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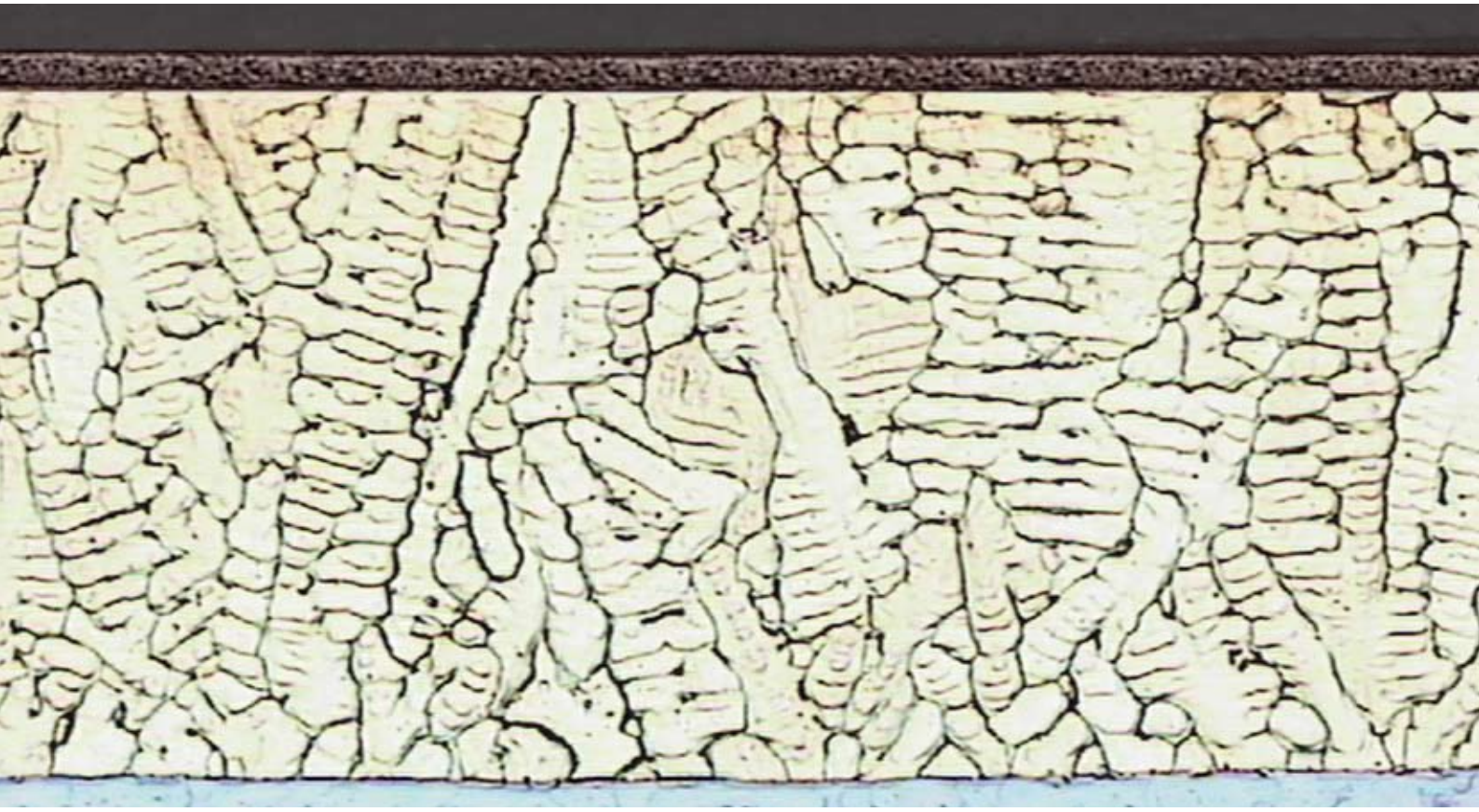


KS X20R

High-load Capacity, Lead-free Steel/Brass Composite with Sputtered Running Surface for Main and Conrod Bearings

GLEITLAGER

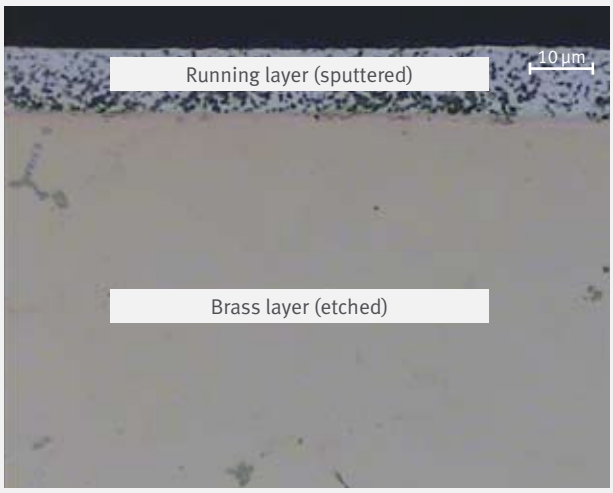
Brief description of the sliding material

KS X20R is a tribological material for main and conrod bearings in highly supercharged diesel engines. This newly developed, lead-free steel/brass composite with AlSn sputter coating features high load capacity and good tribological properties.

