



Mobil

The Power to Perform

New Mobil 1 with **SuperSyn™**

The best motor oil ever to wear the Mobil 1 name.



Table Of Contents

The History Of Mobil 1	1
Mobil 1 With SuperSyn	2
A History Of Mobil 1 Credentials	6
Mobil 1 Frequently Asked Questions	7
Motor Oil Basics	14

The purpose of this booklet is to give you:

- Background on Mobil 1 and its development.
- An explanation of the advantages of Mobil 1 synthetic motor oil.
- The truth behind some myths about motor oil.
- Answers to some commonly asked questions about specific applications.
- A basic overview of motor oil.





The History Of Mobil 1

The Mobil 1 story began almost 40 years ago, when Mobil resolved a problem plaguing carrier-based military planes. While the planes were aloft, cold temperatures would sometimes solidify the grease on wheel bearings. When the planes slammed down onto the aircraft carriers, the bearings failed.

A synthetic wheel-bearing grease, Mobilgrease 28, was developed for this situation and continues to be used in aircraft applications worldwide.

By the late 1960s, this technology was used to develop a synthetic motor oil for a very specific application – helping the big diesel engines powering oil rigs on Alaska's North Slope start and run even at temperatures as low as -40°C. Encouraged by this success and the realisation of synthetic oil's many high-performance qualities beyond low-temperature applications, a New Concept Engine Oil Team was created in 1971. The team's work resulted in the development of the first Mobil 1 fully synthetic motor oil. By engineering its component fluids, Mobil 1 achieved far superior lubricant properties than those of conventional oils.

Mobil 1 synthetic motor oil was launched in Europe and Japan in 1973, and in North America a year later. Initially available only in a fuel-saving SAE 5W-20 viscosity grade, the Mobil 1 line expanded in the next decade and its reputation for outstanding performance grew.

In 1992, a new formula was introduced that improved high-temperature engine protection.

Advanced Formula Mobil 1 was launched with improved anti-wear performance and lower phosphorus levels to increase the life of catalytic converters, whilst also providing ultimate temperature protection ranging from 200° C down to colder than -45° C.

The evolution of Mobil 1 continued, when in 1996, Mobil 1 Tri-Synthetic Formula was launched. Engineered to outperform even its world-renowned predecessor, Mobil 1 Tri-Synthetic combined three highly advanced synthetic components with an innovative package of unique additives. Mobil 1 Tri-Synthetic series motor oils offered improved wear protection, cleaner running engines and better high and low temperature durability.

Now, for 2003, Mobil 1 with SuperSyn is being introduced. With a unique combination of high-performance fluids, plus the SuperSyn anti-wear system for protection under the most extreme use, new Mobil 1 with SuperSyn exceeds even the toughest industry standards. It features:

- Outstanding wear protection.
- Excellent high and low temperature performance.
- Improved protection against sludge and harmful deposits.
- And for specific grades, excellent fuel economy benefits.

In short, Mobil 1 with SuperSyn has a reserve of capability that you may never need to call upon... but it's great to know it's there.

New Mobil 1 with SuperSyn – The Power to Perform

Now Mobil 1 provides a higher level of performance than ever before. With the new proprietary SuperSyn anti-wear technology, Mobil 1 helps give your car exceptional protection against engine wear, under normal or even the most extreme use.

The engineering story behind Mobil 1 with SuperSyn is truly remarkable. This proprietary formula was developed to protect engines not just in day-to-day driving, but also in extended-drain applications and in engines with many years and miles of service.

Help extend the life of your engine. Pour in the performance – Mobil 1 with SuperSyn.

1. Why did you formulate Mobil 1 with SuperSyn?

This new-generation Mobil 1 was created for several reasons – new technology, new global standards and the increased demands being placed on motor oil by car manufacturers.

Mobil 1 with SuperSyn uses a combination of high-performance engineered fluids, including polyalphaolefins (PAO), plus the latest innovation in synthetic technology – the proprietary SuperSyn anti-wear system. This combination of high-performance components in Mobil 1 has resulted in a motor oil that can provide excellent engine protection, and one that exceeds car manufacturers and oil industry specifications.

Mobil 1 with SuperSyn is the best motor oil ExxonMobil engineers have ever developed.

2. What's better about Mobil 1 with SuperSyn? What are the advantages of this new formulation?

With several car manufacturers extending or varying oil change intervals, Mobil 1 with SuperSyn has even more performance reserve. Mobil 1 with SuperSyn offers:

- Outstanding wear protection, even under the most extreme conditions.
- Enhanced high-temperature durability and low-temperature performance.
- Outstanding engine cleanliness, with better sludge protection and reduced piston deposits.
- Enhanced fuel-economy benefits

The primary goal for Mobil 1 has always been to protect your engine under circumstances where conventional oil cannot, such as very cold starting temperatures, extreme high temperatures and high-load conditions. But Mobil 1 is not just for use in extreme circumstances. You can also realise Mobil 1's benefits of improved engine cleanliness and long engine life under everyday driving conditions.





The SuperSyn™ Story

The most significant improvement in the Mobil 1 formula is the SuperSyn anti-wear system. This proprietary additive system has astounding protective properties. Instead of breaking down during extreme high-stress, high-temperature conditions, the SuperSyn anti-wear system actually excels under these conditions.

