



材料结构 Material Structure






FWB系列材料以高强度玻璃纤维增强高温环氧树脂作为承载层，以特种纤维和PTFE纤维作为滑动层，使得轴承在高载低速工况条件下具有优良的耐磨性和很低的摩擦系数，甚至可以在长时间不加油的情况下仍能发挥良好的自润滑特性和很高的轴承比压。由此我们开发了可以适合不同工况下的多种自润材料。

The back material of FWB series material is high strength glass fiber with epoxy resin and the lubricating layer of it is PTFE wound fiber or special lubricating fiber. Therefore, this special structure performs an outstanding anti-wear feature and low friction coefficient under high load and low speed condition. Furthermore, this absolutely new idea gives better solution for high load and excellent wear resistance possibility.

典型特征 Typical Features

- 极高的动承载能力，最高140Mpa;
- 优秀的耐磨性能;
- 极低的摩擦系数，摩擦系数<0.12;
- 长期干运行，不推荐加油。
- Very high load capacity, Max. 140Mpa;
- Very good chemical resistance;
- Lower friction and good wear properties. Friction coefficient<0.12;
- Long time dry operation without oil.

技术数据表 Technical data table

材料性能 Material Properties	单位 Unit	 CRM	 CRB	 CRG	 CRP	 CRW	 CRF
基本类型 Basic type		通用型 Universal type	标准型 Standard	高载型 High load	高速型 High speed	水下型 Under water	多用途 Multi-role
密度 Density	g/cm ³	2.00	2.00	2.00	2.00	2.00	1.30
极限PV值 Max. PV (dry)	N/mm ² × m/s	1.8	1.8	2.0	1.6	1.8	1.2
摩擦系数 Coefficient of friction		0.05~0.15	0.03~0.12	0.03~0.12	0.02~0.12	0.02 ~ 0.10	0.08~0.30
工作温度 Working Temp.	℃	-100/+160	-100/+160	-100/+160	-100/+160	-100/+100	-40/+130
最大表面速度 Max. Speed	m/s	0.20	0.20	0.20	0.40	0.40	0.13
最大载荷 Max. load	MPa	420	420	420	420	420	300
静载荷 Static load	MPa	240	240	240	240	240	150
动载荷 Dynamic friction /steel (dry)	MPa	100	140	160	30	100	45
径向压溃强度 Radial compressive strength	MPa	550	550	550	550	550	200
邵氏硬度 Shore hardness	D	95	95	95	95	95	90
线性热膨胀系数(25 ~ 150℃) Linear coef. of thermal Expansion	10 ⁻⁶ × K ⁻¹	13	13	13	13	13	40
颜色 Color		蓝色 Blue	咖啡色 Coffee	黑色 Black	乳白色 White	绿色 Green	深灰色 Dark grey

轴承摩擦系数 Friction Coefficient

缠绕轴承的摩擦系数为0.03 ~ 0.12，影响摩擦系数的主要因素有承载、运动方式、速度以及相配轴的表面粗糙度等。

图1显示了缠绕轴承在PV旋转载荷下的摩擦系数随着载荷的升高而降低。

Friction Coefficient of filament Bearing is 0.03 ~ 0.12. The main factors affect the Friction Coefficient are Load, Moving method, Speed and Roughness of mating surfaces. Graph 1 shows the friction coefficient is going down while load is increasing under the rotation method.

