Oil Viscosity

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Oil has changed so much over the years. With today's number of choices and types, it's really interesting to see this evolution. Manufacturers keep moving more in the direction of synthetic oil, which does help with the life of the engine and its components in many cases. However, there are several determining factors in the type of oil to use. Probably one of the most basic is viscosity—or a fluid's resistance to flow. Understanding viscosity helps with the engine's ability to reduce wear, improve fuel economy, and make more horsepower. But the most important of all of these (in my opinion) is the wear of the engine and its internal parts as we usually want to keep our engines running as long as possible.

To begin with, in oil nomenclature, "W" does not stand for "Weight." It's a common mistake that I see all the time. It stands for "Winter" and that is the key to understanding viscosity grades. The Society of Automotive Engineers has developed standards and classifications for oils. As an example, 10W-30 is a multi-grade (two viscosities) motor oil and, as the name implies, it meets more than one grade. Looking back 50 or 60 years, there were winter grades for cold weather and summer grades for warmer weather. A typical winter grade was 10W. A typical summer grade was 30. These oils were "straight grade" oils. A 10W oil flows well in cold weather to protect the engine at start up, but it is too thin for use in the summer. A 30-grade oil, thick enough to protect in the heat, was recommended for summer use.

Then multi-grade oils were formulated. A 10W-30 had the winter cold-start flow properties of a 10W and the summer, high-temperature thickness of a 30 grade. Multi-grade oils could stay as close to the optimum viscosity over a range of temperatures—not too thick when it is cold and not too thin when it is hot.

The difference between 0W-30 and a 10W-30 is indicated by how well each flows at lower temperatures. The viscosity of hot oil is measured using different test parameters than when the oil is cold, so the numbers after the "W" don't relate to the numbers in front of the "W." The difference between 10W-30 and a 10W-40 is the high-temperature viscosity. Obviously, a 10W-40 is thicker than a 10W-30 at high temperature.

So how do we put this understanding of viscosity grades to practical good use? Remember that using oil with a viscosity that is too high can result in excessive oil temperature and increased drag. Using an oil with a low viscosity can lead to excessive metal to metal contact between moving parts. Using the correct viscosity oil eases starting, reduces friction, and slows wear. For a standard engine in your daily driver, I definitely recommend following the manufacturer's guidelines. They have spent millions of dollars developing the engine so they have already done the homework on what is best. For other applications, especially our older cars with rebuilt engines, you just need to look at how the car and engine is used.

For more effective start-up protection, use a synthetic 10W-40 instead of a conventional 20W-50. The synthetic 10W-40 flows easily while maintaining enough viscosity to protect piston skirts and bearings when the engine gets hot. The improved temperature stability of synthetics makes them a better choice for race engines and serious high-performance engines. Even with a synthetic, however, viscosity changes with temperature. Selecting the correct viscosity for an application requires knowing the operating temperature of the oil. Engines that run high operating oil temperatures require higher viscosity oil.

"THE DIFFERENCE BETWEEN 0W-30 AND A 10W-30 IS INDICATED BY HOW WELL EACH FLOWS AT LOWER TEMPERATURES."

Engines that run low oil temps require lower viscosity oil. Look at an NHRA Pro Stock engine, a NASCAR Sprint Cup engine, and a World of Outlaws 410 Sprint engine. Each engine has a very different operating oil temperature—Pro Stock, 100°F; NASCAR, 220°F; and Sprint cars, 300°F. All three engines run very different viscosity oils as well—SAE 0W-5, SAE 5W-20, and SAE 15W-50, respectively.

Here's another thought regarding viscosity. It is vitally important to keep internal engine clearances in mind. Looser clearances in the engine and oil pump require higher viscosity oil to maintain oil pressure. Tighter clearances need lower viscosity oil, which provides better cooling and improved horsepower.

Armed with knowledge of viscosity grades, you can select the right one. In return, you will prevent wear and hopefully have an engine that will last you a very long time.