



柔性轴承 **Flexible Bearing**



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柔性轴承 Flexible Bearings

柔性滚动轴承是利用柔性元件可控的弹性变形来传递运动和动力的，其特点是，传动比大并且适用范围广、精度高、空回小、承载能力大、效率高、体积小、重量轻、传动平稳、噪声小、可向密封空间传递运动。

谐波减速机用柔性轴承主要用于谐波减速机，谐波传动变速器包括三个基本构件：波发生器、柔轮、刚轮及柔性轴承。其中柔性轴承是核心部件，变速器通过轴承的弹性变形达到高减速比的性能要求。

柔性轴承在工作中，内圈安装在椭圆形的凸轮上，工作中承受循环应力载荷，外圈安装在柔轮上，工作中随凸轮的转动而发生弹性变形，不仅承受循环应力载荷，而且承受交变应力载荷。

这些点对轴承内圈和外圈以及保持架的设计和制造提出了高的要求，外也仅有日本、美等少数家可以生产。河北精密柔性轴承有限公司谐波传动变速器用柔性轴承的设计制造水平，已达到国际先进水平。柔性轴承的设计已形成套完整的理论体系，产品的制造工艺日趋完善、成熟，产品质量日趋稳定。3E系列谐波传动减速器用柔性轴承质量可靠性能稳定，已成功应用于“神舟”、系列飞船的谐波传动驱动装置中，为我的载人航天事业作出了贡献。

由于柔性滚动轴承的内圈与波发生器的刚性凸轮紧套在起。故可视为刚性的椭圆环；滚动体(一般为球)则为通过弹簧与内外圈相连接的具有集中质量的质点；而外圈为弹性薄壁环，其原始曲线为柔轮原始曲线的内等距曲线。

齿轮系统的动力学行为包括轮齿动态啮合力和动载系数，以及齿轮系统的振动和噪声性等。随着齿轮传动日益向高速重载的方向发展，齿轮传动的动态性研究已成为当前齿轮研究的主要课题，人们对系统动力学分析有了更高的要求，提出了柔性多体动力学问题，即同时考虑结构本身的弹性变形与系统的宏观刚体运动。

Flexible bearings (harmonic drive strain wave gear bearing)

Flexible bearings for harmonic reducer are mainly used in harmonic reducer. Harmonic transmission includes three basic components: wave generator, flexible wheel, rigid wheel and flexible bearing. Flexible bearings are the core components, and the transmission meets the performance requirements of high deceleration ratio through the elastic deformation of bearings.

In the work of flexible bearing, the inner ring is installed on the elliptical cam, the outer ring is installed on the flexible wheel, and the elastic deformation occurs with the rotation of the cam, which not only bears the cyclic stress load, but also bears the alternating stress load.

These points put forward high requirements for the design and manufacture of bearing inner ring and outer ring and cage, and only a few enterprises such as Japan and the United States can produce it.

Luoyang Monton Flexible Bearing has reached the advanced level of design and manufacture of flexible bearings for harmonic transmission. The design of flexible bearing has formed a complete theoretical system, the manufacturing technology of the product is becoming more and more perfect, mature, and the product quality is becoming more and more stable. The 3E series harmonic drive reducer flexible bearing has been successfully applied to the harmonic drive device of "Shenzhou" and series spaceship, which has contributed to my manned spaceflight industry.

Because the inner ring of the flexible rolling bearing is tightly sheathed with the rigid cam of the wave generator. Therefore, it can be regarded as a rigid elliptical ring, the rolling body (generally a ball) is a particle with concentrated mass connected with the inner and outer rings through the spring, and the outer ring is an elastic thin-wall ring, and its original curve is the inner isometric curve of the original curve of the flexible wheel.

Harmonic drive transmission consists of three basic components: wave generator, flex spline, Circular Spline and flexible bearing. Among them, the flexible bearing is the core component, and the transmission achieves the performance requirement of high deceleration ratio through the elastic deformation of the bearing.

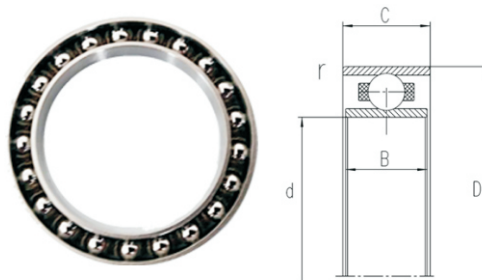
When the flexible bearing is in operation, the inner ring is mounted/installed on the elliptical cam, which bears the cyclic stress load during the work; while the outer ring is mounted/installed on the flexible wheel, and elastically deforms with the rotation of the cam during the work, which not only bears the cyclic stress load, but also withstands the alternating stress load.

Flexible rolling bearing utilizes controllable elastic deformation of the flexible components to transmit motion and power. It has characteristics of large transmission ratio, wide application range, high precision, small air return, large carrying capacity, high efficiency, small volume/size, light weight, smooth transmission, low noise, and can transfer motion to sealed space.

