Nye® Lubeletter

The World Leader In Synthetic Lubricants **Volume 28 Number 1**

An Extra Special Issue

Welcome to our first annual "SAE/Best Ride" edition of the Nye Lubeletter!

We've expanded our traditional two-page automotive edition to four for several good reasons — to celebrate SAE 2000 and our long history of partnering with automotive engineers to boost component life and performance ... to highlight our co-sponsorship of the Best Ride competition ... to announce breakthrough lubes that OEMs are calling solutions to BSR problems ... and to tell you about UniFlor — the only family of lubricants you'll ever need for long-life, broad-temp, fuel-and-fluid-resistant, plastic-compatible, automotive applications.

Let us know what you think — and what you need. Call Nye Automotive at (248) 597-0007.

*The Lexus 470 SUV claimed top spot overall in **Machine Design** magazine's fourth annual Best Ride Competition, co-sponsored by Nye Lubricants, Inc.*

UniFlor Unveiled as "Compelling Choice" for Auto OEMs and Suppliers

The show invitation mailed to more than 15,000 automotive engineers by Nye Lubricants just prior to SAE 2000 was simple but provocative. It said, "Good-bye, Krytox®. Hello, UniFlor™."

"We want to get the automotive world's attention," explained Brian Holley, Nye's national sales manager, who also heads up Nye's Detroit team. "And here's our message: if you want a completely inert lubricant, one that's safe on any rubber or plastic component, one that survives extremely high and low temperatures, you've now got a choice — a choice we believe is very compelling."

Hello UniFlor. UniFlor is the new trademark for Nye's family of fluorinated oils and greases. Like Krytox®, UniFlor products are formulated with perfluoropolyether (PFPE) oils. The UniFlor product line, however, goes one step further. It includes PFPE lubricants formulated from not one, but from each of the world's PFPE oils — which makes UniFlor the most comprehensive line of fluorinated oils and greases in the world. For manufacturers who find value in single-source suppliers, the breadth and depth of the UniFlor line is one compelling reason to take a closer look.

Several manufacturers around the globe manufacture PFPE oils, but "all PFPE oils are ***not*** created equal," Brian explained. "Each does offer excellent rubber and plastic compatibility, but there are important distinctions. Because of different base materials and polymerization processes, each oil has a different temperature range, volatility, viscosity, Viscosity Index, and wear prevention ability — all critical considerations in the field of lubrication. So, one thing that makes UniFlor unique is, it's never 'one-size-fits all.' A customer gets the PFPE oil — or a grease formulated from that oil — that's best for his or her application."

"For example," Brian added, "we've now got a PFPE oil that can survive temperatures down to -90°C. We also have what's probably the best metal-on-metal PFPE available. With an operating temperature range of -70C° to +250°C, it's ideal for bearings in alternators, water pumps, and superchargers. No other line of fluorinated lubricants offers this kind of choice."

UNIFLOR™ Performance To The Limit

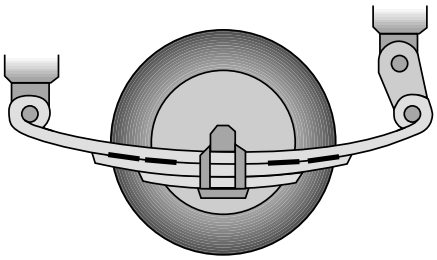
Old, new, improved. While the UniFlor trademark is new, Nye's experience in formulating PFPE lubricants goes back to the early 1970s, just a few years after PFPE lubricants were first introduced. In fact, Nye was the first company to have a complete family of fluorinated greases qualified under military specification. Since that time, the Company has worked closely with design engineers from every industry that uses PFPE lubricants. In the automotive industry, Nye designed PFPE bearing greases for some of the first exhaust pumps. Soon after, it formulated a brake-fluid-resistant PFPE grease that is still specified for antilock braking systems. Today, more than a dozen automotive components — including switches, connectors, potentiometers, sensors, even door-lock tumblers — use PFPE lubricants by Nye.

"We want to continue to work with automotive engineers on the high-end

Turning Over a New – and Quieter – Leaf Spring

A staple on horse-drawn buggies, the leaf spring is probably the oldest vehicle suspension system in use. Popular in a bevy of autos in the heavy-car 60's and 70s, today leaf springs are usually confined to larger vehicles, pick-up trucks, SUV's — and Technical Service Bulletins. Like in the Wild West, leaf springs still squeak.

It's the nature of beast. Lay several lengths of steel on top of each other, and no matter how tightly they're bound, on the road (or off-road!) unlubricated metal on metal eventually is going to make some noise. And in a marketplace that wants even its pick-ups quiet, a little leaf spring squeak can be a particularly pesky BSR problem for service dealers and vehicle owners: Leaf spring squeaks are not easily repeatable. Nonetheless, leaf springs are a proven, rugged, economical suspension system, and fairly inexpensive to repair — which makes the search for a squeak cure a good investment in perceived quality.



