SSN	High-speed small ceramic ball bearing (15,000rpm)

Parameters of Bearing Technology

Type	Principal dimension			Basic preload ratings (kN)		Mounting dimension (mm)				Other dimension (mm)					Limiting Speed (r/min)	Mass (kg)	Grease filling (ml)	Clamping force (kgf*cm)	
	d	D	B	C_r	C_{or}	$d_{a,bmin}$	$D_{a,bmax}$	r_{amax}	r_{bmax}	d_1	D_1	$r_{1,2}$	$r_{3,4}$	a	Grease			First	Second
7014 17° TN8/P4 G240	70	110	20	42.1	35.1	77	102	0.8	0.6	82.6	97.5	1.1	0.6	23.8	8,000	0.598	3.6~4.3	1632	1429
7014 17° TN8/P4 G240 S	70	110	20	33.43	22.67	77	102	0.8	0.6	82.3	97.5	1.1	0.6	23.8	10,000	0.595	3.6~4.3	1632	1429
7014 C TN8/P4 G240 SN	70	110	20	42.3	35.3	77	102	0.8	0.6	82.6	97.5	1.1	0.6	22.9	12,000	0.511	3.6~4.3	1632	1429
7014 17° TN8/P4 G90 H	70	110	20	21.5	19.1	77	102	0.8	0.6	85.0	95.05	1.1	0.6	23.8	10,000	0.654	2.4~3.6	1632	1429
7014 17° TN8/P4 G70 HSN	70	110	20	21.5	19.1	77	102	0.8	0.6	85.0	95.05	1.1	0.6	23.8	12,000	0.619	2.4~3.6	1632	1429
7014 17° TN8/P4 G70 SSN	70	110	20	21.5	19.1	77	102	0.8	0.6	85.0	95.05	1.1	0.6	23.8	15,000	0.619	2.4~3.6	1632	1429

Comment*: In a way of QBC use, according to the recommended preload installation, can run for 24 hours without stopping at this speed.

Inner ring's tolerance comparison (unit: μm)

Comparison item	Tolerance grade	Δdmp		Δds		$Vdsp$	$Vdmp$	Kia	Sd	Sia	ΔBs			VBs
											All	Normal	Correction	
		Upper deviation	Lower deviation	Upper deviation	Lower deviation	Maximum	Maximum	Maximum	Maximum	Maximum	Upper deviation	Lower deviation		Maximum
GB	4	0	-7	0	-7	5	3.5	4	5	5	0	-150	-250	4
TIMG	4	0	-7	0	-7	1.5	1.5	2	1	2	-10	-50		1.5
GB	2	0	-4	0	-4	4	2	2.5	1.5	2.5	0	-150	-250	1.5
TIMG	2	0	-4	0	-4	1.5	1.5	2	1	2	-10	-50		1.5

Tolerance symbol Definition

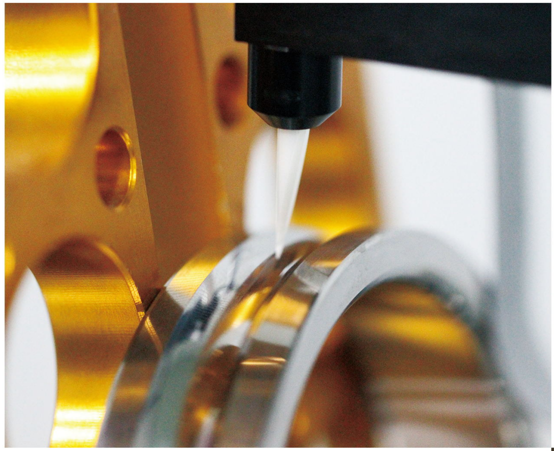
Δdmp: Deviation of a mid-range size (out of two-point sizes) of bore diameter in any cross section from its nominal size / Δds: Deviation of a two-point size of bore diameter of a cylindrical bore from its nominal size / Vdsp: Range of two-point sizes of bore diameter in any cross section of a cylindrical bore / Vdmp: Range of mid-range sizes (out of two-point sizes) of bore diameter obtained from any cross section of a cylindrical bore / Kia: Circular radial run-out of inner ring bore surface of assembled bearing with respect to datum, i.e. axis, established from the outer ring outside surface / Sd: Circular axial run-out of inner ring face with respect to datum, i.e. axis, established from the inner ring bore surface / Sia: Circular axial run-out of inner ring face of assembled bearing with respect to datum, i.e. axis, established from the outer ring outside surface / ΔBs: Deviation of a two-point size of inner ring width from its nominal size / VBs: Range of two-point sizes of inner ring width

Same as ΔBs of the same bearing's inner ring (unit: μm)

Comparison item	Tolerance grade	ΔDmp		ΔDs		$VDsp$	$VDmp$	Kea	SD	Sea	ΔCs			VCs
											All	Normal	Correction	
		Upper deviation	Lower deviation	Upper deviation	Lower deviation	Maximum	Maximum	Maximum	Maximum	Maximum	Upper deviation	Lower deviation		Maximum
GB	4	0	-8	0	-8	6	4	6	2.5	6	Same as ΔBs of the same bearing's inner ring			4
TIMG	4	0	-8	0	-8	1.5	1.5	2	1	2				2
GB	2	0	-5	0	-5	5	2.5	5	1.25	5				2.5
TIMG	2	0	-5	0	-5	1.5	1.5	2	1	2				2

