

SKC-coatings for joint faces are used to adapt and to fit machine components, ensuring the highest demands of accuracy. They are also used as high load capacity adhesives.

The moulding technique allows corrections of machining tolerances within microns. Even if the layered thickness differs, accuracy to microns is still obtained.

SKC coatings for joint faces provide a very high adhesion force and harden without any technically relevant shrinkage.

Coating for Joint Faces SKC 57

Standard type
Injection method

Coating for Joint Faces SKC 55

shorter separation time
Injection method

Coating for Joint Faces SKC 53

Standard type
Spatula method

Coating for Joint Faces SKC 58

Low viscosity
Pouring method

Coatings for Joint Faces

Advantages

- ▶ high accuracy
- ▶ 100 % support function
- ▶ excellent load absorption
- ▶ high load carrying capacity 100 N/mm²
- ▶ exact precision in the μm range without expensive mechanical preparation or finishing work

Examples of application

- ▶ Adaption of machining components in final geometry to the machine base
- ▶ Fitting of welded components and welded constructions
- ▶ Fitting of hardened guide-way gibs, ensuring best shape- and load-transmission
- ▶ Fitting of columns and bed to final geometry
- ▶ Bearing surfaces for spindle units
- ▶ Fitting of metal parts to concrete (polymer concrete), ensuring best shape- and load-transmission
- ▶ Isolation of live components

Technical Data

Coatings for Joint Faces

	SKC 53	SKC 55	SKC 57	SKC 58
Specific weight [kg/dm ³]	1.7	1.6	1.6	1.6
Mixing ratio resin : hardener	100:7.6	100:7.9	100:8.1	100:9.2
Safe surface load, static [N/mm ²]	150	100	100	100
Modulus of elasticity [N/mm ²]	4380	5070	5070	5070
Shearing resistance (St 37/blasted) [N/mm ²]	~ 47			
Tensile strength (St 37/milled) [N/mm ²]	~ 55			
Maximum operating temperature [°C]	80 (short time 100)			
Heat-exchange coefficient [K ⁻¹]	~ 30 × 10 ⁻⁶			
Heat conductance [W/mK]	0.5-0.8			
Volume resistance [Ωcm]	~ 1 × 10 ¹⁷			
Dielectric coefficient	~ 4			
Dielectric strength [kV]	~ 10 (at 2.5-3 mm thickness of layer)			
Minimum thickness of layer, approx. [mm]	0.5 (run-out against zero possible)			
Thickness of layer recommended [mm]	2	2	2	3
Shrinkage during hardening [%]	< 0.1			
Quantity required	volume [cm ³] × F _m equals quantity [g]			
Factor F _m *	3	2	2	2
Time of application at 20 °C, approx. [min] **	45	20	30	45
Time before separation at 20 °C [h]	12-16	8-12	12-16	18-22
Hardening time at 20 °C [h]	16-22	12-18	16-22	22-30
Storing life at approx. 20 °C, dry conditions	6 month			
Available ready-to-use packings	see order details			

* The factor F_m contains the specific weight and a safety factor.

** The time of application is strongly depending on the ambient temperature and the mixing process. Even in cases of big agglomerations of the compound (e. g. in cartridge or can) the time of application can become widely shorter.

The above details are to our best knowledge. We cannot accept responsibility in individual cases as the way in which the material is prepared and handled is outside our control. Due to the manifold conditions of production, operating and application, every user has to check by himself the suitability of the product for his specific purpose of application. The specifications given in this brochure are not to be understood as an assured property.

Guidelines for Application

Coatings for Joint Faces

Preparation

Before coating, the surfaces should be cleaned carefully from grease and contaminations. Films of oxide and mill scale have to be removed.

If a separation of the components is envisaged, one surface has to be roughened, e.g. by milling or sand-blasting. The counter surface has to be finish-machined and to be treated with an releasing compound.

The dimensional accuracy is not affected, if the thin film of the releasing compound is re-polished with a soft cloth. In addition, a fixing in position of the two components to each other is required e.g. by cylindrical or tapered pins, so that the original geometry of the forming position is obtained when the components are separated and re-assembled.

The injection bore hole - depending on the system of cartridge press used - has to be arranged in the centre of coating surface. To obtain a better distribution of the compound, the exit bore (core hole) must have a wide counter-sink. For ventilation and control, bores or notches have to be provided at points farthest from the injection hole. When injecting the compound through an angular bore, pocket holes should be avoided to prevent any air pockets!