***NyoGel 774VH-MS**, Nye's new leaf spring grease, is silencing squeaks in DaimlerChrysler's Dodge Ram pickups.*

Generally, squeaks are caused by friction. So, plastic inserts have been inserted between the steel layers of some leaf springs, to dampen metal-on-metal noise and reduce metal wear. They're quieter, but even with fortified-nylon inserts laced with slippery PTFE, squeaks happen.

DaimlerChrysler decided to tackle the problem head-on. Friction is usually minimized with a lubricant. Could a lubricant also dampen the noise? Nye's regional engineering manager Roger Cady said yes, as long as the lubricant is designed for the job.

A leaf spring lubricant would have to be a very heavy, sticky grease to stay in place on plastic inserts, especially under heavy load and shock conditions. It also would have to resist dirt, as well as water and salt-water washout. Roger recommended a modified version of one of Nye's heaviest damping greases.

***Burma Road**, made up of softball-size rocks, is a grueling test track for leaf-spring squeaks. Squelch those squeaks with Nye Rheolube 774VH-MS. Photo courtesy of **Machine Design**.*

Damping greases were formulated about 50 years ago to build fine tolerances economically into microscopes, telescopes, and binoculars. Applied to focusing threads, they also delivered silent operation. In the mid 1980s when Nye introduced the first broad-temperature line of damping greases, automotive switch manufacturers were among Nye's first customers. Applied to detents, a daub of damping grease quelled the annoying click of plastic switches. Today, damping greases are used in more than 30 automotive parts, including window visors, lumbar adjustment knobs, sunroof motors, parking brakes — and now suspension systems. Nye's new leaf spring grease, a modified damping grease called NyoGel 774VH-MS, was a winner at DaimlerChrysler.

"The engineers were pleased," Roger said, "There was an immediate noise reduction, warranty issues went away, and they gave the grease a part number. It's there to stay. And the solution was relatively inexpensive too — pennies per gram."

Ford suppliers interested in turning over a new leaf can e-mail Brian Cichoski (cichoski@nyelubricants.com). GM folks should e-mail Rick Trecapelli (ricktrec@nyelubricants.com). Either can also be reached at (248) 597-0077. Evaluation samples of NyoGel 774VH-MS are available at no charge.

New Addition at Nye Automotive

Rick Trecapelli

Rick Trecapelli joined the Nye team in Troy, Mich., in November 1999. Rick brings several years experience in the automotive industry, having worked for a major control cable supplier.

"Rick knows first-hand the need for automotive suppliers to meet high performance standards cost-effectively — and how our lubricants play a critical role in achieving that goal," said Nye national sales manager Brian Holley."

Rick will serve as the primary contact at Nye for GM engineers, as well as manage lubricant business related to control cables, shifters, sunroofs, and seat components.

New Grease May Change Rack & Pinion Manufacturing Process

Rack-and-pinion steering is a mainstay in today's vehicle fleet. Over time, excessive gear wear or noise can also make it a warranty issue. That's what an engineer at Visteon Automotive Systems wanted to avoid — and he got more than he bargained for.

All rack-and-pinion systems consist of a toothed rack that mates to a pinion gear. When the steering wheel turns, the pinion gear rotates, which moves the rack to the left or right to steer the car. The Visteon engineer needed a lubricant to minimize wear on the gear teeth.

A separate but related wear and noise issue had to be addressed. On the smooth side of the rack, a spring-loaded yoke is used to keep the rack teeth mated to the pinion gear. The yoke is inserted through a tapped hole on the rear of rack-and-pinion housing. A plug, screwed into the hole, compresses the spring and holds the yoke in place. Under mechanical shock (test labs, potholes, railroad tracks, for example), the rack would bounce, jar the yoke, cause a knocking sound, and exacerbate wear. Typically, an insert, sometimes an expensive composite plastic, was added between the yoke and the polished side of the rack to reduce wear on the rack and yoke. But even inserts wore quickly if the proper amount of torque was not applied to the plug. In addition to steering problems, too much torque on the plug hastened insert wear through excessive pressure. Too little torque hastened wear because it allowed too much play between the yoke and the rack.

