ANTIFRICTION PASTE AND SOLID ANTIFRICTION COATING PREPARED FROM SAME

FIELD OF THE ART

The invention relates to mechanical engineering, and more particularly, to antifriction pastes to be used to obtain a solid lubricating coating in friction assemblies.

BACKGROUND OF THE INVENTION

Antifriction pastes on the basis of phenol-formaldehyde, epoxy, butyral and other film-forming substances in which the antifriction properties are determined by a filler, such as molybdenum disulphide, titanium diselenide or a mixture thereof are widely known (cf. L. N. Sentjurikhina, E. M. Oparina, "Solid molybdenum disulphide lubricants" (in Russian), "Khimija" Publishers, Moscow, 1966, pp.24–99). The pastes are cured in furnaces at from 100° to 200° C. The latter makes these antifriction pastes unsuitable for large-size friction assemblies, such as slides of machine tools, which are three and more meters long. The pastes are to be used to obtain a solid lubricating coating in small-size friction assemblies only.

Also known in the art are antifriction pastes for producing a solid lubricating coating in friction assemblies, which are solidified at room temperature. Thus, one of the known antifriction pastes has the following composition (in parts by weight):

epoxy resin: 80–150
dibutylphthalate: 15–30
molybdenum disulphide: 50–100
polyethylenepolyamine: 15–30
solvent of epoxy resin consisting of 50 parts by weight of toluene, 15 parts by weight of butyl alcohol, 10 parts by weight of ethanol, 10 parts by weight of butyl- or amylacetate, 8 parts by weight of ethylene glycol and 7 parts by weight of acetone: 80–150 (cf. USSR Inventor's Certificate No. 228,231, Int. Cl. B 22 d 11/00).

The above-described paste has a fluid consistency and is applied to contact surfaces of parts of a friction assembly by brushing or spraying (such as by means of a spray gun). Thickness of the resultant solid lubricating coating is limited to a range from 0.05 to 0.1 mm. This thickness limitation considerably reduces the service life R of solid lubricating coating (that is the service life of friction assemblies).

Antifriction performance (sliding friction coefficient $f_{fr.}$, intensity of linear wear I_h and service life R) of the solid lubricating coating on the basis of the above-described paste is inadequate when the paste is used in friction assemblies, such as in machine tool slides, especially in machine tools operating at high accuracy. Thus, with a sliding speed $V=0.06$ m/s and at a load of $P=10$ kgf/cm^2, coefficient of sliding friction $f_{fr.}$, is 0.5, intensity of linear wear I_h is $1.0.10^{-7}$, and service life is 8.5 km.

SUMMARY OF THE INVENTION

It is an object of the invention to provide an antifriction paste which ensures the formation of a solid lubricating coating exhibiting high antifriction performance.

Another object of the invention is to provide an antifriction paste which is suitable for both small- and large-size friction assemblies.

With these and other objects in view, the invention resides in an antifriction paste containing epoxy resin, molybdenum disulphide, polyethylenepolyamine, wherein the paste also contains graphite, aluminum, copper, and alumosilicate, the components being used in the following proportions (in parts by weight):

epoxy resin: 40–80
molybdenum disulphide: 15–30
graphite: 10–15
aluminum: 5–10
copper: 5–10
alumosilicate: 8–15
polyethylenepolyamine: 5–10.

In case it is required to produce a solid lubricating coating exhibiting maximum possible hardness, the antifriction paste preferably contains a large amount of a filler (molybdenum disulphide, graphite, aluminum, copper and alumosilicate). In such case a solvent for the epoxy resin is preferably added to the antifriction paste in an amount from 5 to 30 parts by weight. The addition of a solvent ensures the preparation of a paste having a desired consistency.

The antifriction paste according to the invention is named EDMA.

The addition of molybdenum disulphide and graphite to the composition of the EDMA paste according to the invention enables a considerable reduction of coefficient of sliding friction $f_{fr.}$. Thus, at a sliding speed $V=0.06$ m/s and load $P=10$ kgf/cm^2, coefficient of sliding friction is 0.1.

The provision of alumosilicate, copper and aluminum in the antifriction paste according to the invention considerably improves mechanical strength and wear resistance of a solid lubricating coating based on this paste, thereby substantially reducing the intensity of linear wear I_h of the lubricating coating. Thus, the intensity of linear wear at a sliding speed $V=0.06$ m/s and at a load $P=10$ kgf/cm^2 is $1.0.10^{-9}$.

The paste according to the invention is of a dense consistency and may be applied to contact surfaces of friction assemblies in the form of a layer of any desired thickness, preferably 1–2 mm. The service life R of the solid lubricating coating based on the paste is substantially prolonged. Thus, at a sliding speed $V=0.06$ m/s and at a load $P=10$ kgf/cm^2, the service life is from 250 to 500 km (depending on the coating thickness).

The antifriction paste according to the invention is cured at room temperature so that it may be used in both small- and large-size friction assemblies. The parts of friction assemblies may be made of metal, wood or plastic.

DETAILED DESCRIPTION OF THE INVENTION

The antifriction paste according to the invention is prepared by blending epoxy resin with a filler in the above-described porportions. Several minutes before the antifriction paste is applied to contact surfaces of parts of a friction assembly, a cold hardener—polyethylenepolyamine—is added to the prepared mixture under thorough mechanical stirring.

The prepared paste is applied, e.g. with a spatula, to contact surfaces of parts of a friction assembly. The applied paste sets at 18°–22° C. in 1.5–2 hours. A solid lubricating coating produced thereby acquires maximum hardness at the above-mentioned temperature in 36–48 hours after the paste has been applied. The duration of curing of the antifriction paste is shortened to