Tech Article: Engine Oil by Pedro Bonilla

In this chapter of our tech articles, let's talk about a slippery subject: Engine Oil. And I mean slippery in the full sense of the word because it has been the subject of many, many discussions and opinions. Therefore I'll try to stick to the facts.

Engine oil is mainly a lubricant, but it also serves several other important functions, such as cooling, cleaning, and protecting from corrosion the different internal engine surfaces that it bathes. To be able to perform these functions, special additives are mixed into the base oil. These additives include detergents, multi-viscosity additives, emulsifiers, anti-foaming agents, polymers, anti-wear formulations such as ZDDP (Zinc DialkylDithioPhosphate), etc. Some of these additives, such as phosphorus (contained in ZDDP), which is an excellent anti-wear agent, with time can cause damage to the catalytic converters. Because of this, the automobile manufacturers and the emissions-regulating agencies have forced the oil companies to reduce the amount of phosphorus (and other additives) in their oils. Products that meet the new ILSAC (International Lubricant Standardization and Approval Committee) GF-4 Specification, must have phosphorus levels at less than 800 ppm. The ILSAC-G4 Standard was jointly developed and approved by Japan Automobile Manufacturers Association, DaimlerChrysler, Ford, and GM.

Because automobiles and internal combustion engines are used in different and varied environments, from the sub-freezing arctic to the scorching desert, the engine oil must be able to adapt to those extreme-at-time conditions. Hence the multi-viscosity feature which means that the oil will have a particular viscosity at low temperatures and another at high operating temps. This is necessary because the oil needs to be thin and circulate through the engine quickly at start up, and it must also have thicker characteristics when hot to provide the needed protection at operating temps. Viscosity, simply put, is how thick or thin an oil is at a certain temperature. Viscosity ratings are regulated by SAE (Society of Automotive Engineers). In a particular oil, its viscosity is expressed by numbers and/or letters. There are single-grade (single-weight) and multi-grade (multi-weight) oils on the market, although the majority of our vehicles now use multi-grade formulations. There are also Standard Petroleum Oils, Synthetic Oils, and blends of both. In multi-grade oils, the first number and the letter W (winter) refer to the oil's viscosity when the oil is cold. For example, 0W, 5W, 10W, 15W, etc., where the higher the number, the more viscous the oil at low temperatures. The second number refers to the oil's viscosity at high, operating temperature. For example, 30, 40, 50, etc., and again, where the higher the number, the higher the viscosity for that temperature range.

Lately, low viscosity (thin) oils have become the OEM (Original Equipment Manufacturer) norm. This is so for two main reasons: (1) The lighter the weight of the oil in the engine, the less internal friction there will be. This in turn allows the engine to make a bit more HP and offer a little better MPG numbers. The main reason behind this is that the auto manufacturers are forced to reach certain environmental CAFE (Corporate Average Fuel Economy) numbers. The down side is that the thinner the oil, the less protection it provides. So there's a very delicate balancing act between an oil's weight and the protection it offers the engine components. (2) Bearing, piston-to-cylinder, and gear-to-gear clearances have become smaller because of better metallurgic and manufacturing methods. Using thicker oils may interfere with oil flow and increase oil pressure. In older (worn) engines it's generally better to use a higher viscosity oil because the clearances have become bigger.

Oil gets degraded with use, mainly because of gasoline and carbon blow-by, and because of the high temperatures and pressures to which it is subjected. That's why oil needs to be changed on a regular basis, to remove all those contaminants that, if left in suspension, in time will turn the oil acidic, potentially causing damage (corrosion) to the engine's internals. Each manufacturer has an oil change recommendation for each particular model, which, in my opinion, should be the worst-case scenario for replacing. For my personal car, a 1998 Boxster, Porsche recommends replacing the oil once every year or 15,000 miles, but in my Baby the oil and oil filter get changed every 7,500 miles or less. This formula is working just fine, since I just clocked 193,000 miles on the odometer with almost 12,000 of those being hard track miles.

When the factory fills a car with oil they don't know under what specific conditions the car will be used, so they use a "blanket" oil; for Porsche this is now 0W40 Mobil 1. Many people tend to stay with what's offered by the factory, thus they will replace their oil with the same. However, based on considerations mentioned above, one should consider one's physical location (weather) as well as the type of driving done in order to select the best possible oil. Many times the particular brand of oil is irrelevant; since they need to be approved under the same regulations, most of the brands are compatible with each other. Even though the factory recommends using Mobil 1 oils, they also produce a "Porsche Approved Oils List," which includes tested and Porsche-approved off-the-rack oils for different regions of the world.

In my sunny South Florida "paradise" we don't need to worry about the lower end of the thermometer's scale, since it will rarely dip below 50 degrees. Because of this we shouldn't even look at 0-weight oils. Also, the top-end of our thermometer's scales tend to stay high, especially during the long summer months. I generally recommend 10W40 oil to my local customers, and in my car I use 15W50. I find that after 100,000 miles, switching to the heavier multi-viscosity formulations gives better protection against wear because of the looser clearances. It also cuts down on rear main seal leaks and on sporadic puffs of smoke on startups.

For the complete Porsche List of Approved Oils and additional information on oil changes and other topics, feel free to visit the DIY pages of my website: www.PedrosGarage.com.

Happy Porsche'ing,
Pedro