



Lubeletter

Synthetic Lubricant News from The SmartGrease Company

NEWSClips

The LED Packaging Conference in Penang on April 19 featured a pre-conference seminar on silicone encapsulants by SmartGel® Program Manager Joe Brooks and R&D Chemist John Doherty, who presented results of recent studies by Nye on lumen output and tensile strength.

Volkswagen's Twincharger TSI engine won the "Best New Engine of 2006" award at Engine Expo in Stuttgart in May. A synthetic lubricant by Nye is used in the supercharger, which is manufactured by Eaton.

Four Automotive Engineering Guides are now available at SmartGrease.com: Steering and Suspension Systems, Powertrain and Underhood, Interior Components and Electrical Systems — in English, French, German, Italian, Japanese and Chinese. [Click here](#)

SmartGrease™ — The Movie is a three-minute overview of what you can expect working with Nye. No plug-in required. [Click here](#)

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Antioxidants to Nanoparticles: Additive Studies Aim to Boost Lube Performance

New lubricant additives are usually touted as breakthroughs, but proof of technical advantage lies only in vigilant testing, which is why Nye is undertaking an intensive study of additives as a route to improving lubricant performance.

While the basic features of a lubricant are determined by its base oil, additives are "by far the most important ingredients of properly formulated, high performance synthetic lubricants" (*Practical Lubrication for Industrial Facilities, The Fairmont Press, 2000*). Lubricant additives are used to improve antiwear, anticorrosion, antirust and extreme pressure performance. Rounding out the lubricant engineer's tool box are antioxidants, lubricity enhancers, viscosity modifiers and pour point suppressants.

Nye is now testing a new, patent-pending antioxidant, which the developer says survives temperatures up to 500°C. In terms of a lubricant's lifetime, antioxidants are among the most critical of grease additives. Antioxidants protect the base oil from oxidation, which is the major culprit in sludge or varnish formation. Worse, oxidation reduces the amount of available lubricating oil, leading to "lubricant starvation" and possible application failures. High heat conditions normally cut short antioxidant life.

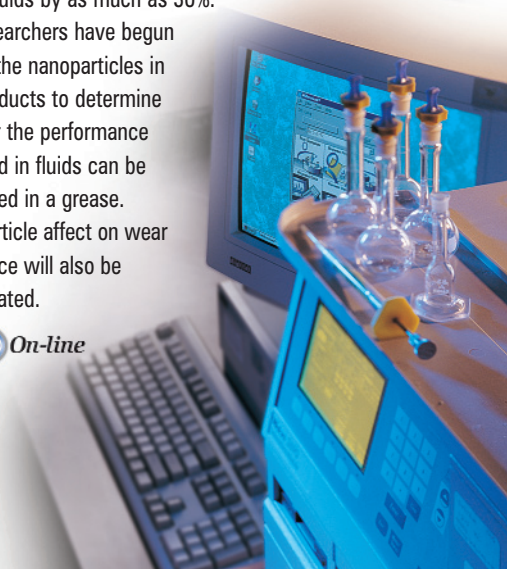
Pressure Differential Scanning Calorimetry (PDSC) tests show the new material exhibits a significant increase in antioxidant efficiency when formulated with a special family of synthetic hydrocarbon oils. A formulation that requires only .005% of the new material achieves the same Oxidation Induction Time (OIT) as a formula with a .2% standard antioxidant package. Using less additive material means more oil will be available to the application. On the other hand, the test results suggest that it may be possible to substantially extend the life of a lubricant by increasing the amount of this new additive to levels comparable to standard antioxidant packages. Nye is continuing tests to determine the optimal combination of oils, thickeners and the new antioxidant, which could be instrumental in formulating a new generation of high-temperature lubricants.

Another lab study promises something truly unique: a new additive that is soluble in perfluoropolyether (PFPE) oil. PFPE is highly inert, which offers design benefits such as extreme temperature performance and excellent material compatibility. Its inertness, however, means that few additives are soluble in PFPE. As a result, PFPEs typically do not offer the same level of wear protection as hydrocarbon lubricants, which can more readily take advantage of additive enhancements.

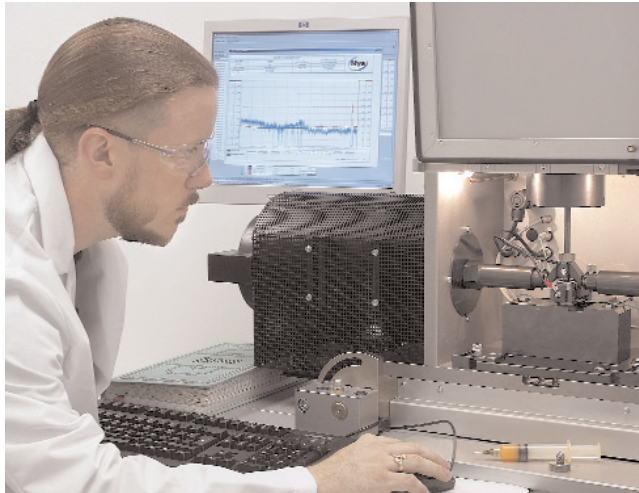
Testing shows the experimental PFPE additive could push the wear capabilities of PFPE greases closer to traditional hydrocarbons. The additive is soluble in pendant PFPE fluids, also known as Y molecules. Depending on a variety of factors, like oil viscosity or percentage of additive, the improvement in antiwear capabilities is demonstrated by a 13% to 54% reduction in wear scars. The potential is significant. Greater wear protection may be brought to extreme environments, especially in loaded metal-on-metal applications.

