PART 1: ARE OIL CHANGES REALLY NECESSARY?

I believe the whole point of using a premium synthetic oil is peace of mind. I like knowing that I can trust the oil in my car to protect my engine. I like knowing that 300,000 miles down the road, I won't necessarily have to start looking for another vehicle (unless I'M ready). I also like knowing that when 20,000 miles rolls around, I still have a few thousand miles left to find time to change the oil.

Now, you're probably saying to yourself, "This guy is nuts! There's no way that an oil could possibly last for 20,000 miles."

Well, if you don't mind, I'd like to take a little time to, first of all, prove that I'm not in need of psychiatric care. And secondly, I hope that you'll allow me to explain why I believe that a premium synthetic oil CAN last for 20,000 miles or more.

I used to be a pretty regular 3,000 mile oil changer. I had a very hard time believing that an oil could possibly last longer than 5,000 or at best 7,000 miles. Changing at 3,000 miles was very safe and "assured" me of no mechanical breakdowns.

When I started looking at synthetics, my perspective changed a little. I figured, if I was going to go out and buy a $20,000 new car, I wanted to get the most for my money. Just protecting against breakdown for a couple hundred thousand miles wasn't enough. I don't take my car to the mechanic and hope he doesn't break it. I take my car to the mechanic so that he can make it better.

The same can be true of your oil. Let's talk about oil changes first. If it's necessary to change oil every 3,000 to 5,000 miles, then so be it. We should just

do it, and accept that it's an integral part of keeping our vehicles from breaking down.

But, if it's not necessary, why do it? Just because our Dad did? My Dad used to listen to 8-track tapes too. Now we've got these nifty little CD's that sound clear as a bell and last pretty much forever. Am I going to listen to 8-track tapes? Probably not.

I don't change my oil every 3,000 miles anymore either.

There are only a few basic reasons why it is necessary to change your oil, and they all, in the end, have to do with decreased protection of your engine and decreased performance. If these elements can be minimized, then there would be little or no reason to change the oil.

PART 2: MOTOR OIL BREAKDOWN: WHAT REALLY CAUSES IT?

First off, all oil breaks down. That generally will include basestocks and additives. Without focusing on performance characteristics, the most significant difference from one oil to another is how quickly breakdown occurs. Although there are many factors that contribute to the breakdown of an oil, heat is one of the most important. Depletion and decreased effectiveness of oil additives is also important, but that will be discussed later.

Petroleum oil begins to break-down almost immediately. A high quality synthetic, on the other hand, can last for many thousands of miles without any significant reduction in performance or protection characteristics. Synthetics designed from the right combination of basestocks and additives can last almost indefinitely with the right filtration system.

As alluded to above, the first major difference between petroleum and synthetic oil is heat tolerance. Flash point is the temperature at which an oil gives off vapors that can be ignited with a flame held over the oil. The lower the flash point the greater tendency for the oil to suffer vaporization loss at high temperatures and to burn off on hot cylinder walls and pistons.

The flash point can be an indicator of the quality of the base stock used. The higher the flash point the better. 400 degrees F is the absolute MINIMUM to prevent possible high consumption.

Today's engines are expected to put out more power from a smaller size and with less oil than engines of the past. Therefore, the engines run much hotter than they used to. That puts an increased burden on the oil.

Even the best petroleum oils will have flash points only as high as 390 and 440 degrees F. Some actually have flashpoints as low as 350 degrees. For today's hot running engines, this is not nearly enough protection. Just about any synthetic you come across will have a flashpoint over 440 degrees. Premium synthetics can have flashpoints over 450 degrees with some even reaching as high as 500 degrees. That's a big difference.

As a result, I think that it's quite obvious that these high- tech oils offer a substantial benefit when it comes to potential breakdown due to burn-off. Nevertheless, even though synthetics are MUCH less prone to burn-off than are petroleum oils, there is still some burn-off during extremely high temperature operation.

Thus, it becomes important to discuss the manner in which petroleum and synthetic oils burn off. As a refined product, petroleum oil molecules are of varying sizes. Thus, as a petroleum oil heats up, the smaller, lighter molecules begin to burn off first.

Since the ash content in many petroleum oils is higher than synthetics, deposits and sludge are left behind to coat the inside of your engine. Detergent and dispersant additives are used to keep these deposits to a minimum, but only so much can be done. Unless you're changing a petroleum oil every 2,000 to 3,000 miles some deposits are going to be left behind.

In addition, as smaller particles burn off, the larger, heavier molecules are all that is left to protect the engine. Unfortunately, these larger particles do not flow nearly as well and tend to blanket the components of your engine which only exacerbates the heat problem.