Mobil 1 with SuperSyn helps provide significant advantages over conventional motor oils, such as:

ANTI-WEAR

- Helping engines last longer.
- Superior protection under heavy engine loads / stress, such as pulling trailers / carrying heavy loads.
- Minimising oil degradation.

ALL TEMPERATURE

- Faster lubrication at start-up in low temperatures.
- Superior protection at high temperatures.
- Superior resistance to thermal breakdown.

ENGINE CLEANLINESS

- Superior protection against harmful deposits.
- Cleaner running engines.

ENGINE EFFICIENCY

- Greater resistance to oil oxidation (thickening).
- Lower oil consumption under high-speed conditions.
- Optimising engine efficiency.

3. Will the consumer lose anything with this new formulation?

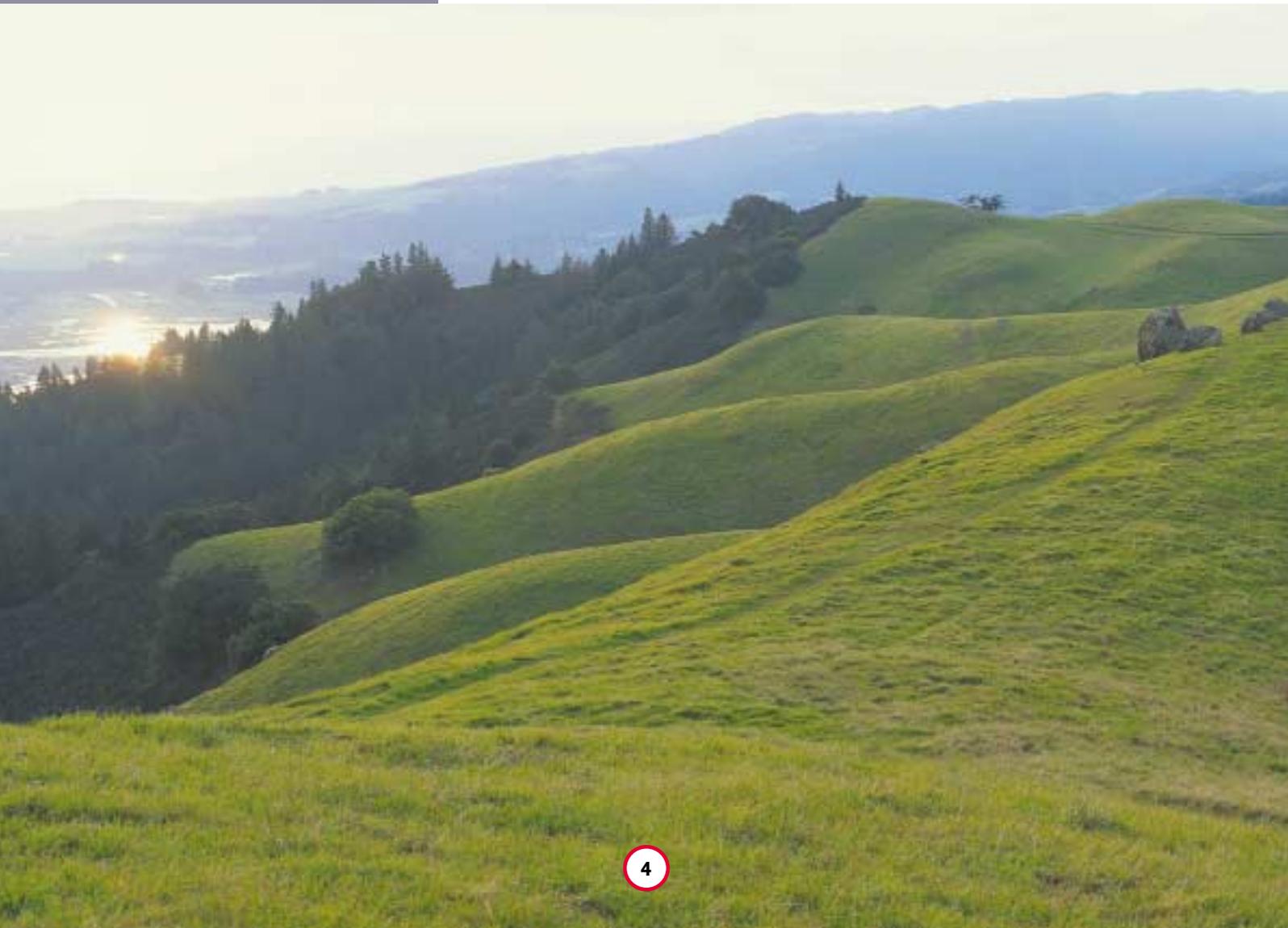
No. Mobil 1 with SuperSyn is the best Mobil 1 ever. In addition, the new formulation is compatible with all previous formulations and engine oil requirements.

4. Is this reformulation necessary to meet new standards from the oil industry, car makers or another government or industry group?

One of the reasons behind the new formulation is to not just meet, but exceed, new standards. Mobil 1 with SuperSyn is truly a global formulation, exceeding the latest standards from the oil industry and vehicle manufacturers alike.