Recently a nanotechnology research firm suggested incorporating its nanoparticles into some of Nye's lubricants to evaluate their effect on heat tolerance. The particles are already used as protective coatings in industrial applications, and the developer claims the particles improve heat properties in fluids by as much as 30%. The researchers have begun testing the nanoparticles in Nye products to determine whether the performance observed in fluids can be duplicated in a grease. Nanoparticle affect on wear resistance will also be investigated.

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SRV Speeds Customer Product Development



speeds up to 2,000 RPM. Temperatures can be set up to 280°C with adjustable relative humidity. The test motion can be rotational or oscillatory, with varied stroke frequency and speed. Changes in any parameter can be programmed to occur at preset times and rates. The SRV IV automatically generates detailed graphs that pinpoint failure values.

These capabilities can be used to define the limits of an additive or a lubricant formulation. Coefficient of friction, oxidation stability, appearance of friction points, temperature performance and depth and diameter of a wear scar, all of which are measurable on the SRV, point to the effectiveness of a lubricant or additive.

How can you be sure a lubricant will match your product's projected life?

Nye's new SRV IV tribological test system may help. SRV is a German acronym for oscillation, friction, and wear. It was specifically designed for fundamental research in tribology, friction and wear analysis and is used in several ASTM and DIN test protocols. It can also simulate real world conditions to forecast how a lubricant will stand up to accelerated life testing.

The versatile SRV IV can mimic demanding applications with dynamic changes in load, humidity, temperature, frequency, stroke and angle of contact. Test forces range from 1 to 2,000 Newtons, with

Common mechanical components like gears, ball screws or rolling bearings can be simulated, as can worst case scenarios like a clutch overrun or bearing failure. Unique materials can be evaluated if provided samples are formed to fit the SRV IV test bed. Only life testing proves a lubricant's true effectiveness, but the SRV IV's modeling capabilities can help troubleshoot existing applications and head off potential problems before life testing begins.

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Lab Cameras Offer Real Time Webcasts

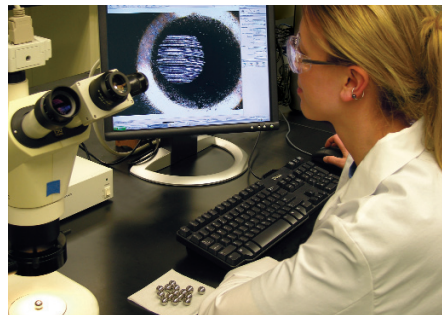
Now Nye's lab is as close as your web browser.

Nye recently installed Nikon digital cameras on lab microscopes for high resolution image capture and web-based viewing. Customers can log on and see exactly what a Nye lab technician is looking at in real time.

Nye's Director of Technology Joe Braza said, "The cameras enable a whole new level of cooperation and communication. We'll be able to share results from tests as they happen."

By combining SRV data (see article above) with microscope images, Nye can provide a complete picture for lubricant development and application

trouble shooting. Rather than depending on verbal descriptions or emailed images, engineers and technicians can confer about a project "on the fly."



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ISO 9001:2000
ISO/TS-16949



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Get smart about grease

Even though 90% of commercially available additives are soluble in polyalphaolefin (PAO) oils, trade publications on occasion imply otherwise.

Recently an industry newsletter stated because "the PAO base oil does not dissolve additives effectively, it is usually formulated with an ester co-base."

While PAO's solubility is not as robust as petroleum, less robust does not translate to poor or ineffective. PAO's solubility is sometimes "dialed up" by blending it with an ester oil, but it is a mistake to consider that a necessity. For example, Nye has over 100 greases formulated with PAO base stocks, less than 10% are blended with esters, but all of them have additive packages for improved performance.

Petroleum is a complex mixture of compounds, containing non-polar and polar molecules. So a wide variety of additives, both polar and non-polar, are soluble in it. But that same complexity is what limits petroleum's high and low temperature performance, oxidative stability and wear protection. PAO, on the other hand, is a highly refined synthetic material, stripped down to a basic molecular structure. Non-polar in nature, it requires non-polar additives, of which there is no shortage.

Nye LubeMatch

LubeMatch™ is a lubricant selection program featured on all on Nye websites. The software walks you through the lubricant selection process by asking basic questions about your application. While only controlled life testing can accurately determine the best match, LubeMatch offers a quick and simple place to identify suitable lubricants for your project.

[Click here to Try LubeMatch!](#)