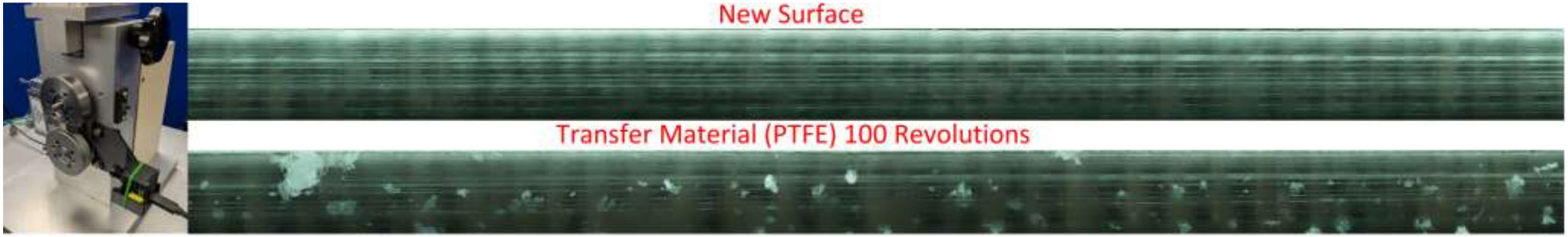
Tribology Update – ISSUE 47 – January 2026

WORK IN PROGRESS – DEVELOPMENT

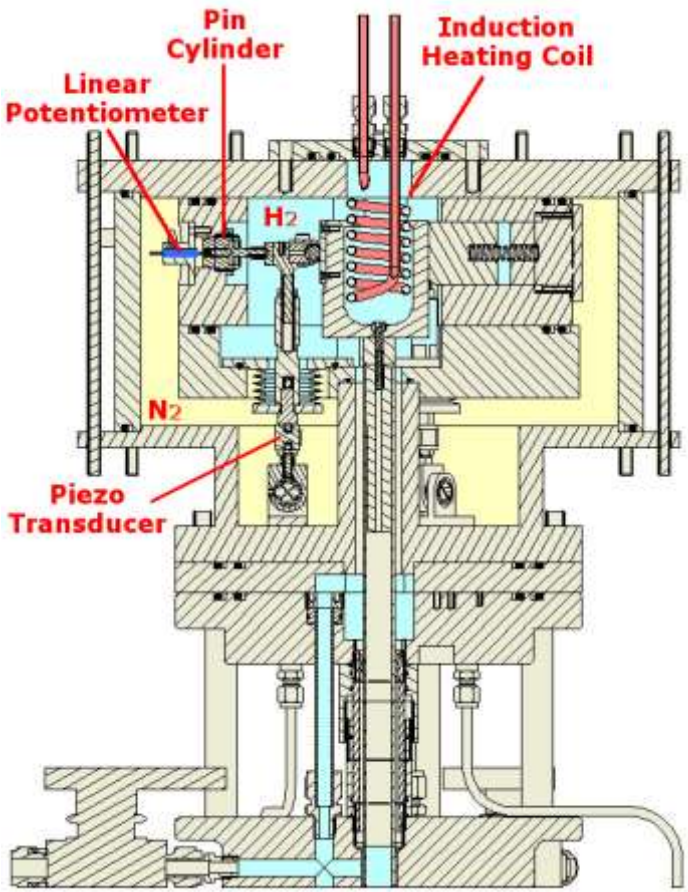
TE 53 Multi-Purpose Friction and Wear Tester

We are currently running a test programme on the TE 53 with block on ring and cross cylinder test geometries, with polymer samples run against a steel roller. The tests are being used to develop a low-cost area scan imaging system to observe the wear track/transfer films on the lower roller.



The system is designed not to provide continuous recording of the wear track, which would require an expensive high-speed camera, but to generate periodic images of the complete track, using a low-cost USB camera. At the required point in a test, the rotational speed is reduced to 20 rpm, and the camera is triggered to take images at 30 frames per second. The software then automatically stitches the series of images together to give a single, high resolution, image of the complete circumferential track.

