

Autumn 1994

Solving Design Problems With Synthetic Lubricants

New Testing System Pre-qualifies Electric Switch Lubes for Customers

Nye Lubricants recently installed an integrated, menu-driven Data Acquisition System with analysis software to pre-qualify lubricants for large volume manufacturers of electric switches designed for severe environments.

The system—and the hiring of an electrical engineer to run the new testing service—is a unique indication of Nye's commitment to expand its already strong presence in the electric switch lubricant marketplace.

"Because of the high volume of electric switch lubricants we manufacture, Nye wants to get more involved in testing to see what actually is going on in switches from the electrical and mechanical perspectives," said Nye's new electrical engineer Kevin Akin. "The Data Acquisition System, an automated eyes and ears

for taking any type of information that can be transmitted electrically, enables us to do that."

Nye already offers actuation life-testing and some environmental testing which often allows pre-qualification of switch lubricants. The new system enables us to offer a broad range of electrical testing as well.

The Data Acquisition System monitors up to eight different voltage signals simultaneously. With our cooling oven, switches can be tested over a wide range of temperatures, to simulate operating environments and to match customer protocols.

The most recent project focused on a specialty switch that was not maintaining electrical contact at low temperatures, possibly due to deformation of the switch

metals. The manufacturer supplied switches and test results they obtained. Their test results were replicated in our lab. Then, we formulated an experimental lubricant to compensate for switch limitations. It passed initial tests at Nye and was sent with appropriate technical documentation to the customer, who is now running more extensive tests on the pre-qualified grease.

Typically, this is the scenario suggested for other switch manufacturers who may want to take advantage of this new Nye service.

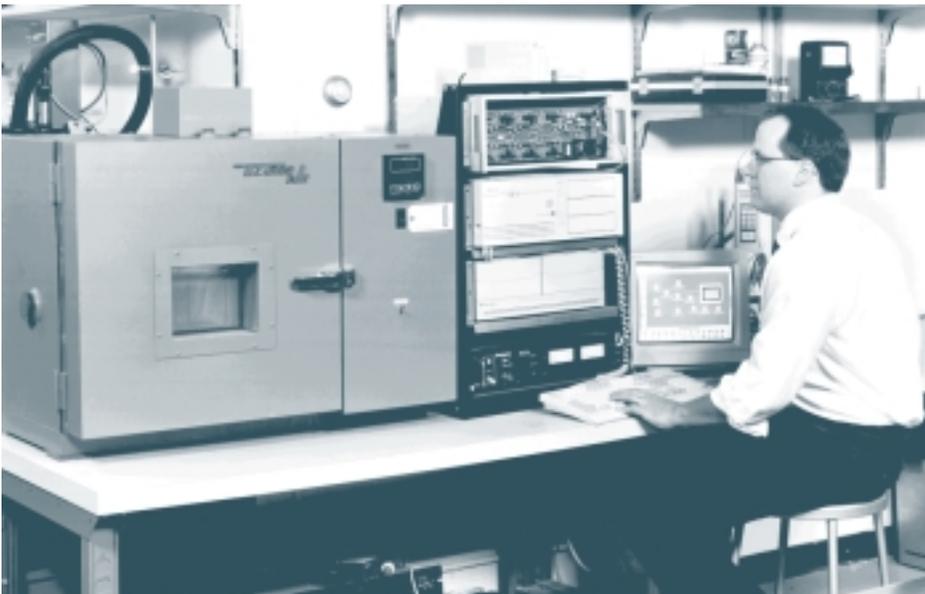
"We're willing to pre-approve electrical switch lubricants for customers when projected volumes justify the time it takes to conduct these tests—and when customers are willing to give us the time, samples and information we need to provide this service," Kevin explained. "We see this as a 'partnership' program."

"For some companies, quality testing can take months," Kevin added. "If we can focus on problematic, lubricant-related areas and send pretested samples, we can cut their in-house testing time and save them money. To date, my experience has been that customers are happy to find a lube manufacturer willing to work this closely with them."

