

## Lubrication Ability of Ionic Liquids as Additives for Wind Turbine Gearboxes

This technology has the potential to be an improvement to the current wind turbine gearbox lubricants by reducing wear.

**Keywords:** Lubrication, wind turbine gearbox, gear wear, ionic liquids

### Process Implementation Readiness



### Background and Technology Description

Large wind turbines have maintenance issues with their gearboxes due to the relatively short life of the gears. For this reason, this research program at the Rochester Institute of Technology investigated the potential tribological benefits of two phosphonium-based Ionic Liquids (ILs) as additives to a base synthetic lubricant composition without additives Poly-alpha-olefin, Synton-PAO-40, (PAO), and to a fully formulated and commercially available wind turbine oil, Mobilgear SHC XMP 320 (MG). The ILs tested were Trihexyl-tetradecyl-phosphonium decanoate (suffix [Deca] in figure) and Trihexyl-tetradecyl-phosphonium bis (trifluoro-methyl-sulfonyl) amide (suffix [NTf2] in figure), both from Sigma Aldrich. Wear testing was conducted via a high frequency reciprocating rig (HFRR) wear test (ball on plate). Both additives reduced wear compared to

controls as shown in the figure below (Ionic Liquids shown in red color).

### Technology Benefits and Value

- Reduce gear surface wear and, potentially reduce surface cracks
- Resulting wear reduction in gearbox could improve gear life

### Target Customers

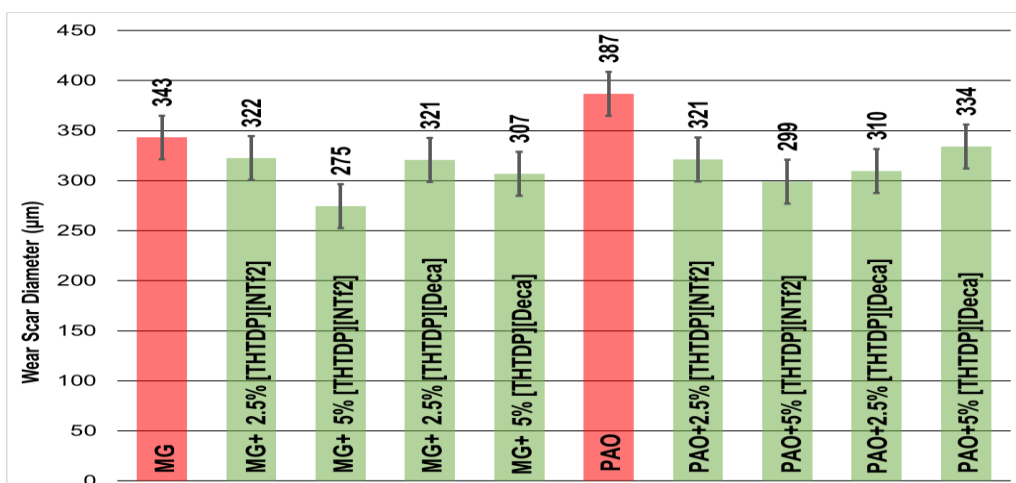
Wind turbine and lubricant manufacturers

### Intellectual Property

This process is not under any patent.

### Opportunity

NYSP2I is interested in working with qualified parties for product development of this technology.



Ref: M.A. Gutierrez, M. Haselkorn and P. Iglesias, "The Lubrication ability of ionic liquids as additives for wind turbine gearboxes", *Lubricants*, 4(2), pp. 1-12, 2016.

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