

The Hotter It Gets, The Hotter It Gets

AMSOIL Severe Gear® Synthetic Gear Lubes provide superior protection against thermal runaway

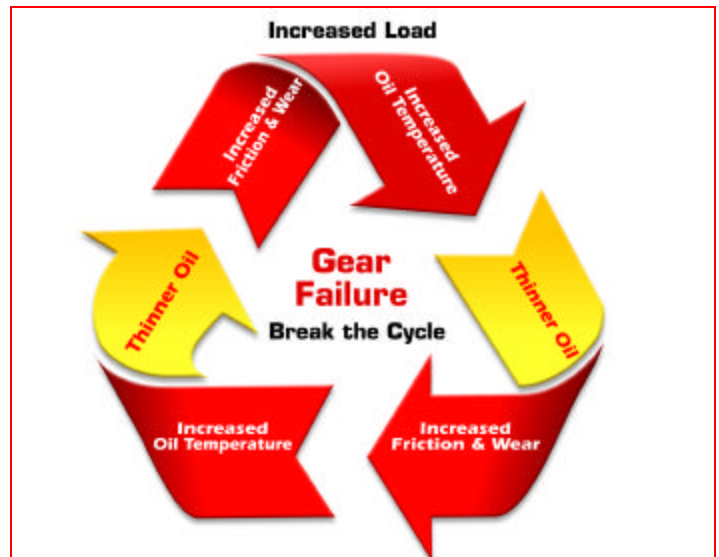
Modern turbo diesel pickup trucks, V-10 gasoline pickups and sport utility vehicles (SUVs) and high-horsepower V-8 trucks boast more towing and payload capacities than ever before. In fact, the market has seen a 34 percent increase in engine horsepower over the last decade. In the light truck segment, there has been a 93 percent horsepower increase since 1981. In vehicles such as a fifth-wheel equipped Ford F-350 Super Duty, towing capacities have reached a high of 19,200 lbs. Testing shows that in new axle applications simulating trailer-towing at 88 km/h (55 mph) at a 3.5% grade, temperatures can reach as high as 188°C (370°F). Differential stress has also increased in limousines, conversion vans, and trucks and cars with modified, high-performance engines.

The extreme loads, pressures and temperatures experienced by modern vehicles place increased stress on gear lubricants that can lead to a serious condition known as **thermal runaway**. As temperatures in the differential climb upward, gear lubricants tend to lose viscosity, while extreme loads and pressures can break the lubricant film, causing increased metal-to-metal contact and heat. The increased friction and heat, in turn, cause the lubricant to lose further viscosity, which *further* increases friction and heat. As friction and heat increase, lubricant viscosity decreases. As viscosity decreases, friction and heat continue to spiral upward. The hotter it gets, the hotter it gets. It is a vicious cycle that eventually leads to greatly increased wear and irreparable equipment damage.

AMSOIL Severe Gear Synthetic Extreme Pressure (EP) Gear Lubes feature an exclusive blend of high viscosity, shear stable synthetic base oils and an extra treatment of high-performance additives that provide a highly protective iron sulfide barrier coating on gear surfaces. Severe Gear Synthetic Gear Lubes effectively protect equipment from thermal runaway through superior viscosity protection.

Viscosity Protection

Viscosity is the most important property of a lubricant in its defense against friction and wear. Viscosity correlates to film strength, and it is film strength that keeps moving parts from contacting each other and creating friction, heat and wear. The higher the viscosity of a lubricant, the greater protection it provides. AMSOIL Severe Gear Synthetic Gear Lubes are available in 75W-90, 75W-110, 75W-140, SAE 190 and SAE 250 viscosities, each providing superior protection through superior film strength.



As gear and bearing loads increase, oil temperature rises. As oil temperature rises, the oil becomes thinner. When the oil becomes thinner, wear protection is reduced and friction increases. As friction and wear increase, the oil temperature rises further, the oil becomes even thinner, and the friction and wear increase again. This nasty cycle called thermal runaway can ultimately lead to gear failure. AMSOIL Severe Gear® Extreme-Pressure Lubricants are shear stable. They maintain their protective viscosity in the most demanding gear applications. Break the cycle with AMSOIL Severe Gear.



