

Category: Materials, Coatings & Processes

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Friction Reduction by DICRONITE® Technique

In the frame of the development of advanced lubrication techniques for space applications DICRONITE® has been produced as a universally applicable dry lubricant adherent to the surface. With this method friction can be reduced to a so far unrivalled minimum. Dry lubrication can prevent wear, reduce energy conversion into heat and enable lubrication without contamination.

In this technique a pretreated surface is bombarded with a specially modified Tungsten Disulfide which is implanted into the atomic structure. The process causes a molecular bond and thereby a high adhesion to the surface. The process is effected at high speed at room temperature with conditioned air as supporting medium. To enable the physical bonding of the dry film lubrication the surface of the component to be coated is pretreated to achieve an atomically clean structure free of oxides and impurities.



The dry lubrication film created with the DICRONITE® technique is uniformly 0.5 µm thick. It prevents direct contact of the frictional metal surfaces and thereby acts like an oil film. Furthermore, the layer has an extremely low friction coefficient of $\mu = 0.030$ (only half that of graphite which is $\mu = 0.073$), thus preventing to high friction, heating and wear by galling. Due to the manufacturing process the coating becomes part of the surfaces and can only be removed by removing a portion of the substrate itself.

Due to the combination with other layers like e. g. CrN or CrC which offer high hardness and protection against corrosion, surfaces can be furnished with a property collection which does not depend on the properties of the basic material. Thus, corrosion resistance, surface hardness and of course friction sensitivity can be neglected in the choice of the basic material, since these requirements are covered by the coating.

Innovative Aspects:

- Dry lubrication layer permanently fixed to the surface by molecular bonding
- Extremely low friction coefficient of $\mu = 0.030$
- Layer prevents the formation of deposits and offers less chances for adhesions and therefore is easier to clean
- The ultra thin coating is applicable on all metallic surfaces and also in high vacuum
- Virtually no limitation to working temperature; with a range of use of -188°C to $+538^{\circ}\text{C}$ a multitude of applications can be covered.

Application Areas:

Among others, the process is suited for applications in the fields of:

- Engines and drive technology
- Precision engineering
- Ultra-high vacuum technology
- Plastics processing
- Optics
- Clean room technology
- Medical technology.

Examples of components to be coated are as follows:

- Parts of moulding tools in to minimize abrasion and to reduce the mould release energy
- Joints, hinges, ball bearings and bearings (also if already mounted), engine and drive components in racing
- Screws and other fastening elements made of critical materials (titanium, aluminium, VA)
- Mobile micro components for precision instruments.

Cooperation:

Interest in execution of coatings on commission. The company is in a position to execute coatings of components of sizes of up to 600 mm x 800 mm and of a weight of 250 kg on the spot.

Furthermore, new application areas could be developed in cooperation with other coating companies.