

Spring 1995

Solving Design Problems With Synthetic Lubricants

## Two Lubricant Solutions for Telecom Connector Manufacturers

Faced with the need to find environmentally acceptable ways to apply contact lubricants and to extend product life, electrical connector manufacturers are fast turning NyeTact 570 and NyeTact 502G into telecommunication industry standards.

"We're seeing the demand grow on two fronts," explained Nye's Marketing Manager Don Fairbanks. "Since government regulations now restrict the use of chlorofluorocarbons, manufacturers need CFC-free solvent systems to apply the lubricant. Second, manufacturers who do not lubricate connectors are realizing that in the near future contact lubrication will likely become a requirement of all the Bell Systems, and if they want to compete in that market they'll have to add connector lubrication to the manufacturing process."

The chemists at Nye designed NyeTact 570 for noble metal connectors out of necessity three years ago. A raw material for then popular polyphenyl ether-based lubricants became unavailable. Based on studies conducted by AT&T Bell Labs, Nye engineers focused development efforts on other readily available oils. Alternative oils had performed well in AT&T tests, significantly extending the life of noble metal contacts; their only drawback was migration. Nye solved the migration problem by a complex formulation, which held the oil in place. Once introduced, the demand for NyeTact 570 grew quickly among manufacturers of noble metal connectors.

NyeTact 570 is a dispersion of lubricant in a fast-evaporating, nonflammable, ozone-safe fluoroalkane solvent, which also meets the current need for CFC-free solvents. In seconds after application, the benign solvent evaporates and NyeTact 570 becomes a durable, chemically resistant lubricant layer.



*In demand.* NyeTact 570 for noble metal connectors and NyeTact 502G (not pictured) for tin and tin-lead connectors are used widely in the telecommunication industry to protect contacts from wear, prevent corrosion and extend connector life. Evaluation samples of both are available by calling Nye Lubricants at 508-996-6721.

Another Nye product, NyeTact 502G, is the lubricant currently recommended for tin and tin-lead connectors. Recently tested by a national independent telecommunication research laboratory, NyeTact 502G proved to be extremely effective in preventing fretting corrosion and thereby extending contact life.

A high viscosity synthetic gel, NyeTact 502G is dispersed in a fast-evaporating, halogenated solvent, still allowed under current environmental regulations. It provides a thin, uniform, durable lubricant film. For manufacturers who require totally non-ozone depleting solvents, NyeTact 502M is a mineral spirits version of NyeTact 502G.

## Nye Names Two New Representatives in Ohio and North Carolina Regions

To better serve our existing customers and to explore new applications for Nye's lubricants, Nye President and CEO Jerry Madden announced the hiring of Jeff Lay and Jay Weikel as regional sales managers for the midwest and southeast US.

Jeff, based in Ohio, will serve customers and prospective customers in Ohio, Indiana, Kentucky, West Virginia, Pennsylvania and Western New York. Jay will focus on the Carolinas, Florida, Georgia, Virginia and Tennessee.



"We have a substantial piece of existing business in the midwest," Jerry noted, "and as our third regional sales manager in that area, Jeff will be the key to our ability to give even better service to our current customers. He will also be introducing Nye products and services to other manufacturers in that market — which is home to many suppliers and OEMs in the automotive and appliance industry."

The southeast is also growing as an automotive manufacturing center, and Jay's presence there gives us a direct link to that market. In addition, with Jay's background in textiles and chemical engineering at DuPont, Jerry's betting that Nye can make inroads into the textile industry.



Jeff Lay



Jay Weikel

"In the last several years, there's been some heavy duty infusion of dollars into modern equipment by the textile industry in that part of the country — and that equipment is maintained with high performance, synthetic lubricants. That's our field of expertise, and though it's our

first major venture into the maintenance applications, we know we can offer a high quality, competitive, domestic lubricant supply to those manufacturers."

Jeff can be reached at 513-847-2929. Jay's telephone number is 704-587-9447.

