

Powertrain & Underhood



A lubrication guide for engineers who design powertrain and underhood components

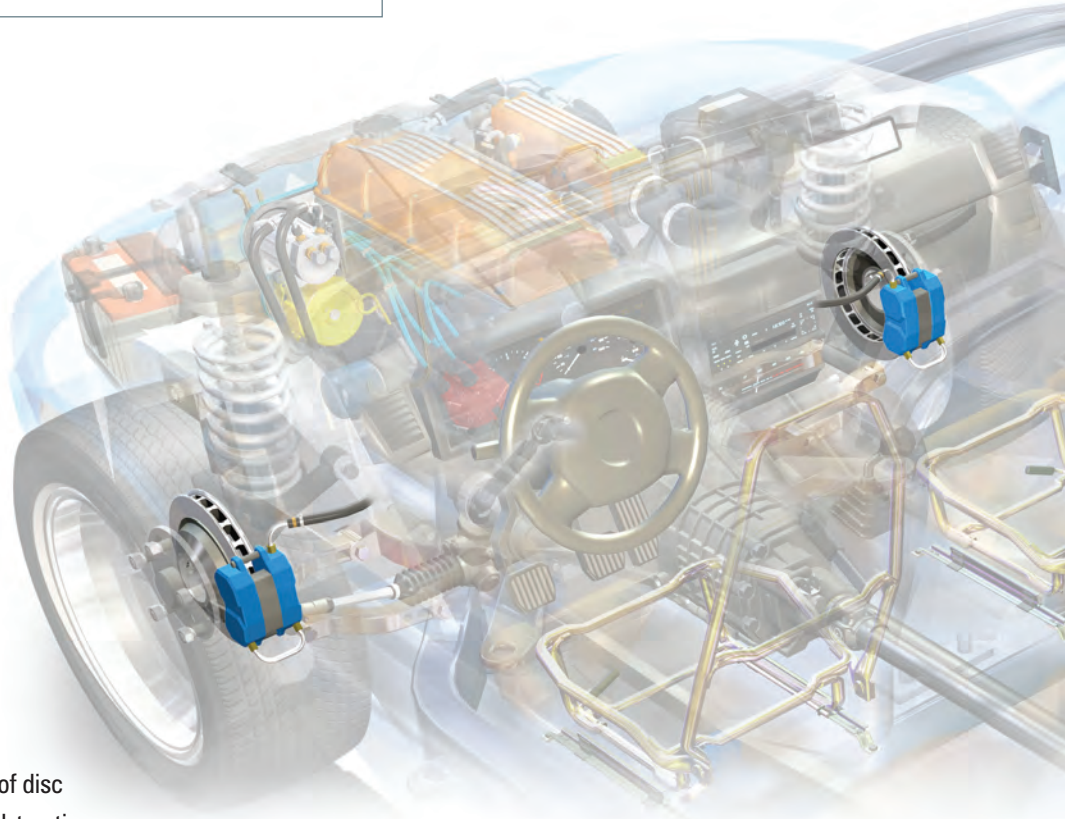


Powertrain & Underhood

It's getting hot in here. Powertrain and underhood components share the automobile's least forgiving environment. Mounted in, around or atop the engine, underhood components must routinely operate at temperatures exceeding 150°C. Trends indicate that underhood components will become even smaller and run hotter. For powertrain components, add the challenges of dirt, road grit, low-temperature torque and wide temperature swings. Synthetic lubricants can go a long way toward ensuring the reliability and long operating life of these components.

In this brochure, we highlight some of what we've learned about the lubrication of powertrain and underhood components — knowledge that comes from working with OEMs and world-class Tier One suppliers. Use it to think about the best lubricant for your application early in the design process. Then, call Nye for specific recommendations and lubricant samples for your application.

Log on to NyeLubricants.com for datasheets, MSDS, and more information about synthetic lubricants.



