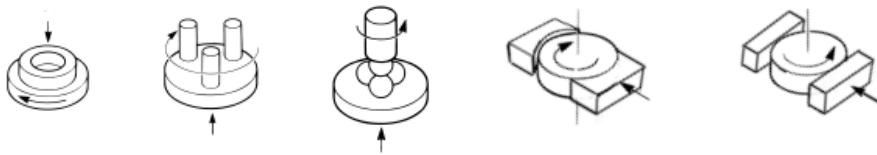


## TRIBOLOGY UPDATE: *ISSUE 29 – MARCH 2014*

This is the latest issue of our **Tribology Update** newsletter. The last six months have been exceptionally busy for us, so we have a lot to report. For further information, we can be contacted by e-mail at [info@phoenix-tribology.com](mailto:info@phoenix-tribology.com).

### WORK IN PROGRESS – IN PRODUCTION:

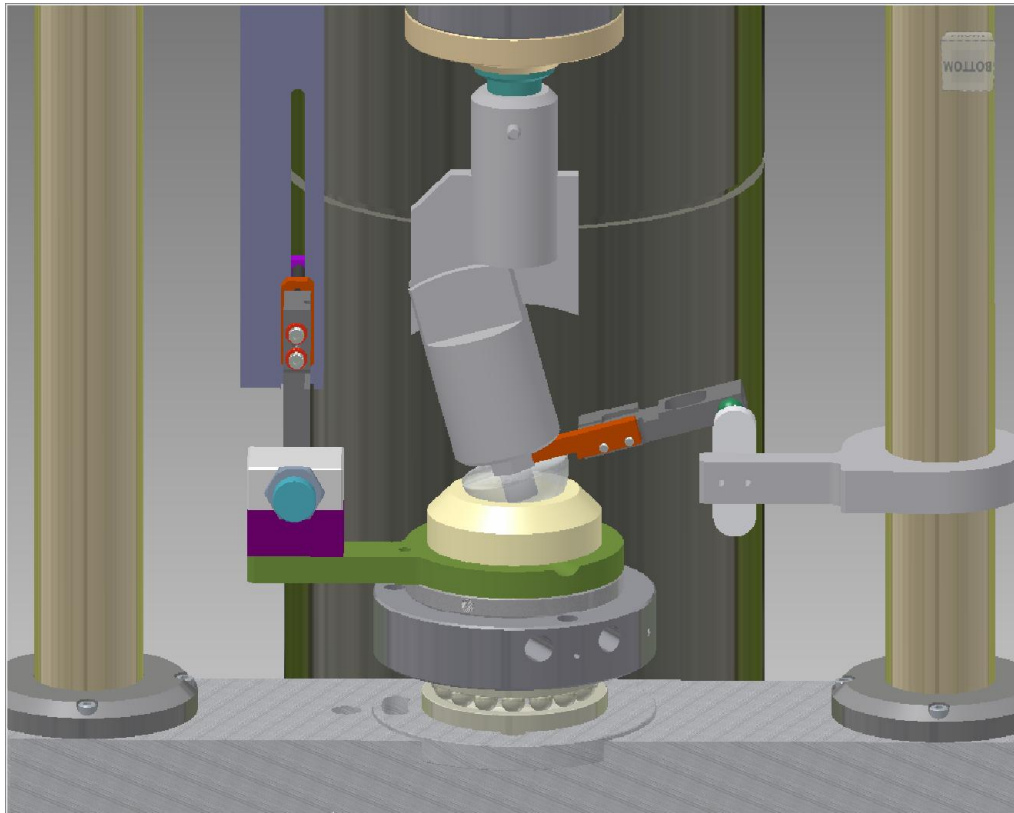
#### *TE 58 High Pressure Rotary Tribometer*



The first production unit is currently nearing completion.

