



20W30, 10W30, syn, dino, Mobil 1, Castrol GTX, NAPA no-name..... Do you know what all this stuff means and how it affects your Miata? This month I'll try to give you a little information and wade through the myriad of facts and slick fiction (not friction ☺) of motor oil so you can decide what's best for your Miata, style of driving, climate, age of vehicle, etc.

### **Introduction – Slip Slidin' Away.....**

Motor oil, engine oil and engine lubricant are synonymous with specialized lubricants with additives for lubrication of internal combustion engines, i.e., that big black, noisy thing under your Miata's hood. Its main function is to reduce wear on engine moving parts, clean and inhibit corrosion, improve sealing and help cool the engine.

Motor oils are made from a heavier, thicker petroleum organic hydrocarbon base stock taken from crude oil with additives, commonly referred in the vernacular as "dino" (for dinosaur) or made from non-petroleum synthetic chemical compounds - "synthetic" motor oil commonly referred to as "syn". A blend of both dino petroleum and syn non-petroleum oil is also available.

### **A Wee Bit O' History**

Originally thought to be of some medicinal value in the mid-1800's which was later abandoned (thank you!), motor oil was eventually developed from petroleum into a high viscosity, high-temperature lubricant for steam engines (boat and locomotive at the time), well before the automobile was invented. *Valvoline* (so named in 1873) was the first engine oil manufacturer and is still available today! Wish my great-grandfather had bought stock. ☺

### **So What Does it Do Besides Needing to be Changed Every 3,000?**

Well, for starters, and this can get complicated so I'll be brief. Oil creates a film between the surfaces of moving parts and minimizes direct contact, decreasing heat caused by friction and reducing wear to protect the engine.

The oil transfers heat via *convection* (remember "convection, conduction and radiation" in science class? Me neither.) through the engine via air flow over the surface of the oil pan, an oil cooler and by evacuation of the buildup of oil gases through the PCV (Positive Crankcase Ventilation) system. Additionally, coating parts with oil also inhibits oxidation at high engine temperatures preventing rust and corrosion and serves as a seal between the piston rings and cylinder walls.

In in the crankcase (look it up if you want to know what that is) of your engine, oil lubes various rotating or sliding surfaces such as bearings, rods connecting the pistons.

Since motor oil is mostly composed of hydrocarbons which burn if ignited and can give off vapors which can also ignite at its *flashpoint* (the lowest temp at which the oil gives off vapors), the oil refinery will remove volatile compounds, increasing the flash point and reducing the tendency to burn since it would be dangerous for the oil in a motor to ignite and burn. Okay, enough of that. Let's move on.....

### **So, What's The Oil Filter For?**

A quickie explanation: We're not specifically talking about oil filters here but they are certainly an important and integral part of the lubricating system so here's why you need and change frequently for the good of your engine:

Metal engine parts rubbing together cause the wearing of tiny microscopic metallic particles that accumulate within the oil and may grind against parts causing wear. So, the particles are circulated through an oil filter to remove them and changed at regular intervals with fresh oil. And remember I have suggested in the past about getting a good brand-name one for this reason

### **What's All The Numbers Mean?**

Yup, the "W" in 5W20 does stand for "winter", not "weight" as commonly mistaken. ☺

The SAE (Society of Automotive Engineers) has come up with the numerical system for grading multi-grade motor oils used in most automobiles according to their viscosity (the thickness or a measure of how resistant a liquid is to flowing). (By the way, the SAE has separate viscosity ratings for gear, axle and manual transmission oils. They're pretty smart folks.) Motor oil has to flow at the lowest expected temperature it may experience in order to minimize metal-to-metal contact between moving parts after starting the engine.

There's all sorts of properties required in motor oil specs that define the various SAE classifications but for purposes of this discussion we will concentrate on "multi-grade" motor oils commonly used in our vehicles. So don't be scared...it's pretty easy. ☺

Here's what the oil can numbers are all about:

From low to high viscosity: 0, 5, 10, 15, 20, 25, 30, 40, 50, or 60.

These numbers are followed by the letter "W" designating they are "winter".

The scale rates oil from a low of 5 to a high of 60. As you've probably noticed, most auto motor oils have two numbers, hence "multi-grade".