Robot bearing/harmonic drive bearing is a special kind which easily deforms in a reversible way.

It has a very thin outer ring which varies from round shape to oval interatively during its working time. easily double sealed bearing designed primarily for application of radial load—deep ball grooves also permit application of thrust load in either direction, often used in conjunction with another bearing.

柔性轴承 Flexible Bearings



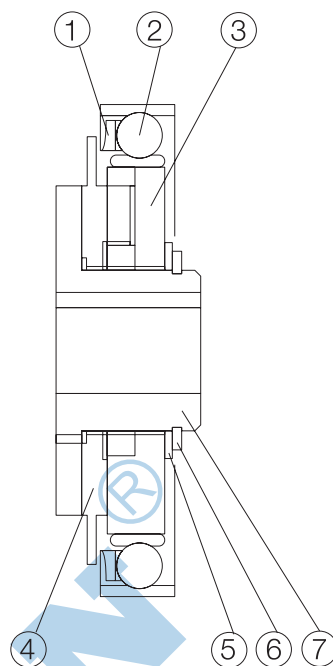
轴承型号 Model List	内径	外圈	厚度	额定动负荷	额定静负荷	最大径向变形	输入转速	输出力矩
	Inner ring	Outer ring	Width	Dynamic load rating	Static load rating	Radial Deformation	Input rotate speed	Output torque
	ID	OD	B	Cr	Cor	Max. mm	r/min	N.m
3E904KAT2	18.8	25	4	3.75	3.12	0.2	3000	2
3E905KAT2	24	32	5	4.74	3.75	0.2	3000	6
3E806KAT2	30	40	6	7.12	5.83	0.3	3000	16
3E907KAT2	37	50	8	12.63	12	0.3	3000	30
3E809KAT2	45	60	9	12.89	11.55	0.4	3000	50
3E911KAT ₂	57	75	12	14.76	13.18	0.5	3000	7.5
3E812KAT ₂	60	80	13	15.51	14.44	0.5	3000	12
3E814KAT ₂	70	95	15	22.38	21.57	0.6	3000	20
3E815KAT ₂	75	100	15	26.4	25.67	0.6	3000	25
3E818KAT ₂	90	120	18	34.7	34.94	1	3000	45
3E822KAT ₂	110	150	24	43.55	45.63	1	1500	80
3E824KAT ₂	120	160	24	57.02	57.75	1	1500	120
3E826KAT ₂	130	175	30	81.59	86.1	1	1500	170
3E830KAT ₂	150	200	30	91.6	102.67	1	1500	200
3E832KAT ₂	160	220	35	115.66	127.59	1.25	1500	220
3E836KAT ₂	180	240	35	130.04	146.47	1.5	1500	250
3E838KAT ₂	190	250	40	139.96	160.42	1.5	1500	350
3E842KAT ₂	210	280	45	173.15	210.91	1.5	1500	400
3E844KAT ₂	220	300	45	181.72	231	1.5	1500	500
1000907AKIT2	35.8	48.2	8	9.93	8.36	0.3	3000	30
1000809AKIT2	45.7	61.8	9.5	12.89	11.55	0.4	3000	50
10008810AKT2	48	63	9.7	12.89	11.55	0.4	3000	50
1000912AKT2	60	80	12	27.19	28.18	0.5	3000	120
F14	25.07	33.9	6.1	4.74	3.75	0.2	3000	8
F17	30.3	41.72	6.16	7.12	5.83	0.3	3000	16
F20	35.56	49.07	7.24	9.93	8.36	0.3	3000	30
F25	45.21	61.34	9.02	12.89	11.55	0.4	3000	50
F32	58.93	79.76	11.8	22.28	20.91	0.5	3000	120
M14	25.07	33.9	6.1	5.53	4.73	0.2	3000	12
M17	30.3	41.72	6.16	8.31	7.35	0.3	3000	24
M20	35.56	49.07	7.24	12.63	12	0.3	3000	45
M25	45.21	61.34	9.02	16.4	16.58	0.4	3000	75
M32	58.93	79.76	11.8	27.19	28.18	0.5	3000	180