Aligning

The required accuracy of the machine parts to each other is obtained by aligning with setting screws (tension and clamping bolts) or with other auxiliary elements (setting wedges). If injection or pouring technique is applied, the surfaces to be coated have to be sealed, e.g. by foam rubber, adhesive tape, sealing mastic etc.

Mixing

The fillers could be subject of separation depending on the storage

time. Therefore they must be stirred thoroughly before adding the hardener. The coating residue has to be removed from the tin bottom and the resin compound to be mixed - clod-free - with the stirrer. Before further application, the resin components have to cool down to ambient temperature.

Following this the hardener is added, carefully poured in and - for one minute - intensively mixed by hand into the resin compound. By means of a stirrer, clamped in a drill or in an upright-drilling machine, the two components are ready mixed at about 400 rpm. Here, a stirring time of two minutes has to be observed. Insufficient mixing of the two components will prevent proper hardening. In the ready-to-use packings the mixing ratio of resin and hardener is exactly adapted to each other, therefore these ready-to-use packings should be used completely.

Spatula method

With a metallic spatula, the compound is taken out from the tin and to be spread out on a sheet metal. From there the compound is taken with a spatula and applied in several thin layers, where the first layer will carefully be pressed into the roughening. Finally, the compound has to be applied somewhat roof-shaped, thus allowing its distribution on the counter-surface without any air holes during moulding.

Injection method

The coating for joint faces has to be poured in a thin stream onto the wall of the cartridge which should be held in inclined position. Press the piston into the filled cartridge and ventilate. For ventilation, the cartridge has either to be deformed slightly by depressing the piston or by providing ventilation by adding a thin wire during inserting the piston. Afterwards, the wire has to be re-

moved again.

Only for cartridge SK500, KK1000: The tip of the thread nipple is to be cut off and the nozzle to be reduced to the diameter of of injection bore (see chart on left side). Then, the diaphragm inside of the cartridge is pushed from front through the nozzle.

Insert the cartridge into the press and close the press with the sealing cap. Hold the press vertically upwards and ventilate it until a small quantity of compound escapes. According to the press system, the cartridge nozzle is to be pressed or screwed into the the injection bore provided. Press the coating for joint faces slowly and continuously into the gap, until it escapes through the ventilation bore at the farthest points. In case of horizontal gaps, the injection bore is to be arranged centrally and for vertical gaps at the lower end.

Pouring method

Into wide (> 4mm) and easily accessible gaps, pourable compounds can be poured in directly from the can. A thin stream enables air bubbles to tear off and to escape. In other cases, a filling of the gap is functionally made via a hose (PVC transparent, Øinside 12 x 2 mm). This hose is plugged onto a short piece of a pipe having an outside diameter of 12 mm. The cartridge together with the nozzle is then inserted into the free end of the hose; the cartridge itself will now be filled directly off the can. When the compound escapes at the control bores, the latter will be closed. As a material reservoir, the filling hose remains connected until separation. In case of horizontal gaps, the filling bore is to be arranged centrally and for vertical gaps at the lower end.