For instance, the appropriate grades of Mobil 1 with SuperSyn exceed ACEA standards A3/B3, API Service SL/CF, Japanese valvetrain requirements and ILSAC GF-3, in addition, some viscosity grades exceed specific OEM standards. One example is Mobil 1 0W-40, which exceeds Mercedes-Benz's 229.3 and 229.5 specifications.

While all of these abbreviations and numerical designations may seem daunting, you can rest assured that Mobil 1 with SuperSyn represents the latest technology in synthetic motor oil, and that it is engineered to exceed industry specifications.



“Original Equipment”

The quality of Mobil 1 is recognised by many of the world's car manufacturers. For example:

- Mobil 1 0W-40 is factory fill in all Porsche cars.
- Mobil 1 0W-40 is factory fill in all Mercedes-Benz AMG cars.
- Mobil 1 0W-40 is factory fill in all Aston Martin cars.



A History Of Mobil 1 Credentials

Over the years and through several generations, Mobil 1 has been tested under the most grueling circumstances imaginable. Each test yielded confirmation of the incredible performance of Mobil 1. And each evolution has made Mobil 1 even better.

1,600,000 kilometres with Mobil 1

As one example of the level of testing undertaken, a 1990 model year BMW was tested for 1,600,000 kilometres with Mobil 1 and showed extremely low wear. Oil drain intervals were 12,000 kilometres, as specified by the manufacturer, and Mobil 1 was used from the very first day of testing.

After the end of the test, with 1,611,146 kilometres on the vehicle, the engine was removed and internal components were inspected and measured. Overall engine wear was extremely light. In fact, with the exception of light to moderate wear on the camshaft and followers, no other significant engine wear was noted. Oil consumption over the entire test was just 0,023 litres/1,000 kilometres.

A 320,000 kilometre comparison.

Another high-mileage test compared identical 2.3-litre four-cylinder engines run for 320,000 kilometres – one using Mobil 1 5W-30 and the other using a premium brand 5W-30 conventional oil. There were some interesting results:

- Engine-wear rates were higher for the conventional oil than for Mobil 1.
- The conventional oil produced heavy varnish deposits,

while Mobil 1 left the engine virtually clean.

- Consumption of the conventional oil was eight times higher than that of Mobil 1.
- While Mobil 1 remained at the SAE 30 viscosity level throughout most of the test, the conventional oil showed rapid degradation, with its viscosity increasing into the 15W-40 range. This obviously would adversely affect any fuel economy performance benefits.

High-Stress Engine Test

An earlier formulation of Mobil 1 was also subjected to an engine test that demonstrates the oxidative stability and wear protection of an oil under high-temperature conditions. This test of Mobil 1 was derived from a Sequence IIIE engine test and was run using a GM 3.8-litre V6 engine with the oil kept at a constant 150° C in the sump. While the Sequence IIIE test is normally run for 64 hours, this Mobil 1 test was run four times longer. And even after 256 hours, Mobil 1 still provided protection to the engine.

Keeping in mind that these tests were conducted with earlier formulations of Mobil 1, ExxonMobil engineers are confident that Mobil 1 with SuperSyn will provide even greater protection than its predecessors.



Trust the factory-fill decisions of engineers who design Porsche, Mercedes-Benz AMG, Chrysler Viper and Aston Martin engines. They all use Mobil 1.

Mobil 1 Frequently asked questions

The following questions and answers are presented to help explain some of the more difficult motor oil-related concepts, and to help dispel some of the myths about synthetics in general and Mobil 1 in particular.

In some cases, a certain degree of prior knowledge about motor oils and automotive technology is assumed. If you'd like to learn about more fundamental questions, turn to "Motor Oil Basics" on page 14 of this booklet.

1. What's the difference between a fully synthetic and a semi-synthetic motor oil?

All motor oils are made up of base oils and additives. In general, fully synthetic motor oils contain non-conventional, high-performance fluids. Semi-synthetic oils (also called "blends") usually use a small percentage of non-conventional, high-performance fluids in combination with conventional oil.

2. Is Mobil 1 a fully synthetic oil?

Yes, it is. To meet the demanding requirements of today's specifications (and our customers' expectations), Mobil 1 uses high-performance synthetic fluids, including polyalphaolefins (PAO), along with a proprietary system of additives. In fact, each Mobil 1 viscosity grade uses a specific combination of synthetic fluids and selected additives in order to tailor the viscosity grade to its unique requirements.

3. What makes synthetic motor oil superior to conventional motor oil?

First of all, the performance of Mobil 1 is more robust, especially in terms of low-temperature pumping and

flow. High-temperature stability and protection against deposits are also superior. These attributes translate directly into less engine wear and longer engine life.

Historically, conventional oils lack the performance of synthetic oils in the areas of low-temperature performance and high-temperature oxidation stability. Conventional oils also contain much greater amounts of impurities, such as sulphur, reactive and unstable hydrocarbons, and other undesirable contaminants that cannot be completely removed by conventional refining of crude oil.

4. You talk about cold-temperature performance, but just how good is Mobil 1 at low temperatures?

Because of the high-performance fluids in Mobil 1 synthetic motor oil, it generally flows at much lower temperatures than a conventional oil.

