

R&D

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 research and develop lubricant coatings and other related tribological technologies for space mechanisms.

Tribology Applications Programme (TAP)

ESTL operates the Tribology Application Programme (TAP), providing the means of generating essential tribological data for the benefit of the European space community. Such data will help ensure the continuing success of European spacecraft mechanisms. The TAP activities take into account inputs and requests for studies made by, and solicited from, European space industries and ESA itself.

Recent TAP activities have been performed in the following areas:

- Hybrid lubrication (combined solid/fluid lubricant solutions)
- Improved solid lubricants (including improved PVD MoS₂ and future replacements to lead lubrication)
- Component-level assessment and characterisation (i.e. gearboxes, bearings, linear actuators)
- Fluid lubricants and their applications (including creep barriers, phenolic cages, evaporation behaviour, and degradation lifetimes)
- Quantitative assessments of lubricant conditions and inspection techniques
- Literature and feasibility studies

The TAP activities are fully funded by ESA and as such all results are openly disseminated to European industry.

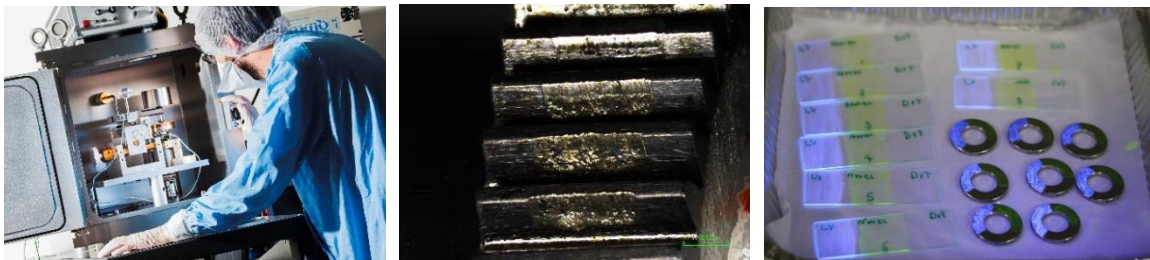
Commercial R&D

If you need additional support, or if our TAP activities do not directly relate to your development, ESTL can provide tailored R&D on a commercial basis. Your project could be entirely confidential in this instance, if appropriate.

R&D Support Hardware

To support these activities, ESTL has a number of highly specialised test facilities available for use in the field of space tribology research and development including:

- **Vacuum Pin-on-Disc Tribometers (PoD)** – Multiple sliding tribometers for assessment of friction and wear of solid and fluid lubricants. Testing can be performed under vacuum conditions, or under fully controllable cover gas environments. Operable over the temperature range -100°C to $+150^{\circ}\text{C}$
- **Spiral Orbit Tribometer (SOT)** – Unique European test rolling tribometer for assessment of lubricant consumption (i.e. life) and friction coefficients. The SOT features representative kinematics of an angular contact bearing (rolling and pivoting), and can provide results in much shorter timescales than conventional angular contact ball bearing testing
- **Gear test rigs** – Fully automated bespoke testing hardware for harmonic drive gearbox units, miniature spur gear systems and sliding bush contacts
- **Advanced Bearing Test Rig (ABTR)** – Angular contact bearing test facility featuring the capability to assess axial shaft displacement and active monitoring of bearing preload, allowing in-situ film thickness and/or wear or other raceway changes to be inferred for both compliant and hard preloaded systems
- **Detailed support and inspection hardware** – Including Residual Gas Analysis (RGA), Optical Microscopy with EDF imaging, Scanning Electron Microscopy (SEM), Electron Dispersion Spectroscopy (EDS), X-ray Fluorescence (XRF), Non-contacting White-Light Profilometry, Pre-loading Press, Co-ordinate Measuring Machine (CMM) and Micro-hardness and Indentation



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

- Simon Lewis, Manager, ESTL
E: Simon.Lewis@esrtechnology.com T: +44 (0)1925 843451
- Mike Buttery, Senior Project Scientist
E: Michael.Buttery@esrtechnology.com T: +44 (0)1925 843437
- Simon Griffin, Business Director
E: Simon.Griffin@esrtechnology.com T: +44 (0)1925 843499
- Or visit www.esrtechnology.com