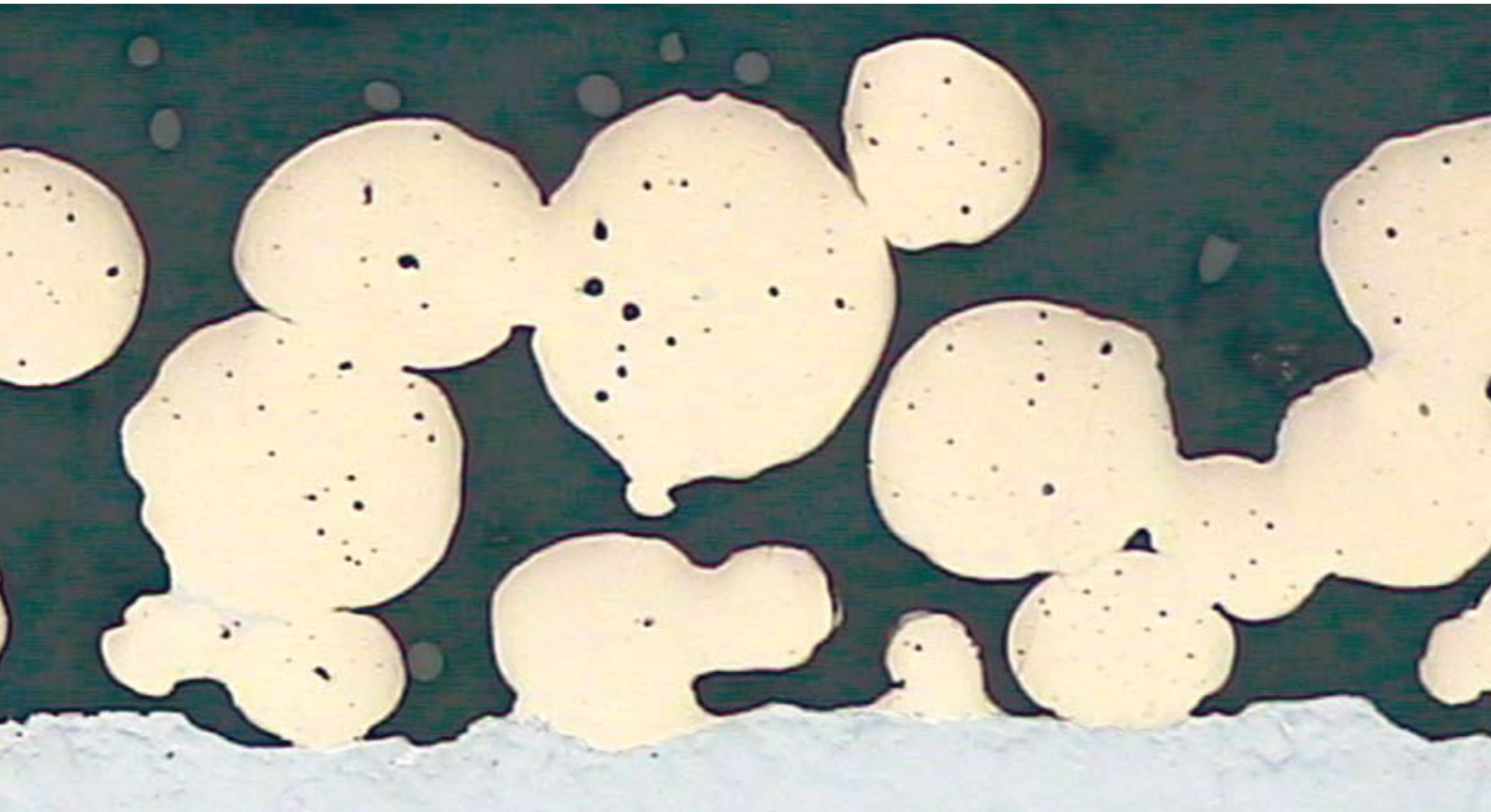


KOLBENSCHMIDT PIERBURG GROUP



KS P141

Lead-free Steel/Plastics Composite



GLEITLAGER

Brief description of the sliding material

KS P141 is a lead-free material for plain bearings which is specifically suitable for liquid-lubricated systems with a high degree of mixed friction. Grease is only recommended conditionally as a lubricant in contact with KS P141.

As a matter of fact, plain bearings made of KS P141 can just as well be used for maintenance-free applications.

The material is produced by applying a continuous sinter impregnation method. In a purpose-adapted process, the sliding surface of bronze is sintered onto a steel carrier material, leaving a mean pore volume of about 30%. A solid lubricant mass is impregnated into these hollows and submitted to thermal treatment.

KS P141 features a low coefficient of friction, excellent emergency running properties and high resistance to flow erosion. Plain bearings made of KS P141 are particularly suitable for use in high-pressure injection pumps and as guide elements in shock absorbers.

This system of materials complies with the requirements of EU Directive 2000/53/EC on End-of-Life Vehicles.

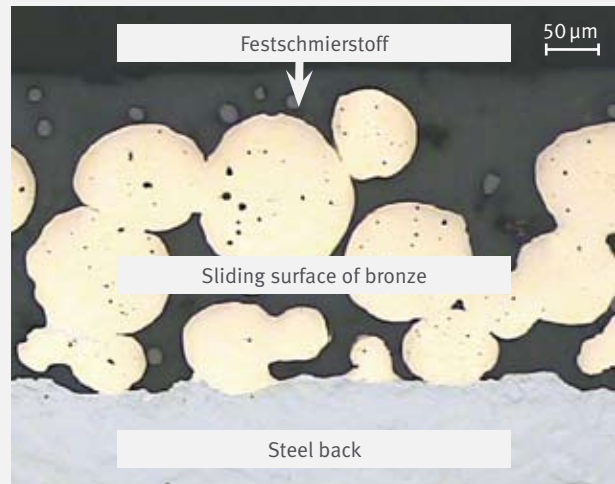
Bearing structure

Sliding elements in KS P141 are composed of a steel back, a sintered-on, porous tin-bronze layer and the solid lubricant PTFE with fillers.

