THE TREND TOWARD LOWER-VISCOSITY MOTOR OILS

When AMSOIL Synthetic Motor Oil was introduced in 1972, 10W-40 motor oil was widely recommended in passenger cars/light trucks. Today, according to the *Lubes'n'Greases* 2013 Industry Factbook, 10W-40 represents just 2 percent of U.S. sales. Not only that, but 10W-40 is no longer included in the *National Oil & Lube News* Operator's Survey, one of the most in-depth studies of the oil installer market.

Today, 5W-30 is king, accounting for 56 percent of the market. However, its position at the top doesn't figure to last much longer; according to *Lubes'n'Greases*, SAE 5W-20 and 0W-XX will represent more than 60 percent of the passenger-car/light-truck market before the decade ends. Most newer Toyota and Honda vehicles require 0W-20 motor oil, while Dodge and Ford require 5W-20 in many of their newer vehicles. Even lighter oils are on the horizon. Last spring, the Society of Automotive Engineers (SAE) added SAE 16 to the SAE J300 Engine Oil Viscosity Classification Standard, clearing the way for SAE 0W-16 oils.

What explains the downward trend in viscosity? A need for improved low-temperature performance and the need to meet tightening corporate average fuel economy (CAFE) requirements. Because they circulate easier during cold starts and improve fuel economy due to reduced internal friction, original equipment manufacturers (OEMs) have been recommending lower-viscosity oils to maximize performance. Since 5W-20 and 0W-XX oils cannot be formulated without synthetic base stocks, demand for synthetics has been increasing. Plus, some motorists feel lower-viscosity oils may not provide adequate wear protection, making high-quality brands, like AMSOIL, even more attractive.

The Era of Monograde Oils

The standard for assigning the viscosity grades most motorists are familiar with today began in 1911 with the publication of the SAE J300 Engine Oil Viscosity Classification Standard. It defined only five monograde viscosities (SAE 10, 20, 30, 40 and 50) based on flow rates at 100°C (212°F), or normal engine operating temperature.

Over time, the SAE J300 Standard was augmented and improved. By 1926, SAE 60 was added and a standard scientific measurement of viscosity, known as centistokes (cSt), was adopted to replace rate of flow. As more people began buying cars and changing oil throughout the decades that followed, it became evident that heavier grades of oil didn't offer the low-temperature performance engines needed during the winter months. As a result, many motorists adopted the habit of switching from a heavier oil – SAE 40, for example – to a lower viscosity as winter approached. The practice was both inconvenient and wasteful.

Clarifying Cold-Weather Performance

A major development occurred in 1952 when the SAE J300 Standard was updated to include a set of winter-grade designations denoted by the letter "W". They included 10W, 15W, 20W, 25W and 30W and were determined by the oil's viscosity at 0°F. Assigning a winter-grade viscosity helped address problems with oil performance in cold weather. Automotive engineers and motorists had come to realize that oils formulated from different crude-oil sources behaved differently in service. For example, when the temperature dropped below freezing, an SAE 20 oil refined from crude oil sourced from the Gulf Coast was much thicker than an SAE 20 oil refined from Pennsylvania crude. Although they were both SAE 20 motor oils and their viscosities were similar once the engine reached operating temperature, the SAE 20 designation didn't communicate the difference in winter performance. The introduction of winter-grade designations changed that.

Did You Know?

Viscosity is the measurement of a lubricant's resistance to flow. It is considered a lubricant's most important property. How viscosity reacts to changes in temperature, pressure or speed determines how well the lubricant performs. Synthetic lubricants maintain viscosity during severe operating conditions better than conventional lubricants, providing increased protection and performance.

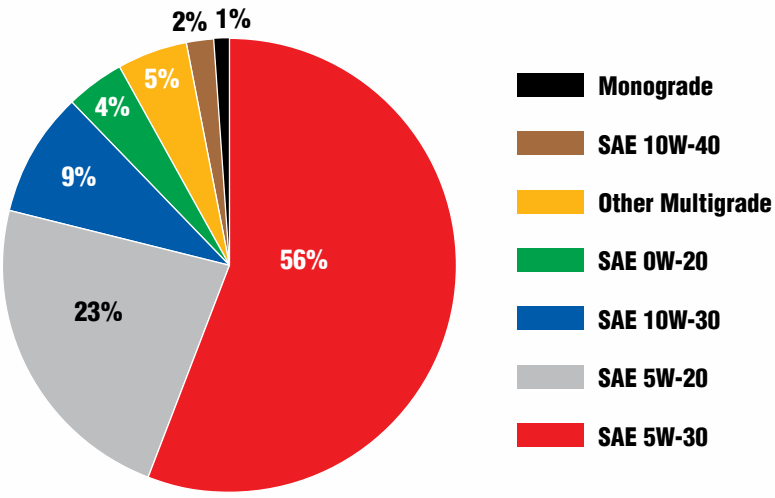
Multigrade Motor Oils

Soon after, the development of viscosity index (VI) improvers ushered in the multigrade motor oils consumers know today. Multigrade oils offer the best of both worlds – good performance and engine protection both at start-up and once the engine has reached operating temperature. A 5W-30 oil, for example, offers the fluidity of an SAE 5W oil at -30°C and the stability of an SAE 30 oil at 100°C.

VI improvers minimize thinning of the oil as temperatures increase. This allows a thinner conventional base stock to also meet higher temperature requirements. Low-quality VI improvers, however, are prone to two significant problems: they can thicken the oil at low temperatures and can shear when subjected to shearing forces inside the engine, causing oil viscosity loss. High rates of shear occur in areas where the oil is forced through narrow passages, such as between the piston rings and cylinder walls. Viscosity loss due to shear can result in excess oil consumption, increased deposit formation and wear.

