Technology Summary: Lubricant Additive

Opportunity Statement

Lubricant additives are used to improve the base oil into a better performing lubricant. A lubricant additive package can comprise anywhere from 1% of a finished hydraulic oil to approximately 20% of a typical multi-grade motor oil. Lubricant additives can be applied across a wide range of industries including wind turbines, automobile engines, industrial machines and power generators.

Problem

The use of an energy-conserving and anti-wear lubricant additive would have a great impact on energy conservation and cost reduction. However, such an additive would need to enhance, or at least maintain, the most important desirable lubrication properties, such as viscosity index, low-temperature performance, high-temperature performance and oxidation resistance.

Therefore, there is a need for a lubricant additive that enhances efficiency and reduces wear while maintaining or enhancing key lubrication properties.

360ip Partner's Solution

The product involves a lubricant additive composed of nanometric tungsten disulphide (WS_2) powder, nanometric molybdenum disulphide (MoS_2) powder, dispersant, antioxidant and metal deactivator. The most impactful and distinctive feature of the product is the use of **WS_2 nanoparticles**, considered potentially the best lubricating materials in the industry.

The nanoparticles, averaging 100nm-200nm in size, are created by a proprietary process that allows them to be evenly dispersed in the base oil. The nanoparticles form a protective layer on metal surfaces which reduces abrasion to friction-prone surfaces. (See **Annex A**)

Mini-Traction-Machine (MTM) tests also show that lubricants containing the WS_2 nanoparticles provides significant improvement in lubrication performance. (See **Annex B**)

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Additives that can provide similar improvements in lubricant performance for different applications (e.g., wind turbines, compressors, industrial applications, etc.) can also be formulated based on our Partner's proprietary technologies.

The Partner is able to provide lubricant additives for use in the potential client's existing lubricants or grease, or formulate a customized lubricant containing the lubricant additive.

Patents

360ip's Partner has filed two patent applications on this invention.

360ip is seeking interested parties for further development of the lubricant additive and WS_2 nanoparticles.

For additional information, contact:
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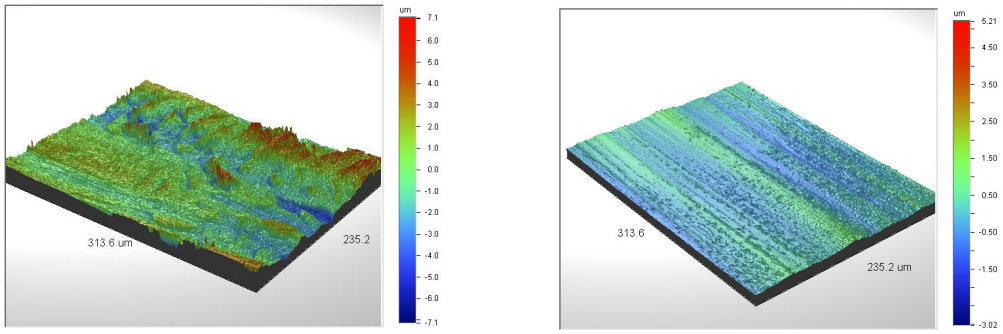
Technology Summary: Lubricant Additive

Annex A

Properties of Lubricant Additive

1. Reduces abrasion and wear

The nanoparticles in the additive form a self-renewing protection layer on the piston ring and reduce frictional wear on the contact surfaces as shown in Figure 1 below.



a. Conventional engine oil
(Image shows a rough surface caused by abrasion during engine operation.)

b. Conventional engine oil + additive
(Image shows a smooth surface indicating lesser wear and abrasion of the surface)

Figure 1 3D Image of Engine Piston Rings

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Annex B

Efficacy of WS_2 nanoparticles

A Mini-Traction-Machine (MTM) was used to perform Striebeck tests on conventional lubricants with and without the lubricant additive.

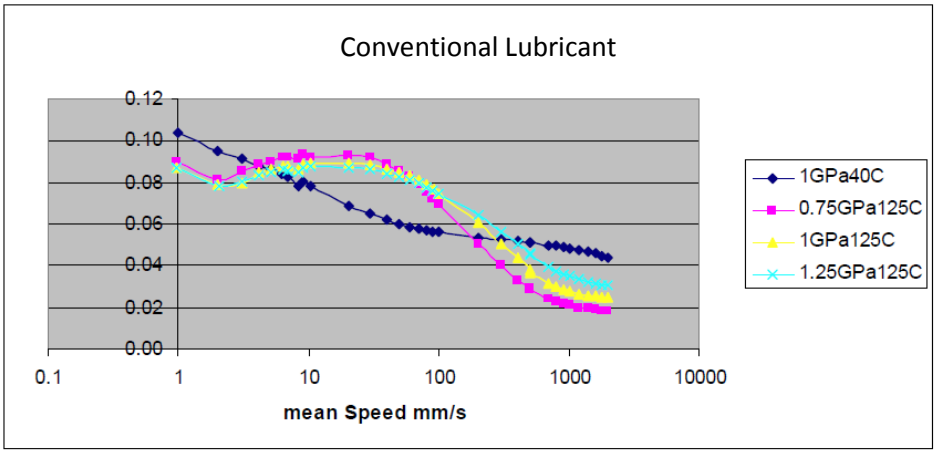

Figure 3 Striebeck data for conventional lubricant

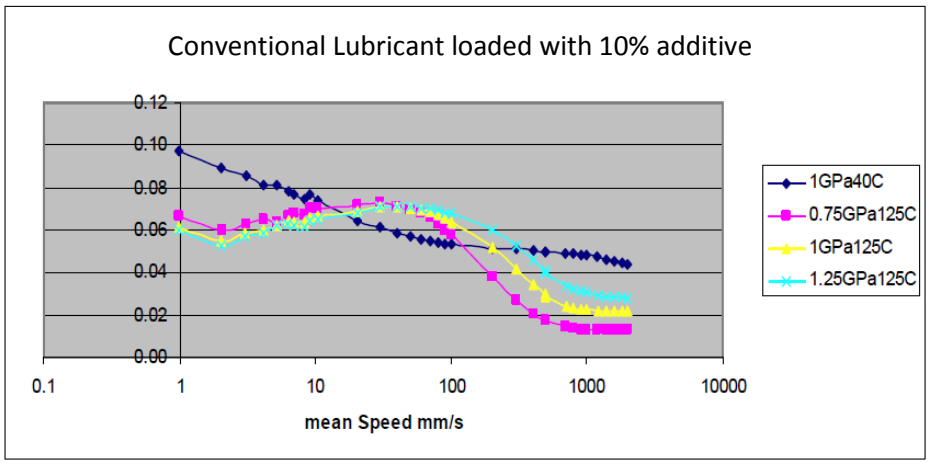

Figure 4 Striebeck data for conventional lubricant loaded with 10% additive

It can be seen that the use of the lubricant additives can provide significant reduction in friction at boundary and mixed regimes.