First Quarter 2010

Lubeletter

Synthetic Lubricant News from Nye Lubricants, Inc.

NEWSClips

At ***Strategies in Light 2010***, the Nye Optical Team will introduce our latest innovations for the LED and lighting industry. The show will take place in Santa Clara, CA at the beginning of February.

Nye products will be available in the **United Arab Emirates and Bangladesh** through our Channel Partner Cinq Astre Enterprises located in Pakistan.

The **change in Nye syringe design** is planned for the first quarter of 2010. The new syringes will provide smoother fluid flow without turbulence or air entrapment. The resulting benefits are less waste, more consistency and cycle time reduction.

Nye started to add and commercialize several of the **Anderol® Greases** formerly made by Chemtura. These greases are comprised of PAO and Ester greases made with Lithium Soap, Clay and Lithium Complex thickeners as well as being very heavily fortified for wear protection. More to follow in our next *Lubeletter*.

5S Program Implementation by Nye improved efficiency and quality in several departments such as Manufacturing & Packaging.

Product Releases:

NyeClean™ 5023 - Ester/urea grease - Worm gears and bearings - Low particle generation

NyeClean™ 5033F - Alkylated diphenyl ether grease - Cleanroom and semicon manufacturing - Low particle generation

NyeClean™ 5067 - General pupose high temp vacuum grease - Bearings, worm gears, linear guides, motion control, etc.

NyeTorr® 5350 - PFPE grease - Vacuum and semicon applications - Better endurance, wear & load capacity

NyeTorr® 5380 - PFPE grease - High temp semicon and vacuum applications - Very low outgassing

From Whaleships to Microchips: Nye's New Products for the Semiconductor Industry

Nye has a long and proud legacy of lubricant innovation in the Aerospace Industry. Similar to the demands of the "Final Frontier" there is another industry with comparable extreme requirements and environmental controls. This is the Semiconductor Industry which has recently expanded from mainly being known for Integrated Circuit Microchip design and fabrication to now include Flat Panel Televisions, Photovoltaic Cells, and Solar Panels.

Nye's involvement in the Semicon Industry is not new as the NyeTorr® line of Semicon lubricants was first introduced in the late 90's. Intensive technical research was done on this product line at Nye with papers being published in magazines such as Machine Design where Nye introduced the NyeTorr® brand to the marketplace. Moving forward to 2007, Nye saw that this rapidly expanding market was in need of some innovative lubricants to help with specific demands and to give new innovative options to their demanding lubrication needs.

One of the sought after improvements that we heard about most from this market was the need for a lubricant that could increase the longevity of their motion control components (ball screws, bearings, etc) while being subjected to high vacuum, high temperatures, and high loads which will cause many lubricants to degrade. To answer the call of the market, NyeTorr® 5350 was developed which is made with a PFPE polymer that does not contain difluoroformyl linkages which are a contributing factor to standard PFPE's degrading because of exposure to high temperatures, vacuum, and sliding friction. Customers testing the NyeTorr® 5350 have seen a 65% improvement in endurance and life of their product when replacing a conventional PFPE grease that decomposes much earlier.

In addition to the high vacuum environments that are primarily supported by the NyeTorr® line, the need for lubricants with very low "particle generation" characteristics in low & non-vacuum environments was also identified.

The term "Particle Generation" refers to the number of particles that are emitted during the dynamic motion of a linear device like a bearing or ball screw. Particles can be counted and correlated using the ISO 14644-1 test method. For applications requiring a certain level of low particle generation, we offer several new products. The NyeClean™ 5023 and 5033F are designed for this style of application and would be suitable for a Class 100 environment. The NyeClean™ 5023 is an ester/urea grease that is suitable up to 150°C whereas the 5033F is an alkylated diphenyl ether/urea that is stable up to 180°C. Should you have requirements that are different than these, please contact Nye so that we can discuss a solution to your applications needs.

Recently we have begun R&D efforts into several new products which include improved versions of our NyeTorr® 5300 and NyeTorr® 5200, both of which have been used in Semicon vacuum robots around the world. The improved version of NyeTorr® 5300 is targeted at improving the already low outgassing (TML: 0.320%, CVCM: 0.032%) as well as the endurance of the lubricant for the next generation of extreme vacuum manufacturing robots. Through the use of the newly developed Pennzane® X2000 Ultra we plan to take the NyeTorr® 5200 to the next level of performance as well since the Pennzane® X2000 Ultra boasts very low outgassing values of less than 0.04 Total Mass Loss and 0.02 Collected Volatile Condensable Materials in the ASTM E-595 Vacuum Stability test.

With these improvements as well as all of the new developmental work going on at Nye for the Vacuum and Clean Room manufacturing environments, we are ready to look at any challenge your application might present and apply our experience and knowledge of innovative lubricant solutions that has been successful since 1844.

MORE On-line

Testing Developments for Electrically Conductive Greases

Nye has been developing a test method to measure the electrical conductivity of a bearing that contains a grease thickened with carbon black powder. Average Electrical Conductivity from a running bearing was measured for several hydrocarbon lubricants that were thickened with single and bi-modal carbon. Test bearings were thrust loaded, EW-1 ball bearings, 52100 steel with nylon retainers. Test conditions included: 100 Newton thrust load yielding a mean contact stress of 1 GPa, speeds up to 2,000 RPM, and temperatures ranging from 50-120°C. An SRV4 Rotational Tribometer from Optimol Instruments of Munich, Germany was used. This modified SRV4 method has the upper thrust washer of the bearing electrically isolated from the lower thrust washer by using insulating composite materials (see above figure). This allows for contact resistance to be measured across the bearing. By using this apparatus we can continually measure the conductivity in the bearing while varying the rotational speed and monitoring the temperature. Under boundary lubrication conditions (i.e. low speeds or high temperatures) low film thicknesses are generated which result in metal, ball to race contact and lower contact resistances. In the mixed film regime where there is less metal to metal contact, contact resistance is typically higher with traditional lubricants. As speed increases, the EHL film thickness will eventually exceed the surface roughness which leads to the contact resistance becoming infinite. When this transition occurs it is deemed as the EHL transition. The conductivity at this transition point is measured along with conductivity and when the lubricant is in both static and boundary conditions.