Viscosity Index

As temperatures rise, gear lubricant viscosity and load-carrying abilities decrease. A lubricant's viscosity index (VI) indicates its ability to maintain its protective viscosity in high temperature service. The higher a lubricant's VI, the less its viscosity changes in temperature extremes.

The ASTM D-2270 Viscosity Index test measures a lubricant's viscosity change between 40°C (104°F) and 100°C (212°F). AMSOIL Severe Gear Synthetic 75W-90 Gear Lube provides a high viscosity index, allowing it to protect against thermal runaway by maintaining its superior viscosity protection in high temperature service.

Shear Stability

Many gear lubes are formulated with viscosity index (VI) improvers in order to ensure multi-grade viscosity protection in both hot and cold temperatures. VI improver additives keep lubricants from becoming too thick to flow in cold temperatures and too thin to protect in high temperatures. However, shearing forces within equipment can cause these additives to break down and lose viscosity.

The CEC L-45-A-99 (KRL) 20-Hour Shear Test is a requirement for all automotive gear lubes to ensure they do not shear down and fall below minimum viscosity requirements. The graph shows initial oil viscosity and viscosity following the test, while the shaded area indicates SAE J306 high-temperature viscosity requirements for SAE 90 gear lubes.



The superior viscosity protection, viscosity index and shear stability properties of AMSOIL Severe Gear Synthetic Gear Lubes effectively protect equipment from the devastating effects of thermal runaway. Severe Gear Synthetic 75W-90, 75W-110 and 75W-140 Gear Lubes are ideal for severe-duty applications, including towing, hauling, steep hill driving, commercial use, plowing, racing, off-road use, rapid acceleration, frequent stop-and-go operation and high ambient temperatures.

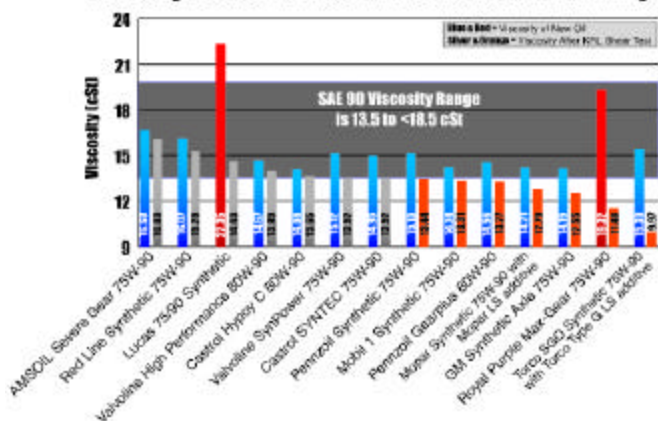
Severe Gear 75W-90 provides superior performance and replaces competing 75W-90 and 80W-90 gear oils. It delivers the best fuel efficiency and cold temperature performance in the Severe Gear line.

Severe Gear 75W-110 provides superior performance and replaces competing 75W-110, 75W-90 and 80W-90 gear oils. It delivers better viscosity protection than Severe Gear 75W-90 and better fuel efficiency than Severe Gear 75W-140.

Severe Gear 75W-140 provides superior performance and replaces competing 75W-140, 80W-140 and 85W-140 gear oils. It is recommended where these viscosities are required by OEMs and where maximum viscosity protection is needed for extreme severe-duty applications.

Severe Gear Synthetic SAE 190 and SAE 250 Gear Lubes are formulated for racing and off-road applications, including off-road truck racing, rock racing, rock crawling, tractor pulling, funny car racing and dragster racing. Other severe duty applications include heavy duty trucks and equipment where increased lubricant film is necessary.

Viscosity Before and After KRL 20-Hour Shear Stability Test



As seen in the graph, two gear oils failed SAE J306 requirements before the shear test began, exceeding the maximum 18.49 cSt initial viscosity requirements for SAE J306. Viscosity measurements following the test revealed that seven gear lubes sheared down below the minimum viscosity requirements for SAE J306. AMSOIL Severe Gear 75W-90 tested in the proper initial viscosity range and retained the highest viscosity of all tested oils after the shear test, indicating its superior ability to protect against thermal runaway by maintaining its protection qualities in severe, high shear operating conditions.