Disc and Drum Brakes

Calipers are an integral part of disc brakes, anti-lock brakes and traction

control systems. Key to their peak performance is a lubricant's ability to survive temperatures from -40°C to 200°C. Silicone-based lubricants have proven very successful in meeting this requirement. They are compatible with EPDM, provide excellent long-life wear protection, resist salt water and road grit, and represent one of the most economical choices for 200°C applications. Silicone greases for calipers may also be used for the adjusting screw and backplane of drum-brake mechanisms, which reduces the number of parts in your design. *Nye suggests: Fluorocarbon Gel 880*

Electric Brakes

For bearings and gears of electric brakes, a PTFE-thickened, medium-viscosity, fluorinated grease is recommended. *Nye suggests: UniFlor™ 8921R*

ABS and TCS

Bearings, pistons, and lead screws in anti-lock braking systems are constantly exposed to brake fluid. EPDM rubber seals and o-rings also pose potential compatibility problems when exposed to some synthetic oils and greases. PFPs are the only extreme-temperature lubricants that are EPDM compatible and resistant to brake fluid. Traction control systems use essentially the same components as ABS; fluorinated greases have also proven successful in these systems. *Nye suggests: UniFlor™ 8512*

Lubrication Tip

Silicones have many properties that make them excellent lubricants, including wide-temperature capabilities and low cost.

Starter Motors

Starter motors must withstand the elements, temperatures from -40°C to 200°C, and 50,000 duty cycles or more. Issues of high load and torque, especially during cold crank, also have to be considered. Effectively lubricating the motors' gears, bearings and splines requires a careful blend of synthetic oils, additives and gellants. Popular starter-motor lubricants feature PAO and ester blends with additives for extreme pressure, corrosion protection and friction reduction.

Nye suggests: Rheolube™ 380

Starter Motor Solenoid

Failure of the starter motor solenoid can lead to "click, no crank." A motion-damping, water-resistant PAO mitigates this problem. It eliminates piston solenoid galling. It also slows the motion of the piston. This reduces the incidence of gear misalignment, which in turn reduces gear knock, extending the life of the gears and reducing potential warranty issues. *Nye suggests:*