## Pennzoil and Nye Team Up to Deliver Lubricants for Space and Other Low Vapor Pressure Applications

At a technical conference about four years ago, an engineer from TRW, Inc. — the company that built rocket engines for the Apollo program, and more recently the communications systems for the first Milstar satellite — asked a researcher from Pennzoil Products Company if they could develop a synthetic hydrocarbon lubricant with a vapor pressure comparable to the vapor pressure of linear perfluorinated polyethers.

Low vapor pressure is an important requirement for lubricants in the vacuum of space, since volatility can be a significant factor in lubricant loss. And for base fluids with very low vapor pressure, linear perfluoroethers were, far and away, the leading choice.

While linear perfluoropolyethers offer several qualities that have made them the preferred lubricant in space — low vapor pressure, very low pour points, thermal stability, to name three — they tend to degrade under boundary lubrication conditions with several commonly used bearing materials. That could jeopardize critical components in aerospace devices — and the mission itself. An alternative synthetic hydrocarbon oil with comparable low vapor pressure would at least open the door to new lubricant formulations designed specifically for boundary conditions.

Two years later, Pennzoil met the challenge. They introduced Pennzane® X-2000, an unformulated multiply-alkylated cyclopentane base oil with a 25°C Vapor Pressure of  $3.5 \times 10^{-11}$  torr — and they began working with Nye Lubricants to develop commercial applications for their new synthetic material.

"Pennzoil did an admirable job of bringing a new commercial product to the marketplace," says Nye's Technical Director Paul Bessette, who is guiding the

commercial development of the new oil at Nye. "There was nothing that even approached the linear perfluorinated ethers in terms of vapor pressure and suitability in rolling element bearings. With this alternative material, there's new optimism about having spacecraft operate longer than they did in the past."

One common problem posed by most oils that can be overcome with Pennzane X-2000 is lubricant migration. Though incompatible with fluorinated oils, NyeBar® barrier film can be used with Pennzane X-2000. By coating the inner and outer race faces, shields, shims, shield retainers and retaining rings, the lubricant can be better contained within the raceway.

Nye distributes worldwide the unformulated Pennzane X-2000 base oil under the name Nye Synthetic Oil 2001A. We also offer Synthetic Oil 2001, a fortified version with boundary lubricants for improved film strength. Our Rheolube 2000 is a sodium-soap grease companion to Synthetic Oil 2001. The temperature range for each product is -45°C to 125°C. Currently, about 20 customers use the product in aerospace applications.

"This oil is also a viable candidate for disk drive bearings," Paul added, "where low volatility reduces the risk of contaminating the media. We look forward to working with disk drive manufacturers and other companies who want to explore how Pennzane X-2000 may serve their lubrication needs."

### Want the next issue of the LubeLetter?

If this is your first issue of our newsletter and you'd like to stay on our mailing list, please check the "Lubeletter" box on the enclosed Literature Request card and return it to Nye.





## Many Solvents, Few Solutions

Many industries are affected by the "passing" of trichlorotrifluoroethane, a CFC-type solvent. Fast evaporating, nonflammable, with low toxicity and relatively inexpensive, it was perhaps the ideal solvent. It was used by Nye as the carrier for many lubricant-plating solutions, which manufacturers used to apply a thin, uniform film of oil or grease quickly and consistently.

Today's solvent options, now that "ozone-safe" is a required selection criteria, are really a mixed bag. For a completely ozone-safe product, perfluorinated solvents — devoid of ozone-depleting chlorine atoms — have some of the benefits of CFCs. They are fast-evaporating, nonflammable and nontoxic. However, these solvents differ from CFCs in two significant ways: they can only be used with fluorinated products — which eliminates their use with all hydrocarbon-based lubricants, and they are expensive. Nye currently formulates several lubricant dispersions using perfluorinated solvents. Both the lubricants and the solvent are available for small volume needs.

With the exception of HCFCs, natural or synthetic hydrocarbon solvents must now be used for hydrocarbon lubricant dispersions, which often forces a trade-off between flammability and volatility in grease-plating applications. As a rule of thumb, the more volatile the hydrocarbon solvent, the lower its flash point. All hydrocarbon solvents are to some degree flammable, so appropriate caution must be taken during application. Some, like mineral spirits, are less flammable but relatively slow to evaporate — which slows the grease-plating process and often adversely affects the consistency of the lubricant film.

