

Fullerenes: optimising surfaces for anti-wear applications

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The TEKNIKER Technological Centre is in the final stages of negotiating with the European Union Commission the project known as "FOREMOST: fullerene-based opportunities for robust engineering: making optimised surfaces for tribology": (opportunities for developing robust engineering based on the use of fullerenes: optimising surfaces for anti-wear applications).

The problem of the tribological behaviour of materials had focussed on either improving friction or prioritising less wear and tear. The target of FOREMOST is to achieve both effects simultaneously and, to this end, the project will be based on the use of inorganic fullerenes (molybdenum bisulphate and bisulphate of wolframite). These new allotropic states of these well-known solid lubricants have the property of forming spheres of a few nanometers in diameter and forming layers like onion skins which act as "nano ball bearings" between the surfaces in contact.

The inorganic fullerenes are to be incorporated into three product families:

- Hard layers: in which fullerenes display greater thermal stability than the bisulphates in their conventional state.
- Polymeric layers and paints: products in which it is thought that the addition of fullerenes will increase "wettability" and, thereby, enable the rapid evacuation of the surface-deposited water (this is of particular interest in aeronautics as the rapid removal of water minimises the negative effects of ice on the moving control structures).

- Lubricants (oils and fats): with the aim of reducing the coefficient of friction (there are already references in the literature that they are highly efficient in this function) and increase load resistance capacity.

The consortium is made up of Ion Bond, Microcoat, Fuchs Petrolub, Spolchemie, Nanomaterials, Renault, EADS, Rolls-Royce and Goodrich, amongst others. Also participating, and nearer home, is the Institute of Materials Sciences of the National Council for Scientific Research and Fatronik Technological Centre.

According to the dates established, this large-scale integrated project will start its activities in March 2004 and conclude in September 2008. TEKNIKER is taking part as co-ordinator in a project that involves 31 bodies from 13 different countries.

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