## WORK IN PROGRESS – PRODUCT DEVELOPMENT:

### *TE 92 Rotary Tribometer - Spherical Bearing Orbital Friction Adapter*

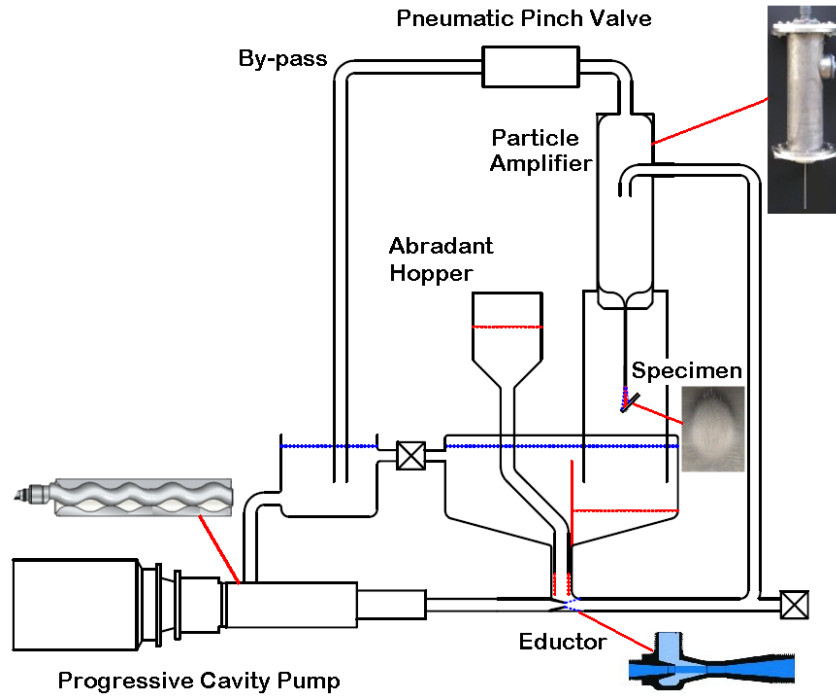


A new adapter has been designed for the TE 92 Rotary Tribometer for measuring friction in spherical plain bearings in orbital motion. The design is based on the technique developed by Dr Vesa Saikko at Aalto University, for measuring friction in hip joints. The maximum vertical load is 3 kN and the internal-external rotation axis is continuously variable from 0 to 15 degrees. The maximum bearing diameter is 50 mm. The adapter provides simultaneous measurement of friction torque about the vertical axis and the leaning axis.

Friction Measurement in the Biaxial Rocking Motion Hip Joint, Vesa Saikko, Journal of Tribology January 2009 Vol. 131.

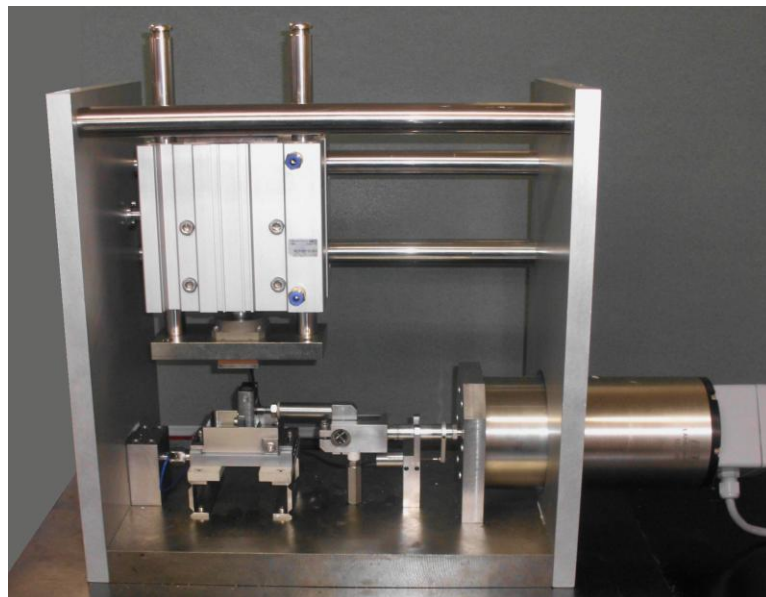
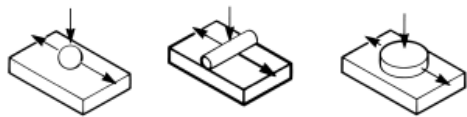
### *TE 64 Slurry Erosion Rig*