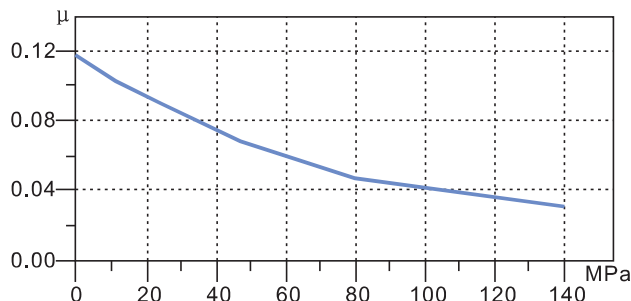


图1: 纤维缠绕轴承的载荷与摩擦系数曲线
Graph 1: Load vs Friction Coefficient

轴承规格: CRB-6070-50	Specification: CRB-6070-50
轴: 45# HRC50, Ra=0.4	Shaft: 45# HRC50, Ra=0.4
轴承载荷: 20~140MPa	Load: 20~140MPa
速度: 1.0m/min	Speed: 1.0m/min
润滑: 干	Lubricate: Dry

轴承的磨损 The Anti-wear property

轴承磨损的影响因素有承载、运动方式、速度以及相配轴的表面粗糙度等；图2说明了缠绕轴承在50MPa载荷、室温的条件下摇摆运动中的磨损情况。根据图表我们可以看出在最初的时间内轴承磨损很快，在这段时间内，内衬中的润滑物质逐渐向相配轴上转移并均匀分布在运动方向上，从而形成光滑的摩擦表面，之后保持很长时间的稳定不磨损阶段。

The main factors affect the anti-wear property are the load, moving method, speed and roughness of mating surfaces. Graph 2 shows the bearing wear off under room temperature with the load of 50MPa when the bearing is swinging. It is found the wear off increases sharply during the initial running-in while the lubricant is transferred from the inner liner and a smooth surface is created there of to form the lubricating surface. After running-in period, it will maintain stable without wear off.

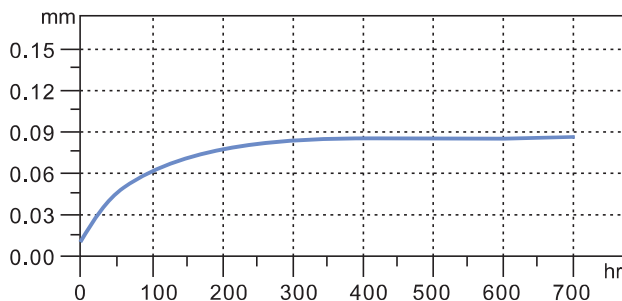
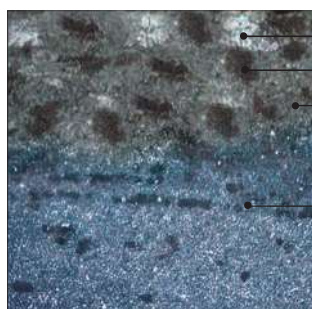


图2: 纤维缠绕轴承工作时间与磨损量的曲线
Graph 2: Duration vs Wear off amount

轴承规格: CRB-4050-30	Specification: CRB-4050-30
轴: 45# HRC50, Ra=0.4	Shaft: 45# HRC50, Ra=0.4
轴承载荷: 50MPa	Load: 50MPa
速度: 1.0m/min, ± 45°	Speed: 1.0m/min, ± 45°
润滑: 干	Lubrication: Dry

CRM 通用型缠绕轴承 Universal Type Bearings



PTFE纤维 PTFE Fiber
 润滑剂 Lubricant
 中等强度纤维 Medium Strength Fiber
 玻纤增强环氧树脂基体
 Enhanced Epoxy Resin

滑动层
 Sliding Layer

■ 轴承材料结构

内衬：以PTFE纤维与中等强度纤维缠绕而成的织物作为滑动层；
 衬背：以高强度玻璃纤维增强高温环氧树脂作为承载层。

■ Material structure

Sliding layer: Continuous wound PTFE and high-strength fibers encapsulated in as internally lubricating layer.

Backing: Continuous wound glass fiber encapsulated in a high temperature epoxy resin.

