The University Of Sheffield.

The Leonardo Tribology Centre

Pin Joints in Aircraft Landing Gear

An investigation into reciprocating articulating joints

The research conducted aims to investigate lubricated reciprocating pin joints, and if a maintenance free alternative is available as this will reduce the service time and lubricants required. In order to achieve this, different greases and bush materials must be investigated to determine the suitability for aircraft landing gear applications

Using the Test rig fittings shown in figure 1:

- An axial load is applied to the pin/bush contact
- The pin is then rotated through a pre determined angle using a Schenk Torsion tension machine for a given number of cycles
- The Schenk torsion/tension machine then logs the forces and positions obtained during the cycle
- This information can be manipulated though calculation into torque requirements and friction co-efficient of the pin/bush contact

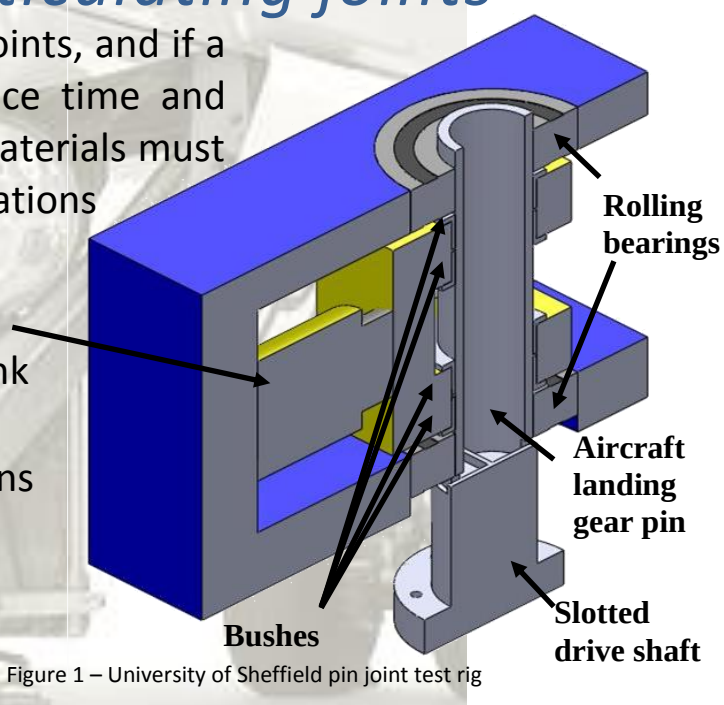

Figure 1 – University of Sheffield pin joint test rig

"Aircraft design has become a very sophisticated from of engineering in the last 30 years or so and the landing gear designer has had to keep pace. He is constantly faced with achieving a satisfactory compromise between the sometimes conflicting demands of structures engineers, aerodynamicists, runway designers, and operational personnel." *– Curry N.S, Landing Gear Design Handbook 4th Edition*

The research is particularly important to the Aeronautical industry as time is wasted greasing joints on landing gear that experiences low loads and motion.

The main benefits to industry and society are:

- Less lubricants required during the course of the aircraft life, therefore less damage to the environment
- Aircraft weight is reduced as less grease is used, hence plane efficiency increases
- Research can be applied to many different pin joints in wide variety of industries, reducing maintenance requirements

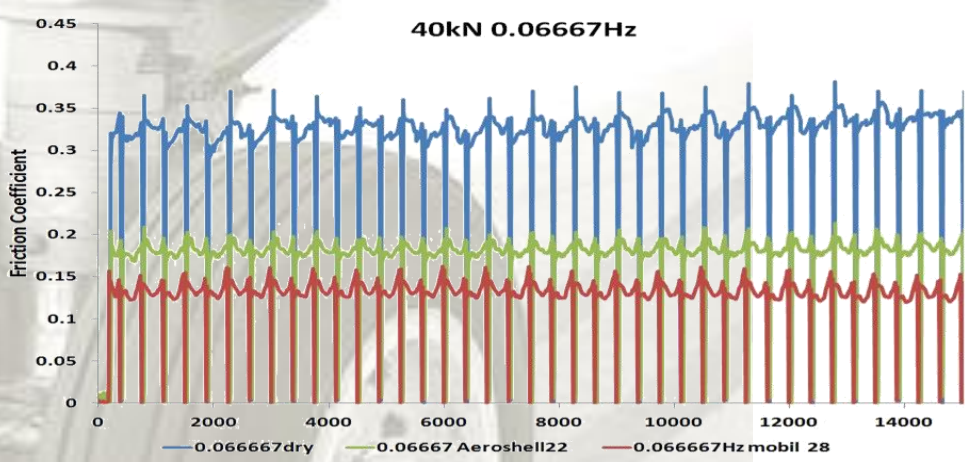

Figure 2 – Friction Coefficients for different lubricants at 40kN, 0.06667 Hz reciprocating Frequency

Figure 3 – Long range landing gear

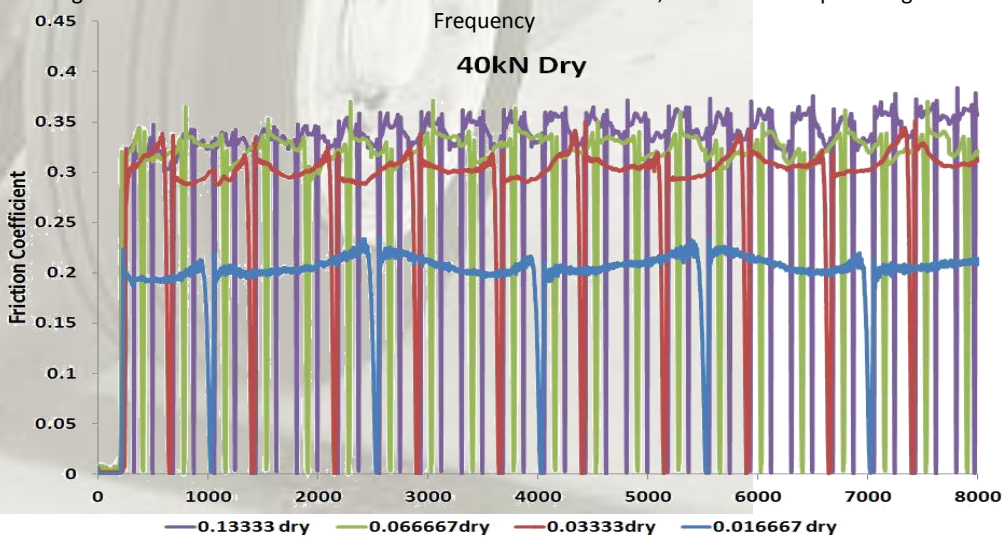

Figure 4 – Friction co efficient for dry contact at 40kN, varying frequencies

Background image: http://www.flickr.com/photos/spanair/3607348504/

PhD student: Peter Krier, p.krier@sheffield.ac.uk
Supervisor: Prof. Rob Dwyer-Joyce
Faculty of Engineering, Sir Fredrick Mappin Building,
Mappin Street, Sheffield S1 3JD, UK
T: +44 (0)114 222 5507

www.leonardocentre.co.uk