Our initial design of slurry erosion rig involved re-circulation of abrasive particles with, as a result of the actions of the particle amplifier vessel, a much higher concentration of particles in the erosion jet than in the re-circulating fluid. Despite the fact that the concentration levels in the latter were lower, all particles still had to pass through the progressive cavity pump. Re-circulation of the abrasive particles is, in fact, a not entirely satisfactory approach, because of progressive comminution of the particles; the particles wear out! Further to this, when using very hard abrasive particles, pump wear becomes a serious issue.



We have re-designed the flow circuit to incorporate a particle educator between pump and particle amplifier vessel, so that the system now provides re-circulation of fluid, but single pass particle flow. A precision feed system can now be incorporated to control the flow of particles into the inlet of the educator.

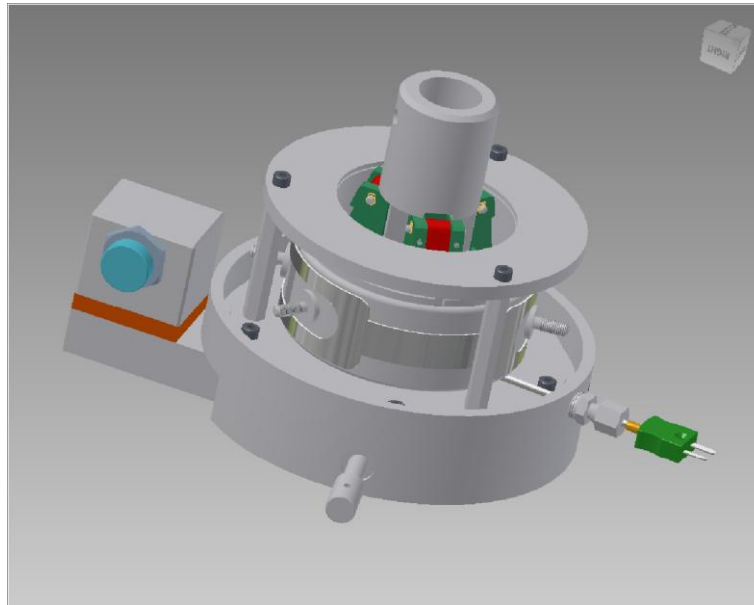
### *Voice Coil Actuator Reciprocating Rig*



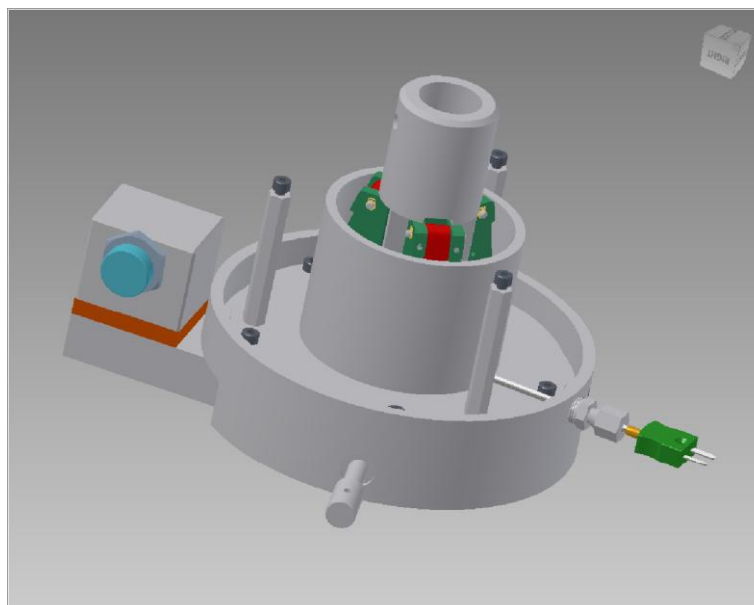
The prototype VCA-RR rig is currently under test.