Synthetic oils, on the other hand, because they are not purified, but rather designed within a lab for lubrication purposes, are comprised of molecules of uniform size and shape. Therefore, even if a synthetic oil does burn a little, the remaining oil has the nearly the same chemical characteristics that it had before the burn off. There are no smaller molecules to burn-off and no heavier molecules to leave behind.

Moreover, many synthetics have very low ash content and little if any impurity. As a result, if oil burn-off does occur, there is little or no ash left behind to leave sludge and deposits on engine surfaces. Obviously, this leads to a cleaner burning, more fuel efficient engine.

As a side note (as it really has little bearing on when to change your oil), synthetics do a much better job of "cooling" engine components during operation. Because of their unique flow characteristics, engine components are likely to run 10 to 30 degrees cooler than with petroleum oils. This is important, because the hotter the components in your engine get, the more quickly they break down.

WHAT ABOUT THE ARCTIC FREEZE?

This is an issue that some people really don't think about when it comes to oil changes. Most people understand that at cold temperatures, an oil tends to thicken up, and many people know that synthetics do a better job of staying fluid. However, many people don't realize why petroleum oils tend to thicken up. More importantly, though, they don't realize that this thickening process can wreak havoc on their oil.

You see, because most petroleum oils contain paraffins (wax), they tend to thicken up considerably in cold temperatures. Therefore, in order to produce a petroleum oil that will perform adequately in severe cold temperatures, additives called pour point depressants must be used in high quantities. These additives are designed to keep the wax components of a petroleum oil from crystallizing. This maintains decent flow characteristics in cold weather for easier cold starts.

In areas where the temperature remains below zero for any period of time, these additives are used up very quickly because petroleum oils are so prone to wax crystallization. As a result, the oil begins to flow less easily in cold weather temperatures. Of course, the result is harder cold starts and tremendously increased engine wear. Thus, the oil must be changed in order to provide the cold weather engine protection which is necessary.

Synthetic oils, on the other hand, contain no paraffins. Therefore, they need NO pour point depressant additives. In addition, even without these additives, synthetics flow at far lower temperatures than petroleum oils. For instance, very few petroleum oils have pour points below -30 degrees F. Many synthetic oils, without any pour point depressants, have pour points below -50 degrees F. That's a big difference. There is, in fact, one oil on the market that has a pour point of -76 degrees F.

Since synthetics do not have any pour point depressants, there is no chance of these additives breaking down or being used up over time. There are no additives to break down. Therefore, synthetic oils maintain their cold temperature flow characteristics for a very long time. As a result, there is one less reason to change the oil if using synthetic as opposed to petroleum.

In addition, another part of cold weather driving that is extremely tough on an oil is condensation. Because it is so cold, it takes a fairly long drive to get the engine warm enough to burn off the condensation that occurs inside the engine. As a result, vehicles routinely driven short distances in cold weather will build up condensation within the oil. If left to do its dirty work, this water would cause acids to build up within the oil and corrosion would begin within your engine.

So, there are additives in the oil which are designed to combat these acids. Generally, the TBN value of an oil will be a good determination of how well and for how long an oil will be able to combat these acids. Most petroleum oils have TBN numbers around 5. Most synthetics have TBN levels over 8 or 9. Premium synthetic oils (especially those designed specifically for extended oil drains) will have TBN numbers around 11 to 14. This allows for much better acid control for a much longer period of time, thus decreasing the need for an oil change due to cold temperature condensation.

PART 3: WHAT ABOUT ADDITIVE DEPLETION?

First of all, I need to make it abundantly clear that I am not speaking of "Miracle Oil Additives" such as Duralube, Prolong and the like, when I refer to oil additives. I am speaking of the additives that are in your oil right from the original bottle that you pulled off the shelf.

Many people swear by these "extra" Miracle Additives, but I am a firm believer in independent lab results. Every independent test I've seen regarding special oil additives such as those mentioned above has given no indication that they provide ANY measure of increased engine protection. In fact, in some cases they may even increase engine wear.

However, this is a whole other story that deserves a complete article. So, for the sake of remaining on topic, I am going to return to the article at hand and leave you to study this oil additive issue a little further on your own.

It is true that the additives in many oils begin breaking down after only a few thousand miles. What needs to be recognized is that there are different quality "grades" of additives just as there are different quality grades of just about any other product that you buy. There are also different combinations of additives that tend to work for better and for longer when combined than when used individually.