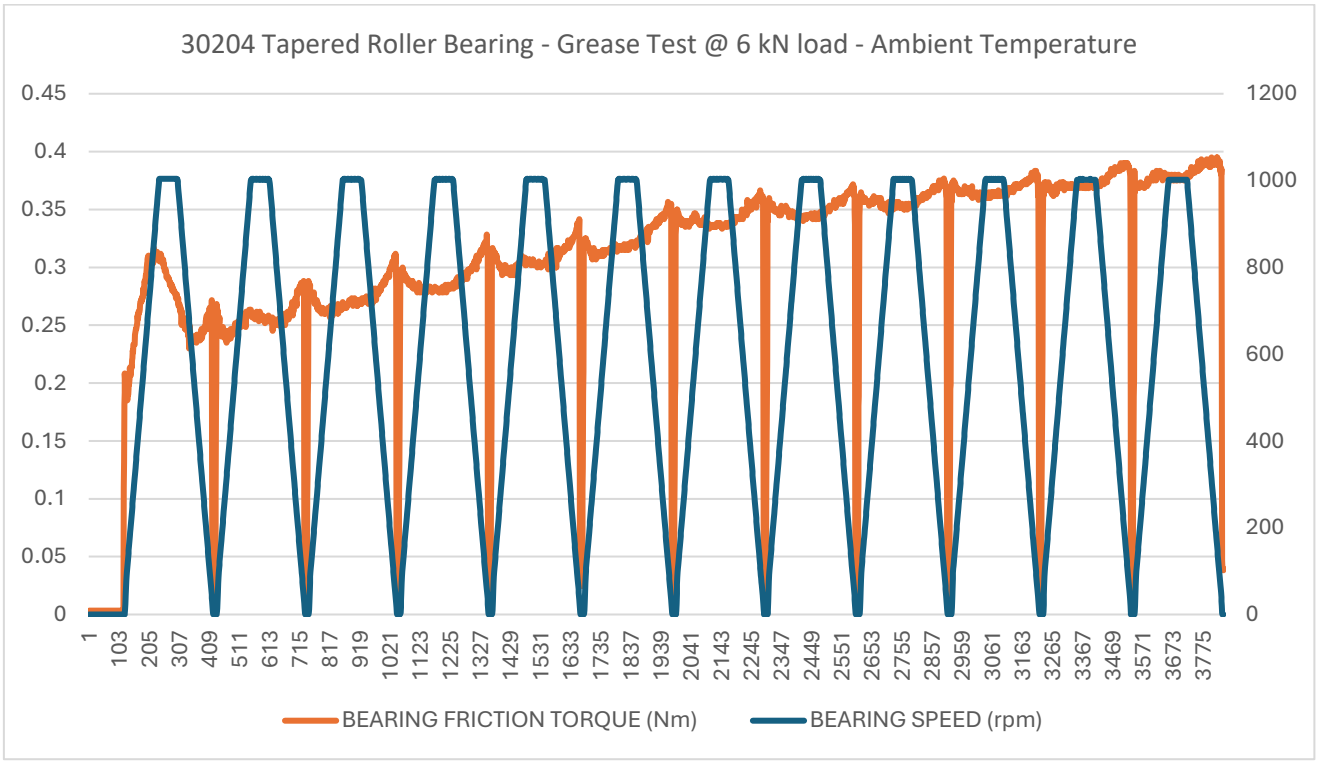
TE 60 High Pressure Hydrogen Tribometer - Low Pressure/High Temperature Adapter



The new low pressure - high temperature test assembly fits in place of the standard TE 60 high-pressure hydrogen test chamber. It is of a compound construction, with an inner hydrogen (blue) chamber rated to 10 bar and an outer nitrogen (yellow) chamber rated to 20 bar. Load is applied by pin cylinders, mounted between the nitrogen and hydrogen chambers and controlled by controlling the pressure difference between the two chambers. Piezo transducers and linear potentiometers are mounted in the nitrogen chamber for sensing friction and wear. The friction transducers are connected to the fixed specimen carrier via stainless steel bellows. The moving specimens are heated with an induction coil projecting downwards into the hydrogen chamber.

TE 92 Radial Loaded Bearings

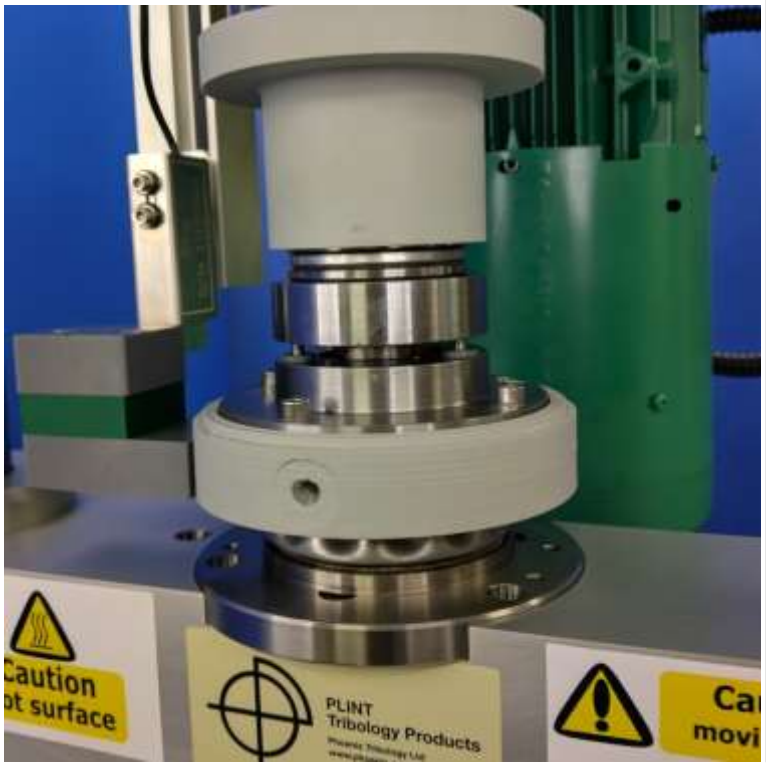
Radial Loaded Bearings - Patent Application: GB2504361.3