## WORK COMPLETED:

### *TE 92 Ring-Liner Adapter*

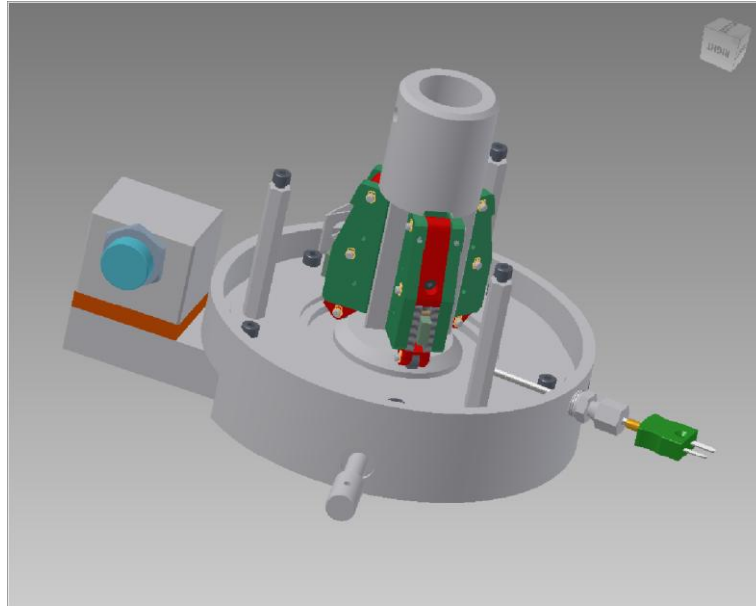


Based on the design of the *TE 47 Six Station Ring/Liner Tribometer* test system, we have designed a new three station ring/liner adapter for the *TE 92 Rotary Tribometer*. The TE 47 allows tests to be performed on a complete liner, without the requirement to cut up or modify the liner, thus preserving its integrity; the liner is the rotating component with the ring samples carrier at rest. This makes it possible to fit thermocouples to the ring samples and have a feed system that applies lubricant directly upstream of each sample.



The standard TE 92 design cannot accommodate either a complete or a rotating liner, so in this case, the design incorporates a fixed section of liner and rotating ring sample

carrier. Lubricant is then dripped down the walls of the liner section, which is heated with a band heater. Ring sample temperature measurement is not possible. This new adapter is available as a retrofit item on all existing TE 92 machines in service.



*TE 76 Two Station Reciprocating Vacuum Tribometer*



The first production unit has been shipped and installed.

