



Lubrication

The application of 'good tribology' contributes significantly to the efficiency, reliability and performance of European Spacecraft mechanisms. ESTL offers independent, specialist support in this field for the benefit of the European Space mechanisms community. Part of ESTL's remit is to a range of high quality and space qualified solid and liquid lubrication products for the space and vacuum industries.

Solid Lubricant Films

Solid lubricants have become well established for use in space. They provide the only viable means of lubrication where oils and greases cannot be used, for example at temperature extremes or where there is the need to avoid molecular contamination.

ESTL provides a solid lubrication service and routinely deposits thin films of molybdenum disulphide and lead for ball bearings, gears and other tribological components in line with ESA requirements.

ESTL places considerable emphasis on providing solutions to lubrication problems, rather than simply just depositing lubricants. To date ESTL has lubricated over 5,000 components for both flight and for research and development purposes, contributing to virtually every European space programme.

ESTL's Sputtering Process

For general bearing and other vacuum applications, ESTL applies thin film solid lubrication by the physical vapour deposition (PVD) technique of high-rate magnetron sputtering. We utilise two facilities employing unbalanced sputtering techniques, and can coat a range of components and sizes. Our system results in the deposition of competitively priced thin films (typically less than 1 micrometer – although this depends on the application and lifetime requirements).

Unlike other methods of coating, sputter-deposited lubricant coatings can be applied with sub- micron accuracy so that it does not compromise the engineering tolerances required by high-precision components such as ball bearings.

Molybdenum Disulphide (MoS₂)

Thin films of MoS₂ when formed by sputtering can, primarily in vacuum, exhibit ultra-low friction behaviour. The principal advantages of MoS₂ are:

- Ultra-low friction capability in vacuum and in inert environments
- Large temperature range of operation (from cryogenic to 800°C)
- Long endurance under pure sliding motion
- Ability to uniformly coat complex surfaces
- Synergistic effects with PTFE based cages in rolling element bearings

Lead

Lead as a lubricant is well suited to operations in combined sliding and rolling motion. The principal advantages of lead are:

- Wide temperature range (from cryogenic to 300°C)
- Ability to transfer in vacuum (“self-repair” characteristics and cage resupply)
- Excellent corrosion resistance.
- Inhibits fluid lubricant degradation (can improve PFPE lifetime by x30)
- Very long lifetime in bearings applications

Fluid lubrication

ESTL can also provide fluid lubrication support, including cleaning, full lubrication (oil or grease), cage impregnation, assembly, torque acceptance testing, and post-lubrication support.



Whatever your tribological needs, ESTL can provide tailored lubrication support to you on your project. Please contact us for further information.

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