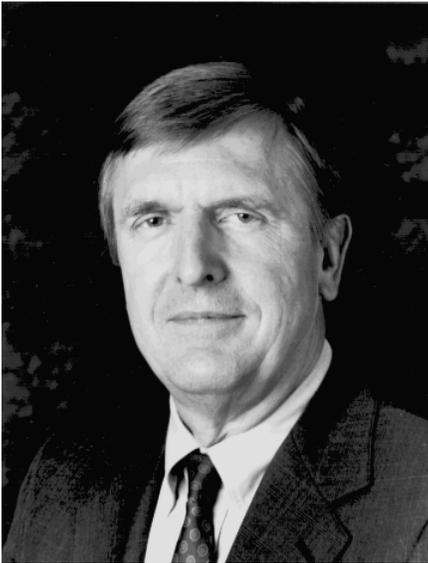
New President Takes Helm At Nye

Gerald I. Madden, a former Du Pont Company executive, became the seventh president and CEO of Nye Lubricants on January 1. His agenda: make Nye a world-renowned supplier of specialty lubricants.

"My basic goal is to make this company known around the world as the leader in synthetic lubricant manufacturing and technology," Jerry said. "We've got the technical know-how, a large customer



Applications engineer Kevin Akin checks the new Data Acquisition System which is used to pre-qualify electric switch lubricants for select switch manufacturers.



Jerry Madden

base and a broad product line—and we're now using those advantages to strengthen our customer interface."

Jerry brings to Nye more than 10 years experience in specialty lubricants — balanced by 15 years in R&D. With a Ph.D. in metallurgical engineering, he started his career at Du Pont, where he worked on advanced materials, unusual coating and plating processes and ceramic honeycomb technology. Ten years ago, he transitioned to managing two Du Pont lubricants, Krytox® and Vydax® — which have since become part of the Wilmington-based company's Performance Lubricants group.

Expanding the Nye sales team is one of his top priorities. He is now looking for additional field sales representatives for the U.S., and is considering full-time Nye employees in Japan and Europe. Admittedly ambitious, growing the sales team underscores his philosophy that the "world is ready for Nye."

"We're positioned nicely," he said. We're in the business of making and selling synthetic lubricants, and more and more companies around the world are striving for performance that requires these products — and synthetic lubricant know-how. We have both at Nye. That makes our agenda simple: do what we do —and do it well."

Former president George B. Mock Sr., who guided the company's growth since 1963, retains his position as treasurer and Chairman of the Board.

Damping Grease Family Grows in Response to Customer Requests

Nye mechanical engineer Jim McGown reports that over the last 12 months the company has more than doubled the number of damping greases in our standard line. Customer requests are the driving force behind the product expansion.

"Customers have been asking us for lighter viscosities for low torque applications, specially formulated damping greases for start/stop and extreme pressure applications, very low-temp damping greases — as well as for damping greases designed especially for compatibility with plastics. By altering viscosities and adding the right performance enhancers to our Nyogel 774 line of damping greases, we've been able to respond to those requests — and more than double our product line in a year's time," Jim said.

Damping greases are typically used in mechanical and electromechanical devices to cost-efficiently control free motion, achieve a "velvet feel," reduce noise, enable precision settings or fine tuning by hand — or any combination of these quality characteristics.

Formulated with highly viscous base oils, they are distinguished from other greases by their internal shear resistance, which "damps" or inhibits free motion like backlash or coasting. Because they are also tacky — like a non-hardening adhesive — they adhere to and prevent actual contact of mating surfaces, thereby "damping" or silencing the noise normally associated with metal on metal, metal on plastic or plastic on plastic contact.

Damping greases have been used for more than 50 years by designers and manufacturers of optical instruments, electronic controls and, more recently, in a growing number of automotive applications. The recent influx of requests for new damping grease formulations, however, does not mean they are either widely used or widely known among design engineers.

"My experience is that there really isn't a lot of knowledge out there about damping greases. That's the feedback I'm getting," Jim commented. "You talk to people on the phone about damping greases as a potential solution to a design problem, and it's like a revelation to them. I've had a group of 15 design engineers after a presentation say, 'Wow, can you guys do that?'"