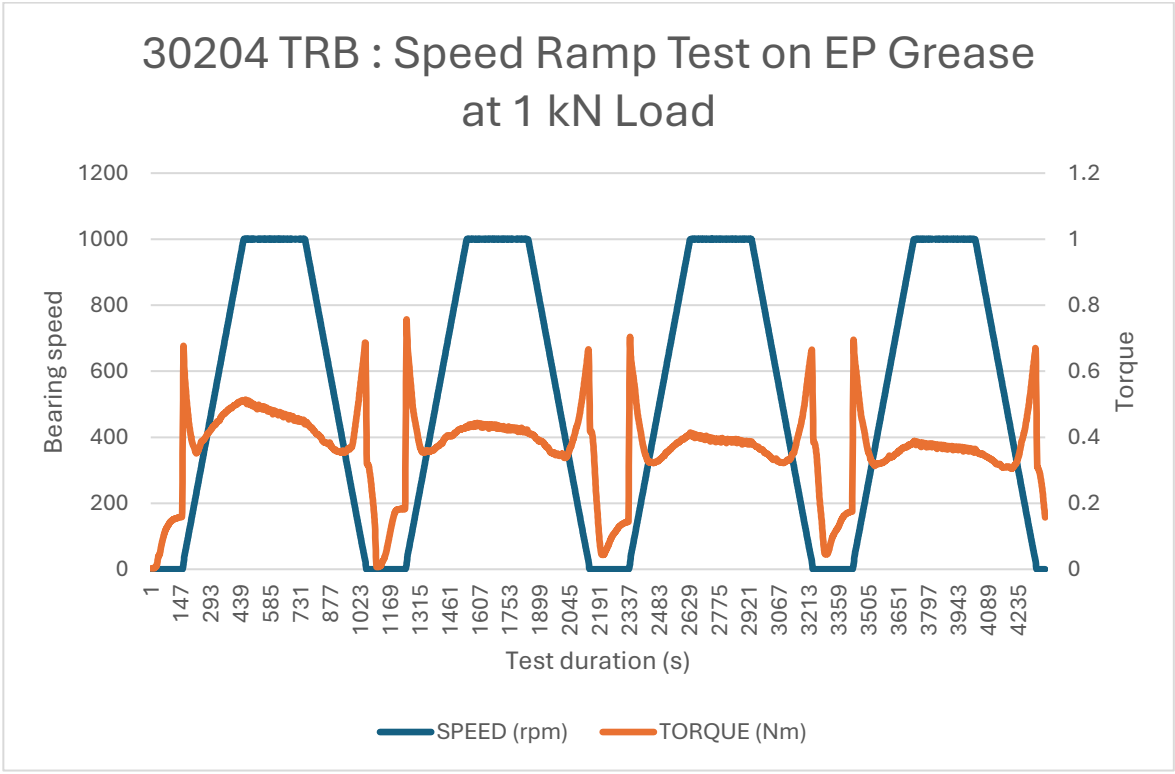


Testing with different grade greases is underway using angular contact and taper roller bearings, at loads and speeds relevant to wheel bearing applications. These tests are run at room temperature, with speed ramps used to generate torque-speed curves at different loads. To view a short video, click on the **link**.

TE 92 Axial Loaded Bearings

Axial Loaded Bearings - Patent Application: GB2501479.6



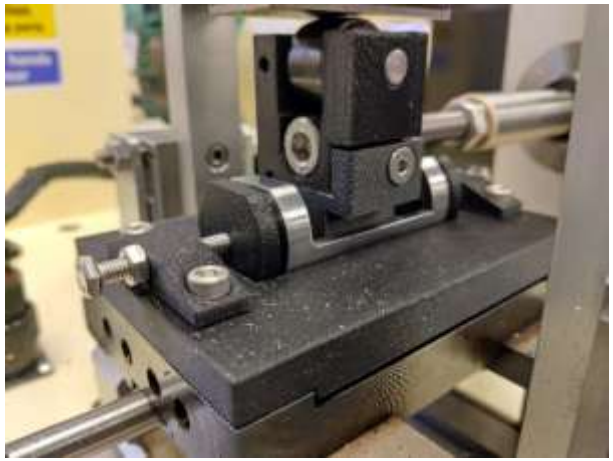


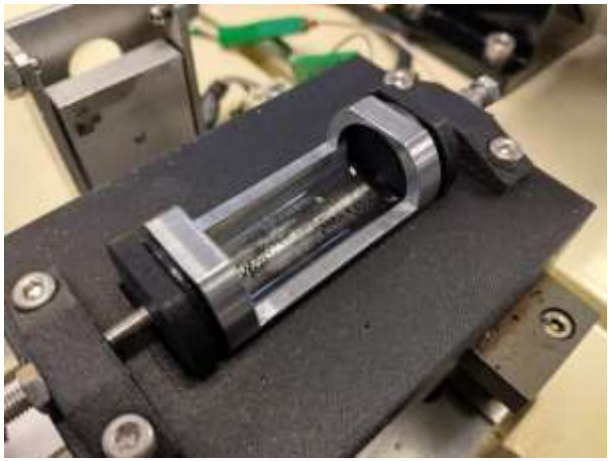
Data has been generated using our prototype tooling, producing some interesting results. Of note is the magnitude of breakaway friction, at start-up, particularly when testing axially loaded taper roller bearings. Longer term grease tests are planned, with the addition of hot air heating. We also plan to run lubricant shear stability tests, with on-line monitoring of friction torque.

