

KOLBENSCHMIDT PIERBURG GROUP



KS X20T

Lead-free Steel/Brass Composite with
Sputter Coating for Plain Bearings of
Maximum Load Capacity



GLEITLAGER

Brief description of the sliding material

KS X20T is a tribological material for main and conrod bearings in combustion engines subject to extremely high loads. This lead-free steel/brass composite with an Ni diffusion barrier and an AlSn sputter coat excels by very high load capacity and high resistance to wear.

Together with the Ni diffusion barrier, the AlSn sputter coat is deposited on the plain bearing material. This system of materials for plain bearings of maximum load capacity boasts excellent tribological characteristics.

Contrary to conventional plain bearings made of steel/lead bronze composites, this system of materials complies with the requirements of the EU Directive 2000/53/EC on End-of-Life Vehicles.

Wear behavior

The wearing behavior of coated plain bearing materials is determined, in principle, by the sputter coat. The sputtered-on AlSn25Cu2.5 alloy of KS X20T distinguishes itself by especially high resistance to wear. In combination with the extremely high load capacity of the brass layer, outstanding tribological properties are achieved.

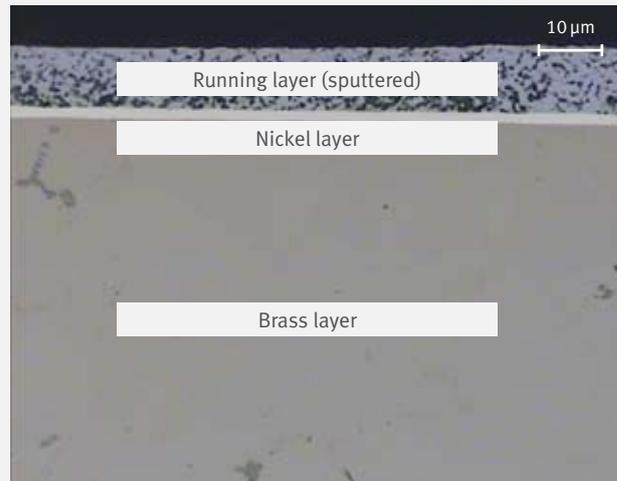
Gleitlageraufbau

The plain bearing composite consists of a steel back, a cast-on brass layer, an Ni diffusion barrier deposited applying the PVD method (sputtering) and an aluminum-tin-copper running surface likewise applied by sputtering.

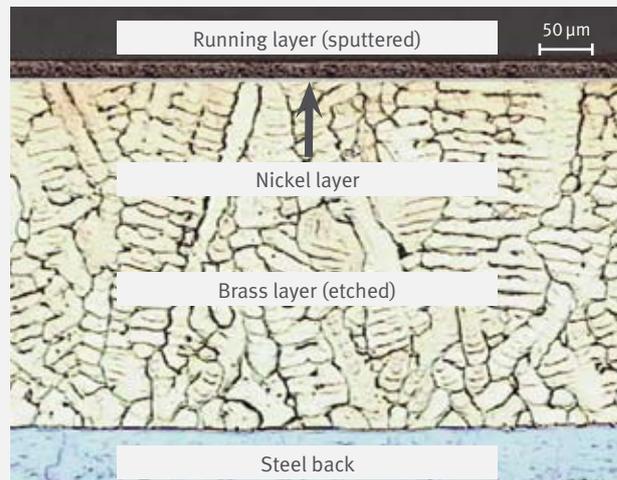
Grade DC04 is used for the steel back (hardness 140 to 220 HB). The steel thickness is determined as a function of the desired application. Typical thicknesses are between 1.0–2.5 mm.

The brass alloy serving as bearing metal is cast onto the steel back. This 0.2 to 0.5 mm thick layer has a hardness of between 120 and 180 HB.