HCFCs (hydrochlorofluorocarbons) are still an alternative to hydrocarbon solvents for hydrocarbon-based lubricants. A Class II ozone-depleting chemical, their use has been extended until 2008, to allow time for the development of a suitable substitute. Nye still formulates lubricant dispersions with HCFCs, which offer many of the benefits of Freon and other CFC solvents.



**On the road.** Nye sales representatives Brian Holley, Jay Weikel, Mark Biteler and Jeff Lay along with Marketing Manager Don Fairbanks (not pictured), manned our newly designed display booth at the Society of Automotive Engineers show in early March. Then they headed to the National Design Engineering Show later that month. Booth traffic was made up primarily of product, project and design engineers, requesting information about Nye and lubricants for specific applications.

## Boost Your Lube IQ with New Seminar

If you want a better understanding of the role lubricants can play in product design and product performance, or if you just want to boost your comprehension after reading a lubricant data sheet, Nye's new lubrication seminar is made to order.

Presented using full-color 35 mm slides and overhead transparencies, the seminar introduces design engineers to the science of lubrication. The seminar opens with brief case studies on several performance problems that were traced to poor lubricant selection. It then introduces basic concepts in lubrication engineering, differentiating oils from greases and explaining the role of various thickeners and additives. It reviews distinguishing characteristics of major lubricant families, discusses how to match lubricant families to performance requirements, and suggests a methodology that can be used to design or select a lubricant for a specific application.

Introduced in April, the seminar is presented by regional Nye representatives. Seminar slides can also be viewed as a computer-controlled slide show on individual monitors.

For more information or to schedule a Nye lubrication seminar at your company, call your Nye representative or call Kevin Akin at 508-996-6721 or Fax: 508-997-5285.





# Problem Solver Becomes Auto Industry Standard for Connectors

To hear Brian Holley, Nye's regional sales manager in Detroit, tell the story, Nye's popular automotive connector grease NyoGel 760G didn't rise to fame — it soared.

"Back in the mid-1980s, automotive connector manufacturers were lubricating female terminals with a petroleum-based, lithium-soap grease with a zinc oxide fortification. It was very soft and stringy, which made the injection process slow and messy — but it's what they used. Two years down the road, they discovered the 'lithium grease' was attacking the plastic connector housings, which started falling off the wiring harnesses. That's when we were asked to design a solution," Brian recalled.

Nye's first response was NyoGel 759G, a high viscosity synthetic hydrocarbon that offered plastic and elastomer compatibility and good high temperature stability. It quickly replaced the old petroleum grease. Pushing the envelope, manufacturers then asked for a still stiffer grease to improve injection capabilities, and yet higher temperature capability.



*One useful grease. Very popular among automotive connector manufacturers, NyoGel 760G, a saltwater resistant, high-temp fortified synthetic hydrocarbon grease, meets specifications at Chrysler, Ford and General Motors. For complete technical data and an evaluation sample, call Nye at 508-996-6721.*

"We responded with NyoGel 760G in 1992," Brian said. "It retains the plastic and elastomer compatibility of NyoGel 759G, but it's a bit stiffer for ease in production. People who are using NyoGel 760G say they can run their presses 30 to 50 percent faster — and

much cleaner. There's no stringiness, so the injection tip pulls away clean from the terminal.

"We also boosted the upper temperature range with a new antioxidant additive system, and we added a UV dye. Because NyoGel 760G is a transparent grease it's tough to see. Now they just run the terminals under an ultraviolet light to ensure lubrication: it looks like a string of Christmas tree lights in production."

Today, NyoGel 760G meets specifications at Chrysler, Ford and General Motors. Completely salt water resistant, it is used in antilock braking systems, wheel speed sensors, electronic control modules and other critical underhood and underbody applications.

"About 60 percent of our customers use NyoGel 760G inside the terminals; another 40 percent use it inside the connector housing as an added environmental seal," Brian added.

For more information about NyoGel 760G or other electrical connector lubricants, call Nye at 508-996-6721, or call Brian directly at 810-542-2720.

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