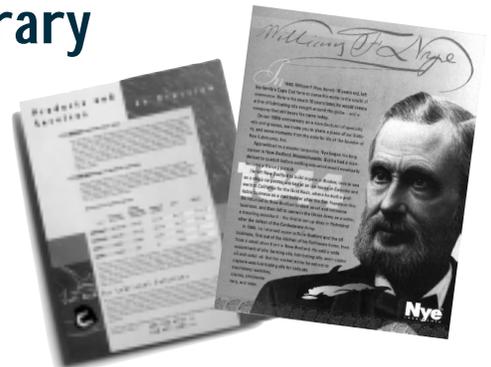
"Of course, they're not appropriate for every application," Jim added. "Though we've had success with fractional horse power motors, flea-power devices couldn't overcome even the lightest damping grease. And because there is a premium to be paid for good quality damping greases, very low cost devices may have to pass. But when a little bit of damping grease can deliver a significant increase in 'performance perception' — that's the ideal application. And I suspect there are many such applications out there that fit that criteria."

For an application summary or a sample of a damping grease especially selected for your application, return the enclosed reply card or call Nye at 508-996-6721.

Update Your Lube Library

Take advantage of new lube lit from Nye.

Start with our Product and Service Overview, a new four-page guide to selecting the right synthetic lubricants for mechanical and electromechanical devices. Browse through a new series of Application Summaries. Seven are now available; more to come. Learn about the history of specialty lubes with our 150th Anniversary Brochure — and a newly edited *LubeLetter Digest 1972 – 1993* that focuses on lubed-for-life devices and extremely hostile environments.



To update your "Nye library," mail or fax the Literature Request card, or call us at 508-996-6721.

Nye Lubes: World Class Reliability and Performance

Brian Holley, Nye's representative in Detroit, has one maxim he uses frequently when he hears about an automotive component that fails in testing — or worse, in the field: You're not using the right lubricant.

And he's ready to prove it. Cases in point: solenoid galling, automatic seat belts frozen in their tracks, corroding connectors — and countless other lubricant problems he's seen Nye solve for auto manufacturers. For safety systems, performance and environmental devices, and accessories that deliver the quality and comfort today's drivers want, major automobile manufacturers and their component suppliers rely on Nye oils and greases.

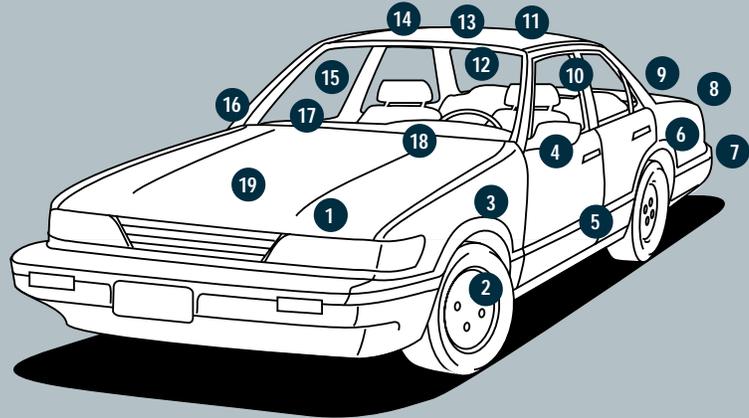
A look back Historically, we began selling small volumes of synthetic lubricants indirectly into the auto industry in the late 1970s, about the time auto manufacturers began moving beyond iron, steel and style to sell automobiles. As auto makers decided to turn to technology and fine accessories to distinguish their products, they turned to several of our customers — high end motor and switch manufacturers — to accomplish that goal.

It was a good match. At that time these component manufacturers were looking to expand their markets. They had recently made strong inroads into the appliance industry, developing lubed-for-life, quality motors and switches, and responding to the auto industry became a way to capitalize on the technology they developed for appliances. Since many of these components were lubricated with Nye's oils and greases, we went along for the ride.