## OTHER NEWS:

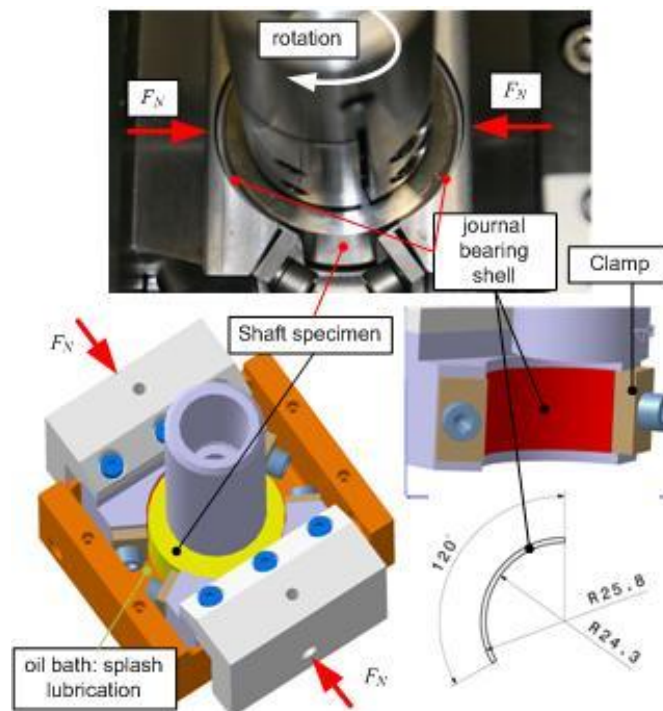
### *Publications Reference List*

We have added another seventy papers to our publications reference list during 2013 and would like to draw attention to two in particular:

Tribometric Development Tools for Journal Bearings – a novel test adapter  
F Grün, H Krampfl, J Schiffer, J Moder, I Gódor and M Offenbecher  
Proceedings - World Tribology Congress 2013 Torino, Italy, September 8 – 13, 2013

Ein neuer, realitätsnaher Modelltest für Verschleißuntersuchungen an Kolbenringen und Zylinderlaufflächen von Verbrennungsmotoren - (A new, realistic model test for wear studies on piston rings and cylinder of internal combustion engines)  
S Schweizer, H-J Füsser  
Gesellschaft für Tribologie 2013 - Fahrzeugtechnik 82/1

The paper by Professor Grün et al at **Montanuniversität Leoben** (Chair of Mechanical Engineering) describes the design and development of a modified version of the TE 92/8 Pin on Vee Block/Bock on Ring Adapter to allow crankshaft bearing shells to be tested in a half-journal bearing test configuration. Contact details: [florian.gruen@unileoben.ac.at](mailto:florian.gruen@unileoben.ac.at), <http://amb.unileoben.ac.at>



The paper by Dr Füsser and Herr Schweizer at Daimler very generously made public the results of their work, to date, on their *TE 47 Six Station Ring/Liner Tribometer*.

### *Cambridge Tribology Course 2014*

The course will take place from 15<sup>th</sup> to 17<sup>th</sup> September 2014.



*National Centre for Advanced Tribology (nCATS) – University of Southampton*

Tim Kamps is taking a break from his PhD to spend three months on a work-placement with us, followed by three months at Southwest Research Institute (SwRI). Whereas his PhD research is focused on an in depth study of scuffing, his time with us will be spent performing a wide range of TE 77 experiment, focusing on breadth and not depth, with the aim of answering a very extensive list of simple but important question, for example:

- How should we interpret a “disorderly” friction signals?
- Can we get Stribeck data from the instantaneous friction signal?
- How quickly does the wear rate stabilise following running-in?
- Does a DLC coating take over the role of friction additives?
- Are line contact experiments fundamentally more sensitive than point contact experiments?

We already have a long list of further questions, but would welcome your suggestions.

*Public Wear Database Initiative*

We are considering setting up a laboratory equipped and staffed to perform a range of basic adhesive, abrasive and erosive wear tests, with a view to generating an extensive, publicly accessible, comparative wear database.

The laboratory would use purpose designed, multi-station, wear generators. A number of internal standard tests would be run, based on modified versions of existing standard tests, optimised to achieve better cost and performance outcomes.

All tests would be comparative and each test run would involve the simultaneous use of reference samples. Clients would choose from a list of tests with standard test conditions. Resulting data would include a wear scar measurement (if appropriate), a weight loss measurement (if appropriate) and an image of the wear scar. Data analysis and consultancy services would not be offered.

The resulting wear data would be owned by the laboratory and published in an on-line wear database. Those providing samples would be asked to contribute towards the cost of the tests, but this price would be substantially less than for normal, commercial tests, where the resulting data are considered confidential. With regard to the latter, the laboratory would also undertake private test contracts, where the resulting data are not made available to the general public, but these tests would be charged at a higher, commercial rate.

Further information is available on our web site. Please let us know what you think of this idea.

George Plint and David Harris  
**Phoenix Tribology Ltd**