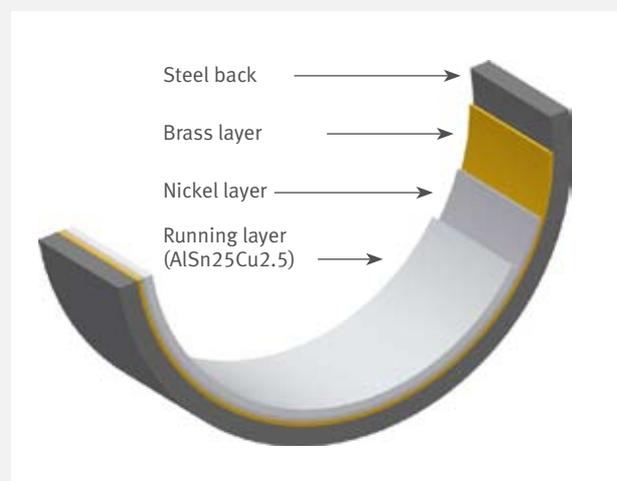
The sputtered-on aluminum-tin-copper alloy which constitutes the contact surface with its counterpart has a thickness of 8 μm –16 μm on the finished bearing shell. The micro-hardness is up to 130 HV. The Ni diffusion barrier is 1 μm –3 μm thick.



Micrograph of the composite



Micrograph of the composite



Layer system: steel / nickel / brass / sputter coat

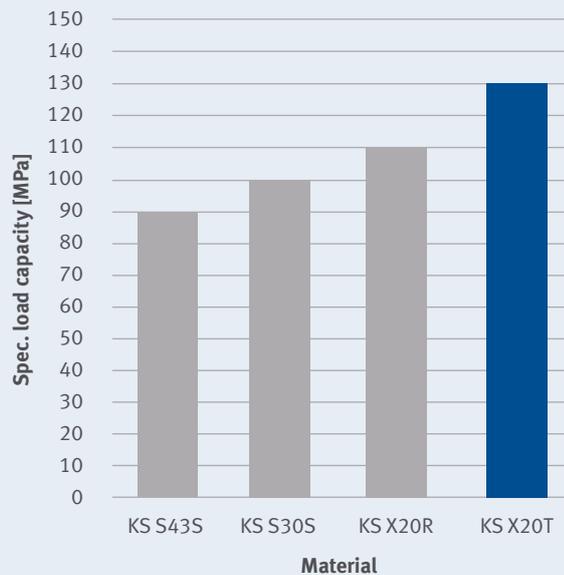
Chemical composition of the running layer

mass-%		
	Sn	23 to 27%
	Cu	2 to 3%
	Al	rest

Chemical composition of the brass layer

mass-%		
	Cu	Rest
	Al	1.7 to 2.3%
	Mn	1.7 to 2.3%
	Fe	0.7 to 2.3%
	Ni	1.7 to 2.3%
	Zn	18 to 22%
	others combined	max. 0.50%

Comparison of the specific load carrying capacity



- **KS S43S:** St/CuPb24Sn4/AlSn20Cu
- **KS S30S:** St/CuPb20Sn2/AlSn20Cu
- **KS X20R:** St/CuZn20Al2Mn2Ni2Fe/AlSn20Cu
- **KS X20T:** St/CuZn20Al2Mn2Ni2Fe/AlSn25Cu2.5

Manufacture of the sliding material

First of all, the brass alloy is cast onto a steel strip. By selective milling down of the casting surface, followed by thermo-mechanical treatment, the required properties of the materials are adjusted.

Plain bearing manufacture

Bearing shells are produced from the KS X20 strip by punching and bending. The shells are reduced to their final wall thickness and adjusted to their interior surface geometry by reaming and boring.

Coating

The machined bearing shells are first cleaned in a PVD coating plant and activated before coating. In a high-vacuum atmosphere, subsequently the Ni barrier and then the Al-Sn25Cu2.5 running surface are deposited on the brass layer by sputtering.

Application

Bearing shells from material KS X20T excel by high load capacity, good emergency running properties and high resistance to wear. They are therefore suitable for use as main and conrod bearing shells in advanced diesel engines operated at high loads.

KS Gleitlager GmbH · Am Bahnhof 14 · 68789 St. Leon-Rot · GERMANY
Tel. +49 6227 56-0 · Fax +49 6227 56-302 · www.kspg.com

KS Gleitlager GmbH does not assume any liability for the completeness of the data presented in this materials brochure. It is exclusively up to the customer to form his opinion about the characteristics of the material and its adequacy for the purposes intended by the customer.

KS Gleitlager GmbH would also like to stress that any information given in this materials brochure does not constitute a legal guarantee for the appearance, characteristics and workmanship nor does it represent a warranted quality.

G-X20T

Printed in Germany. A|IX|g