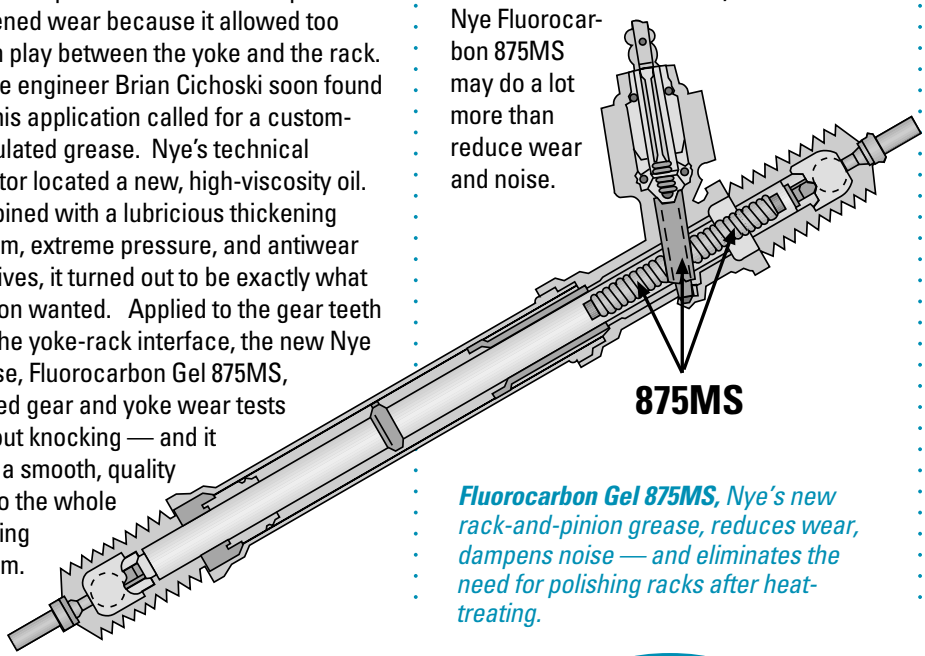
Nye engineer Brian Cichoski soon found out this application called for a custom-formulated grease. Nye's technical director located a new, high-viscosity oil. Combined with a lubricious thickening system, extreme pressure, and antiwear additives, it turned out to be exactly what Visteon wanted. Applied to the gear teeth and the yoke-rack interface, the new Nye grease, Fluorocarbon Gel 875MS, passed gear and yoke wear tests without knocking — and it gave a smooth, quality feel to the whole steering system.

A bonus, the grease also allowed greater tolerances when securing the yoke plug. The viscous grease adheres to moving parts, so mating surfaces don't touch. They actually move within the grease itself. At the yoke and rack interface, this not only silences noise, it eliminates the need for expensive inserts between the yoke and the rack.

Nye Fluorocarbon Gel 875MS will be in next year's Mazda. Lincoln LS and Thunderbird are still in testing, but based on results to date may convert for the upcoming model year. Notably, a Visteon engineer reported that he was using only 12 grams of Fluorocarbon Gel 875MS in the Mazda rack-and-pinion system, and was getting better performance than he got with 50 grams of the old petroleum grease.

The story doesn't end there, however. Visteon uses two yoke styles, the oval and the Y-shaped. After heat-treating the Y-racks, Visteon traditionally hand-buffs each rack to remove scaling and asperities. With the former grease, polishing the rack helped reduce wear. Brian suggested a wear-test on unpolished racks with the new Nye grease. To everyone's amazement, unbuffed outperformed buffed racks!

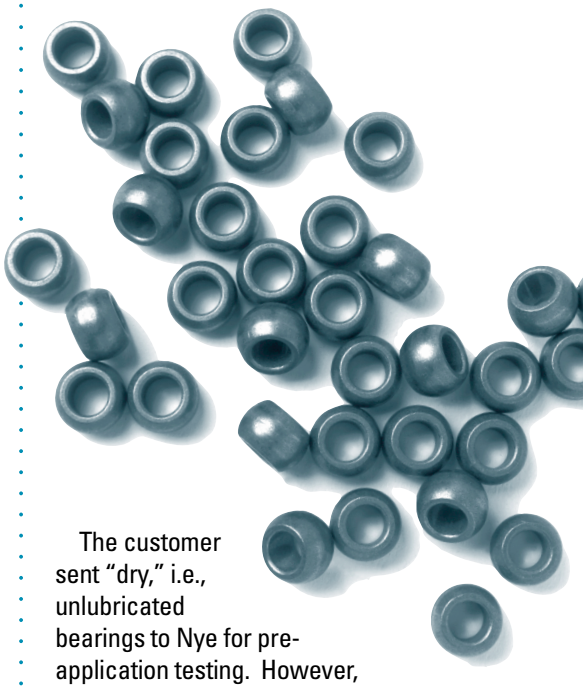
No one has yet calculated the cost savings that could result from eliminating the labor-intensive, rack-polishing operation. But with more than 600,000 Y-racks manufactured each year at Visteon, Nye Fluorocarbon 875MS may do a lot more than reduce wear and noise.