Low-Temperature Performance Mobil 1 With SuperSyn

Viscosity Grade	Pour Point	Pumpability
0W-40	-54° C	-47° C
15W-50	-45° C	-37° C

5. What about high-temperature protection?

At normal engine operating temperatures, Mobil 1 synthetic motor oils offer better wear protection and better resistance to thermal degradation than conventional or semi-synthetic oils. Mobil 1 will continue to perform at temperatures that make conventional and semi-synthetic motor oils start to oxidise and turn to sludge.

Mobil 1 motor oils are capable of protecting engines at temperatures up to 200°C. This type of stability

is especially important for stop-and-go driving, for modern engines which tend to run at higher temperatures, and for turbocharged engines.

6. Why do turbocharged engines have special lubrication needs?

Oil temperatures in turbocharged engines can run significantly higher than those in non-turbocharged engines, especially in the area of the turbocharger bearings after engine shutdown. With no oil movement after engine shutdown, these elevated temperatures can cause "coking" of conventional motor oil – that is, the oil literally turns to carbon. The high-temperature oxidation stability of Mobil 1 makes turbocharged engines a perfect application for Mobil 1, which will help prevent coking in an oil-cooled turbocharger.

Significant engine wear can occur at start-up, so it's critical for engine parts to receive proper lubrication as soon as possible.

7. Does Mobil 1 use the same additives as conventional oils?

Mobil 1 uses carefully selected individual components, creating a unique formulation of additives designed to perform far better than those used in conventional oils. (Most conventional oils use standard additive packages.) In addition, many of the additives that Mobil 1 uses are proprietary.

Most multigrade motor oils use similar classes of performance additives, such as dispersants, detergents and antioxidants that help keep the engine clean, as well as an additive called a Viscosity Index (V.I.) improver to achieve the high-temperature viscosities needed by today's engines. (See "The Additive Story")

Typically, V.I. improvers are long-chain polymers that uncoil at high temperatures to provide higher viscosity and coil up at low temperatures to provide better oil flow.

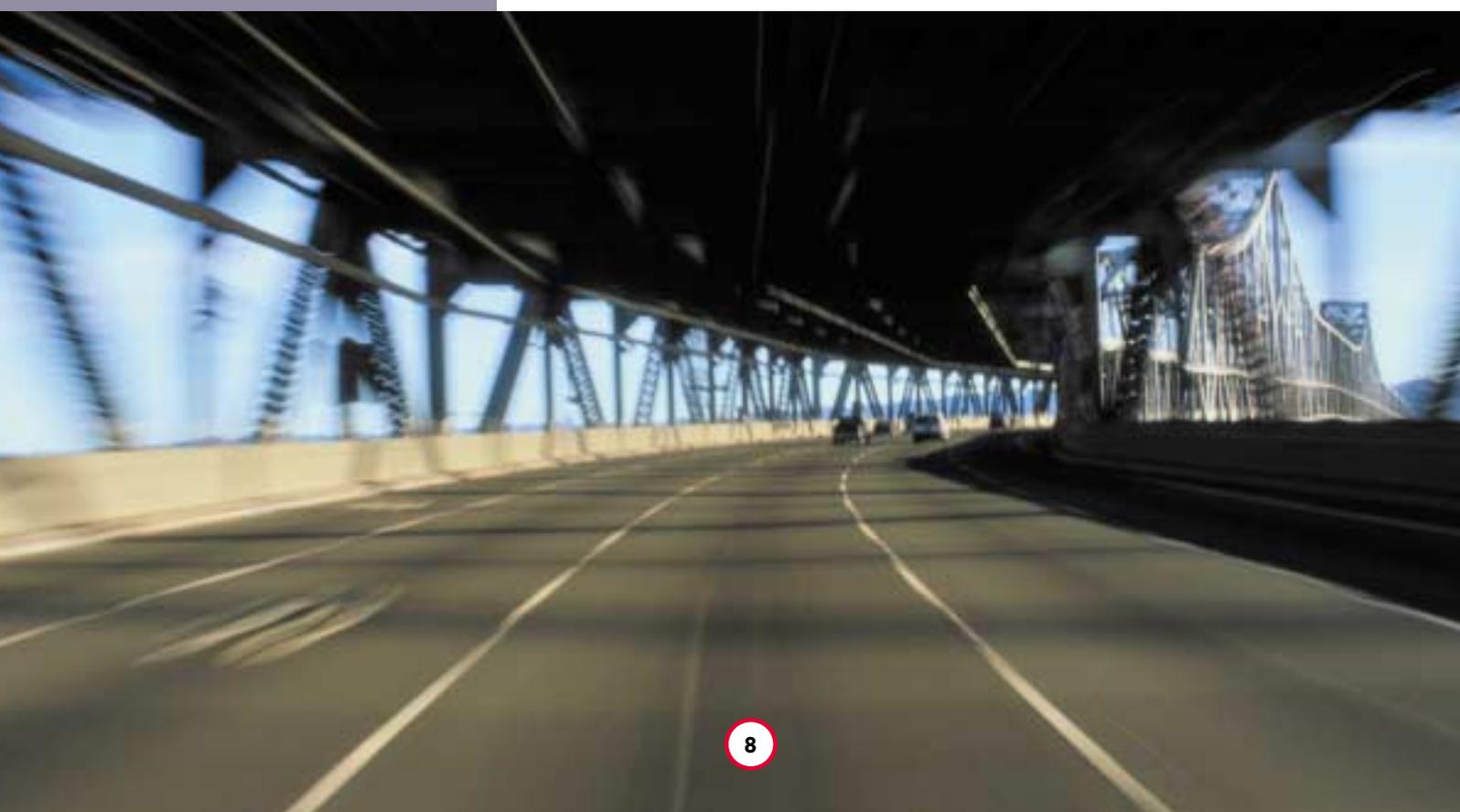
Unfortunately, these molecules can be broken (sheared) by the sliding action of engine parts with close tolerances. Once the V.I. improver molecule is sheared, it is no longer effective.