The AlSn sputter coat is directly deposited on the bearing metal. The diffusion barrier layer required hitherto can be dispensed with. The AlSn20 running surface retains its well known, outstanding friction and wear characteristics.

A plain bearing boasting an optimal cost/benefit ratio is obtained.

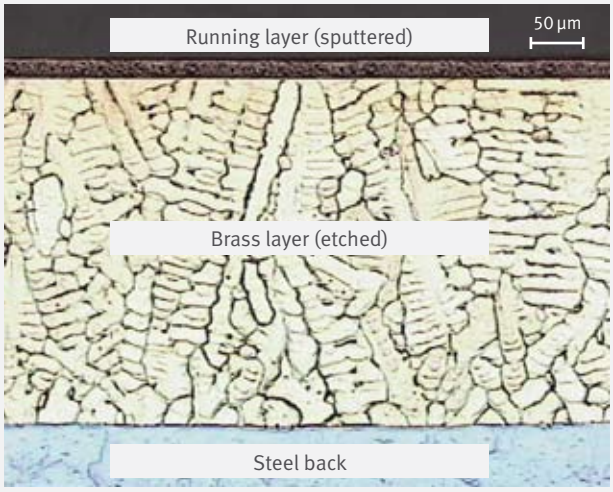
Contrary to conventional plain bearings made of steel/lead bronze composites, this system of materials complies with the requirements of the EU Directive 2000/53/EC on End-of-Life Vehicles.



Micrograph of the composite

Wear behavior

The wearing behavior of materials KS S43S, KS S30S and lead-free KS X20R when exposed to mixed friction is determined by the sputter coat. All materials mentioned have a sputtered-on running surface composed of an AlSn20Cu alloy. As a result, material KS X20R features the same excellent tribological characteristics as the known series materials.



Micrograph of the composite

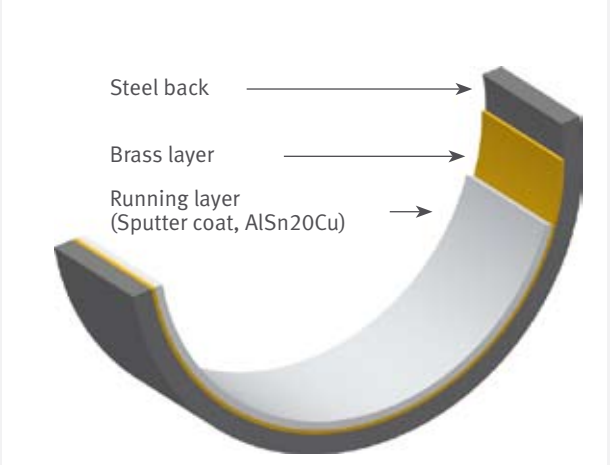
Bearing structure

The plain bearing composite consists of a steel back, a cast-on brass layer and an aluminum-tin-copper running surface (sputter coat) deposited by the PVD method.

Grade DC04 is used for the steel back (hardness 140 – 220 HB). The steel thickness is determined in accordance with the respective application. Typical thicknesses are between 1.0 and 2.5 mm.

Brass alloy is cast onto the steel back to act as bearing metal. This 0.2 – 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 counter part has a thickness of 8 µm – 10 µm on the finished bearing shell. The micro-hardness is up to 130 HV.



Layer system: steel / brass / sputter coat

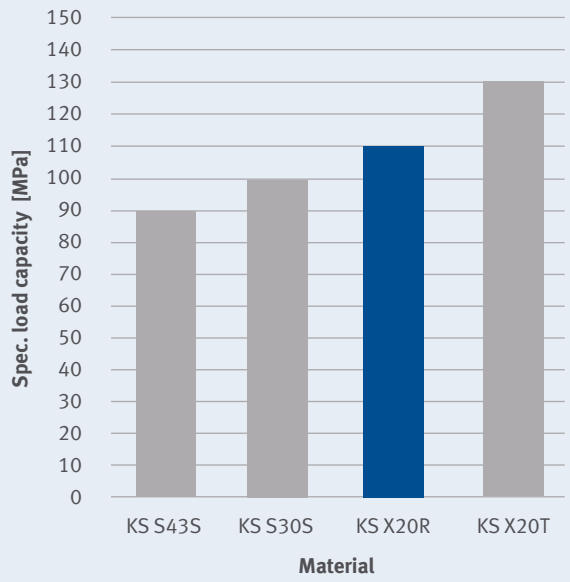
Chemical composition of the running layer

mass-%	Sn	18.5 to 22.5 %
	Cu	0.7 to 1.3 %
	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, brass alloy is cast onto steel strip. By selective milling down of the casting surface, followed by thermomechanical treatment, the required properties of the base 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 AlSn20Cu running surface is directly deposited on the brass layer applying the sputtering method.

Application

Bearing shells made of KS X20R 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

G-X20R

Printed in Germany. A|IX|g