Making a blanket statement that additives in oil die after only 2 to 3,000 miles is like saying that automobile tires will only last for 30,000 miles. To be sure, there are plenty of tires on the market that can only last for 30,000 miles, and then they're toast. But, there are many tires on the market nowadays that will last over 75,000 miles.

The same scenario holds true for motor oils. Many oil companies are using the same additives in their oils as all of the other companies because they are cheap. That's why the oil costs less. You get what you pay for. If they were willing to spend the money on top-quality additive packages for their oils, every synthetic on the market would be recommended for extended drain intervals, and they would all be more expensive. The technology has been around for years. The problem is that oil companies make more money selling a cheaper grade oil and making sure that you change it more often.

1. VISCOSITY RETENTION—Shear stable viscosity index improvers help premium synthetic motor oils maintain their viscosity in the range appropriate to each grade over extended drain use. Conventional oils formulated with easily sheared viscosity index improvers often drop out of viscosity specification relatively quickly—sometimes even before the end of a 3,000-mile oil drain interval. Viscosity loss leaves oils incapable of protecting engines from metal to metal contact and wear in high temperatures.

NOTE: It was mentioned earlier that petroleum oils tend to thicken due to burn-off. The statement above is not contradictory to that. It just indicates that petroleum oil is vulnerable to two opposing types of breakdown, which, in the end, render the oil basically useless for lubrication purposes.

2. CONTAMINANT CONTROL—Dispersants keep contaminants, including combustion by-products, suspended in oil. The rate of dispersant depletion depends on the motor oil's additive treat- rate and the oil's contaminant load. Premium synthetic motor oils are formulated with high additive treat rates specifically to allow extended drain intervals.
3. ACID CONTROL—Total Base Number (TBN) describes the acid neutralization ability of an oil, with higher TBN oils providing longer lasting acid neutralization. Most passenger car motor oils are formulated with TBN of 5 to 7. Many synthetic motor oils are formulated with 9-11 TBN or higher. The result: longer and better acid neutralization capability allowing for extended drain use.

PART 4: HOW DOES OIL CONTAMINATION OCCUR?

There is also the issue of contamination. Oil will be contaminated in three major ways. One will be through debris that comes in through the air intake. Once it makes it through the air filter, it ends up in your oil. Once in your oil, it starts damaging your engine.

The second source of contamination will be metal shavings from the inside of your engine. The lesser the quality of the oil, the higher percentage of these shavings because there will be more metal to metal contact inside the engine.

The third source of contamination will be from combustion by- products. Combustion by-products will generally raise the acidity of your oil, which causes corrosion in your engine. In addition, they will be left behind as the engine oil burns off and will collect on the inside of your engine as deposits. To maintain the viability of your oil as well as protection of the engine, the contaminants have to be removed/neutralized.

One of the best ways to help with this process is to keep most of the contaminants from ever getting inside the engine in the first place. That's where your air filter comes in. Conventional paper air filters are pretty worthless. How many times have you removed your air filter for replacement only to find that you could write your name in the dust that collected around the air intake? That's just the stuff that was left behind. Imagine the amount that actually ended up inside the engine.

Part of the problem is that traditional paper filters do not fit all that snugly in the air intake compartment. They've improved, but they're still not great. More importantly, though, they let way too much debris shoot right through the filter element itself. As a side-note, they do not provide for very good air flow either.

You see, as a compromise to allow enough air flow for your engine to run "properly", surface type air filtration media have to allow certain sized particles to flow through. If they made the filtration media any more tightly woven, not enough air would pass through quickly enough to keep your vehicle running.

As a result, most paper filters won't catch anything smaller than about 20 to 40 microns with any real efficiency. In most cases, the more expensive the filter, the lower the micron level of filtration - and the lower the better, of course.

20 to 40 microns is pretty small. A human hair is about 100 microns in diameter. The problem is that 60% of engine wear is caused by particles between 5 and 20 microns (most likely because there is so much more of it). If you don't keep that stuff out, it'll eat away at your engine.

Consider an alternative air filtration device which is more like a sponge (actually, it's foam). Because foam is "squishy" it can be made slightly larger than the air intake compartment so that when installed it fits very snug with no room for air to by-pass the filtration unit.

In addition, it has millions of "tiny" channels through which air can flow, but these channels are not straight channels. They twist and turn through the filtration media. Air can pass through easily because these "tiny" channels are actually much larger than the channels through the paper filter we just discussed. This is possible because the paper filter only has one chance to get the dirt. This foam media has multiple opportunities to catch the dirt.