■ 典型特征

很好的耐磨性能
 高承载能力
 优良的耐污性能
 较好的化学抗性



■ Feature

Very good friction and wear properties
 High load capacity
 Excellent contamination resistance
 Good chemical resistance

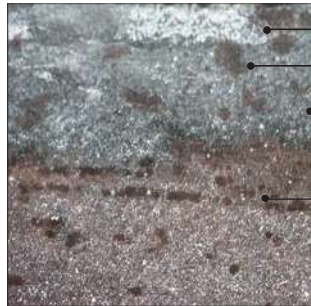
轴承技术数据 Technical Data

项目 Description	单位 Unit	数据 Data
最大载荷 Max. Load	静载荷 Static Load	MPa 240
	动载荷 Dynamic Load	MPa 100
最高滑动线速度 Max. Speed	m/s	0.20
极限PV值 Max. PV Value	MPa × m/s	1.8
摩擦系数（干） Coefficient of friction (Dry)	—	0.05 ~ 0.15
连续工作温度 Continuous work temperature	℃	-100/+160

典型应用 Typical Application

升降作业机械	Boom lifts, Scissor lifts
油缸耳环轴套	Hydraulic cylinder pivots
物流机械	Handling machinery
包装机械	Packager machinery

CRB 标准型缠绕轴承 Standard Type Bearings



中等强度纤维 Medium Strength Fiber

PTFE纤维 PTFE Fiber

润滑剂 Lubricant

玻纤增强环氧树脂基体
Enhanced Epoxy Resin

滑动层
Sliding Layer

■ 轴承材料结构

内衬：以PTFE纤维与中等强度纤维缠绕而成的织物作为滑动层；
衬背：以高强度玻璃纤维增强高温环氧树脂作为承载层。

■ 典型特征

较高的动承载能力
很好的抗冲击性能
较好的耐磨特性
较强的耐腐蚀能力
较低的摩擦系数
不推荐加油



■ Material structure

Sliding layer: Continuous wound PTFE and high-strength fibers encapsulated in as internally lubricating layer.

Backing: Continuous wound glass fiber encapsulated in a high temperature epoxy resin.

■ Feature

Medium to high load capacity
Good impact resistance
Very good chemical resistance
Lower friction and good wear properties
Oil forbidden

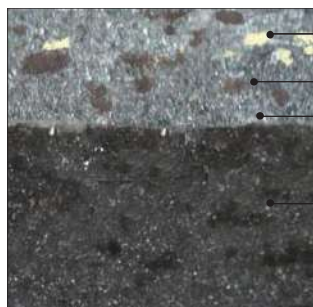
轴承技术数据 Technical Data

项目 Description	单位 Unit	数据 Data
最大载荷 Max. Load	静载荷 Static Load	MPa 240
	动载荷 Dynamic Load	MPa 140
最高滑动线速度 Max. Speed	m/s	0.20
极限PV值 Max. PV Value	MPa × m/s	1.8
摩擦系数 (干) Coefficient of friction (Dry)	—	0.03 ~ 0.12
连续工作温度 Continuous work temperature	℃	-100/+160

典型应用 Typical Application

油缸耳轴套	Hydraulic cylinder pivots
举升机械	Construction machinery arm bushes
起重机械、物料机械	Boom lifts, scissor lifts
建筑机械	Cranes, material handling equipment
港口机械	Port machinery
包装机械	Package machine

CRG 高承载型缠绕轴承 High Load Type Bearings



特种高强纤维 Special Fiber
 PTFE纤维 PTFE Fiber
 润滑剂 Lubricant
 玻纤增强环氧树脂基体
 Enhanced Epoxy Resin

滑动层
 Sliding Layer

■ 轴承材料结构

内衬: 以PTFE纤维与中等强度纤维缠绕而成的织物作为滑动层;
 衬背: 以高强度玻璃纤维增强高温环氧树脂作为承载层。

■ 典型特征

极高的动承载能力
 很高的抗冲击性能
 极好的耐磨特性
 较强的耐腐蚀能力
 不推荐加油



■ Material structure

Sliding layer: Continuous wound PTFE and high-strength fibers encapsulated as internally lubricating liner.