Injection bore
nozzle to be shortened by

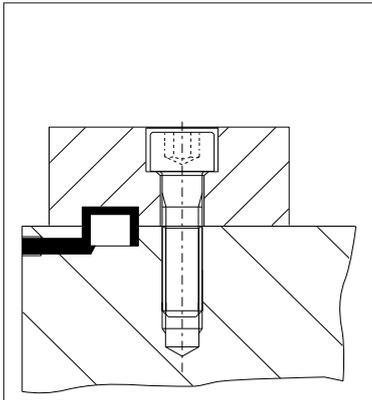
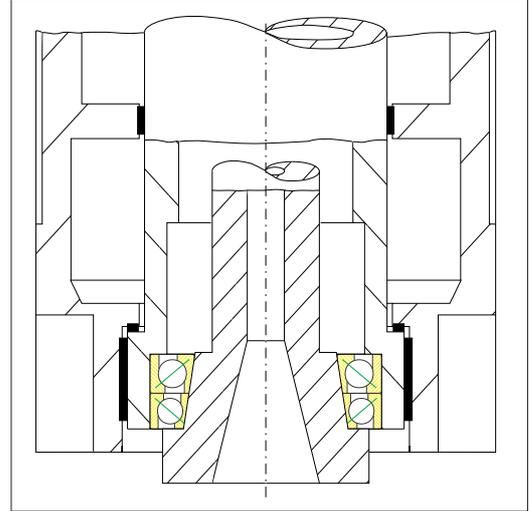
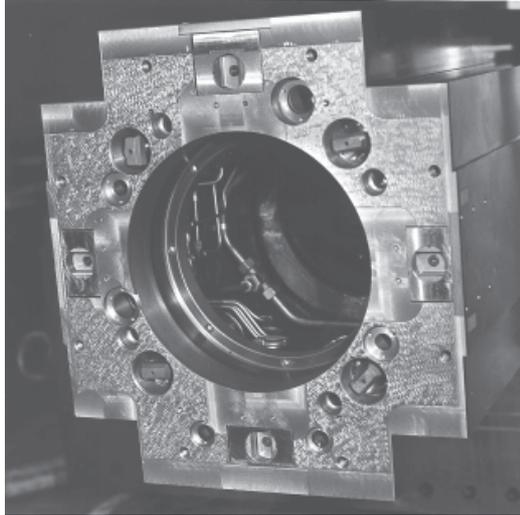
Ø 6	0 mm
Ø 8	12 mm
Ø 10	25 mm
M 8	5 mm
M 10	16 mm
R ¼"	36 mm



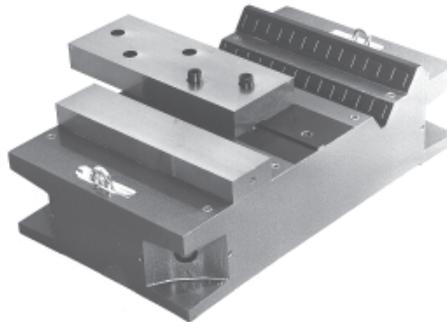
Time of application, time before separation and hardening time: see technical data.

Examples of Application

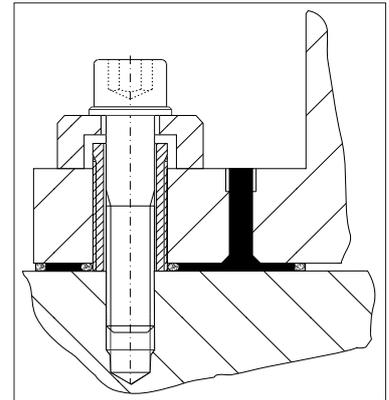
ill. 1 and 2:
Milling head with moulded fitting surfaces for the milling-spindle sleeve. After a so-called master-sleeve has been inserted, aligned and fixed, the two bore walls and the axial bearing surface of the sleeve are formed with coating for joint faces. This compound is injected from outside through bore holes. Advantages: big bore diameters are precisely obtained. Interchangeability is guaranteed.



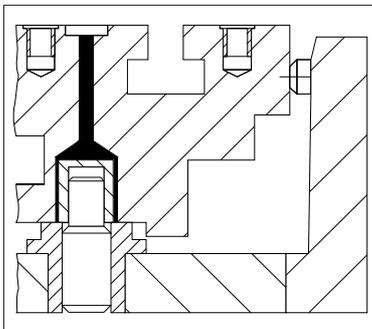
ill. 3:
Locating key in hardened guideway gib moulded in form-fit design



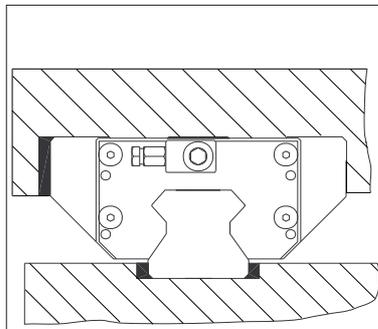
ill. 4:
Fitting of guideway gibs directly to the surface of mineral casting components