You see, as the air travels through these winding channels, it can turn this way and that with ease. However, the dirt particles that the air is carrying travel in a straight line until they hit something. Obviously, at every turn, the debris within the air hits a "wall". You say, "Well, that's great, but why doesn't that dirt just bounce off the wall and keep right on going?" Good point. I tell you what, why don't we put a tacky substance in the foam so that when debris hits these "walls" it's stuck there like a fly to one of those sticky tapes. You say, "Yeah, that would work!"

Not only will it work, it will work far better than the paper air filter discussed above. Because of the depth-type nature of the foam filter AND the added tack oil, it will remove most particles larger than 5 to 10 microns. Thus, most of the harmful stuff is stopped before it ever reaches the inside of the engine.

Now, we've established that such a filtration media would seal up the intake compartment, should have better air flow, and we've established that it has more opportunities to catch the dirt, so probably less dirt makes it into the engine. The next question should be, will it hold as much dirt as the paper filter?

Well, of course it will. It's much thicker than a paper filter, and, because of the nature of the foam media, has a virtually limitless surface area over which to collect dirt. In fact, the more dirt it collects, the better the filtration (with minimal reduction in air flow). It's also much more durable than paper, so it NEVER needs to be replaced. Just wash it once a year, re- oil it and put it back in the vehicle.

PART 5: ENGINE WEAR PARTICLES CAUSE OIL CONTAMINATION

Ok, so we've taken care of the air intake, but what about metal particles from engine component wear? Well, there are a couple of things going on here that lead to better protection from a synthetic oil. One aspect that proves to be very important is cold weather starts. Now, all of us have heard about cold weather starts for years from oil additive manufacturers. We've all heard, "Just put our additive in your crankcase and it will form an impenetrable layer over engine components that will protect your engine against wear, especially at start-up. In fact, it's so good, you could even drain the oil from your engine and drive it around the track a million times at 60 mph."

Hogwash. Just about all of the companies that have made claims like this over the years have been brought up on charges by the FTC. They're full of it. However, they were right about one thing. Cold-weather starts are killing your engine. Consider this:

The pour point of an oil is 5 degrees F above the point at which a chilled oil shows no movement at the surface for 5 seconds when inclined. That's tech-talk which basically means that the pour point of an oil is the point at which it ceases to be "pourable". This measurement is especially important for oils used in the winter.

A borderline pumping temperature is given by some manufacturers. This is the temperature at which the oil will pump and maintain "adequate" oil flow and pressure within an engine. This is not provided by a lot of the manufacturers, but generally seems to be about 20 degrees F above the pour point. So, the lower the pour point the better.

Most petroleum oils have pour points in the range of -15 to -35 degrees F. That means that their borderline pumping temperature is, at best, around -15 degrees F and probably closer to 5 to 10 degrees F. So, if you're running a petroleum oil, don't expect to go out and start your car at 0 degrees and have it purr like a kitten. It's going to spit and sputter and kick and scream for a few minutes.

Why do you think that is? It's not getting any oil up into the engine. It's like trying to suck molasses through a tiny straw in an Alaskan January. There's literally nothing keeping the metal components in your engine from tearing each other apart. Every time you start your engine in conditions like this, your engine dies a little bit more.

Synthetic oils, on the other hand, routinely have pour points around -40 degrees or colder. Some have pour points as low as - 60 to -70 degrees F. Granted, there are very few of us who will ever have to start our car at this temperature, but imagine how well these oils lubricate at -20, if it they still flow at -70.

Now, I know that some of you live in areas where you almost never see temperatures under freezing. For you folks, the pour point of your oil may be a little less important, but it still serves to prove a point about the protection differences between petroleum oils and synthetics.

In addition, lets get back to that impenetrable barrier over your engine components that oil additive manufacturers sputter about all the time. Although, there is no scientific testing that proves this will really occur in actual automotive applications when using an oil additive, synthetic oils do provide something similar to this.

Generally, a thin film of synthetic oil will remain on engine components for days after it was last run. Petroleum oils tend to drain back down to the oil pan very quickly, leaving no oil film to protect your engine at start-up. Many auto techs and backyard mechnics can attest to this after doing engine tear- downs. Those using synthetic oil generally will have a thin film of oil left on components even if the engine has been sitting for awhile.

It's certainly not impenetrable, and I wouldn't go draining your oil after installing 6 quarts of synthetic just to see if your engine still runs, but it does serve a purpose. Your engine should virtually NEVER see metal to metal contact, whether in hot or cold climates. That's something that a petroleum oil can't do.

In addition, because of the higher film strength and better lubricity characteristics of synthetic oils, they routinely perform better on standardized ASTM wear scar tests. This would indicate a higher level of engine protection and would certainly lead to fewer engine wear particles in an engine. Hence, fewer contaminants in the oil to necessitate changing it.