Once in the industry, our role quickly expanded. Aerodynamically designed cars created smaller engine compartments, a more hostile environment for the growing number of sophisticated devices finding their way under the hood. Coupled with the increasing demand for 100,000-mile performance standards, synthetic lubricants — and Nye — began to move from an "optional accessory" to a "standard feature" in automobile design.

Shopping list Today, auto manufacturers work directly with Nye (we maintain a GM-certified lab) to develop

Where you'll find Nye oils and greases in 1995 automobiles



- | | |
|--|---|
| 1. Parking Brake Cable | 12. Window Visor |
| 2. Disc Brake Calipers | 13. Dome Switch |
| 3. Strut Sealant | 14. Sunroof Cables and Switches |
| 4. Power & Folding Mirrors | 15. Window Motors |
| 5. Seat Motors/Actuators | 16. Window Tracks/Guides |
| 6. Fuel Tank Connector | 17. Door Lock Actuator/Switch |
| 7. Trunk Pulldown Switch | 18. HVAC/Radio Controls, Air Bag Clocksprings, Switches: Turn/Hazard, Ignition, Headlamp, Dash Panel Dimmer, Rear Defrost, Window, Seat |
| 8. Hood/Trunk/Fuel Door Cables | 19. ABS Actuators, ABS Motors, TPS, Oil Pressure Sensor, Exhaust Pump, Starters, Superchargers, Idle Air Controls, Trans Temp Sensor |
| 9. License Plate Bulb Socket | |
| 10. Automatic Seatbelt Tracks/Recoil Springs | |
| 11. Rear Seat Reading Light | |

lubricants for a wide range of systems and components. And they specify many of our lubricants to their component suppliers.

In the safety arena, we provide all six lubricants used by one ABS manufacturer and half the lubricants used by another. In addition, a special synthetic grease from Nye is used for disk brake calipers and emergency brake cables in many cars. For 100 percent reliability, our lubes are used in air bag connectors and accompanying clock spring electrical connector ribbons. And our PTFE-fortified formulations offer reliable, low temp — and quiet — performance for automatic seat belts.

Performance accessories — superchargers, throttle position sensors and idle air controls for example — all use wide temperature, high performance Nye lubricants. So do a wide variety of electrical connectors. Properly selected Nye PAO, silicone and fluoroether connector greases can prevent the fretting corrosion and water intrusion that

often cause intermittencies in electrical connectors — those pesky NPFs (No Problem Found) that wreak havoc with mechanics and performance-conscious drivers.

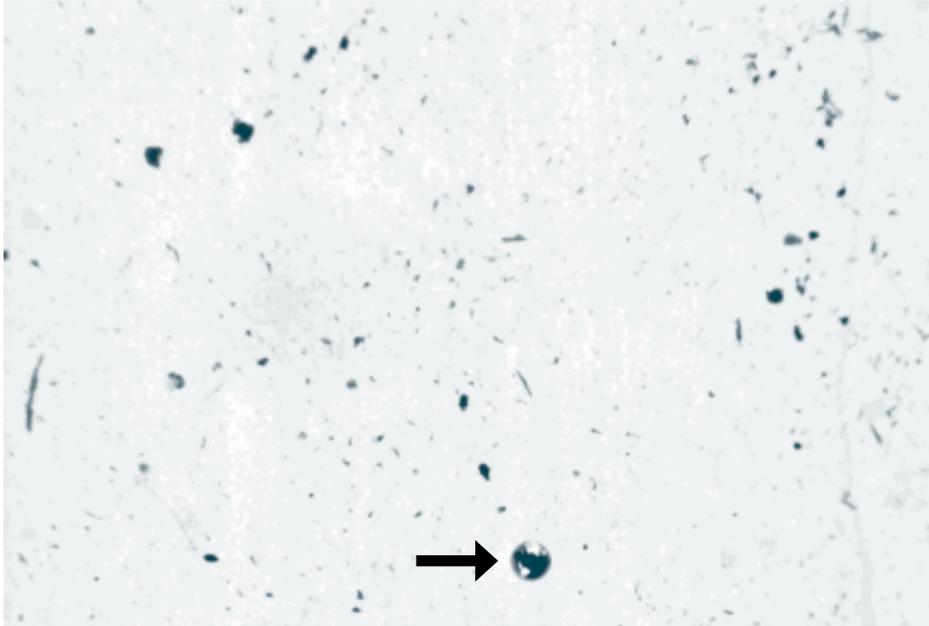
Then, there's the arms-length list of accessories that use Nye lubes for long life and quality performance: sunroof control cables, window lift motors, seat motors and actuators, exhaust pumps where lubricants have to withstand aggressive gases at 400°F, multifunction switches and dozens of other control switches — from HVAC and stereos to instrument panel illumination and head-up displays.