COMPLETED PROJECTS – DEVELOPMENT

TE 77 Brake Fluid and Elastomer Testing

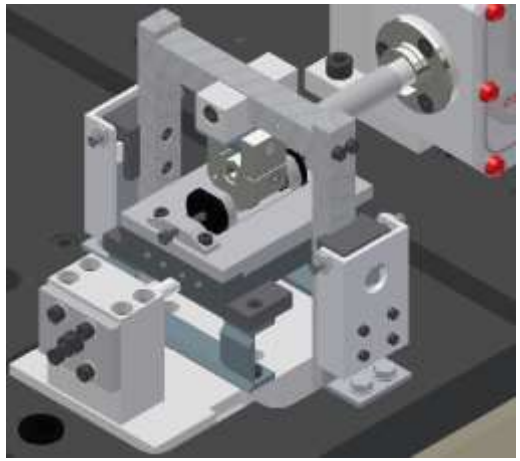
We have a new test adapter for use on TE 77 for evaluating brake and other hydraulic fluids, and elastomers for use in sliding seals. The two test geometries are self-locating, so avoiding the generation of "Oxley waves".

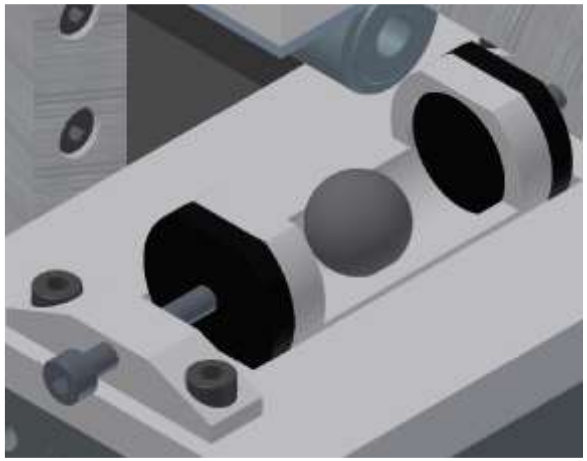


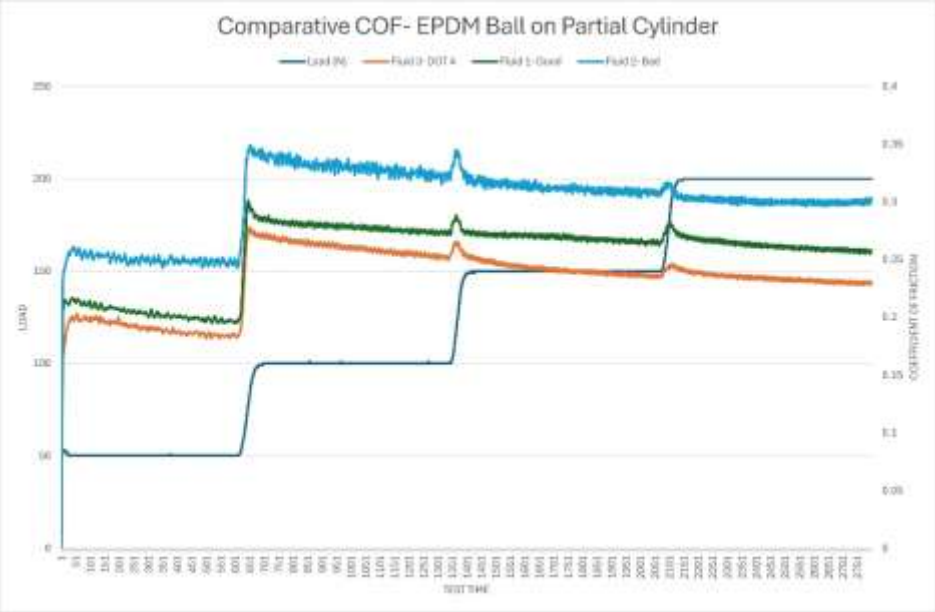


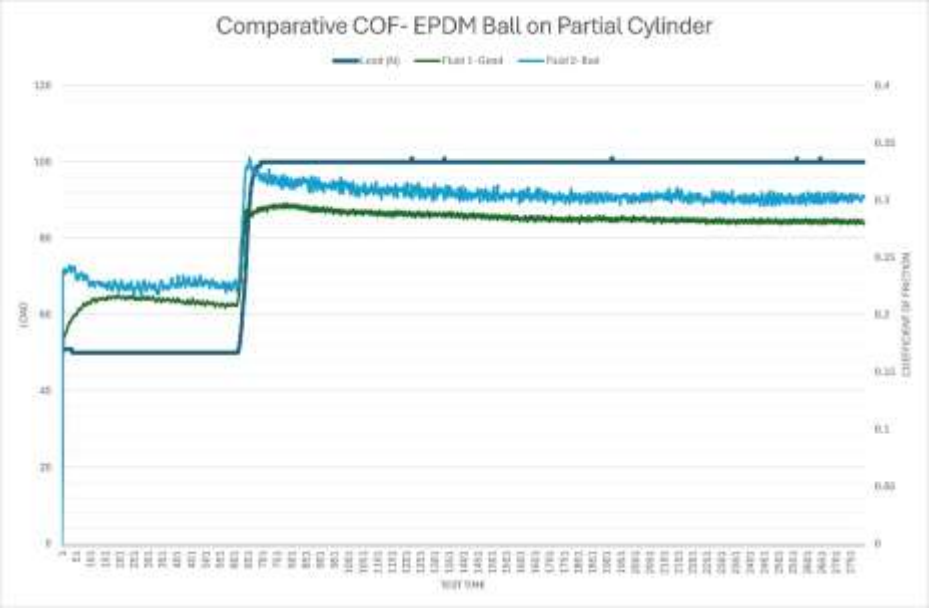
Two types of moving specimen are available:

