



MEMA SPECIAL REPORT

The Reality of the 3,000 Oil Change

May 2005

The 3,000 mile oil change is part of the American automotive culture. Not everyone follows it, but everyone has learned the 3,000 mile number. However, there are parts of the industry that now openly challenging that convention. In previous years, manufacturers have published oil change intervals other than the 3,000 mile schedule, however, has been done in a passive manner that required the owner to find it. Today, oil drain intervals are being stretched further than ever and the impetus is not just from the car manufacturers. In January 2005 Exxon-Mobil launched three new lines of Mobil Oil: Mobil Clean 5000, Mobil Clean 7500 and Mobil 1 Extended Performance. These oils are warranted for oil drain intervals of 5,000 miles, 7,500 miles and 15,000 miles respectively, even on engines that have a shorter factory service interval.

The move towards extended service intervals appear to be three-fold.

1. New oil technologies have allowed the manufacturers and refiners to create more stable oils that will endure longer service.
2. European car manufacturers through the ACEA (European Automobile Manufacturers Association) have long sought the ability to reduce oil use, consistent with the European emphasis on fuel economy.
3. Decreased frequency of traditional tune-up services such as spark plugs and transmission oil have led to less frequent visits for service and a demand by consumers that oil changes follow suit.

What is an extended drain? While the 3,000 mile interval has been most heavily publicized, manufacturers have long been putting 5,000 and 7,500 mile oil change intervals in their service schedules. These are considered regular service drain intervals, not the severe service interval called for in certain conditions. For this article, an extended drain is defined as one that is performed at 10,000 miles or longer.

Extended drain technology is primarily based on the availability of synthetic oils. While the additives in conventional, non-synthetic oils allow them to function longer than the tradition 3,000 miles, it is primarily the synthetic base stocks that allow the oil to last much longer. Synthetic oil offers many advantages in durability versus conventional petroleum oil and it is all based on the synthetic oil's superior heat and oxidation resistance. Synthetic oil is more accurately controlled at the molecular level and therefore can be engineered to resist the forces in an engine that work against oil durability. Furthermore, this tightly controlled molecular structure allows a synthetic oil to use fewer viscosity improvement additives in order to provide the high and low temperature protection of multi-viscosity oils. This is borne out by the availability of synthetic only weights such as 0w-40, 5w-50 and 10w-60. No conventional oil can provide such a wide viscosity spread and remain stable for long periods of time.

However, in order to function properly, oil must do more than just provide lubrication over the specified viscosity range. Oil helps keep internal engine parts clean and free from deposits caused by combustion. A Shell Global Solutions report titled “Deposit Formation and Control in Engine Lubrication - Mechanisms & Models”, states that deposits created by the interaction between oils and combustion cause increased emissions, raise internal friction resulting in lowered fuel economy, and can lead to accelerated engine wear. According to synthetic oil manufacturer Royal Purple, a superior oxidation stability results in an oil that can resist forming deposits for longer. Because the formulation of synthetic oil base structure does not have to rely on anti-oxidant additives that wear out it is more suited to longer drain intervals.

In order to attain an extended drain capability, the oil must also have a higher level of detergents to continue to provide the necessary cleaning properties. Because deposits will not be removed by drainage as frequently, any oil that is designed for an extended drain must also have a higher level of dispersants to hold the accumulated deposits. Mobil reports that the Mobil 1 Extended Performance synthetic oil has 37% greater cleaning additives than the non-extended drain Mobil 1 formulation. For dispersants, the presence of esters in the synthetic basestock perform the dispersant function without the need for additives found in conventional oils.

The European Automobile Manufacturers Association (ACEA) publishes oil quality sequences (their name for standards) as a way to inform oil manufacturers of the properties necessary to lubricate the engines that are being manufactured. These ACEA sequences have a significant contrast to the American Petroleum Institute (API) standards used to govern oil specifications in the United States: ACEA is made up of automobile manufacturers while the API is composed of oil companies. While there are many theories regarding the influence of the oil companies, this is not one of them. Both engine manufacturers and oil producers share a common interest in producing high quality engine oil. However, the vehicle manufacturer is less sensitive to the economic ramifications of the extended drain interval.

