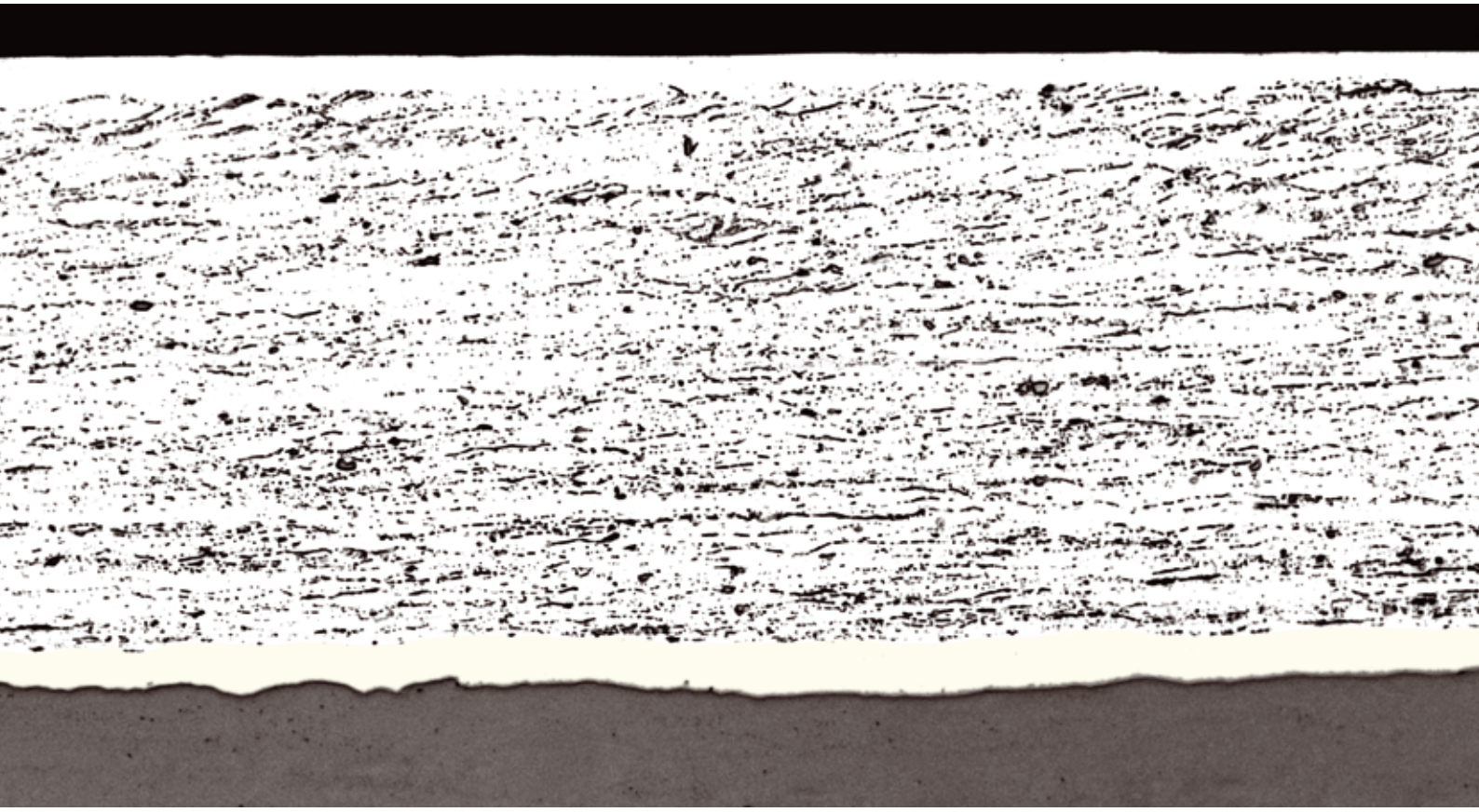
KOLBENSCHMIDT PIERBURG GROUP



KS R30

Lead-free Steel-Aluminum Composite Material for Main Bearings and Conrod Bearings

GLEITLAGER

Brief description of the sliding material

Plain bearings made from steel/aluminum composite materials are widely used as main and big-end bearings in gasoline and diesel engines.

KS R30 is a high-capacity bearing material. Given the high wear resistance and load-bearing capacity, KS R30 is suited for the manufacture of high-end bearing shells in bi-material design, for example. This material is insensitive to oil corrosion.

Thanks to its specific load-bearing capacity of up to 60 MPa, this material is suited for application in engines subject to medium to high loads as a big-end bearing.

In the present chemical composition, KS R30 complies with the requirements of the EU Directive 2000/53/EC on End-of-Life Vehicles.