Elastomer Ball in Partial Tube

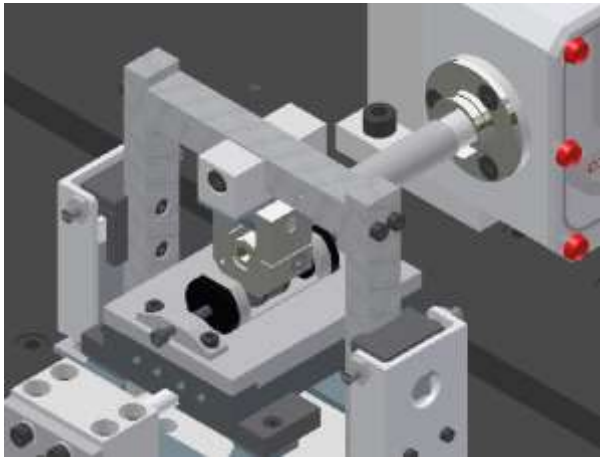


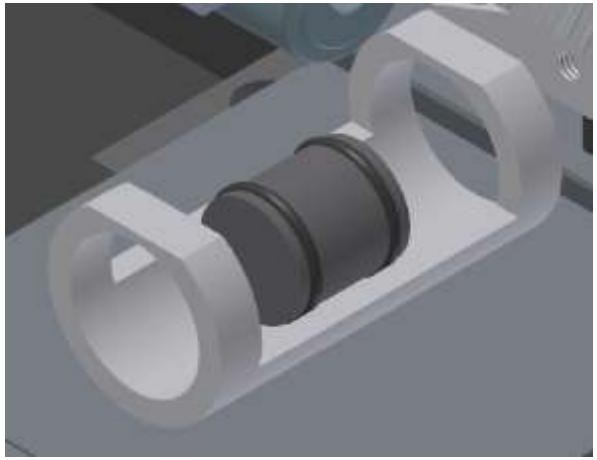


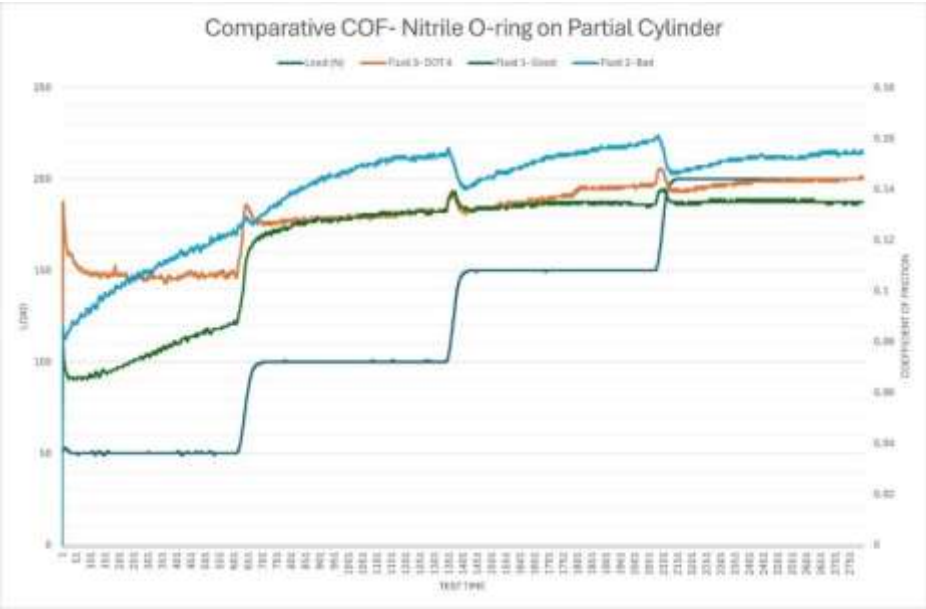


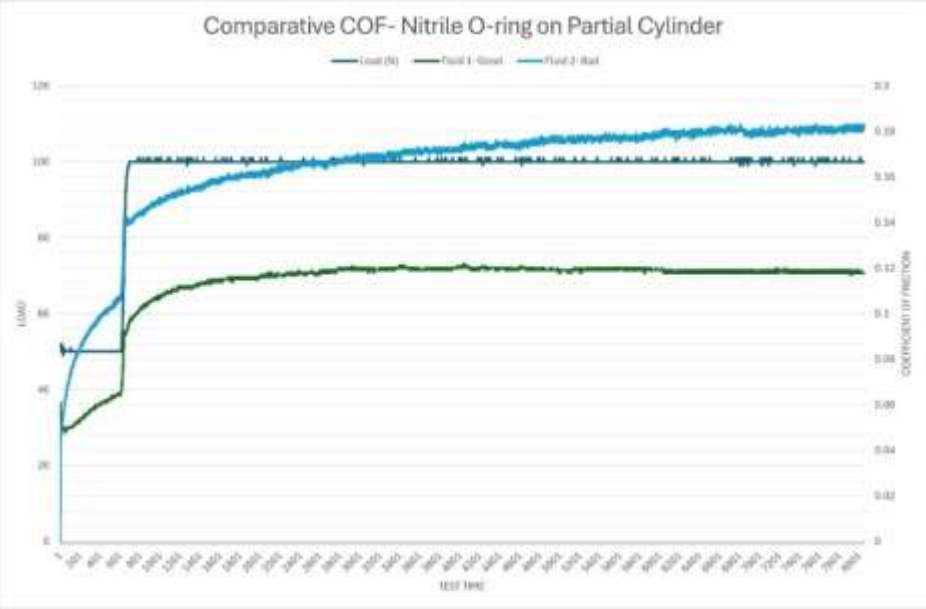


Twin O-rings in Partial Tube





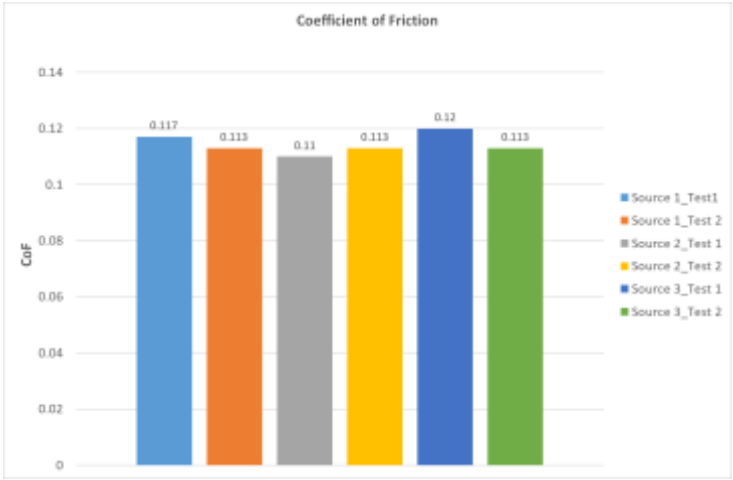


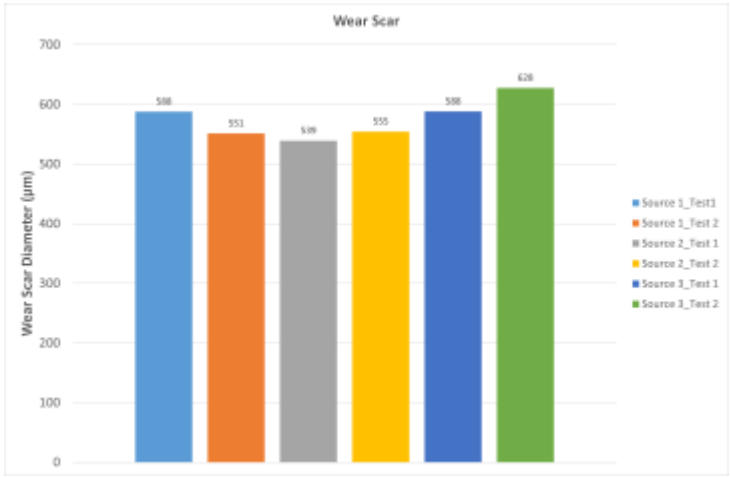


Both geometries have generated interesting data, as well as showing a good discrimination between ‘good’ and ‘bad’ fluids in both load ramping and two-hour long endurance tests.

ST-RT Standard Test - Reciprocating Tribometer – Specimens

We have completed tests in accordance with ASTM D5707 using disc specimens from three different sources and NLGI 1 Lithium grease. The results shown here are for tests run at 80°C, 200 N and 1 mm amplitude (2 mm stroke length).