PART 6: COMBUSTION BY-PRODUCTS CAUSE ENGINE DAMAGE

Only one type of contaminant left to discuss: combustion by- products. These little buggers can wreak havoc in an engine. Not only can they form deposits on the inside of an engine which will rob it of performance and, ultimately, life expectancy, they will also tend to raise the acidity of the lubricant.

Higher acidity levels in your oil can lead to severe corrosion and break-down of engine components. In turn, this break-down leads to more oil contaminants and the necessity for an oil change.

Three things keep these contaminants in check: the TBN of the oil, high efficiency oil filtration and tight ring seal. The most important of these three is ring seal. If the number of combustion by-products entering your oil can be reduced, there will be less necessity to remove or neutralize them.

Poor ring seal allows combustion by-products to pass from the combustion chamber into the crankcase where they contaminate the oil. Tight ring seal keeps them out. Synthetic motor oils encourage a tighter ring seal than petroleum motor oils do.

As we discussed earlier, TBN (total base number) is a measure of how well a lubricant can neutralize acidic combustion by- products. The higher the TBN, the better the protection against these acidic by-products and the longer that protection will last. Hence, the possibility of longer oil drain intervals with oils that have high TBN values.

Oil filtration is the last component that must be discussed when making the case for extended oil drains. The next section in this series addresses this critical component.

PART 7: EFFICIENT OIL FILTRATION RECOMMENDED

Now, on to oil filtration. Even having taken care of all other issues relating to oil contamination, there is still a certain amount of dirt and debris in your oil which must be taken care of. Hence, there is a necessity to maintain adequate oil filtration in order for a lubricant to remain viable. Even though the extra dispersancy additives keep dirt and debris surrounded and impede contact with engine components, those contaminants must still be removed. This is where your oil filter comes into play.

First of all, the statistics previously mentioned regarding engine wear haven't changed. 60% of all engine wear is caused by particles between 5 and 20 microns. Unfortunately, most oil filters on the market today are lucky to remove even a small percentage of particles under 30 to 40 microns. This, again, leaves most of the harmful debris in your oil.

The actual filtration efficiency of a particular filter really depends upon the filter manufacturer, and it is sometimes very difficult to get any specific numbers from them regarding their filters' actual filtration efficiency.

MICRON LEVELS NOT GREAT FOR COMPARISON

If you do any research on your own, you'll find that most manufacturers no longer use micron levels to rate their filters. This is a result of some manufacturers' shady representation of their filters using micron ratings. You see, some filter manufacturers would indicate that their filters would remove x micron particles and leave it at that ("x" being whatever arbitrary number they chose to print). Of course, consumers would take this to mean that all particles larger than this micron level would be removed, which is not necessarily the case.

The truth is that chicken wire will remove 5 micron particles. It will even remove 1 micron particles. BUT, it will not do so with very good efficiency. The key is, how efficient is the filter at removing x micron particles. If you don't know how efficient it is at a certain level, the micron rating means nothing.

So, most companies have gotten away from micron ratings (to avoid the confusion) and have gone to an overall efficiency rating. In other words, an industry standard test is used in which oil is contaminated with a certain number of particles of varying micron sizes. At the end of the test, there is a measurement taken to determine the total percentage of ALL of these particles that were removed by the filter. That percentage is then stated as the overall filtration efficiency of the filter.

Some companies use a single pass test, others use a multiple pass test. Both are perfectly valid and will give you an excellent way of determining how well a filter will do its job, but you should not try to compare results from a single pass test to results of a multiple pass test. You'd be comparing apples and oranges. In either case, high efficiency filters will rank in the low to mid 90's for filtration efficiency. Off-the- shelf filters will rank in the mid 70's to mid 80's for filtration efficiency.

IF MICRON LEVELS ARE TO BE USED

Nevertheless, you may still want to compare filters using micron ratings. If this is the case, the following is a good rule of thumb. A filter is considered nominally efficient at a certain micron level if it can remove 50 percent of particles that size. In other words, a filter that will consistently remove 50% of particles 20 microns or larger is nominally efficient at 20 microns.

A filter is considered to achieve absolute filtration efficiency at a certain micron level if it can remove 98.7% of particles that size. So, if a filter can remove 98.7% of particles 20 microns or larger, it achieves absolute efficiency at that micron level.

Most off-the-shelf filters are based upon a cellulose fiber filtration media. Most of these filters are, at best, nominally efficient at 15 to 20 microns. They won't generally achieve absolute efficiency until particle sizes reach 30 microns or higher.