The first number describes viscosity at low temperatures. The second number refers to viscosity at normal engine operating temperatures, typically viscosity at 212F. Some examples: the "5" in a 5W-20 motor oil will protect an engine down to an air temperature of about -25 degrees Fahrenheit. The "10" in a 10W-30 is good if the lowest temperature to be in the neighborhood of -10 or so.

As for the "20," that is well-suited for the typical temperatures that most cars operate at these days. If you are driving a racing, you might want the higher-temperature protection afforded by a motor oil with a second number of, say, 50.

Which oil should you use? My suggestion: Refer to the owner's manual that came with your car. It will tell which grade to select. If you're a Racer Boy (or Girl), you're on your own. ☺

### **So What Else Is In It?**

I mentioned additives earlier. Modern motor oil is blended by using base oils and adding viscosity improvers, detergents and dispersants to keep the engine clean and minimize oil sludge

build-up, anti-wear and other compounds in case of metal to metal contact and alkaline additives to neutralize acidic oxidation which are products of oil. Certain high-performance oils may contain up to 20% of an additional chemical called *esters*, a chemical compound derived from acid. So you can see, motor oil isn't just pure "oil" by any means. And of course, there are commercially available retail oil additives to pour in after-the-fact. Remember Andy Granatelli and "STP"? Whoops, I'm dating myself here....

### **Synthetics Motor Oil**

Well, here's a controversial subject for you. There are arguments for both dino and syn motor oils. I will present the facts as I have researched them and you decide as I have written in previous columns.

### **A Little History and What Is It Exactly?**

Synthetic lubricants were first synthesized, or man-made, as replacements for petroleum-based lubricants by German scientists in the late 1930's to early 40's. In the 1970's, syn motor oils were formulated and available for the first time for automobiles. Incidentally, the same SAE numerical rating system for designating viscosity also applies to syn oils.

So simply put, synthetic oil is a lubricant consisting of chemical compounds that are artificially made (synthesized). Synthetic lubricants can be manufactured using chemically modified petroleum components rather than whole crude oil, but can also be synthesized from other raw materials as well.

Higher purity and better control in manufacturing means syn oil has better properties at extreme high and low temperatures. This has to do with molecules and all that stuff but basically, although syn oil's viscosity decreases as temperatures go up they have a higher "viscosity index" over petroleum-based oils. So their specially designed properties allow a wider temperature range at higher and lower temps. With their improved viscosity, they require less added viscosity improvers, components most vulnerable to degrade as the oil ages and so they do not degrade as quickly as conventional dino oils. However, they still collect metallic particles and clog oil filters, so periodic oil and filter changes are still needed even though it is touted intervals between oil changes with syn oil can be longer than conventional oil, say, 10,000 -15,000 miles due to reduced degradation by oxidation. (I wouldn't ever go that long without an oil/filter change but you decide.)

### **Semi-Synthetic Oil**

Semi-synthetic oils (also called 'synthetic blends') are blends of traditional dino oil with no more than 30% synthetic oil designed to have many of the benefits of synthetic oil without matching the higher cost of pure synthetic oil. The first semi-synthetic motor oil was available in 1966.

So here's some "pros" and "cons", if you will, of the benefits (or not, of using synthetic motor oils over traditional oil:

### **Advantages**

The technical advantages of synthetic motor oils as claimed by manufacturers and supposedly impartial testing facilities include:

- Better low- and high-temperature viscosity performance at service temperature extremes<sup>1</sup>
- Better (higher) viscosity index
- Better chemical stability
- Decreased evaporative loss

- Resistance to oxidation, thermal breakdown, and oil sludge problems
- Longer replacement intervals with an environmental benefit of less used oil waste
- Improved fuel economy in certain engines
- Better lubrication during extreme cold weather engine starts
- Possibly a longer engine life
- Superior protection against deposit formation in engine hot spots
- Increased horsepower and torque due to less initial drag on engine
- Improved fuel economy - from 1.8% to up to 5% has been documented in fleet tests

### **Disadvantages**

- The disadvantages of synthetic motor oils include:
- Substantially more expensive than conventional oils.
- Inability to mix syn with dino (unless “blended syn is used 100%)