Backing: Continuous wound glass fiber encapsulated in a high temperature epoxy resin.

■ Feature

Very high load capacity
 Excellent impact resistance
 Very good chemical resistance
 Low friction and good anti-wear properties
 Oil forbidden

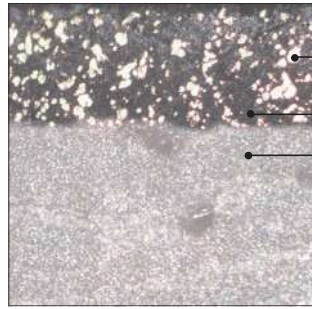
轴承技术数据 Technical Data

项目 Description	单位 Unit	数据 Data
最大载荷 Max. Load	静载荷 Static Load	MPa 240
	动载荷 Dynamic Load	MPa 160
最高滑动线速度 Max. Speed	m/s	0.20
极限PV值 Max. PV Value	MPa × m/s	2.0
摩擦系数 (干) Coefficient of friction (Dry)	—	0.03 ~ 0.12
连续工作温度 Continuous work temperature	℃	-100/+160

典型应用 Typical Application

油缸耳轴套	Hydraulic cylinder pivots
建筑机械曲肘轴套	Construction machinery arm bushes
举升机械	Boom lifts, scissor lifts
起重机械、物料机械	Cranes, material handling equipment
港口机械	Port machinery
包装机械	Package machine

CRP 高速型缠绕轴承 High Speed Type Bearings



金属粉末 Metal Powder
PTFE填充物 PTFE Filler
玻纤增强环氧树脂基体
Enhanced Epoxy Resin

滑动层
Sliding Layer

■ 轴承材料结构

内衬：以PTFE填充物作为滑动层；
衬背：以高强度玻璃纤维增强高温环氧树脂作为承载层。

■ 典型特征

较低的动承载能力
较低的摩擦系数
较高的运动速度
特别适用于往复运动
内孔可机加工
允许加油

■ Material structure

Sliding layer: Laminated with compound PTFE tape as bearing layer.

Backing: Continuous wound glass fiber encapsulated in a high temperature epoxy resin.

■ Feature

Relatively low load capacity	Suitable for traverse motion
Low friction co-efficient	Inside machineable
High motion speed	Oil allowed

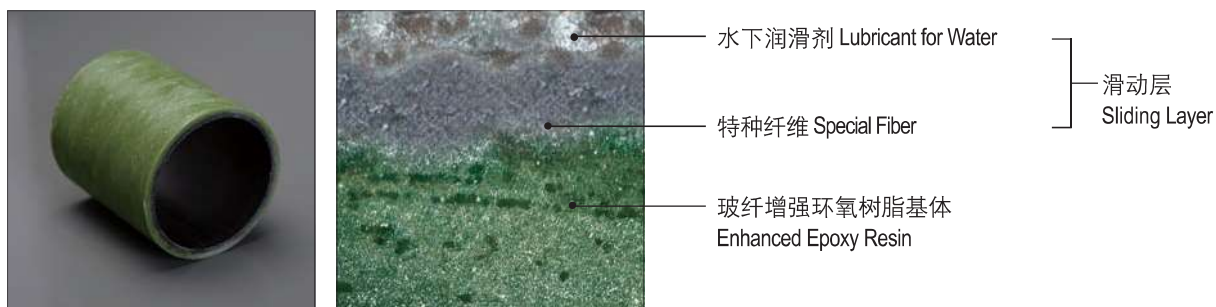
轴承技术数据 Technical Data

项目 Description	单位 Unit	数据 Data
最大载荷 Max. Load	静载荷 Static Load	MPa 240
	动载荷 Dynamic Load	MPa 30
最高滑动线速度 Max. Speed	m/s	0.40
极限PV值 Max. PV Value	MPa × m/s	1.6
摩擦系数 (干) Coefficient of friction (Dry)	—	0.02 ~ 0.12
连续工作温度 Continuous work temperature	°C	-100/+160