High efficiency oil filters have filtration media made of a combination of at least two of the following: glass, synthetic fibers and cellulose fibers. Those that use all three are generally the best in terms of filtration. Those that use only two will fall somewhere in between. The best of these high efficiency filters will achieve absolute efficiency down to about 10 microns and will be nominally efficient down to 5 microns or so.

HOW IMPORTANT IS BETTER EFFICIENCY?

The fact is, you would probably be amazed at how much engine wear could be eliminated simply by using more advanced oil filtration. In paper 881825 the Society of Automotive Engineers indicates that a joint study was performed between AC Spark Plug and Detroit Diesel Corp. The study found that finer oil filtration significantly reduced the rate of engine wear.

According to the paper, the tests regarding engine wear within a diesel engine were performed using four levels of oil filtration. They chose filters whose efficiency rating was very high for particles of 40 micron, 15 micron, 8.5 micron and 7 micron sizes.

The same was done for gasoline engines, except that the relative sizes were 40 microns, 30 microns, 25 microns and 15 microns.

To make a long story short, the researchers had this to say:

"Abrasive engine wear can be substantially reduced with an increase in filter single pass efficiency. Compared to a 40 micron filter, engine wear was reduced by 50 percent with 30 micron filtration. Likewise, wear was reduced by 70 percent with 15 micron filtration."

By combining this type of oil filtration with the superior protection and cleanliness of a premium synthetic oil, you will virtually eliminate engine wear.

EFFICIENCY IS NOT THE ONLY IMPORTANT FACTOR

Of course, filter capacity and quality of construction are also important considerations. If a filter has low capacity and high efficiency, it will clog up quickly. As a result, your oil will begin to bypass the filter completely and will become contaminated very quickly. Filters with high efficiency and low capacity should definitely be changed at 3,000 to 5,000 miles or 3 months - without question.

Filters which have high capacity but low efficiency will last longer without becoming saturated, but will not protect your engine as well. Of course, filters with low capacity AND low efficiency are at the bottom of the barrel and should be avoided. Generally, you can call a filter manufacturer and ask them specifically what their filtration efficiency and capacity ratings are for your filter. They should have that information.

If they give you a micron rating, ask them how efficient their filters are at removing particles of that micron size. You might also ask them at what micron level their filters are nominally efficient (50% removal) and at what level they achieve absolute efficiency (about 99% removal). If they can't or won't provide you with a straight answer, I wouldn't purchase their filters.

If they give you an overall percentage efficiency rating, ask them if that is for a single pass test or a multiple pass test. That will be important if you are to compare those ratings with other manufacturers so that you'll be comparing apples to apples.

I DON'T WANT TO DEAL WITH ALL OF THAT

For those of you who just want to know what's best, here's a breakdown of the top 3, in my opinion. Mobil 1, Pure 1 and AMSOIL provide the greatest filtration efficiency in the tests I've seen. Mobil 1 and Pure 1 both achieved 93% overall filtration efficiency on the SAE HS806 test. AMSOIL scored a 94%.

In regards to filtration capacity, the AMSOIL outscored them by a wide margin. In a comparison of filters recommended for the same application, the AMSOIL could hold 21 grams of particulate matter. Comparable filters from Mobil 1 and Pure 1 held 18 grams and 15 grams respectively. So, the AMSOIL filter held 17% more than the Mobil 1 and 40% more than the Pure 1.

The AMSOIL also appears to have a little heavier construction, but everyone seems to have different criteria they use to judge this. You'd have to cut the filters apart for yourself to make your own judgements in this matter.

The AMSOIL company recommends changing their filters at 12,500 mile or 6 month increments. Based on their numbers, this seems reasonable. They have better capacity and stronger construction which should allow them to achieve longer change intervals. Since AMSOIL filters have been recommended for these intervals for about 20 years, it seems reasonable that they know what they're talking about.

Mobil 1 and Pure 1 recommend changing their filters at your vehicle manufacturer's recommendations. That generally means change the filter at each oil change which amounts to changing the filter every 3,000 to 7500 miles depending upon driving conditions. Because of the lower capacity of the Pure 1 filters, I'd recommend changing them closer to 3 to 5,000 miles. The Mobil 1 would probably last 5,000 to 7500 miles with good results.

As a side note, you can determine if your oil is bypassing your oil filter by touching your filter after at least 45 minutes to an hour's worth of driving. If the filter is hot, you're probably in good shape. If it's not, the oil is likely bypassing the filter, and it is time for a change.

WHAT ABOUT THE PRICE?