Mobil 1 formulations do not require the same level of Viscosity Index improver as do conventional oils. Since Mobil 1's high-performance components are less likely to break down, Mobil 1 is engineered to protect your engine longer.

8. Does the viscosity of Mobil 1 differ from that of typical motor oils, especially at high or low temperatures?

At very low temperatures, when the oil needs to be "thinner" to flow readily, Mobil 1 is capable of pumping easily while conventional oils can thicken substantially.

At very high temperatures, when the oil needs to be thick enough to provide a film on engine parts to prevent metal-to-metal contact, Mobil 1 resists being squeezed out



of the contact area between metal surfaces by maintaining its viscosity. This helps prevent premature engine wear.

Typically, a conventional oil can easily evaporate and more readily oxidise in extreme heat. The new Mobil 1 formulation, with its combination of high-performance fluids and a proprietary additive system, provides greater stability in extreme low or high engine temperatures.

Mobil 1 synthetic motor oils have an inherently higher Viscosity Index than conventional motor oils. Mobil 1 is also less prone to thermal viscosity breakdown – the oil maintains its viscosity for a longer time.

Mobil 1 with SuperSyn, in particular, has tremendous visco-elasticity. Simply put, this is the ability of the oil to retain its viscosity under incredible stress, pressure and shear conditions.

9. Can I use an oil supplement and/or engine treatment with Mobil 1?

We do not recommend it. According to the American Petroleum Institute (API) “certified oils eliminate the need for supplementary engine oils additives. In fact, the use of any ‘oil supplement’ is not recommended by car manufacturers and may invalidate a warranty.”

Considering the comprehensive testing and engineering that has gone into Mobil 1, nothing can be gained by using these supplements.

10. How often should I change the oil if I'm using Mobil 1?

Oil change intervals can be as short as 5,000 Kilometres or as long as 30,000 Kilometres on some new cars. We recommend that you follow the oil and filter change frequencies shown in your owner's

manual, especially during the warranty period. With Mobil 1's high-performance reserves, you can have the confidence to go the full distance or time frame recommended by the vehicle manufacturer. Mobil 1 with SuperSyn is especially suitable for the latest vehicles with extended drain intervals or vehicles with oil monitoring systems that vary oil drain intervals.

THE ADDITIVE STORY

In addition to its synthetic components, Mobil 1 is comprised of a unique selection of additives, each designed to accomplish certain goals. Unlike most motor oils that are formulated with additive packages, Mobil 1 is formulated by carefully testing and selecting the highest-performance additives available. Some, like SuperSyn, are proprietary. Others are used in unique concentrations. Here is a summary of the kinds of additives found in Mobil 1:

- Anti-wear agents including SuperSyn and more traditional additives such as zinc/phosphorus-based components.
- Detergent/dispersants – Designed for optimal engine cleaning, these agents help reduce varnish, carbon, sludge and harmful deposits.
- Rust and corrosion inhibitors – Hold acids in suspension.
- Oxidation inhibitors – These elements offer high-temperature protection and cause the molecules that create oxidation to be neutralized.
- Foam inhibitors – Particularly beneficial in high-performance applications, such as sustained high engine revs.
- Friction modifiers – Aid in wear protection and provide fuel-economy benefits.
- Viscosity Index improvers – While Mobil 1 requires a lesser amount of these additives, the V.I. improvers used are among the most shear-stable available.
- Seal-swell agents – Designed to enhance compatibility with engine seals in all engines (new and old).

11. Should I follow the “severe service” oil change intervals mentioned in the owner’s manual? Does Mobil 1 offer specific benefits under these conditions?

Many kinds of driving conditions qualify your vehicle for “severe service” oil change intervals, and Mobil 1 is ideal for this service. “Severe service” conditions can include:

- Trips of less than 16 kilometres.
- Driving in cold weather.
- Idling for extended periods.
- Stop-and-go traffic.
- Pulling trailers/carrying heavy loads.
- Driving in dusty conditions.

Under both “normal” and “severe service” conditions, Mobil 1 is engineered to provide performance reserves in the areas of sludge prevention, piston cleanliness, wear protection and high-temperature durability.