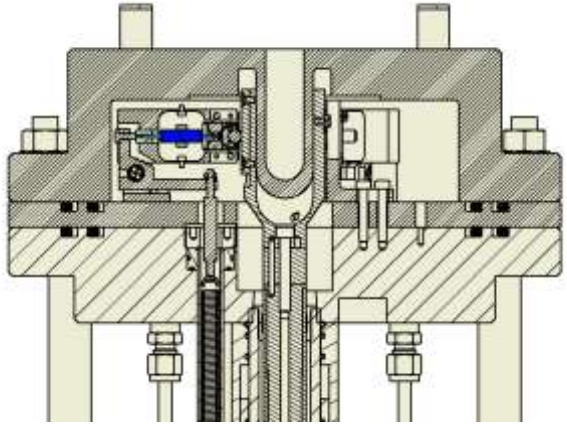


The friction coefficient results are all within the specified repeatability range: difference between successive results not exceeding 0.008. The wear scar diameters results are all within the specified repeatability range: difference between successive results not exceeding 70 microns. We will leave you to draw your own conclusions.

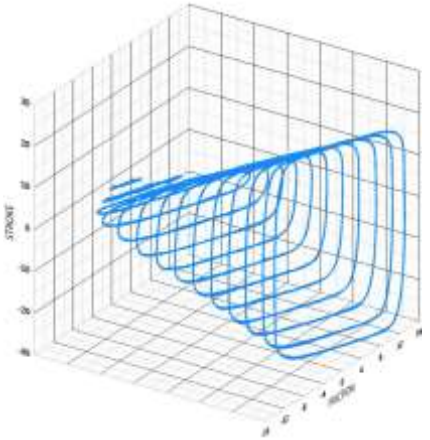
WORK IN PROGRESS – PRODUCTION

TE 60 High Pressure Hydrogen Tribometer – Wear Measurement

The first TE 60 used Lord MicroStrain NC-DVRTs for measuring wear displacement and deflection of the friction measuring flexures. These proved problematic and unreliable. Shortly after delivery, Lord was acquired, first by Parker, then by HBK. With two changes of ownership, the NC-DVRT products disappeared. For subsequent machines, flexure deflection is sensed using hydrogen and pressure rated LVDTs. These could not be accommodated for wear measurement, so this feature was dropped. To re-introduce wear measurement, we now fit linear potentiometers within the flexure loading assembly. The great merit of using linear potentiometers in this way is that they are very cheap to replace and do not require expensive electronics and signal processing.

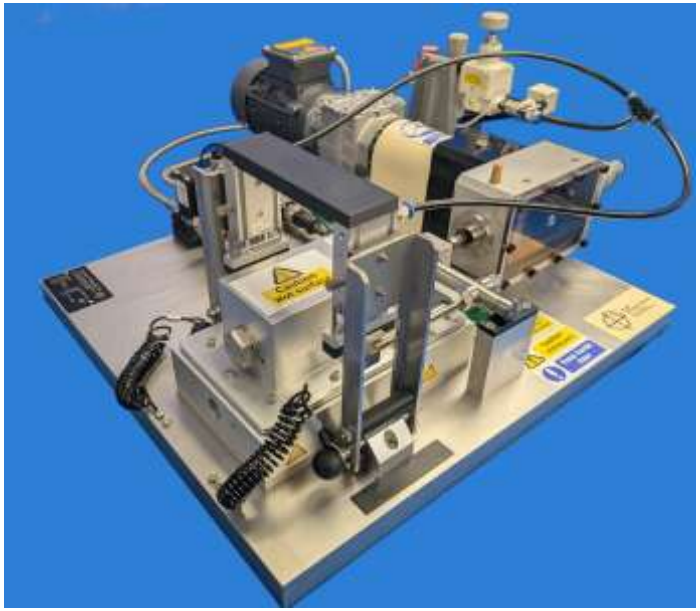


TE 44 Piezo Fretting Rig – Extended Stroke



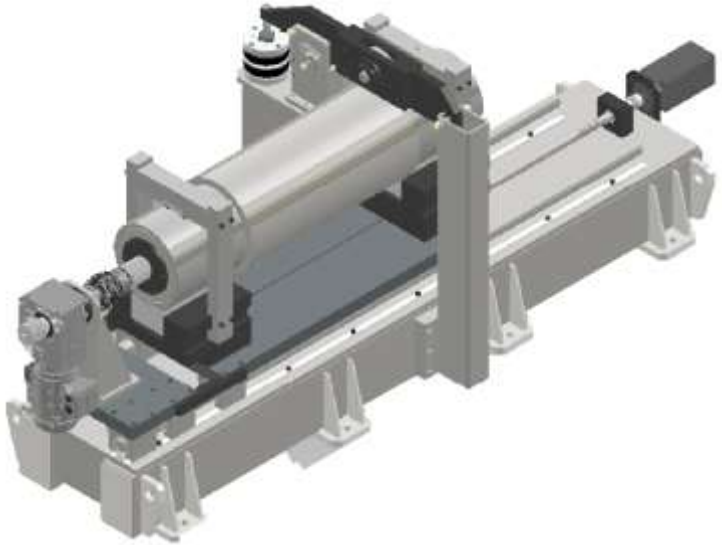
We are currently manufacturing a custom version of the machine with an extended stroke range piezo actuator. This gives a continuously variable stroke of 0 to 500 microns, with all the control precision and resolution typically associated with piezo actuation.

