SERVICE INFORMATION

Design and layout of bearing assembly: design of the interacting sliding part

The following generally applies:
In a tribological system, the shaft (in the case of radial bearings) or the pressure shoulder (in the case of thrust bearings) should project over the sliding surface to maximise the contact ratio and prevent running-in with deposits in the sliding layer.

Shaft

Shafts must be chamfered and all sharp edges rounded, which:

- Simplifies mounting
- Prevents damage to the bush sliding layer

Shafts must never have grooves or pricks in the area of the sliding zone.

Interacting sliding surface

Optimum service life thanks to correct roughness depth

- Optimum service life is achieved when the interacting sliding surface has a roughness depth of R_z0.8 to R_z1.5:
  - with dry running of KS PERMAGLIDE® P1
  - with lubrication of KS PERMAGLIDE® P2.

Attention:
Smaller roughness depths do not prolong the service life and may even cause adhesive wear. Larger roughness depths considerably reduce it.

- With KS PERMAGLIDE® P1 and P2, corrosion on the interacting sliding surface is prevented by:
  - Sealing,
  - Use of corrosion-resistant steel,
  - Suitable surface treatment.

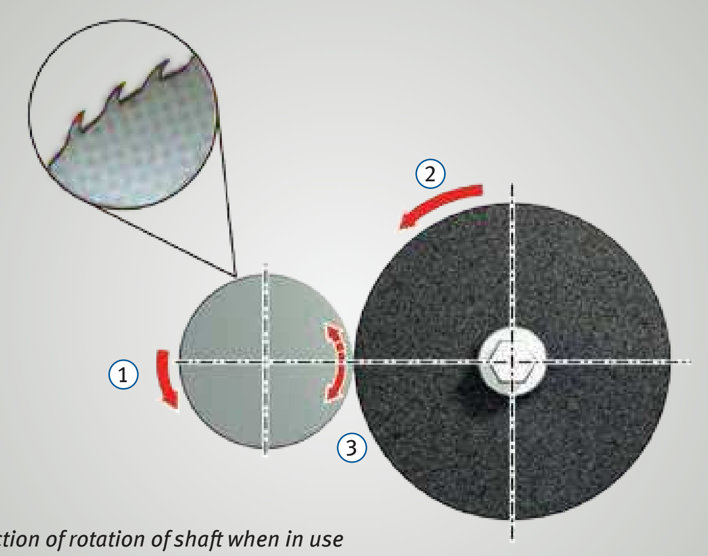
With KS PERMAGLIDE® P2, the lubricant is also effective against corrosion.

Surface quality

- Ground or drawn surfaces are preferable
- Precision-turned or precision-turned and roller burnished surfaces, even with R_z0.8 to R_z1.5, can cause greater wear (precision turning produces spiral scores)
- Spheroidal graphite iron (GGG) has an open surface structure, and should therefore be ground to R_z2 or better. Figure 1 shows the direction of rotation of cast shafts in use. This should be the same as the direction of rotation of the grinding disc, as more wear will occur in the opposite direction.

Hydrodynamic operation

For hydrodynamic operation, the roughness depth R_z of the interacting sliding surface should be less than the smallest lubricating film thickness.
Motor Service offers hydrodynamic calculation as a service.



1 Direction of rotation of shaft when in use
2 Direction of rotation of grinding disc
3 Any direction of rotation for the shaft during grinding

Fig. 1: Grinding a cast shaft

Gaskets
Protecting the bearing assembly is recommended in the event of greater exposure to dirt or in the case of an aggressive environment.
Figure 2 shows recommended gasket types:
- The surrounding gasket (1)
- A gap gasket (2)
- A shaft seal (3)
- A ring of grease

Heat dissipation
Thorough heat dissipation must be assured.
- In hydrodynamic operation, heat is overwhelmingly conveyed away by the lubricating liquid.
- In dry and grease-lubricated plain bearings, the heat is also dissipated by the housing and shaft.