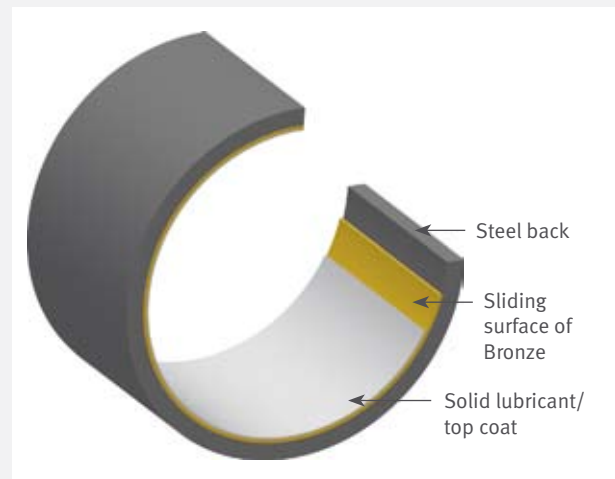
The steel carrier material used is typically of grade DC04. Its hardness ranges from 100 to 180 HB.

The steel thickness is chosen as a function of the proposed application. Typical thicknesses are between 0.7 and 3.2 mm.

The contact surface is made up of spherical CuSn10 bronze. The bronze is sintered to exhibit a pore volume of about 30%. The coat thickness is 0.2–0.35 mm. The pores are filled with a thermally treated solid lubricant which covers the bronze surface, acting as run-in coat. The run-in coat thickness is 0.005–0.030 mm.



Micrograph of the composite



Layer system: steel back / sliding surface of bronze / solid PTFE lubricant

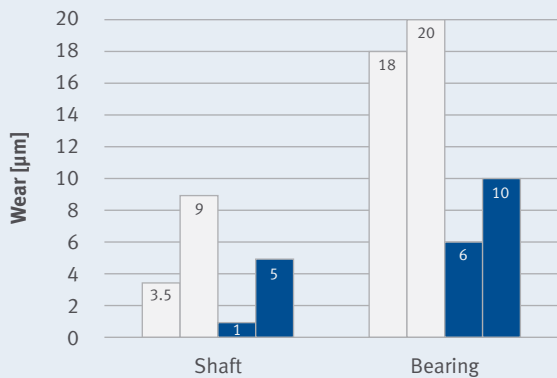
Material characteristics

Characteristics, limit loads	Unit	KS P141
Max. pv value	N/mm ² · m/s	2.0
Permissible specific bearing load p		
■ Static	N/mm ²	250
■ Very low sliding speed	N/mm ²	140
■ Oscillating, vibrating	N/mm ²	56
Permissible sliding speed v		
■ Dry run	m/s	2
■ Wet run	m/s	5
Permissible temperature range	°C	-60 to +260
Coefficient of thermal expansion	k ⁻¹	11 · 10 ⁻⁶
Coefficient of thermal conductivity	W · (m·k) ⁻¹	> 42

Chemical composition of the solid lubricant

in vol. -%		
	ZnS	17%
	PFA	5%
	C fiber	3%
	PTFE	75%

Wear in liquid-lubricated tribological systems



□ P10 ■ P141

Application: Internal gear pump

Lubricant: Emulsion of 1cSt (97% H₂O)

Shaft: hardened, HRc 50, R_z = 0.6 – 0.8

Sliding speed: v = 1.8 m/s

Load: dynamic, 5s load, 3s load-free

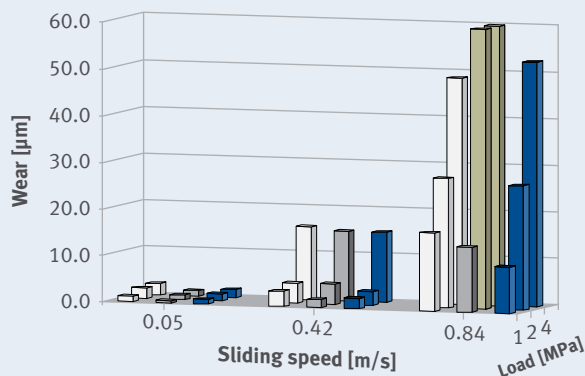
F = 17 N/mm²

Environment: T = 20 °C

Duration: t = 20 h

Bearing size: 29 x 33 x 34 mm

Non-lubricated wear



□ P10 ■ P14 ■ P141 ■ failed

Shaft material X 155 Cr V Mo 121, hardness 58 HRc

Manufacture of the sliding material

The solid lubricant mass is produced in a purpose-adapted mixing process. In parallel, bronze powder is pore-sintered onto steel in a continuous sintering process. Subsequently, impregnating rollers will feed and apply the solid lubricant. In a series of thermal process steps the characteristic features of the integral tribological system are adjusted and then the necessary thickness accuracy of the composite is accomplished by means of controlled roller pairs.

Minor alterations of the contact surface color will not affect the performance of the plain bearing.

Plain bearing manufacture

Sliding elements of the most varied shapes are produced from KS P141 by cutting, punching and forming. Depending on each specific case of application, a fine-tuned corrosion protection treatment is carried through.

Quality

The complete manufacturing process is monitored and controlled by a close-meshed net of quality assurance measures.

Application

KS P141 has been designed for a wide range of applications. It is especially effective when used in liquid-lubricated systems with a high degree of mixed friction.

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