12. When can I start using Mobil 1 in my new vehicle?

You can start using Mobil 1 at any time, even in brand-new vehicles. In fact, Mobil 1 is original equipment (it is installed in the factory) in:

- All Porsche cars
- Mercedes-Benz AMG cars
- All Aston Martin cars
- Chrysler Vipers

13. Is it true that new engines need a break-in period using conventional motor oil?

That is a myth. In the past, running-in an engine was necessary to remove any metal flashing (called swarf) or abrasive material left inside the engine after machining, as well as to allow the valves and rings to “seat” properly. Today’s engines are built with much tighter tolerances, much improved machining and under much cleaner conditions compared to the engines of 10 or 20 years ago. Current engine manufacturing technology does not require a break-in period using petroleum-based motor oils.

In fact, Mobil 1 has shown excellent results in industry standard ASTM tests, most of which use completely rebuilt engines for each new test run. Mobil 1’s outstanding results in these tests demonstrate that proper break-in using Mobil 1 is not a concern. Mobil 1 can be used in an engine from the day you drive off the showroom floor.

Trust the engineers that specify Mobil 1 as original equipment.

14. Will the use of Mobil 1 invalidate my new-car warranty?

With the exception of the Mazda rotary engine (Mazda does not recommend any synthetic oils), Mobil 1 will not invalidate new-car warranties. Mobil 1 exceeds the ACEA, API and ILSAC engine oil service requirements of all new-car manufacturers. If in doubt, always check your vehicle's owner manual or contact your vehicle's manufacturer.

15. Can I use Mobil 1 in older vehicles with high mileage?

Yes you can. Mobil 1 can help increase the life of all engines, even those in older vehicles and/or with high mileage. The extra cleaners in Mobil 1 can help clear stuck rings to help restore engine efficiency. Keep in mind, however, that Mobil 1 cannot correct an existing engine problem.

Mobil 1 is engineered to provide performance reserves in the areas of sludge prevention, piston cleanliness, wear protection and high-temperature durability.



16. Is it okay to mix conventional oil with Mobil 1?

Mobil 1 is fully compatible with conventional motor oils, semi-synthetic motor oils and other synthetic motor oils, should it be necessary to mix them. However the superior performance of Mobil 1 will be reduced by diluting it.

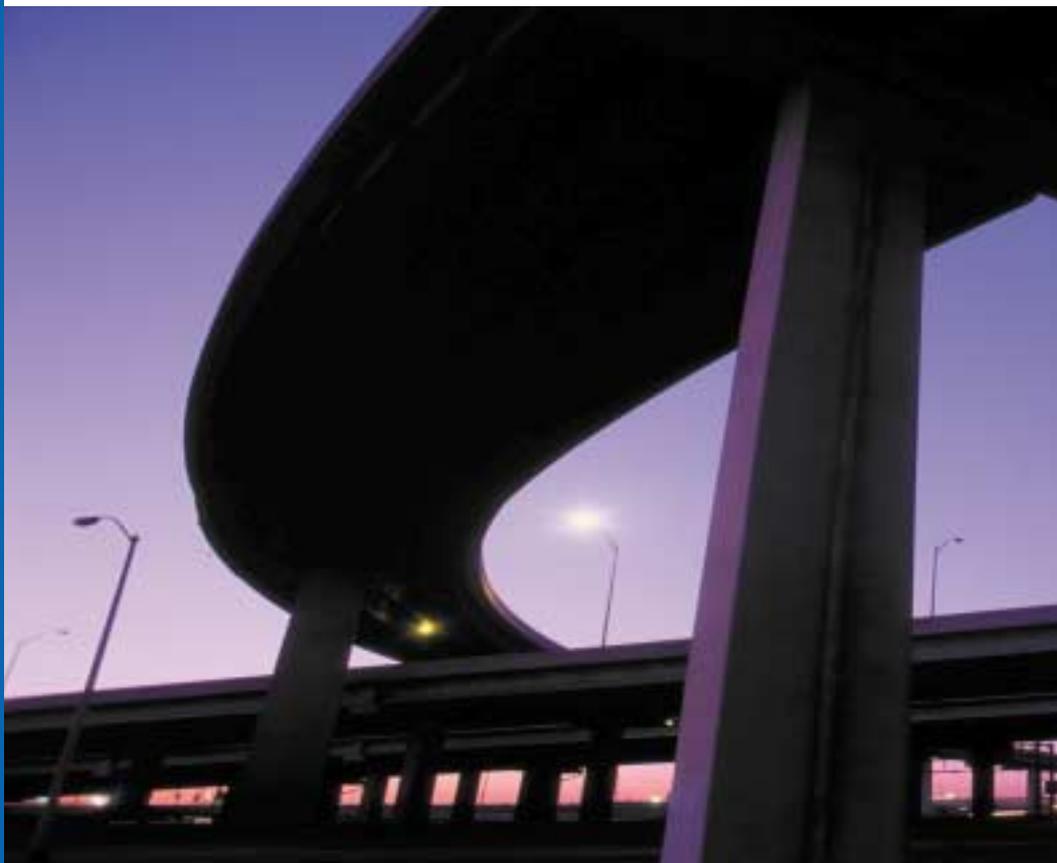
help improve fuel economy, extend oil drain intervals, extend engine life, provide enhanced wear/cleanliness protection and reduce oil consumption.