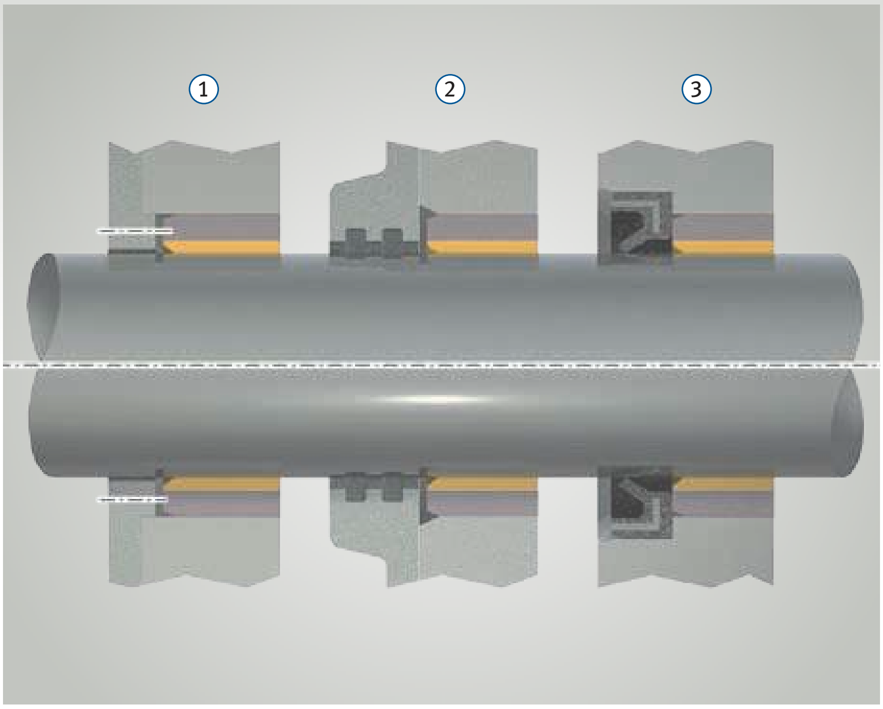


Fig. 2: Gaskets

Machining the bearing elements
- KS PERMAGLIDE® plain bearings can be cut or can be machined in other ways (e.g. shortening, bending or boring)
- KS PERMAGLIDE® plain bearings should preferably be cut from the PTFE side. The burrs produced during cutting would impair the sliding surface
- Bearing elements must be cleaned after machining
- Bare steel surfaces (cut edges) must be protected against corrosion with:
  - Oil or
  - Galvanic protective layers
    At higher flow densities or with longer coating times, the sliding layers must be covered to prevent deposits.

Attention:
Machining temperatures that exceed the following limits are hazardous to health:
+280°C for KS PERMAGLIDE® P1
+140°C for KS PERMAGLIDE® P2
Chips may contain lead.

Axial orientation (precise alignment)
Precise alignment is important for all radial and axial plain bearings. This is particularly the case for dry-running plain bearings, in which the load cannot be distributed via the lubricating film.
Misalignment over the entire width of the bush must not exceed 0.02 mm (see Fig. 3). This figure also applies to the overall width of bushes arranged in pairs, and of thrust washers.
Bushes arranged one behind the other may need to have the same width. The joints must be flush during mounting.