NyoGel® 774L

Superchargers and Turbochargers

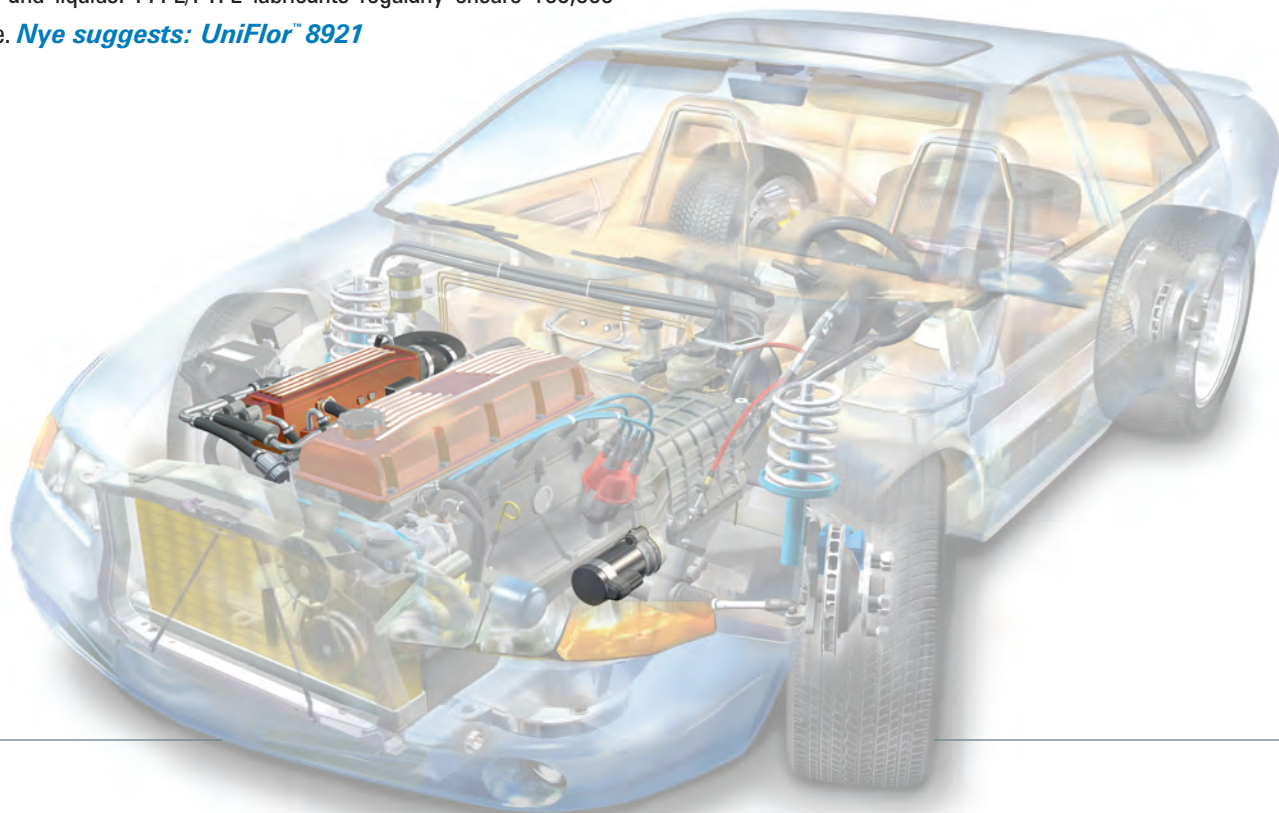
Synthetic lubricants have been a mainstay in lube-for-life superchargers and turbochargers. For gears and powdered metal parts, a light viscosity ester oil with a copper deactivator and EP agents is recommended. For high-speed bearing applications, a light viscosity ester grease with EP additives has a good track record. *Nye suggests: Nye Synthetic Oil 605*

Lubrication Tip

Molybdenum disulfide is an excellent EP additive for high-load, metal-on-metal applications.

EGR Valve

The Exhaust Gas Recirculation (EGR) valve is exposed to extremely high temperatures and acidic exhaust fumes. PFPEs thickened with PTFE perform well in this demanding environment. They offer the broadest temperature capabilities of any synthetic lubricant and are unaffected by corrosive gases and liquids. PFPE/PTFE lubricants regularly ensure 100,000 mile EGR service. *Nye suggests: UniFlor™ 8921*



Electronic Throttle Control

The stepper motor that powers an electronic throttle control must withstand high temperatures as well as caustic, fuel-system vapors. Fluorinated lubricants, inherently inert, tolerate this kind of environment. In addition to staying fluid at very low temperatures, their superior thermooxidative stability prevents high-temperature varnishing, even at continuous temperatures of 250°C. **Nye suggests:** *UniFlor™ 8512R*

Idle Air Actuator

An extremely small stepper motor with very low torque, the idle air actuator requires a low-viscosity synthetic bearing lubricant for cold-temperature performance. The lubricant must also survive an extreme temperature environment rich in fuel vapors. An extremely light, fluorinated grease, thickened with PTFE is recommended. PTFE exerts minimal drag on the system. Fluorinated oils can be specified for temperatures from -90°C to 250°C. **Nye suggests:** *UniFlor™ 8961*