典型应用 Typical Application

球阀、蝶阀轴套	Ball and butterfly trunnion bearing
气泵轴套	Air pump guide bushes
伺服电机	Servo-motor bearings
塑胶机械格林柱导套	Water dam bearings
水利机械轴套	Tie-bar guide bearing
油压机械导套	Hydraulic pressure machinery

CRW 水下型缠绕轴承 Water-lub Type Bearings



水下润滑剂 Lubricant for Water

特种纤维 Special Fiber

 玻纤增强环氧树脂基体
Enhanced Epoxy Resin

 滑动层
Sliding Layer

■ 轴承材料结构

内衬：以PTFE纤维与中等强度纤维缠绕而成的织物作为滑动层；
衬背：以高强度玻璃纤维增强高温环氧树脂作为承载层。

■ 典型特征

极好的水下耐磨性能
高承载能力
优良的耐污性能
较好的化学抗性
非常低的摩擦系数

■ Material structure

Sliding layer: Continuous wound PTFE and high-strength fibers encapsulated in as internally lubricating layer.

Backing: Continuous wound glass fiber encapsulated in a high temperature epoxy resin.

■ Feature

Excellent anti-wear property under water
High load capacity
Excellent contamination resistance
Good chemical resistance
Very lowest friction coefficient

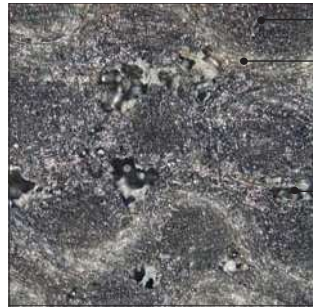
轴承技术数据 Technical Data

项目 Description		单位 Unit	数据 Data
最大载荷 Max. Load	静载荷 Static Load	MPa	240
	动载荷 Dynamic Load	MPa	100
最高滑动线速度 Max. Speed		m/s	0.40
极限PV值 Max. PV Value		MPa × m/s	1.8
摩擦系数（水） Coefficient of friction (Water)		—	0.02 ~ 0.10
连续工作温度 Continuous work temperature		°C	-100/+100

典型应用 Typical Application

船舶机械	Marine machinery
港口机械	Port machinery
水电闸门	Water gate machinery
清洗设备	Cleaning equipment

CRF 多用型缠绕轴承 Multi-role Type Bearings



特种高强酚醛树脂 Special Phenolic Resin

高强度纤维 Strength Fiber Textile

专用润滑剂 Special Lubricant

■ 轴承材料结构

CRF轴承是采用特种高强酚醛树脂和高强度纤维织物浸渍缠绕为基体，并填充专用耐磨剂。

■ 典型特征

较低的动承载能力
较高的摩擦系数
特别适用于油润滑工况
一般的耐磨性
内外径可机加工
允许加油

■ Material structure

This bearing material consist of strength fiber textile rein forced special phenolic composites.

■ Feature

Relatively low load capacity
Relatively high friction co-efficeint
Suitable for oil lubricating applications
Average anti-wear feature
Completely machinable
Oil allowed

轴承技术数据 Technical Data

项目 Description	单位 Unit	数据 Data
最大载荷 Max. Load	静载荷 Static Load	MPa 150
	动载荷 Dynamic Load	MPa 45
最高滑动线速度 Max. Speed	m/s	0.13
极限PV值 Max. PV Value	MPa × m/s	1.2
摩擦系数（干） Coefficient of friction (Dry)	—	0.08 ~ 0.30
连续工作温度 Continuous work temperature	°C	-40/+130

典型应用 Typical Application

水力机械轴套	Hydraulic machinery bearing
拉杆轴套	Tie-bar bearing
包装机械	Package machine
气泵轴套	Air pump guide bushes
伺服电机	Servo-motor bearings