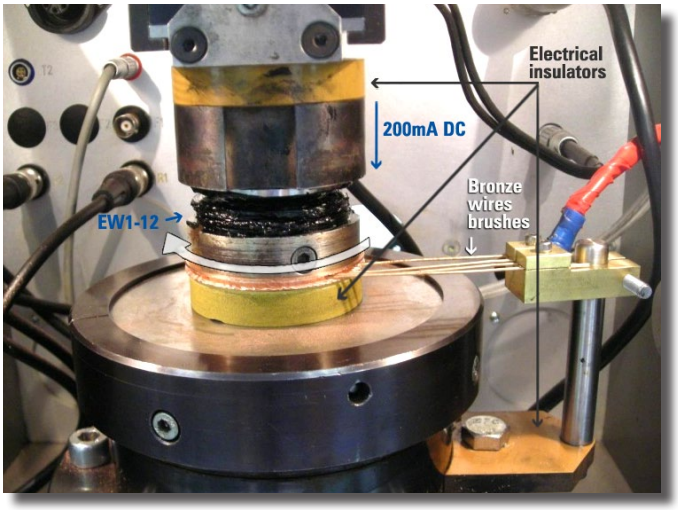


Figure: *SRV® 4 Fixture for Measuring Electrical Resistance of Conductive Greases*

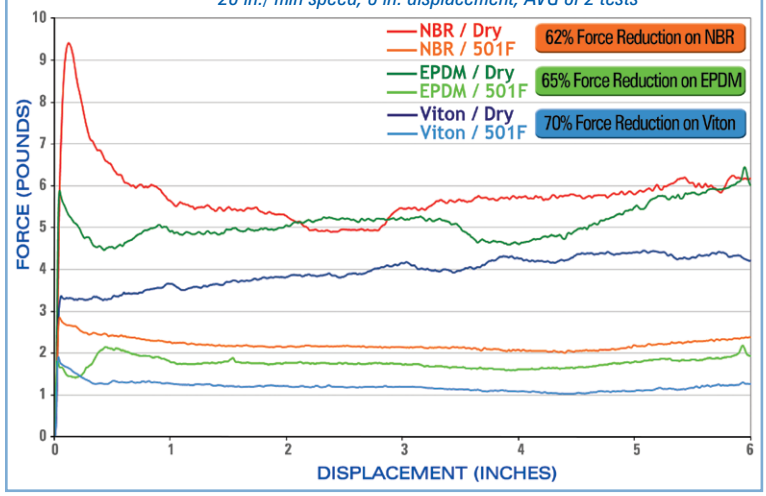
Nye Solution for Assembly Aids

NyeFilm® 501F is a lubricious 15% aqueous dispersion of PTFE. This dispersion is applied in a "wet form" which then dries to the surface. NyeFilm® 501F was developed to have a controlled particle size distribution where no particles are greater than 10 microns. This allows for an even distribution of PTFE. Additional benefits of NyeFilm® 501F include rub and abrasive resistance and chemical compatibility with all polymers. Originally NyeFilm® 501F was designed as an assembly aid dry film to substantially reduce insertion forces in automotive markets. Our customers require a lubricant that is both in "dry form" and environmentally friendly. NyeFilm® 501F provides superior lubricity while being cost effective and environmentally safe.

Nye uses the Instron testing of o-rings sliding on metal shafts and it has shown greater than 60% force reductions on popular polymers such as NBR, EPDM, and Viton.

Figure: *Instron Testing of O-Rings Sliding on a Steel Rod*

20 in./ min speed, 6 in. displacement, AVG of 2 tests



MORE On-line

Nye's Type IV Grease - 8961MT

Nye has recently developed 8961MT which is a perfluoropolyether (PFPE) grease thickened with polytetrafluoroethylene (PTFE) that is certified to the Type IV, Mil-PRF-27617F specification and is listed on the Qualified Product Database (QPD). This specification is for greases resistant to hydrocarbon fuel and liquid oxygen for use as a lubricant in aerospace vehicles, aircraft, instrument, and supporting equipment. The Type IV grease has an operating temperature range of -73°C to 204°C. The 8961MT grease will also be used to formulate a grease to meet the Boeing BMS 3-34 specification.

Nye's New Director of Technology

Anthony Grossi joined the Nye Technical Team last December as Director of Technology. His responsibilities include managing the Research & Development Laboratory, the Technical Support Engineers' group and the Quality and EH&S Team.

A Ph.D. graduate in Organic Chemistry, Tony brings to Nye an extensive knowledge of specialty additives in plastics, rubber, and lubricants. As a former Global Technical Director of Chemtura's Petroleum Additives business, he developed a strong understanding of lubricant additives such as antioxidants, antiwear, anti-friction and dispersants.

He also has significant background in new product development processes using structured approaches such as Stage-Gate® and Portfolio Management.

Nye is pleased to welcome Tony to the Technical Team. His experience is going to be a great asset for the company and its customers.

Nye Synthetic Lubricants
Innovative Solutions since 1844

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