17. Do I need to flush my engine before switching to Mobil 1?

Absolutely not. No special preparation is necessary when switching from conventional motor oil to Mobil 1.

18. Can Mobil 1 be used in diesel engines?

Mobil 1 will provide excellent service for passenger car diesel engines exceeding ACEA B3 and API CD or CF. Light and heavy-duty truck engines (API CE, CF-4, CG-4, CH-4 or CI-4) should use one of the products from the Delvac line for heavy-duty diesel engines – like Mobil Delvac 1 synthetic engine oil. Mobil Delvac 1 synthetic oil can



Mobil 1 Advantages

Mobil 1 with SuperSyn offers numerous advantages over conventional oil, including:

- **Wear protection** – Significant wear can take place at engine start-up, especially under cold operating temperatures. Mobil 1 flows easily at very low temperatures, allowing it to reach all areas of the engine and valvetrain quickly. Mobil 1 with SuperSyn is formulated with a proprietary high-performance additive system that continues to provide wear protection during long-term use.
- **High-temperature stability** – High temperatures can oxidize lubricants, causing the viscosity to increase (the oil thickens). By using high-performance fluids and a robust antioxidant system, Mobil 1 resists oxidation better than conventional oils, even at temperatures as high as 200° C.
- **Cold-temperature performance** – Conventional oils can thicken as components crystallize at very low temperatures, impeding oil flow. Because of the superior flow of its high-performance components, Mobil 1 will pump quickly to moving parts.
- **Deposit protection** – Sludge formation from oil breakdown can block oil passages, impede oil flow and cause piston rings to stick. Mobil 1's uniquely balanced additive package provides outstanding protection against deposits and sludge.



Motor Oil Basics

1. What does motor oil actually do in an engine?

Motor oil probably handles more tasks within an engine than any other component, fluid or material. While most people know that motor oil's main job is to protect the engine by lubricating its moving parts, modern motor oil also needs to:

- Cool critical engine parts by transferring heat away from them.
- Protect against engine wear that could be caused by a variety of contaminants, from acidic combustion by-products to sludge and soot deposits to dirt and dust particles.
- Pump easily to critical engine parts at low temperatures.

- Remain stable at high temperatures.
- Help improve fuel economy.
- Keep internal components clean and free from varnish and harmful deposits.

2. What's inside the oil that can help it accomplish all these tasks?

Since lubricating engine components – reducing friction for smoother running and optimal efficiency – is only part of what a motor oil must do, it obviously must rely on help. That's where additives come in.

All detergent-type motor oils contain detergent and dispersant additives that suspend contami-

nants and combustion by-products. That's why your oil may look dirty when you check it – it's doing its job. And that's also why you can't tell when it's time to change the oil simply by looking at its color.

The oil is designed to prevent these corrosive contaminants from being deposited on engine surfaces, where they can cause piston rings to stick and oil-pump screens to become blocked.

The oil filter helps by removing abrasive particles as the oil passes through the filter. But an oil filter can't catch fuel dilution and other liquid contaminants.



No matter how good the oil and the oil filter, eventually they can no longer do their jobs effectively. That's because with time and use, the oil's additives get used up – causing the oil itself to degrade (oxidize or thicken). At that point, the oil must be changed, before sludge and deposits build up. When the oil is drained, the contaminants are removed with it.

Obviously, oil should be changed before its contamination level reaches the point that could result in engine damage. Yet it's unlikely that the individual motorist will be able to determine this critical point. For this reason, automobile manufacturers recommend oil changes at a specific time or distance interval, whichever comes first.

3. How often should I change the oil?

Without scientific analysis of the oil, it's impossible to tell how quickly your motor oil becomes depleted. That's why all automotive companies have specific time and mileage intervals specifically recommended for your vehicle.

We strongly recommend that you follow the oil change frequencies shown in your owner's manual. These recommendations vary by model year and manufacturer, and are influenced by driving habits, conditions and environments. In addition, you should always change both the oil and the oil filter at these intervals.

4. My owner's manual lists two different schedules. How do I know if I should follow the "normal" or "severe service" schedule?

Virtually all manufacturers list two types of "service" – normal and severe. Severe service operations will require more frequent oil and filter changes. Severe service conditions can include any of the following:

- Trips of less than 16 kilometres.
- Driving in cold weather.
- Idling for extended periods.
- Stop-and-go traffic.
- Pulling trailers/carrying heavy loads.
- Driving in dusty conditions.

Short trips, especially during cold weather, can be particularly severe. The engine may not get a chance to warm up sufficiently to boil off moisture and unburnt fuel in the oil, leading to the development of acids in the oil.

Since the engine is partially cooled by airflow, temperatures can increase when the engine is idling. High temperatures can also occur when the engine is under heavy loads, such as when towing. High temperatures can lead to more rapid oil oxidation and thickening.

GOOD MAINTENANCE PRACTICES

Using the right motor oil, and changing both the oil and filter regularly, are all part of a proper maintenance regime that can help your vehicle's engine last longer. Proper maintenance of your vehicle's engine will not only help it run better, but also have a direct effect on the useful life of the motor oil.