Bearing structure

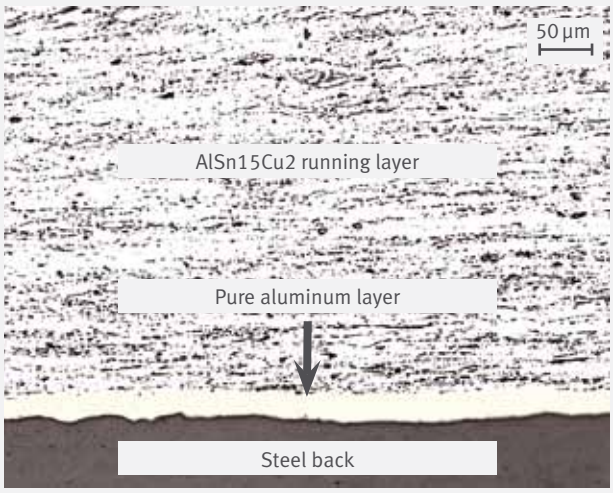
KS R30 is composed of a steel back, an intermediate layer made from pure aluminum and an aluminum-tin-copper running layer.

The steel quality used is normally grade DC04 with a hardness in the range of 150 – 220 HB.

The thickness of the steel layer is defined as a function of the application. Usually, it ranges between 1.0 and 2.5 mm.

The intermediate layer made from pure aluminum provides the bond between the steel and the aluminum running layer. Its thickness varies between 0.01 and 0.05 mm.

On the finished sliding element, the aluminum-tin-copper alloy that forms the running layer to the sliding partner exhibits a thickness of 0.2 – 0.5 mm and a hardness of 50 – 70 HB.



Micrograph of the composite

Bi-material: steel / aluminum bearings

Material characteristics

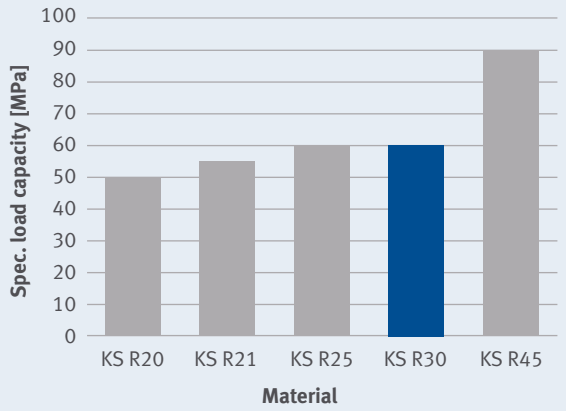
Characteristics, limit loads	Unit	KS R30
Tensile strength	MPa	>170
Yield point	MPa	>150
Young's modulus	GPa	63
Coeffcient of thermal expansion	k^{-1}	$23 \cdot 10^{-6}$
Thermal conductivity	W $(m \cdot k)^{-1}$	50

Chemical composition of the running layer

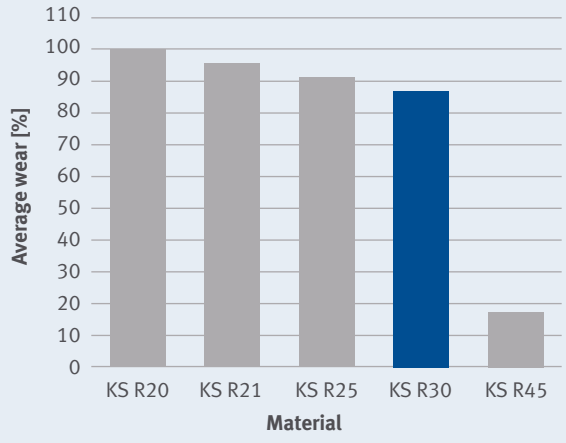
mass-%	Sn	14.0 to 18.0 %
	Cu	1.7 to 2.3 %
	Si	max. 0.7 %
	Ti	max. 0.2 %
	Ni	max. 0.1 %
	Fe	max. 0.7 %
	Mn	max. 0.7 %
	others combined	max. 0.5 %
	Al	rest

The hardness of the running layer is in the range of 50 – 70 HB

Comparison of the specific load carrying capacity



Comparison of wear behavior



Test conditions

- Bearing shell diameter: 47.8 mm
- Wall thickness (approx.): 1.4 mm
- Sliding velocity: 0.25 m/sec
- Spec. static load: 6.2 MPa
- Test duration: 3.0 h

Manufacture of the sliding material

The aluminum alloy is manufactured in vertical continuous casting. Mechanical processing of the strand surfaces as well as special heat treatment steps prepare the material for plating. The so-called pre-composite results from plating a pure aluminum foil (Al 99.5) on the strand. Roll-cladding is used to apply the pre-composite onto the steel. Selective thermo mechanic treatment steps give the desired material characteristics.

Plain bearing manufacture

KS R30 strip is used to manufacture sliding elements by punching and forming. The final wall thickness of the bearing shells and the design of the inside surface is achieved by machining.

Application

Sliding elements made from KS R30 are characterized by their high wear resistance and high load-bearing capacity. They are therefore suited for application as con rod bearings in medium to high-load engines.

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-R30

Printed in Germany. A|IX|j