Tolerance symbol Definition

ΔDmp:Deviation of a mid-range size (out of two-point sizes) of outside diameter in any cross section from its nominal size / ΔDs:Deviation of a two-point size of outside diameter from its nominal size / VDsp:Range of two-point sizes of outside diameter in any cross section / VDmp:Range of mid-range sizes (out of two-point sizes) of outside diameter obtained from any cross section / Kea:Circular radial run-out of outer ring outside surface of assembled bearing with respect to datum, i.e. axis, established from the inner ring bore surface/ SD:Perpendicularity of outer ring outside surface axis with respect to datum established from the outer ring face / Sea:Circular axial run-out of outer ring face of assembled bearing with respect to datum, i.e. axis, established from the inner ring bore surface / ΔCs:Deviation of a two-point size of outer ring width from its nominal size / VCs:Range of two-point sizes of outer ring width



01

Test and Measurement

Be honest with each data

02

Production

Rely on technology and detail management

03

Enterprise Culture

Persistence makes extraordinary

04

Industry University Research

Apply the basic theory to the product

01

Raw material advantage

All raw materials are used highly pure bearing steel imported from Europe.

02

Heat treatment

Advanced facility and art of heat treatment, and also control the whole process seriously, which is to ensure excellent microstructure & performance of TIMG's bearings.

03

Cage

According to the material characteristic of PEEK, TIMG® uses the simulation analysis like aerodynamics, high speed deformation and plastic injection molding, which makes our design more suitable for the working condition of spindle both in theory and reality.
Our cage is made by extremely precise injection mold.

04

Design

TIMG has the powerful development team and makes use of computer technology to guide the bearing design, at the same time combines the practical production and mathematical calculations.

05

Production

TIMG has the advanced and professional production line of precise angular contact ball bearings, and furthermore the key facilities are adopted from worldwide top brands.

06

Inspection and Measurement

TIMG retains all kinds of accurate inspection equipment to meet with the requirements for bearing's production.

07

Assembly

TIMG bearings are grinded by a way of lean assembly and all bearings have been done universal matching(universally matched).

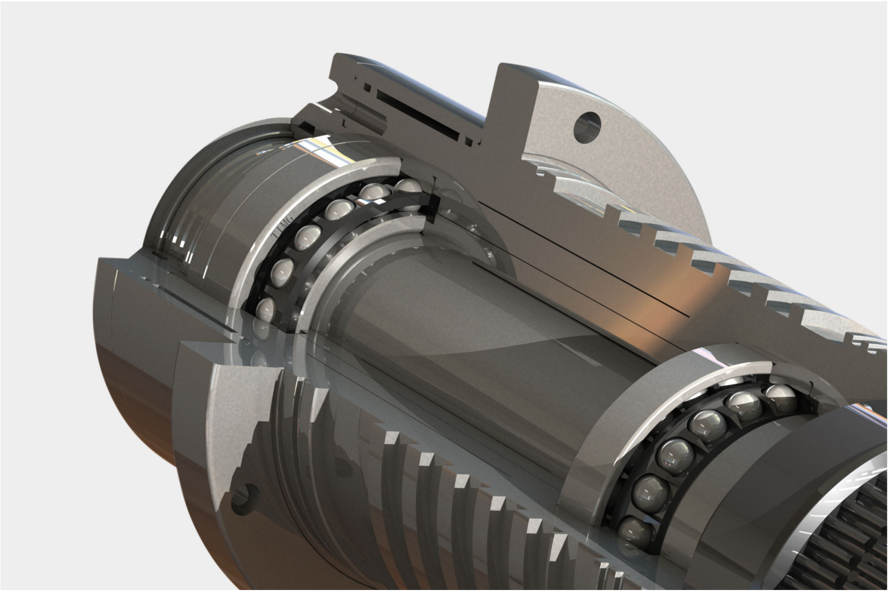
08

Technical Service

TIMG has the capability to provide customers bearing's selection, also a package of solutions to problems that may be arisen during use.

Precautions for use TIMG high precision spindle bearings

- Ensure that bearing's storage location is clean and dry. While removing the package of bearing, shall pay attention to anti-rust and anti-fouling.
- Use multi-row bearing, and shall select bearings with similar outer diameter and inner diameter.
- Use multi-row bearing, and the axial loading of bearing set shall be less than unloading force. Unloading force is related with bearing's loading condition and preload. More details, please contact with TIMG.
- Bearing's spacer shall be made by adopting high level of steel, in order to obtain the hardness of 45~60HRC. The parallelism error of both ends is controlled within 2um.
- Recommended range of preload is 240~860N. Regulation of preload can be done by adjusting the height difference between inner and outer spacers. Detailed proposal can be consulted with TIMG.