Motor Oil Viscosity Demand for All U.S. Cars and Light Trucks, 2012

Lubes'n'Greases 2013 Industry Factbook



Like other raw materials, VI improvers are available in a range of qualities, so while other oils may be formulated with low-quality VI improvers, superior oils, such as AMSOIL synthetic motor oils, are formulated with shear-stable VI improvers that enhance the oil's low- and high-temperature performance.

By the 1970s, multigrade oils gained favor with OEMs, with 10W-40 emerging as the most recommended viscosity due to its performance in a wide range of operating temperatures and its fuel-economy benefits.

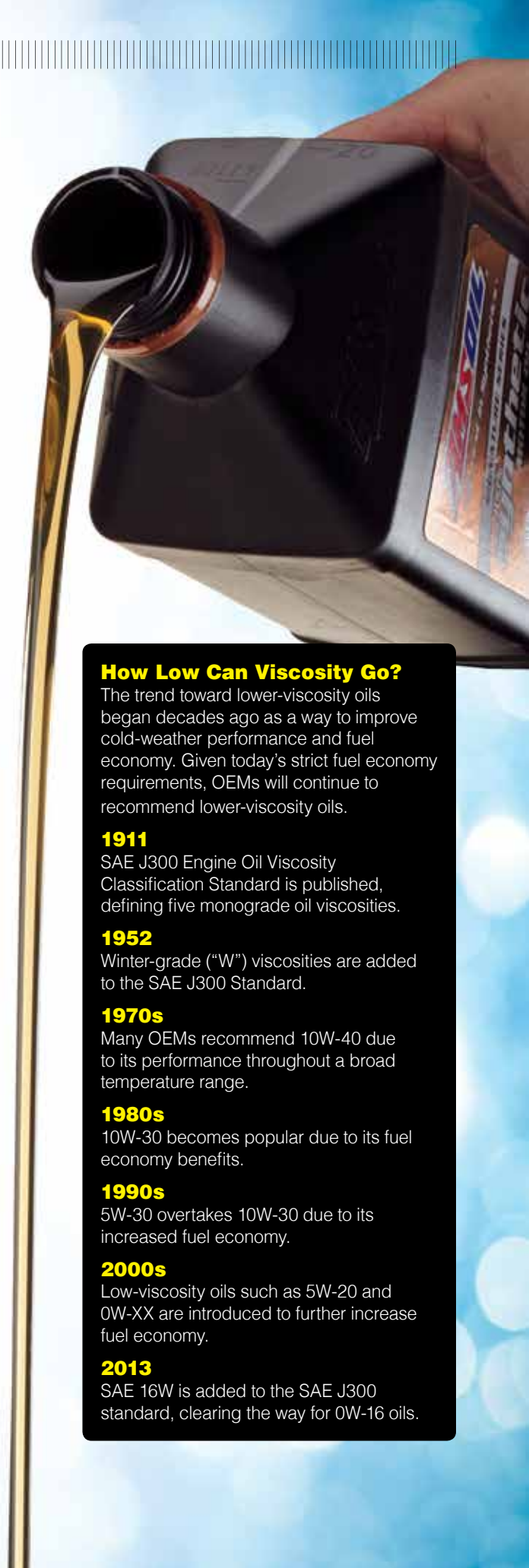
Thin Is In

In the fall of 1973, the Organization of Arab Petroleum Exporting Countries (OAPEC) announced an oil embargo against the United States, leading to inflated gas prices and widespread shortages. Two years later, the federal government introduced the first CAFE requirements in an effort to reduce the country's dependence on foreign oil. It required OEMs to increase the average fuel economy of their passenger car fleets to at least 18 mpg by model year 1978. CAFE standards have since grown more strict, with an increase to 35.5 mpg beginning in 2016 and 54.5 mpg by 2025. OEMs that fail to comply face heavy fines.

To meet the requirements, OEMs built smaller cars with smaller engines that used lighter-viscosity oils. As a result, 10W-30 soon gained favor over 10W-40. And by the 1990s, 5W-30 was the most recommended viscosity, and remains so today.

Quality is Key

Although lower-viscosity oils are proven to increase fuel economy, some motorists question their ability to protect against wear. The key is to use a premium oil that balances fuel economy and wear protection. AMSOIL synthetic motor oils are formulated using high-quality synthetic base stocks that maintain a strong lubricating film between metal components. Their premium additives resist viscosity loss due to shear to ensure engines receive excellent wear protection no matter which viscosity is used. ■



How Low Can Viscosity Go?

The trend toward lower-viscosity oils began decades ago as a way to improve cold-weather performance and fuel economy. Given today's strict fuel economy requirements, OEMs will continue to recommend lower-viscosity oils.

1911
SAE J300 Engine Oil Viscosity Classification Standard is published, defining five monograde oil viscosities.

1952
Winter-grade ("W") viscosities are added to the SAE J300 Standard.

1970s
Many OEMs recommend 10W-40 due to its performance throughout a broad temperature range.

1980s
10W-30 becomes popular due to its fuel economy benefits.

1990s
5W-30 overtakes 10W-30 due to its increased fuel economy.

2000s
Low-viscosity oils such as 5W-20 and 0W-XX are introduced to further increase fuel economy.

2013
SAE 16W is added to the SAE J300 standard, clearing the way for 0W-16 oils.