Let's assume you drive 25,000 miles per year. The Pure 1 is about half the price of the AMSOIL or Mobil 1 in most cases, and runs about $5.00 for a filter for a 96 Ford Taurus 3.0L. However, I recommend that it be changed more often due to a lower filtration capacity. With changes at 5,000 miles you're looking at 5 filters x $5 = $25. If you decide to play it a little safer and change at 3,000 miles (which I'd recommend), you're looking at about 8 filters x $5 = $40 for the year.

The Mobil 1 and AMSOIL filters will run you roughly $10 for a filter for that same application. If you take the Mobil 1 to the high end at 7500 miles, that amounts to about 3 filter changes or $30. Playing it a little safer at 5,000 miles puts you at 5 filter changes or $50 for the year.

If you use AMSOIL's recommended filter changes (12,500 miles), that amounts to 2 $10 filters or $20 for the whole year. Seems to me this is the better buy. You get slightly better filtration efficiency and fewer filter changes for less money. Can't see how it gets any better than that.

WHAT ABOUT OIL STARVATION?

Of course, the first question that comes to mind when most people hear of high efficiency filtration is oil starvation. How can an oil filter remove particles that much smaller and still provide adequate oil flow to critical engine components?

Well, again I refer back to the high efficiency foam air filter we talked about earlier in this eBook. You'll remember that it is designed to have a much thicker filtration media that will trap particles throughout the entire media instead of only on the surface as with a paper air filter.

This is also how high efficiency oil filters work. Instead of trapping all of the oil contaminants on the surface of a paper (cellulose) type filtration media, high efficiency oil filters have a depth type media which will trap contaminants throughout the entire filtration media. This, combined with the different type of materials used for the filtration media allows high efficiency oil filters to remove more and smaller particles without restricting oil flow - just as high efficiency foam air filters remove more and smaller particles without restricting air flow.

There is also the option of using magnetics to help with filtration. Some filters are magnetically charged so that they hold all engine wear particles within the filter, no matter what the size. These are not necessarily a bad idea, but they do not remove other oil contaminants which are not metallic in nature. Therefore, if possible, you might want to consider some combination of magnetic filtration AND high efficiency filtration media.

PART 8: SYNTHETIC OILS OFFER GREATLY EXTENDED DRAINS

There you have it. If this "little" article doesn't at least get you thinking about switching over to synthetics, I'm not sure what will convince you. I know that this article is a little less technical than it could be. There are many other differences between petroleum and synthetic oils which were not touched on here, but if we had covered those too, this article would have been 50 pages long. Most of the information presented here was meant to deal strictly with the concept of extended drain intervals and why they're possible. If you'd like to learn more about the technical aspects of automotive lubrication and filtration, you might want to consider purchasing "The Motor Oil Bible".

There are a couple of companies out there that are probably good for extended oil drain intervals. I'll speak more about the specific companies in the next chapter. However, since many people use Mobil 1 and believe it to be the best synthetic available (mainly because it is the most recognizable name), I thought I might spend a little time touching on that particular company.

In my opinion Mobil 1 oils are most likely good for 10,000 to 15,000 miles, but the company does not make that recommendation. I have known of many people who do very well running Mobil 1 for these intervals, but it has not been designed specifically for extended drain use. Moreover, the company probably would not back you if you had any mechanical problems resulting from such extended drain use, since they only recommend "manufacturer recommended change intervals".

In light of the information above, I would like to leave you with a few notes of importance. If a synthetic oil is not specifically recommended for extended drain use, and you choose to attempt extended drains, you do so at your own risk. Extended drain synthetic oils must be formulated with special long-life additives and blended basestocks so as to maintain their lubricating properties for an extended period of time.

In addition, in order to get the full benefit from extended drains, it is most beneficial to be using high efficiency oil and air filtration as well. If you are using traditional filtration methods, you will likely have to change your oil more often and will end up with reduced engine protection. If you're going to do it, do it right. It will cost you less in the long run, and probably in the short run too.

PART 9: VERY FEW COMPANIES OFFER EXTENDED DRAINS

Now, you may be saying to yourself, "This is all great, but there is something I just don't understand. If there are oils out there that will last for 25,000 miles - and have been for over 25 years - why am I still being told to change my oil every 3,000 miles? Either someone is lying or someone just doesn't have all of the facts.

Well, I believe that it is a little bit of both. You've probably heard that 3,000 mile oil changes are necessary from friends, family, possibly your mechanic and definitely your local quick lube operator. The problem is, most of them are just reiterating what they've been told for years - and it has served them fairly well.