Vehicular environmental impact is also a topic with which the automobile manufacturer must contend. The European Union views used motor oil as a form of pollution and has since 1974 issued directives on its proper disposal and use. The EU legal basis and objective concerning waste and pollution is to “avoiding waste by promoting environmentally-friendly and less waste-intensive technologies.” Critically important is the emphasis on the reduction of waste production, rather than simply looking at ways to deal with pollution that is produced. Working within these guidelines, the ACEA would be obliged to set sequences that allow for extended drain intervals.

ACEA extended drain specifications for gasoline and diesel engines are A3/B3, A3/B4 and A5/B5. These specifications can be found on many modern oils and are specifically designated “for extended drain intervals where specified by the engine manufacturer.” These sequences form the basis of the individual manufacturer’s specifications for extended drain interval oils. These specifications, such as the Mercedes Benz MB 229.5 allow for service up to 30,000km (18,641 miles) when used with a special fleece oil filter. Of note, only full synthetic oils have been able to meet the MB 229.5 specifications.

Also facing the automobile manufacturers is the demand from consumers to reduce service frequency. The integration of the 100,000 mile tune-up interval, made possible by electronic ignition and platinum spark plugs, with a 3,000 mile oil service interval may seem unreasonable for consumers. One solution presented by the automobile manufacturers is the electronic oil service system, also known as oil life monitors. BMW introduced a system on the 1982 528e and many manufacturers have followed suit. An oil life monitor is much more than an automated mileage counter. GM's description of it is:

The GMOLS (GM Oil Life System) system is not a mileage counter. It is actually a computer based software algorithm that determines when to change oil based on engine operating conditions. There is no actual oil condition sensor. Rather, the computer continuously monitors engine-operating conditions to determine when to change oil. Over the years, millions of test miles have been accumulated to calibrate the system for a variety of vehicles. The system was first introduced in 1988 and is now on more than 18 million GM vehicles.

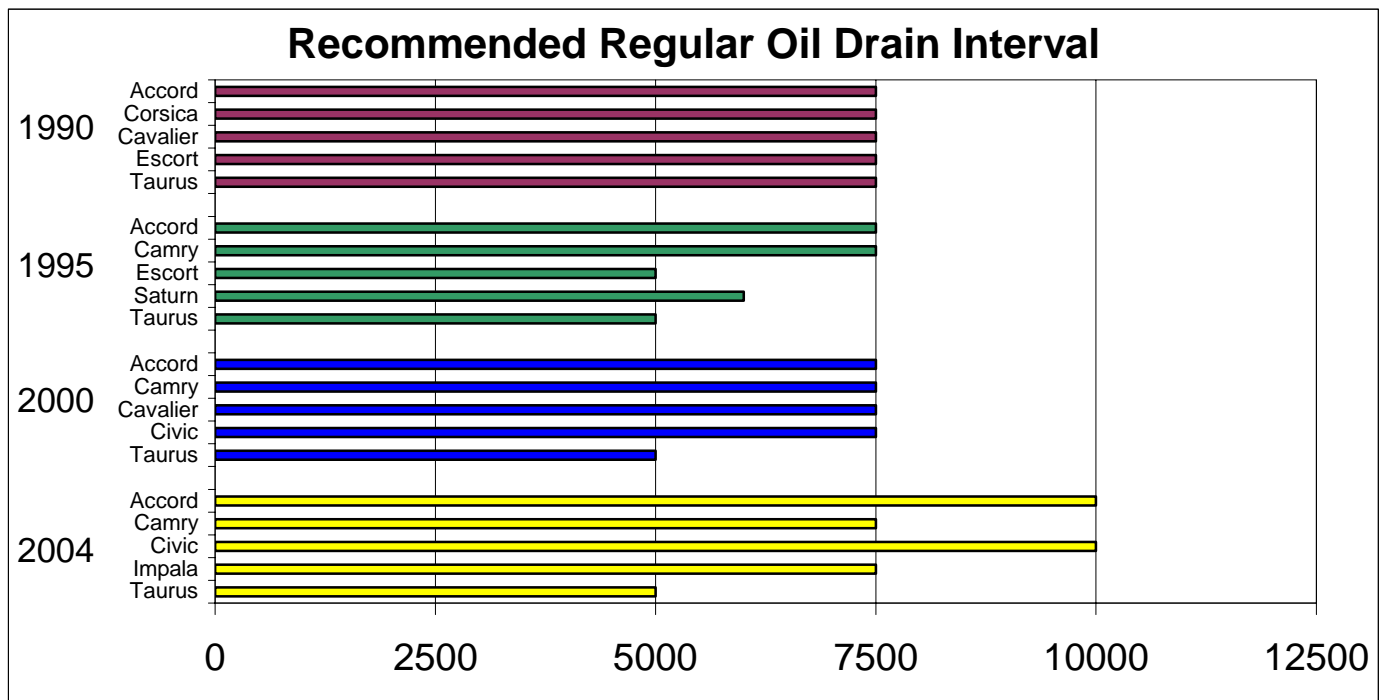
The oil life monitors allow the manufacturer the ability to extend drains without relying on the owner to determine anything involving oil service life. This reduces the involvement of the car operator, a priority of many manufacturers. In "GM's Tough Agenda for Lubes," Lubes 'n' Greases reports that 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."