A look ahead After drawing an illustration of the number of auto applications using Nye products, Mark Biteler, Nye's representative in Chicago, offered a suggestion. Illustrate where Nye oils and greases are **not** used in automobiles. Then, he says, we'd have a perfect "visual marketing plan" for 1995.

If any automotive designers want to assist with that illustration, please call Nye.

New Study

"Clean Grease" Provides Better Wear Protection for Precision Bearings



Collision course. A magnified view of a 350 micron ball, (see arrow) about the diameter of a human hair, is surrounded by some of the smaller particulate contaminants removed from a bearing grease through ultrafiltration.

A new study concluded that ultrafiltration of greases can improve bearing life by providing better surface wear protection for precision bearings.

"The test results indicated that the filtered greases provided better wear protection on the bearing surface than those of unfiltered greases...(and) clearly showed that solid particles can cause very serious damage to precision bearings, either long-term wear by fine particles or rapid scoring by coarse particles," the report said.

The study compared filtered and unfiltered versions of two widely used, military precision bearing greases. It was conducted by U.S. Army research engineer In-Sik Rhee at Fort Belvoir, VA, and published in *NLGI Spokesman* (March, 1994), a publication for the lubrication industry.

Nye Lubricants' technical director Paul A. Bessette, who published his own study on ultrafiltration in 1985, said that the new report "is as extensive a look at the effects of ultrafiltration as I've ever seen." Using Nye's ultrafiltration equipment, Paul produced the filtered samples for Mr. Rhee's investigation.

Ultrafiltration, a service commercially pioneered by Nye nearly 15 years ago, removes potentially damaging particulate matter from greases and oils. Lubricants filtered by Nye contain no more than 500 particles in the 10 to 34 micron range per cubic centimeter, and none greater than 35 microns. Each batch is measured against this quality standard for residual cleanliness.

Mr. Rhee investigated whether such ultrafiltration removes critical additives or changes the structure of the thickener, to adversely affect performance. After comparing 18 characteristics of the filtered and unfiltered greases, he found very similar results in performance attributes of both. Further, he reported that the filtered version of one of the greases extended bearing life by 20%.

The report also observed that ultrafiltration did not remove thickener, cause excessive oil separation or change thermal-oxidation stability, and that the cleanliness and homogeneity of filtered greases contributed to reduction of noise level.

"In-Sik's study is a conservative look at the data," Paul said, "but the results

deflate the whole argument that filtration drastically removes additives and thickener from lubricating grease. On the contrary, it demonstrates that ultrafiltration removes harmful particulate contamination, breaks up particles of soap to make them more homogeneous, and does not adversely affect the physical/chemical attributes of the grease."

"The study I conducted nine years ago was more general," Paul added. "I wanted to demonstrate that a whole range of different types of greases could be filtered without adversely affecting major physical properties. I tested six greases, each based on a different thickener system, and found that ultrafiltration did not appear to alter the physical characteristics measured. In-Sik limited the number of greases he studied, and looked at many more physical characteristics. But we both arrived at virtually the same conclusions. At that time, I felt we could filter all kinds of greases, and time has borne out my assumption."

Nye's Ultrafiltration Services

Nye offers ultrafiltration services for any oil or grease — our own or those of other manufacturers. Recommended for all precision bearings, ultrafiltration at Nye removes all particulate matter greater than 35 microns.

Today, a significant percentage of the world's precision bearing manufacturers rely on Nye for ultrafiltration services. For more information about whether ultrafiltration can improve the performance of your device, call Nye at 508-996-6721.

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