

## TRIACETIN AS LUBRICANT ADDITIVES: FRICTION MEASUREMENT BETWEEN METAL PAIRS

F. Majdoub <sup>a\*</sup>, S. Chuepeng <sup>b</sup>, G. Nkou Bouala <sup>a</sup>, N. Chantarapanich <sup>b</sup>, F. Dubreuil <sup>c</sup>, J. Perret-Liaudet <sup>c</sup>

[\\*fida.majdoub@ecam.fr](mailto:fida.majdoub@ecam.fr)

<sup>a</sup> LabECAM, ECAM La Salle, Université de Lyon

69005, Lyon, France

<sup>b</sup> Department of Mechanical Engineering, Kasetsart University,  
Chon Buri, Thailand

<sup>c</sup> Univ Lyon, Ecole Centrale de Lyon, CNRS, ENTPE, LTDS, UMR5513  
69130 Ecully, France

### KEYWORDS

*Friction; Fluid Lubrication; Lubricant additives; Triacetin*

### ABSTRACT

Friction between rubbing pairs plays a significant role in operating machines. In some circumstances, sliding friction may occur during dry and boundary lubrication. Lubricating the contacts using a suitable lubricating agent is very essential. This research aims to use Triacetin as a lubricant additive with oil, used for automotive applications, in order to measure the friction between different metal pairs: steel on aluminum, brass, copper, and stainless steel contacts. Each pair is tested dry, lubricated with oil as well as lubricated with oil and two different percentages of Triacetin additive, 4 and 10 %v/v.

The friction is evaluated using an apparatus called “Dynamic Oscillating Tribometer”, presented in Figure 1, developed at the Laboratory of Tribology and System Dynamics (LTDS) [1]. This technique is based on a single-degree-of-freedom mass-spring oscillator system supporting the sliding contact. This apparatus allows us to measure the dynamic free responses at the contact [1, 2].

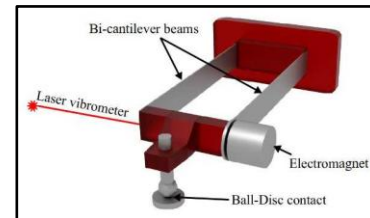


Fig.1 Schematic representation of the Dynamic Oscillating Tribometer

The mechanical properties of the various metals are measured and correlated with the friction results. Moreover, the viscosity of the different lubricants is evaluated in order to better understand the friction values.

Results show that a lower friction is evaluated for stronger and harder metals. It is also demonstrated that as the dynamic viscosity increases significantly, the friction coefficient is diminished.

### REFERENCES

- [1] Rigaud, E., Perret-Liaudet, J., Belin, M., Joly-Pottuz, L., Martin, J.M., “An original dynamic tribotest to discriminate friction and viscous damping”, *Trib. Int.*, 431, 2, 2010, 320-329.
- [2] Majdoub, F., Perret-Liaudet, J., Belin, M., Martin, J.M., “Decaying law for the free oscillating response with a pseudo-polynomial friction law: Analysis of a superlow lubricated friction test”, *J. of Sound and Vibration*, 348, 2015, 263-281.