Most of them simply do not understand lubricants nearly as well as they think they do. Even those mechanics who are brilliant when it comes to automotive engines are not necessarily experts on lubrication. Lubrication technology is much more involved than most of them thinks.

Nobody can know everything, but in order to give people the most accurate advice, it pays to make sure that you have all of the relevant information.

I believe that there are even a large number of quick lube operators that don't know nearly as much about lubricants as they'd like to think. However, I also believe that some of those same quick lube operators that are telling you to change your oil at 3,000 mile intervals might very well be using synthetic oil for extended oil drain intervals in their own vehicles.

It's sad, but true. Oil companies and many quick lube operations know that synthetic oils are capable of extended drain intervals but are too afraid of lost revenue to admit it. In fact, here are a few quotes from different people in the automotive and lubrication industries which should illustrate what I mean:

According to GM's Mike McMillan, "Certainly there is technology available to raise the standard and extend the drain interval without compromising engine durability or removing the performance cushion ... Europe is already at a 9,000 mile drain interval and is seriously considering twice that". Of course, you have to remember that most vehicles in Europe are using synthetic oil.

Most other auto manufacturers seem to agree with Mr. McMillan. In the May 1996 issue of Lubes 'n' Greases representatives from the three major US auto makers detailed how lack of knowledge about available lubricant technology led to an unsatisfactory PCMO (Passenger Car Motor Oil) upgrade.

In "GM's Tough Agenda for Lubes," Lubes 'n' Greases reports that extended drains are a customer service issue. "...We're very concerned about engine durability and oil drain intervals particularly as they impact reducing the amount of maintenance our customers are required to perform. Customers want to minimize their vehicle maintenance time and changing engine oil is their single biggest remaining maintenance item. Addressing that issue is very important to us."

Even quick lube operations know that the technology exists to extend oil drains well beyond the 3,000 mile mark. Some are embracing extended drain technology as a way to increase customer satisfaction as well as company profits by working WITH the improvements in lubrication technology, instead of against them.

Dennis Brooks, Vice President of SpeeDee Oil Change and Tune- Up, implied as much in a statement he made in the November 1996 issue of National Oil & Lube News, a respected periodical in the lubricants industry.

In regard to the extended drain issue Brooks said, "I believe there will be greater potential to move into selling a higher percentage of synthetic oil."

Others in the quick lube industry, however, are running scared. Jim Sapp, Convenient Automotive Services Institute (CASI) president, is quoted in the same article as saying, "For years, Jiffy [Lube] has preached the 3,000 mile or three month oil change interval. And fortunately for us, many motorists take it as gospel. But we need to do more as an industry ... It's not inevitable that intervals will expand to the point where we can no longer stay in business." In other words, it IS possible to continue to keep motorists in the dark about extended drains.

In the October 1996 issue of Lubes 'n' Greases, Quaker State CEO Herbert M. Baum suggests, "We need to go on the offensive. Stop fighting with each other and go forward as a group; fight for regular oil changes. We have to build business as a group, and it's the role of our associations to promote the use of our products."

Nevertheless, Quaker State now is manufacturing and selling an oil which they say can last for 7,500 miles (although they neither recommend nor guarantee those intervals). They're trying to ride the rail and pad their pockets, but eventually a train is going to come along, and they are going to have to choose a side or get bulldozed.

You see, extended drains are happening and have been scientifically proven for nearly 30 years to be safe as long as the oil used has been designed for extended drain use. As of May 2000, I know of only three motor oil manufacturers that actually recommend extended drain intervals for their oils: AMSOIL, NEO and Red Line.

Other synthetic oils are likely to last longer than 3,000 to 5,000 miles (probably closer to 7 to 10,000), but the manufacturing companies do not recommend, nor will they back such practices with any sort of warranty.

AMSOIL recommends and guarantees up to 35,000 miles or one year for most automotive gasoline applications and has recommended slightly shorter 25,000 mile changes since the early 70's. NEO has also been in business since the early 70's and recommends 25,000 miles or one year intervals. Red Line gives a range of 10,000 to 18,000 miles as the recommended change interval, depending upon your driving habits.

Of these three oils, AMSOIL sells for the best price at as little as $5.70 per quart for their 25,000 mile oils or just over $8.00 per quart for the Series 2000 35,000 mile oil. Red Line follows at an average of $7.50 to $8.00 per quart for all of their oils. NEO appears to be the most expensive at close to $10 per quart.

If used for their full recommended drain interval, all of these oils are more economical than an off-the shelf synthetic oils that you find at the local K-Mart, Walmart or Meijer. These typically run about $3.50 to $4.00 per quart but should be changed 3 to 5 times as often.