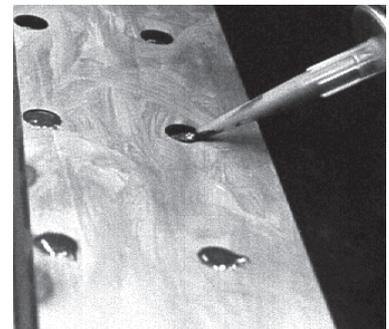
ill. 5:
Mount of a machine column to the base; alternatively an alignment can be carried out by separate tension bolts and pressure screws



ill. 6:
Moulding of a sleeve to create an index bore on a workpiece carrier
Advantage: unlimited interchangeability, as all pallets are moulded from a master-device



ill. 7:
Lateral fixing of guideway gib and bogie by pouring the groove with a coating compound for joint faces

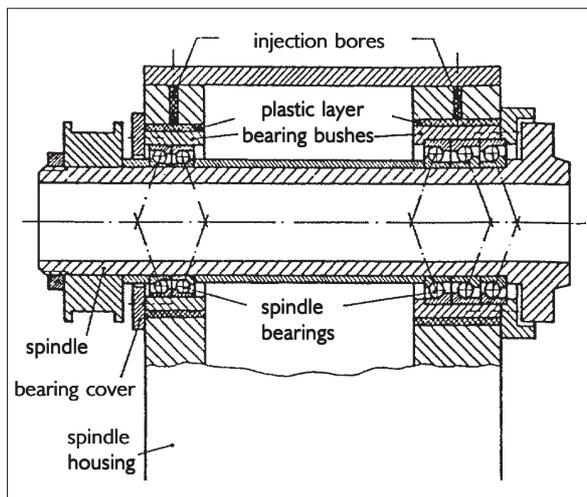


ill. 8:
Pouring of screw holes

Example of Application: Embedding of bearing bushes into a spindle-housing

The bearing seats of main spindles running in antifriction bearings are exposed to high demands of accuracy. Any deviations of dimensions and of design are transported to the thin-wall bearing rings: alignment errors may affect the gravitational conditions inside of the bearings. The consequences - among others - could be insufficient running accuracy and rigidity of the spindle, as well as higher friction and faster wear of the bearings.

Often, the available machines are not capable of achieving the necessary accuracy of the bearing seats inside the spindle housing. The use of bearing bushes, which permit precision machining without any problems, is solving this problem. These bushes have to be mounted inside the spindle housing in positional accuracy, free from any deformation and with a high rigidity.



Nowadays, liquid injected hard-set plastics can be used. The diameter of bores of the spindle housing are widened, so that vis-à-vis the bearing bushes annular gaps are produced. Plastic is then injected into these gaps, and after hard-setting, this plastic provides a non-slip connection between the spindle housing and the bearings bushes. Previously

Bearing bushes of turning-lathe main spindle embedded with plastic into a spindle housing

the bearing bushes, together with the bearings have been mounted on the spindle, and by means of devices, this unit aligned and fixed to the reference surfaces of the spindle housing. A careful sealing of annular gap avoids plastic from escaping and from contaminating the bearing.

Compared to bearing bushes which would be mounted directly into the bores of the spindle housing, this procedure offers the following advantages:

- ▶ high accuracy of positioning the bearing bushes relative to each other which can be achieved
- ▶ no transition of geometrical error of the bores of the spindle housing to the bearing bushes
- ▶ improved cold flow from the bearings into the spindle housing reduced costs to provide the spindle housing bores and the outer surfaces of the cylinders of the bearing bushes.

In addition, it appears to be possible - if the plastic layers are suitably dimensioned and probably in connection with a cooling of the bearings - to decrease the heat flow inside the spindle housing and to reduce deformation by heat.

The influence of the plastic layers on the behaviour of the main spindle and its bearing has been investigated. Main point of the first investigation was to find out the static and dynamic rigidity, the thermal behaviour of the bearings and the deformation by heat of the spindle housing.

The plastics used for this purpose were filled epoxy resins from various manufacturers. In comparison with other plastic, these resins are reaching a very high rigidity, offering elasticity modula of more than

10.000 N/mm² and they widely comply with quite a few demands, such as:

- ▶ liquid processibility
- ▶ low swelling and shrinkage during hard-setting
- ▶ good adhesion on metallic surfaces
- ▶ good resistance against water, oils and greases
- ▶ no hygienic or environmental risks in hard-set condition

Among other applications, and suitably modified, is their use for making frameworks (polymer concrete) and guideways (antifriction coating).

The researches have shown, that nowadays, plastic materials are available with which bearing bushes can be embedded into the bores of spindle housings without a considerable change in the behaviour of the spindle bearing system.