规格 Bearing Model	外形尺寸 Dimension mm			备注 Remark
	外径 Inner	内径 Outer	宽度 Width	
	D	d	B Outer /Inner	
φ20	20	14.5	4	
φ26.11	26.11	19.9	4	
φ26.54	26.54	20.2	4	
φ27.5	27.5	20.4	4.5	
φ30	30	22	6	
φ33.87	33.87	25	6.1/6.4	
φ33.896	33.896	25.07	6.095/6.35	14 Series
φ34	34	25.5	5	
φ34.52	34.52	26.2	5	
φ34.7	34.7	26.2	5	
φ35.5	35.5	26.5	6	
φ38.6	38.6	28.4	6	
φ40.1	40.1	30.1	6	
φ41.7	41.7	30.24	6.2/6.7	
φ41.72	41.72	30.295	6.16/6.67	
φ41.722	41.722	30.3	5.16/6.68	17 series
φ42	42	33	8	
φ48	48	35.5	8	
φ48.2	48.2	35.5	8	
φ48.3	48.3	35.9	8	
φ49.03	49.03	35.5	7.2/8.1	
φ49.06	49.06	35.55	7.2/8.1	
φ49.07	49.07	35.56	7.23/8.1	
φ49.073	49.073	35.56	7.24/8.13	20 Series
φ49.08	49.08			
φ49.1	49.1	35.55	7.2/8.1	
φ49.4	49.4	36.6	8	
φ54	54	42.52	8.1	
φ56	56	43	9	
φ61.34	61.34	45.212	9/6.3	
φ61.341	61.341	45.212	9.015/8.6	
φ61.35	61.35	45	9/6.3	
φ61.7	61.7	46.3	9	
φ63	63	48	9.5	
φ72	72	55	10	
φ77.2	77.2	57	12	
φ79.74	79.74	58.96	11.5	
φ79.756	79.756	58.928	11.81/8.64	32 Series
φ92.5	92.5	68	15	
φ95	95	71	15	
φ96.5	96.5	72	15	
φ98	98	73	15	
816	110	80	16	
φ123	123	92.5	18	
φ125	125	94	18.5	
919	130.434	96.954	25	
φ156	156	118	24	
φ192	192	144	30	

轴承型号	内径	外径	内圈厚度	外圈厚度	倒角
Bearings	d	D	B	C	rsmin
HDB18.8/25/4	18.8	25	4	4	0.15
HDB22/30/5	22	30	5	5	0.15
HDB22.79/28.8/3.8/4	22.79	28.8	3.8	4	0.15
HDB24/32/5	24	32	5	5	0.15
HDB25.2/34/6.3/6.05	25.2	34	6.3	6.05	0.15
HDB27/37/6	27	37	6	6	0.2
HDB30/40/6	30	40	6	6	0.2
HDB34/47/8	34	47	8	8	0.2
HDB35.8/48.2/8	35.8	48.2	8	8	0.2
HDB37/50/8	37	50	8	8	0.2
HDB42/58/10	42	58	10	10	0.2
HDB45/60/9	45	60	9	9	0.3
HDB45.1/61.3/6.35/9	45.1	61.3	6.35	9	0.3
HDB48/63/9.5	48	63	9.5	9.5	0.3
HDB52/72/12	52	72	12	12	0.3
HDB59/79.8/8.6/11.8	59	79.8	8.6	11.8	0.3
HDB60/80/12	60	80	12	12	0.3
HDB65/90/16	65	90	16	16	0.3
HDB72/95/15	71	95	15	15	0.3
HDB71.2/98.2/10.2/14.4	71.2	98.2	10.2	14.4	0.3
HDB75/100/15	75	100	15	15	0.3
HDB80/110/16	80	110	16	16	0.3
HDB83/115/20	83	115	20	20	0.3
HDB90/120/18	90	120	18	18	0.5
HDB94/125/18.5	94	125	18.5	18.5	0.5
HDB100/140/25	100	140	25	25	0.6
HDB104/142/21	104	142	21	21	0.6
HDB120/160/24	120	160	24	24	0.8
HDB125/175/32	125	175	32	32	0.8
HDB150/200/30	150	200	30	30	1.0
HDB160/220/33	160	220	33	33	1.0
HDB180/240/35	180	240	35	35	1.0
HDB190/250/36	190	250	36	36	1.0
HDB220/300/45	220	300	45	45	1.5
HDB19.444/26.671/4.8/4.6	19.444	26.671	4.8	4.6	0.15
HDB24.945/33.671/6.35/6.1	24.945	33.671	6.35	6.1	0.15
HDB29.671/41.671/6.68/6.16	29.671	41.671	6.68	6.16	0.2
HDB31.817/46.671/4.8/6	31.817	46.671	4.8	6	0.2
HDB35.58/49.075/8.1/7.2	35.58	49.075	8.1	7.2	0.2
HDB35.58/49.281/8.1/7.2	35.58	49.281	8.1	7.2	0.2
HDB39.674/53.169/8.7/7.2	39.674	53.169	8.7	7.2	0.2
HDB47.671/61.671/6.359.015	47.671	61.671	6.35	9.015	0.3
HDB58.871/79.671/8.64/11.8	58.871	79.671	8.64	11.8	0.3
HDB58.933/79.56/8.64	58.933	79.56	8.64	8.64	0.3
HDB72.62/99.671/10.3/14.475	72.62	99.671	10.3	14.475	0.3
HDB81.937/112.671/11.4/16.3	81.937	112.671	11.4	16.3	0.3

Wave generator Components

- ① Ball Separator
- ② Wave Generator Bearing
- ③ Wave Generator Plug
- ④ Insert
- ⑤ Rub Washer
- ⑥ Snap Ring
- ⑦ Wave Generator Hub



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