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Nye® Lubeletter

Synthetic Lubricant News from The SmartGrease *Company*™

Synthetics Boost Production Efficiencies

Efficiency means doing more with less: less staff, less money, and less time. In terms of industrial equipment, the right synthetic lubricant delivers such efficiency. Replacing petroleum-based machinery oils and greases with high performance synthetic lubricants will reduce cost and repairs, lengthen intervals between scheduled maintenance, and reduce energy consumption. It all adds up to doing more with less.

Price Performance Ratio. Purchasing departments may look at lubricating oil and grease as a commodity and gravitate toward the lowest cost lubricant whenever possible. The fact is: all oils and greases are not created equal when performance is considered. Unlike petroleum, which comes out of the ground, synthetics are the product of carefully controlled chemical processes that are designed to deliver superior lubrication properties.

For example, synthetic motor oils claim to protect your car's engine for 15,000 miles vs. just 3,000 for petroleum motor oils. The advertising is true to fact. Synthetic fluids have a higher tolerance to heat and shear than petroleum. They last longer, leading to a lower rate of consumption.

Even if the unit price of a synthetic is higher, savings are easily calculated. Synthetic hydrocarbon lubricants based on polyalphaolefins (PAOs), which have been used in military and automotive applications for decades, have consistently shown at least 5 to 10 times longer life than mineral based products.

Reduce Wear and Repairs. Synthetics also provide better wear protection. Higher "film strength" makes the difference. Simply put, film strength is a function of a lubricant's molecular structure and viscosity. It is the film, or coating, of a lubricant on moving parts that reduces friction and prevents wear by creating a barrier between abrading surfaces. A synthesized molecule, like a PAO, has a stronger chemical bond than mineral oil making it better able to withstand higher speeds, wider temperatures and heavier loads. A synthetic's film strength is readily complemented by additives known as "tackifiers," which allow synthetics to coat moving parts more quickly than standard oils. This is exceptionally important since significant component wear can occur at start up, when equipment is cold and moving parts are still largely "uncoated."

A synthetic's ability to retain its fluidity over a broad temperature range, i.e. its "viscosity index," is also important. The protective film created by a synthetic is less prone to evaporation at high temperatures, or gumming at low temperatures.

The natural heat tolerance of petroleum runs out around 100ºC. The upper end tolerance of a PAO is 125ºC. Synthetic ester oils can reach 150ºC; silicones, 200ºC; and perfluoropolyethers (PFPEs) withstand temperatures above 250ºC. On the low end, most synthetics are functional to -40ºC; others, like certain PFPE oils, are good to -90ºC. For petroleum the floor is at -20ºC.

Complex oil circulating systems boost the longevity of any oil. But even with circulating or misting systems, synthetics will always beat out petroleum lubricants of a similar viscosity in areas of wear protection, temperature tolerance, and oil change-over intervals. Further, some oil circulating systems used to lubricate high-temperature bearings can be converted to bearings lubricated with a high-temp synthetic grease, virtually eliminating the environmental and safety hazards associated with these high-maintenance systems.

Synthetics help in more subtle ways. The motion of machinery creates vibration, noise and heat. In addition to wear on moving parts, these factors cause micro-motion in non-moving parts, like electrical connectors.

The result is fretting on contacts or loosening of components. A synthetic's superior ability to reduce friction results in less equipment vibration,

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The new SRV® 4 tribological test system from Optimol Instruments was acquired by Nye's R&D department in June.

Dr. Joe Braza, Nye's Director of Technology, presented a paper on multiply alkylated cyclopentanes at the International Tribology Conference in Kobe, Japan, in May.

Koyo Seiko, a Tier One supplier to the global automotive industry, named Nye one of its certified suppliers in May.

Mesan Electronics in Ankara, Turkey, became Nye's 22nd Value Added Reseller in June. Mesan will service Turkey, Northern Africa and Pakistan.

Nye received TS-16949 certification, the international quality standard for automotive suppliers.

Robert Bosch GmbH approved NyoGel® 760G for use on automotive connectors. The Bosch spec number is N28 FT7020-005.

NyeTact® 574H, a newly commercialized lubricant for contacts in electrical connectors, is a dispersion of UniFlor™ 8917 in fluorinated solvent. UniFlor 8917 was developed specifically to reduce insertion force in multi-pin connectors, while maintaining low resistance over connector life. Dispersing the grease in a solvent allows for dip, brush, or spray-on dispensing.

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thereby minimizing the effects of micro-motion and the need for related repairs. The reduction in vibration can also reduce noise, heat and energy consumption.