Consequently the engineering advantages of this process can be exploited for a wide range of spindle bearings.

Moreover, it leads to functional advantages, too. The dimensional and designing accuracy of the bearing seats can be better, as the bearing bushes allow a better accessibility for fine machining than a spindle housing. Vis-à-vis adapted bearing bushes, the deformations of the end of the bearing bushes are smaller and a higher rigidity can be expected. Misalignment of the bearing seats can mostly be avoided, as by the spindle and by the spindle bearings the bushes can be accurately centred. The provisions improve the rolling conditions inside the bearings and have a favourable effect on friction and wear. Besides, with regard to the thermal behaviour of the bearing and of the spindle hou-

Coatings for Joint Faces • Example of Application

sing, opportunities of improvement seem to be given, if the suitable plastic material and the correct dimensioning are used.

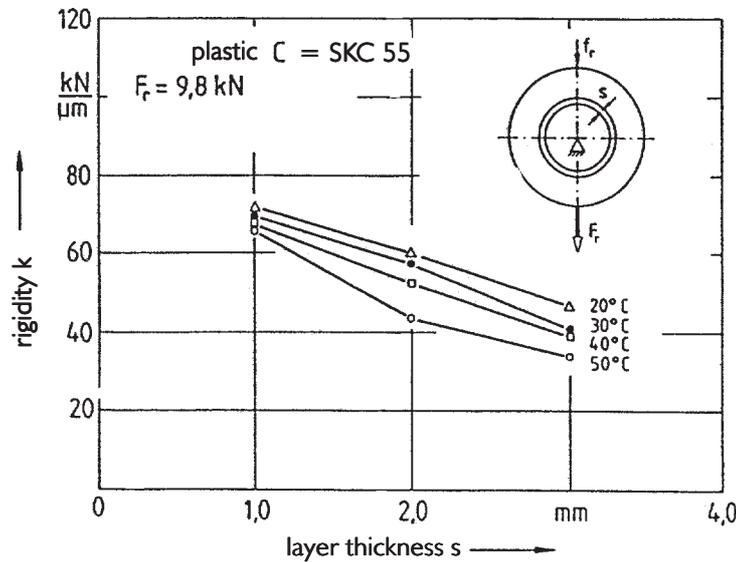
The application of hard-set plastic materials, demonstrated here with the example of the bearing bushes, could also lead to advantages when applied to other elements of a machine tool. It allows to avoid expensive machining of high-precision joint faces and to reduce heat flow in precision-determined components.

ce, could be the assembly of frame elements or the heat-isolated assembly of motors, of feed-screw bearings, of hydraulic elements and similar parts.

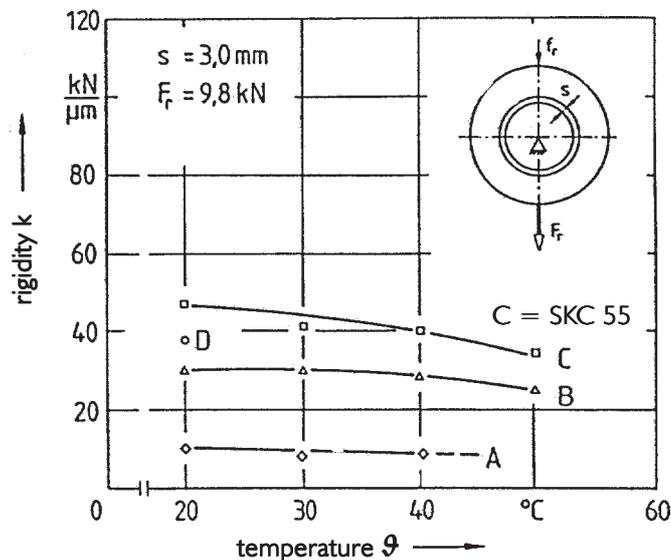
Dipl.-Ing. H. Gerloff, Braunschweig
Report of the Institute for Machine Tool and Manufacturing Technique of the Technical University of Braunschweig. The researches had been supported by the German Community of Researches (DFG).

This print is a shortened version. Please feel free to call on us for the complete report.

Possibilities of application, for instan-



Rigidities of cylindrical plastic layers under radial load in dependence of temperature
plastic C = coating for joint faces SKC 55



Influence of layer thickness on the rigidity of a cylindrical plastic layer