Fluorocarbon Gel 875MS, *Nye's new rack-and-pinion grease, reduces wear, dampens noise — and eliminates the need for polishing racks after heat-treating.*

The Case of the Squealing HVAC

A Tier One supplier wanted an oil for powdered metal bearings in an HVAC motor — to prevent wear and to stop the squeal when the car heater was turned on at 10°F. It wasn't simply a matter of finding the right lubricant.



The customer sent "dry," i.e., unlubricated bearings to Nye for pre-application testing. However, through a soxlet extraction process, Nye was able to remove oil from the bearings — not lubricating oil, but residual process oil used in the manufacture of the bearings. Process oil left in the bearings can pose two problems. First, it takes up space, thereby reducing the amount of lubricant the bearing can hold. Worse, if the lubricant of choice is a polyalphaolefin, ester, or polyglycol, the process oils, with their poor thermooxidative stability, exacerbate degradation of the lubricant.

Nye, therefore, recommended more than a lubricating oil for the sintered bearing. It recommended a complete impregnation process: extract process oils; use a UniFlor oil to assure good low-temperature performance; ensure a full complement of oil within the bearing by impregnating in a vacuum chamber for 24 hours @ 100°C. Outcome: noise problem gone, operating life extended.

(continued from page 1)

components that can benefit from PFPEs," Brian commented. "With our newly expanded stock of PFPE oils and greases, we can offer even more than we did before. But we also want to talk to production engineers — and purchasing agents. Each time a PFPE grease is used on the assembly line or at a dealership to quiet squeaky rubber or plastic components in the cockpit — and there's a ton of it used each year — UniFlor can improve quality and cut costs."

Custom lubes, private labeling — a specialty. Nye's other chemistries coupled with its value-added services make UniFlor even more attractive. Nye is committed to providing the best lubricant for each application. For many applications, it's not a PFPE. To achieve this goal, Nye stocks and designs lubricants based on all commercially available synthetic oils, including synthetic hydrocarbons, polyglycols, esters, silicones, and polyphenyl ethers.

If an application does call for a PFPE and a good match can't be found in the current UniFlor line, Nye engineers can custom-formulate a new PFPE lubricant to meet customer requirements.

"Our custom-lubricant services take on new meaning with UniFlor," said Nye technical director Paul Bessette. "To be able to select the best PFPE base fluid for the task at hand gives us the unsurpassed capability of putting the best lubricant forward."

Water or salt-water washout *is not a problem for Nye's Fluorocarbon Gel 880 under conditions that challenge moving parts in any suspension system. Photo courtesy of* ***Machine Design*** *magazine.*

Nye also offers a full range of specialty packaging services, including private labeling. If our customers want UniFlor packaged with "a GM Vehicle Care, Mopar, Motorcraft, or Goodwrench label, we can do it," Brian said. "We can also assemble service kits, complete with instructions, for immediate distribution to dealerships."

New brand, new challenges. With the world's most complete full line of PFPE lubricants, the challenge now is not aggressive product development. It's introducing more engineers and purchasing departments to UniFlor — and the advantages of working with Nye.

"With UniFlor, we make life easier for customers, said Nye president and CEO Dr. Gerald I. Madden. "They can now get both the raw material best suited for their application and extensive lubricant design experience from a single source. And that's a message we know means a lot to the automotive industry."

A Quick Glance at UniFlor for Automotive Applications

UniFlor Series	Service Temp. (°C)	Typical Applications
8100	-54 to 250	The economical BSR/NVH lubricant. No-worry, plastic and elastomer compatibility. Also suitable for gears, slides, and light-duty bearings. Second-source for Krytox® GPL 105, 205, 225.
8500	-54 to 250	Popular, general purpose, wide-temperature automotive grease for underhood tin/lead connectors, lightly loaded bearings, switch mechanicals, lead screws. Used in ABS systems. Ford and GM spec (under former product name).
8700	-70 to 250	Broad-temperature, high-load bearing lubricant, ideal for alternators, idlers, water pumps, compressors, and superchargers.
8900	-90 to 250	Extreme temperature lubricant now used by First Tier suppliers for underhood and fuel tank sensors, especially when low temperature and low torque are critical.

Krytox® is a registered trademark of DuPont.

Nye Captures QS 9000, Starts Baldrige Process

In December 1999, Nye Lubricants became one of two synthetic lubricant companies in the US to earn QS-9000/ISO 9001 — and the only one that offers all commercially available synthetic fluids.

Registered with the British Standard Institute, Nye is now reviewing requirements for ISO/TS-16949, a new world-wide quality system announced late last year. In addition, the Company has initiated a program which leads to competing for the Malcolm Baldrige National Quality Award. While ISO promotes rigid process standards, the Baldrige criteria focus on performance excellence, in strategic planning, customer and market focus, business results, and several other categories. The Award was established by the National Quality Improvement Act of 1987.

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