

## Tribological performance of modified jatropha oil containing oil-miscible ionic liquid for machining applications<sup>†</sup>

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(Manuscript Received July 13, 2017; Revised August 8, 2017; Accepted August 8, 2017)

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### Abstract

Modifying physicochemical and tribological properties of a bio-based lubricant is essential in improving its lubrication performances. This paper presents the effectiveness of a fully oil-miscible Ionic liquid (IL) as lubricant additive into a bio-based lubricant. Methyltriocetyl ammonium bis(trifluoromethylsulfonyl)imide (AIL) was selected as IL additive to improve the tribological performance of the bio-based lubricant. Additive was mixed into the bio-based lubricant at three levels of mass concentrations (1 wt.%, 5 wt.% & 10 wt.%). Tribology tests on steel/steel contacts were conducted to evaluate the lubricant samples. Test outputs were benchmarked against the neat bio-based lubricant. Results revealed good synergistic effect of the AIL additive blended into the bio-based lubricant. MJO+AIL10 % has shown good corrosion inhibition, superior friction reduction (48 %), lower worn surface area (23 %), excellent surface finish (46 %) and increased tapping torque efficiency (8 %). MJO+AIL10 % provided excellent tribological performances which corresponds to the energy saving and environmental benefit for sustainable machining applications.

*Keywords:* Environmental adapted metalworking fluid; Ionic liquid; Oil miscible additive; Renewable source; Sustainable machining; Tribology

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