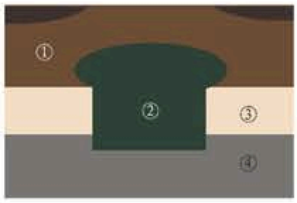
SB-GT Steel shell cast bronze with graphite plug 钢基铜合金镶嵌型固体润滑轴承

Material Structure 材料组织



①Solid lubricant film
固体润滑膜
②Solid lubricant plug
固体润滑剂
③Bronze layer
铜合金
④Steel backing
钢基

Graphite Plug Embedded Type 石墨镶嵌方式

Type A： 内径（ID）≤100

Type B： 内径（ID）≥100

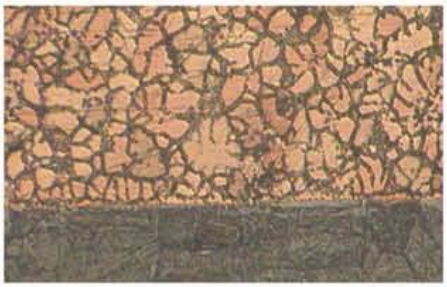
SB-GT Material Introduction

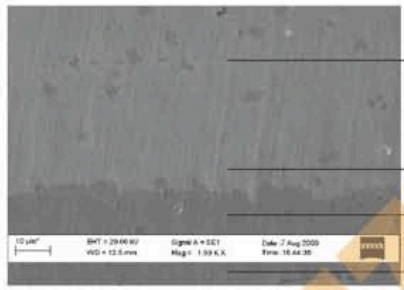
Steel shell with cast bronze bearing material liner with specially formulated solid lubricants embedded into the holes in the liner material. The process of casting bronze on steel achieves an integral metallurgical structure between bronze and steel with an increased carrying capacity while the material cost is considerably reduced. The solid lubricant can reduce the coefficient of friction and performs the self-lubricating function.

在优质碳钢表面浇铸高强度铜合金作为轴承的基础材料，这种制造工艺使得铜和钢结合面达到完全的冶金结合，在降低了材料成本的同时也提高了其承载能力；而根据使用工况在其工作面镶嵌固体润滑剂大大降低了轴承的摩擦系数并达到了自我润滑的目的。

SB-GT Steel shell cast bronze with graphite plug 钢基铜合金镶嵌型固体润滑轴承

The microstructure of the interface 金相下的结合面





Material Properties 材料特点

The microstructure of the steel and bronze interface shows there have intermetallic diffusion between 3 μ -5 μ during the casting process, this ensures perfect adhesion and in every case, the mechanical properties of the interface are superior to those of bronze itself.

This intermetallic diffusion offers excellent mechanical properties and with partial transfer of load to the steel. The thin bronze layers allows the material have closed thermal expansion thus is accept the final production have heating process in case of, that means SB-GT type material can keep the accurate and constant mechanical clearance.

从金相图可以看出临界区的钢与铜合金之间产生了相互扩散，这种在铸造过程中产生的扩散层大约在3 μ ~5 μ 之间使得两种材料达到了完全的冶金结合形成了很好的结合强度，在任何情况下这种机械强度超过了铜合金本身。

钢和铜相互之间扩散的组织结构提供了这种材料优秀的机械性能，同时可将轴承运作过程中产生的热量及时转移。薄壁的铜合金层使得这种双层材料的热膨胀系数相近，因此SB-GT材料可以在铸造后根据需要进行热处理，也就是说这种新型的材料可以确保在使用过程中保持很高的精度和机械配合。

- Combined with the wear resistance of copper alloy and high mechanical strength properties of steel
- Different cast copper alloy material is available according to work condition, including lower friction lead bronze
- The different coefficient of friction of the inner and outer material can protect the axil and rotating movement of the bearing in the housing under extremely high load with low speed
- The solid lubricant plug can be embedded to achieve the self-lubricating performance
- Compare with pure bronze bearing, the cost is reduced obviously
- The steel backing allowed to heat treatment to get high hardness, meanwhile the in layer can be re-machined if necessary
- The bronze layer can be casted on one or more layers to complex structure
- This material have same characteristic as pure bronze bearing, suitable for wide temperature range, different oil condition
- The SB-GT have better mechanical load performance compare with bronze material, especially the impact strength

- 结合了铜合金的耐磨性和钢的高机械强度性能
- 可以根据工况要求铸造不同的铜合金材料包括低摩擦性能的铅铜合金;
- 由于内外层材料具有的不同摩擦系数，可以防止轴承在高载低速工况下的窜动和走外圆;
- 可以根据需要在工作面覆着或镶嵌固体润滑剂以达到自我润滑的目的;
- 相比纯铜套更具有成本优势，节约利用资源;
- 可以进行后期加工，比如钢基体的热处理、合金层车加工等;
- 可以根据设计需要在不同的面或者复杂的面上进行一层或多层的铜合金铸造;
- 与传统的铜套在使用特性上具有类似的特性，可以适合于不同温度下不同润滑条件下的工况;
- 相比纯铜套具有更好的机械承载性能，特别是抗冲击强度;

SB-GT Steel shell cast bronze with graphite plug 钢基铜合金镶嵌型固体润滑轴承

Material Composition and Properties 材料成份和性能表

Grade 材料牌号	SB-GT SB-GTW	SB-GT1 SB-GTW1	SB-GT3 SB-GTW3	SB-GT5 SB-GTW5
Bronze layer material 铜合金成份	CuZn25Al5Mn4Fe3	CuSn5Pb5Zn5	CuSn12	CuZn25Al5Mn4Fe3
Bronze hardness 合金层硬度 HB	>210	>70	>95	>250
Interlay bonding strength 合金层结合强度 Mpa	>150	>100	>100	>150
Max. static load 最大静承载 Mpa	250	150	150	250
Max. dynamic load 最大动承载 Mpa	100	60	70	120
Max. Speed (dry) 最大线速度 (干) m/min	15	10	10	15
Max. PV value最大PV值 N/mm²*m/min	200	60	80	200
Coef. Of thermal expansion 热膨胀系数 10^{-6}/K	1.2x10^{-5}/℃	1.2x10^{-5}/℃	1.2x10^{-5}/℃	1.2x10^{-5}/℃
Temperature range 使用温度 ℃	-40~+300	-40~+400	-40~+400	-40~+150
Compression deformation 永久压缩变形量 300N/mm²	<0.01mm	<0.05mm	<0.05mm	<0.005mm

★ SB-GT, SB-GT1, SB-GT3, SB-GT5 : Steel shell bronze casted with solid lubricant
含固体润滑剂钢基铜合金铸造型轴承材料
★ SB-GTW, SB-GTW1, SB-GTW3, SB-GTW5 : Steel shell bronze casted without solid lubricant
不含固体润滑剂钢基铜合金铸造型轴承材料

Typical Applications 典型运用

This type of products can be widely used under high temperature and high load with low speed conditions, such as successive casting machinery, mineral machinery, injection molding machinery, dock machinery and so on.

SB-GT材料结合了金属与非金属的优点，特别适合于高载低速而又无法加油或不能加油的工作场合，如大型港口机械、轧钢机械、模具行业以及冲压设备等。