Cooling Fan

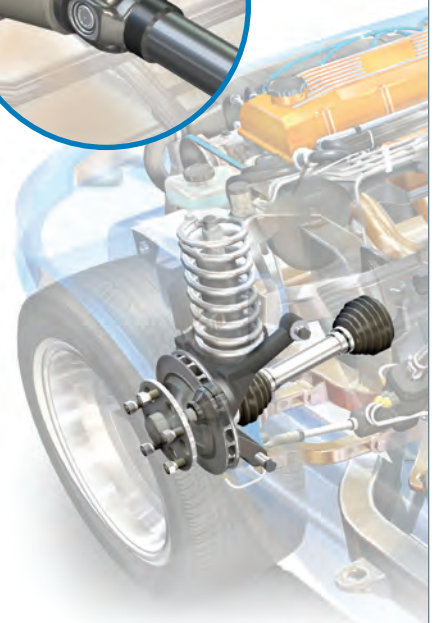
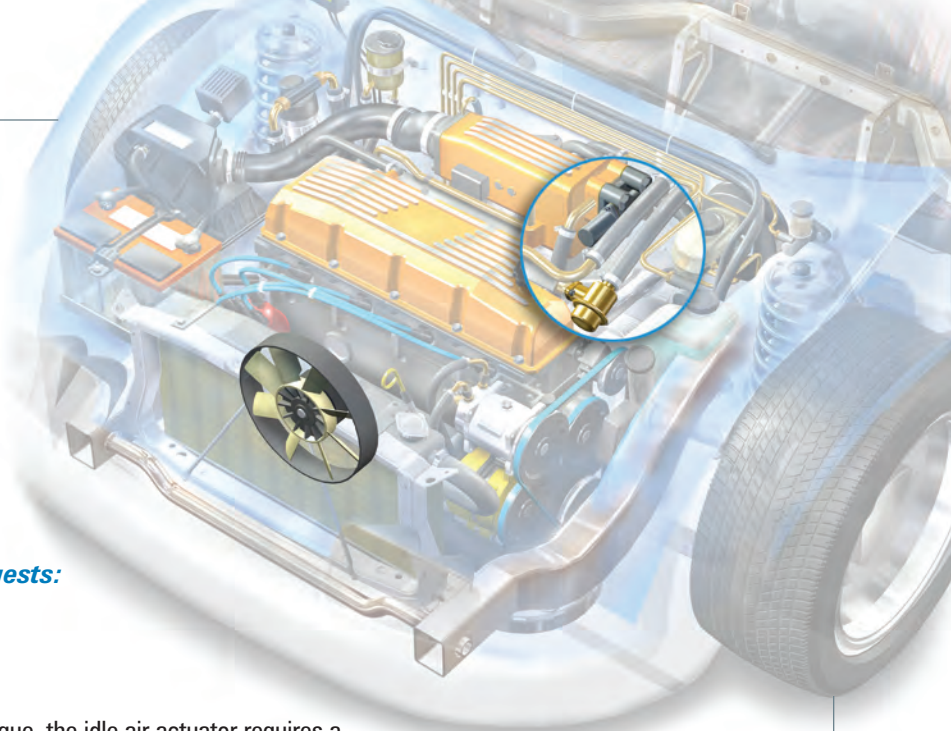
Radiator-fan motor bearings must withstand high heat, dust, dirt and debris. A complex sodium-soap, light viscosity ester is effective. It is also an option for bearings in alternators, water pumps, and air conditioner condensers. **Nye suggests:** *Rheoplex™ 6000HT, Rheotemp™ 500*

CV and Universal Joints

High speed. High load. High temperatures. Boot compatibility. To address the multiple lubrication challenges posed by constant velocity and universal joints, a blend of synthetic hydrocarbons oils with EP additives and antioxidants has proven successful. Alkylated naphthalene blends show great promise. PAO/ester blend greases deliver long life for heavily loaded metal gears. **Nye suggests:** *Rheolube™ 380*

Wheel Bearings

Applying synthetic lubricants to wheel bearings makes the rotating interface as efficient as possible, improving fuel consumption — particularly for high-performance vehicles. A medium viscosity, synthetic hydrocarbon grease offers excellent performance. **Nye suggests:** *Rheolube™ 365A*





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