TE 50 Pressurised Reciprocating Wear Generator



The design of this new pressurised wear generator uses the TE 77 reciprocating drive, in conjunction with a moving specimen loading system, similar to that first used on our earlier TE 102 hydrogen test machine, which was developed in the 1990s. Initial tests for this client were run at SwRI using a modified TE 77. Although the current requirement is for tests to be run at moderate temperatures, we have also made provision for insertion of a cooling probe, to allow temperatures to be run at below the saturation temperature of refrigerants.

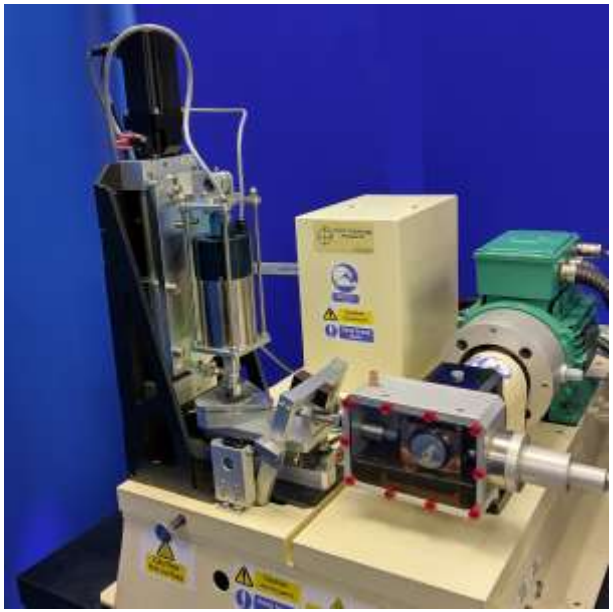
Traversing Roller on Drum Machine

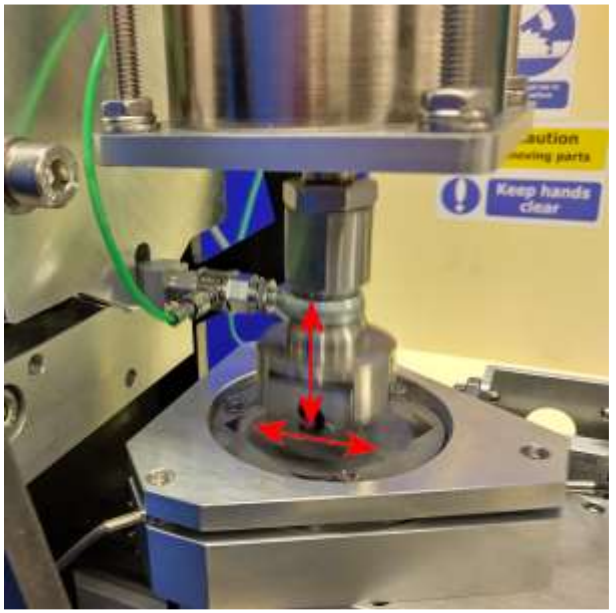


The original traversing roller on drum machine was designed by Plint and Partners Ltd for British Rail Research in the 1960s. The roller is not driven but is free rolling against the drum. Indexing the drum relative to the roller generates skew in the contact, with the resulting axial force measured by a transducer connected to the drum. Sixty years on, we have been asked to design and build an updated version of the rig.

COMPLETED PROJECTS – PRODUCTION

TE 77 Impact Sliding/Fretting Test Adapter





We have completed design, development and delivery of a new impact fretting adapter. To view a short video, click on the **link**.

TE 108 Polymer Production Test Reciprocating Tribometer

The latest unit of this twelve-station friction and wear machine has been delivered.

OTHER NEWS

Product Videos and On-line Tutorials

We continue to add product videos to the web site and have also added a new tutorial on Rolling Contact Fatigue, which can either be accessed via the website or viewed direct on YouTube.

Product Video: RCF 2 Rolling Bearing Tribometer

Tutorial Video: Rolling Contact Fatigue Testing

Tutorial Video: Effects of Machine Dynamics on Tribological Response or Why do the results from my machine not correlate with the results from someone else's machine?

Conferences and Exhibitions

In 2026, we will be attending:

STLE – New Orleans 17th – 21st May 2026

WTC 2026 - Rio de Janeiro – 20th – 25th September 2026

Plus, more to be announced. Be sure to check our LinkedIn page for the latest updates.

Follow us on LinkedIn

George Plint, Cyrille Favede and James Morley

Phoenix Tribology Ltd