Key items to consider under a schedule of proper maintenance include:

- Ignition and engine timing (as required).
- Fuel injection or carburetion adjustments.
- Air cleaner service.
- Regularly checking the general mechanical condition of the engine.

As engines age and engine parts wear, the amount of blow-by gases that escape to the crankcase increases. Blow-by refers to combustion gases that escape between the piston rings and cylinder walls instead of going out the exhaust system. Blow-by gases degrade engine oil, shortening its life. For that reason, you may have to shorten your oil change intervals as your vehicle ages.

Since the engine is cooled partially by airflow, engine temperatures tend to increase when the engine is idling.

QUICK LUBRICATION

Significant engine wear can occur at start-up, so it's critical for engine parts to receive proper lubrication as soon as possible.

Prior to start-up, most of the oil resides in the engine's sump. When the engine is started, a short period of time elapses before the oil can be pumped from the sump and supplied throughout the engine. During this critical time, engine parts are not adequately lubricated. So the quicker the oil can be circulated through the engine, the quicker the engine parts receive proper lubrication.

You can't tell when it's time to change the oil simply by looking at its color. Your oil may look dirty when you check it – that just means it's doing its job.

When you drive in dusty conditions, abrasives can get past the air filter and into the oil system.

All of these conditions are very hard on motor oils. They introduce extra contaminants or waste products into the motor oil and create the need for frequent oil changes.

5. I only drive a few thousand kilometers a year. I shouldn't have to change my oil that often, right?

Wrong! Low annual mileage, especially if it involves short trips, can be far more detrimental to motor oil than high mileage at motorway speeds. That's why all vehicle manufacturers list both time and mileage recommendations for oil change intervals. Believe it or not, this type of driving constitutes "severe service."

6. What is viscosity and why is it important in motor oils?

Put simply, viscosity refers to the "thickness" of a fluid. More precisely, viscosity is a measure of a fluid's resistance to flow. "Thin" or low-viscosity fluids flow easily – water is a good example. On the other hand, honey is an example of a "thick," high-viscosity fluid.

But the viscosity of a fluid often varies with temperature. For example, motor oil changes viscosity as its temperature changes – it is thicker when cold and thinner when hot. Ironically, it needs to act in almost the opposite way.

At low temperatures, oil should be thinner so that it flows readily and won't thicken too much or gel in

cold weather. Use of a thinner (or lighter) oil at low temperatures makes it easier to start an engine and speeds the flow of oil to critical engine parts.

At high temperatures, the oil must be thick enough to form a film on engine parts in order to prevent metal-to-metal contact. A high-viscosity oil resists being squeezed out of this contact area between metal surfaces, preventing premature engine wear.

So the ideal viscosity for an oil has to balance between low-temperature flow and high-temperature protection.

7. What does "multigrade" or "multi-viscosity" refer to?

These two terms refer to the same thing. Multigrade or multi-viscosity motor oils are formulated to meet the requirements of more than one viscosity grade classification from the Society of Automotive Engineers (SAE). This means that multigrade oils can be used over a wider temperature range than monograde (or single-grade) oils. A multigrade oil is identified by two SAE grade designations, e.g., 10W-30. The SAE 10W-30 designation indicates that the oil acts like a 10W-grade oil at cold temperatures and a 30-grade oil at normal operating temperatures.

The "W" initially stood for "winter" when multigrade motor oils were first introduced. The lower number in front of the "W" identifies the oil's performance in engine starting at winter temperatures. A smaller number indicates a better ability to

flow at lower temperatures.

Similarly, the "50" in 15W-50 means that the oil will provide higher oil films during high-temperature operation in the summer.

8. Which viscosity grade should I use in my car?

You should follow the manufacturer's recommendations as indicated in your vehicle owner's manual.

For maximum low-temperature performance and maximum fuel economy, use the lightest (lowest SAE grade) recommended oil viscosity. Heavier oils can impede engine starting, lower fuel economy and steal horsepower. Improved engine technology with tighter piston-ring and cylinder-wall tolerances allows the use of a lower-viscosity oil without increasing oil consumption. (A "loose" engine, or one with wide tolerances, allows too much oil to get past the piston rings and into the combustion chamber, where the oil is burned along with gasoline.)

9. If I'm a little bit low on oil, does it matter if I put in too much?

Yes, it does. Overfilling the engine crankcase could cause the oil to interfere with some moving parts. The crankshaft could churn the oil, causing excessive foaming that would reduce the effectiveness of lubrication to critical areas of the engine. Overfilling might also cause too much oil to get into piston/cylinder areas, which could cause engine smoking and increased oil usage. In extreme cases, engine crankshaft seals could be damaged by the high pressure caused by overfilling the crankcase.

Multigrade motor oils are formulated to meet the requirements of more than one SAE viscosity grade classification – they can be used over a wider temperature range than monograde oils.



Mobil 1 is fitted at the production plant as original equipment in some of the world's finest vehicles, including:

- All Porsche cars
- Mercedes-Benz AMG cars
- All Aston Martin cars
- Chrysler Vipers

The technology employed in Mobil 1, the world's leading synthetic motor oil, is used by the Team McLaren Mercedes – the Formula One team, exclusively in all of their race cars.