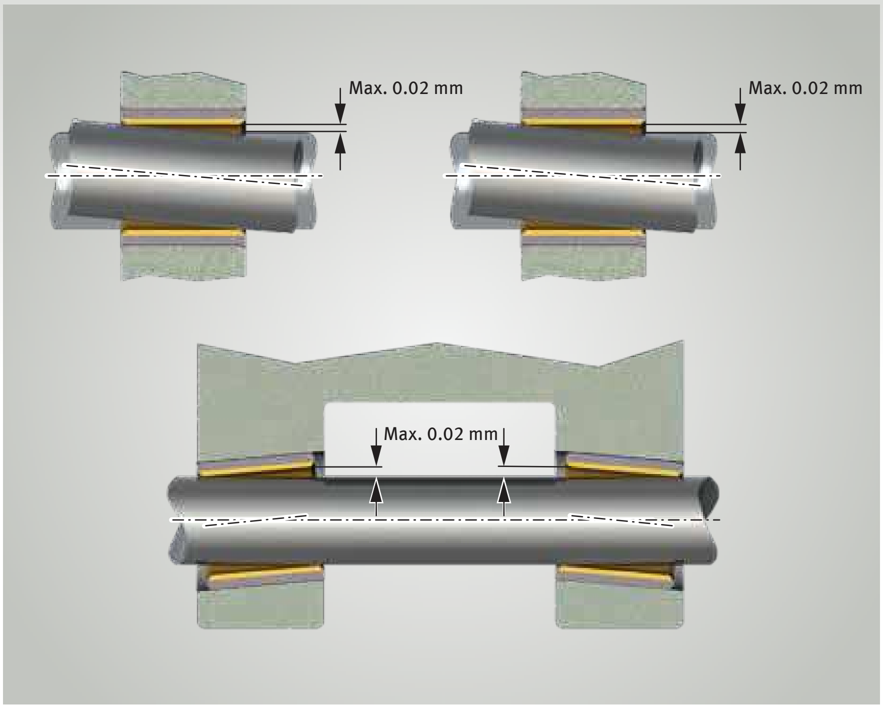


Fig. 3: Permitted misalignment

Edge load on the installed plain bearing
Excessively high load around the edges of the plain bearing may occur as the result of geometric inaccuracies or under special operating conditions. This type of "high edge loading" can cause the bearing to become jammed. This load can be reduced through design measures (Fig. 4).

- Enlarged chamfers on housing
- Enlarged bore diameter in edge region of housing bore
- Allow width of bush to project beyond width of housing.

In addition, edge loading can be relieved by housing with an elastic design.

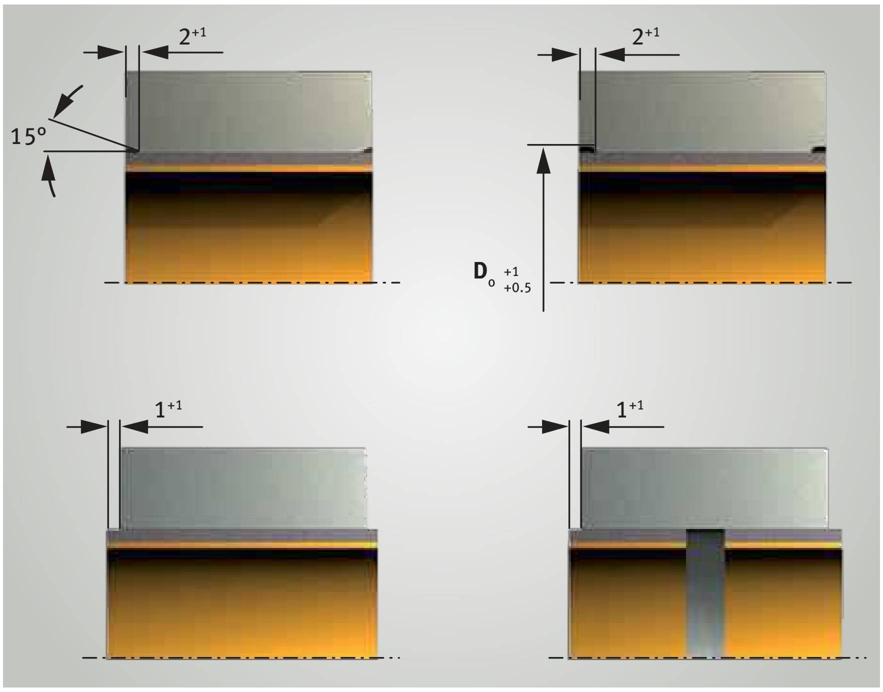


Fig. 4: Reducing peak stresses on edges

KSPG Automotive

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