Longer lasting synthetic lubricants also extend the intervals between scheduled maintenance. Maintenance downtime is also less labor intensive because synthetics leave less buildup than petroleum on reusable parts.

Sustenance Safe. Synthetic lubricants can also be approved for incidental food contact. Nye's food-grade lubricants, registered by NSF, conform to Food and Drug Administration (FDA) CFR Title 21. Synthetic food grade lubricants are nontoxic, odorless, colorless, and tasteless.

Synthetic lubricants boost production efficiencies by enhancing equipment performance and lowering operational costs. There are few simpler changes to machine maintenance that so easily add up to doing more with less.

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Get smart about grease

Some greases may yellow or darken with exposure to heat, air, light or time, but color change does not necessarily affect grease performance.

Color change over time usually indicates antioxidant additives in the grease are working. A battery of tests run on greases with and without antioxidants, exposing them to heat or UV light, showed that greases with the additives will often discolor. In all of Nye's extensive testing, this has been shown to be purely a visual change.

Antioxidants are used to prevent base oils from reacting with oxygen. Additives make up a very small portion of an oil or grease. The characteristics of grease to prevent wear, friction, noise, etc. are not affected by antioxidant additives.

Dyeing a grease will mask any antioxidant color changes, which is why some grease manufacturers routinely dye all their greases. Some customers ask Nye to add dye to lubricants to "color code" different greases used in the same factory. If color change is problematic, dyes can be added to solve that "problem" as well.

Rheolube™ 374A: Coming to a Jet Near You?

After two and a half years of successful testing in the landing gears of the massive C-5 Galaxy transport airplane, the Air Force Research Lab at Wright Patterson suggested that Rheolube™ 374A (MIL-PRF 32014) just may be the next "near universal" military grease. Now the Navy appears to be heading in the same direction, and commercial airframe OEMs are also expressing interest.

Roller bearings from the E-2C Hawkeye after a 10-day corrosion test. The bearing on the left, lubricated with MIL-PRF-81322, showed extensive corrosion and ceased rotation. The bearing on the right, lubricated with MIL-PRF-32014, had no corrosion and continued to operate normally even after three high-pressure wash cycles.

(Photos Courtesy of USS Nimitz Photo Lab and NAVAIR)

The Naval Aviation Depot in San Diego, Calif., compared two greases MIL-PRF 32014, using Nye's Rheolube 374A, and MIL-PRF-81322, using Mobilgrease 28. NAVAIR conducted Salt Water Immersion Tests and Wash Rack Tests on bearing cones and wheel assemblies. The tests were designed to determine which grease offered better protection against corrosion.

Bearing cones from the E-2C Hawkeye were coated with the test greases and suspended in a tank filled with seawater for 300 hours. Test parts were then removed from the tank, cleaned and inspected for corrosion. George Franco, General Engineer (Landing Gear Team), reported the bearing cone lubricated with Rheolube 374A "looked like a brand new part and was still serviceable. This grease should save the US Navy a great deal of money" by preventing corrosion and related mechanical failures. The cone lubricated with MIL-PRF-81322, however, showed significant corrosion and pitting and was deemed unserviceable.

High pressure wash tests, considered more rigorous than typical aircraft cleanings, were designed to force water past the grease seals to conduct comparative corrosion tests. Rheolube 374A showed superior corrosion protection despite a degree of washout from the 100 psi of water pressure. Conversely, the wheel lubricated with the 81322 grease "partially seized on the axle."

Air Force Lab tests drew similar conclusions. After 2,725 flight hours and 1,217 total landings in the C-5, field tests at Dover AFB and Ogden Air Logistics Center confirmed that Rheolube 374A provided superior anti-wear and anti-rust performance. Using Rheolube 374A as a "near-universal" grease, the Air Force expects a significant cost savings due to reductions in part replacements, system failures, and routine maintenance.

Extensive lab tests had been performed on Rheolube 374A prior to its extended in-flight test in the C-5 landing gear. The C-5 deployment proved lab tests were repeatable in the field, and familiarized aircraft personnel with the new grease. Rheolube 374A replaces a significantly more expensive grease that failed to provide the same level of wear and corrosion protection.

Commercial airframe companies, including Airbus, Boeing and Goodrich, have taken note of the C-5 test results, and have expressed interest in knowing more about Rheolube 374A.

Rheolube 374A is a lithium soap thickened, medium viscosity synthetic hydrocarbon grease, formulated with anti-rust and corrosion additives. It is designed for applications with a recommended temperature service range of -54°C to 175°C.

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