The installation process of TIMG high precision spindle bearings is as following

01

Use clean aviation kerosene or 120# solvent naphtha to do rough washing & fine washing to bearings.Rough washing and fine washing shall be arranged separately and have been fully dried.

02

Evenly fill the grease between the balls. It is recommended to use TURMO GREASE Highspeed L252 LUBCON grease, double-sided filling, and rotating the bearing by hands, evenly distributing grease to the raceway surface, inside the cage, between the rolling elements.

03

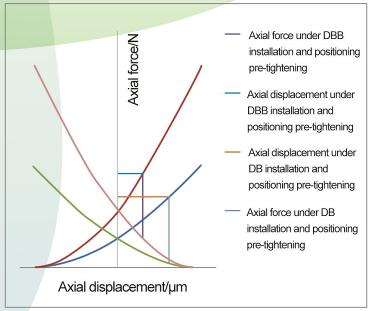
Pre-clean the relevant parts that have passed the dimensional measurement, including the shaft, housing, spacer, precision lock nut and etc., and make them dry thoroughly.

04

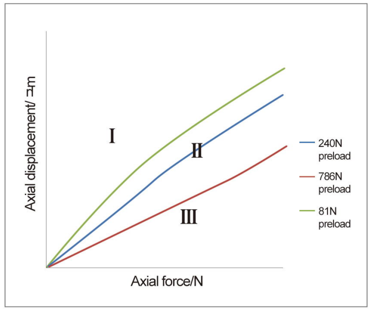
Collar heating of bearing, according to the spindle structure, determines the order of collar heating . The temperature of collar heating is 20-30 ° C, which is higher than the calculated temperature, but not higher than 120 ° C.

05

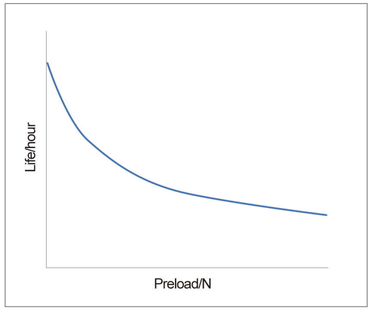
Check if the run-out accuracy is met with the requirements. If it is not possible to adjust to within the qualified accuracy, remove the spindle and reconfirm the qualification of each component.



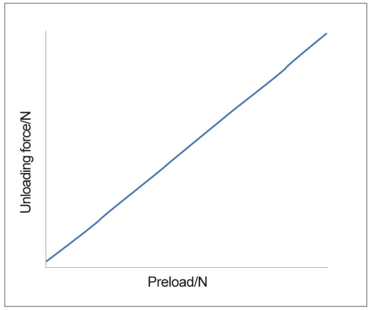
Relationship between preload and rigidity



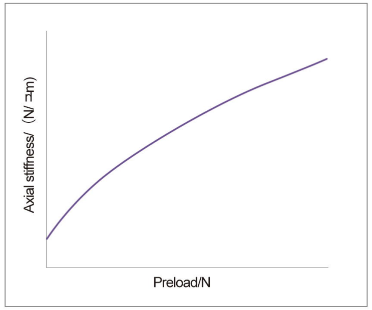
Relationship between axial force and axial displacement



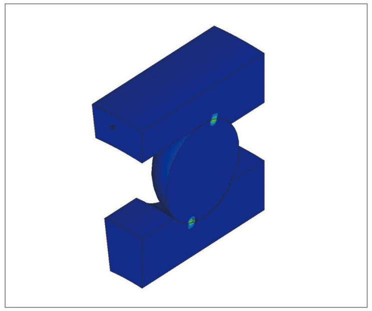
Relationship between preload and fatigue life



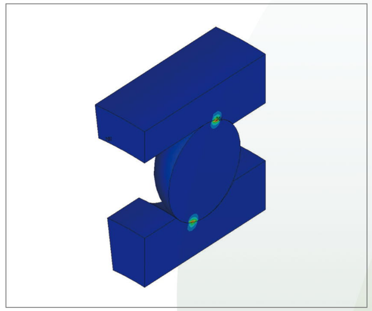
Relationship between preload and unloading force during DBB installation



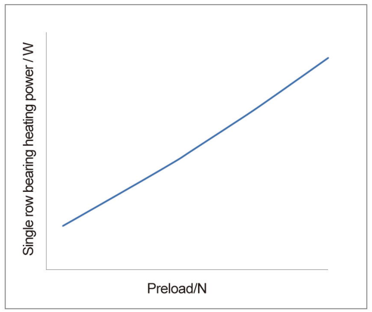
Relationship between preload force and axial stiffness during DBB installation



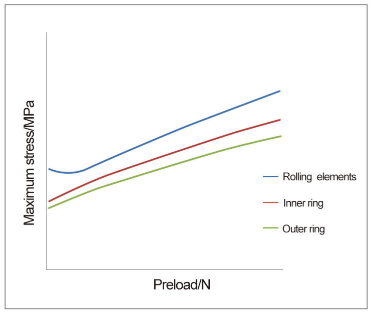
Stress cloud diagram with a preload of 240N



Stress cloud diagram with a preload of 900N



The relationship between preload and bearing heating



Relationship between preload and maximum stress