There are implications to extended drain intervals that go beyond the oil that must be noted. Maintain a three-month or 3,000 mile oil change schedule helps to ensure that automobiles are given attention regularly. Along with the oil change, many fast lube establishments perform other services such as fluid level checks, wiper blade changes, tire pressure checks and tire rotation. Extending the oil drain interval extends the time that these services are performed as well. Considering the recent re-emphasis on the importance of tire pressure as a critical portion of vehicle safety (evidenced by on-board tire pressure monitoring systems becoming mandatory in new cars), the extended interval could have implications beyond vehicle maintenance. Furthermore, quick lube businesses generally perform any other routine maintenance such as air and fuel filter replacement, and transmission and gear oil service. While the service interval for these items is as long, or longer, than even the most aggressive extended oil drain interval, the danger that regular checks will go neglected is legitimate.

For the DIY oil changer, the extended drain interval in-and-of itself is a blessing. Fewer changes means less time spent changing oil. However, there are some disadvantages that may out-weigh the time savings. Synthetic oils are, at current market prices, approximately three-to-four times the cost of conventional oils. While savings can be gained from less frequent filter changes, it would mean that the present oil change schedule would have to be very close to 3,000 miles in order for an extended drain to yield any financial savings. With the plethora of extended drain specifications, the DIYer may have a more difficult time finding the correct oil needed for his vehicle. No longer will oil viscosity be the only important factor in selecting oil. Instead,

attention will have to be given to the many certifications printed on the label. Further complicating the oil change would be the inclusion of an oil life monitor. Some of these systems require dedicated tools in order to reset. Without resetting, the oil life monitor would not know that the oil had been changed and calculation of the next interval would be wrong.

Is the extended drain fact or fiction? According to National Oil and Lube News in March 2004, from 1999 to 2003 that the average oil change interval of reporting fast lube establishment decreased to 4,372 miles. Manufacturers have been recommending a longer than 3,000 mile drain interval for regular service for many years. In fact, there are very few vehicles that recommend a 3,000 mile regular service interval. Looking at the top selling passenger cars, there has not been a large change in the recommended regular drain interval.



Source – Motor OE Scheduled Maintenance Handbook

Honda is the only manufacturer with a top-five selling passenger car that has extended their drain intervals. Note that Ford went the opposite direction in the early 1990s, by shortening the recommended drain interval from 7,500 miles to 5,000 miles. GM, as discussed previously, has gone to an oil life monitor or, in the case where a monitor is not present, usually 7,500 miles, and Toyota has remained at the 7,500 mile interval. Not represented above, most Chryslers are scheduled at 6,000 or 7,500 miles, while Hyundai, Kia, Mazda, Mitsubishi, and Nissan all advise a 7,500 mile oil drain interval for most of their vehicles. Volkswagen and the other European brands use either an oil life monitor or employ extended drain intervals ranging from 10,000 to

The other aspect to consider is public reaction to the extended drain interval. With the 3,000 mile drain interval having been so heavily publicized, will a 10,000 mile interval gain widespread acceptance? A small scale study conducted by the author with MEMA employees indicate that nearly two-thirds of those polled followed an oil drain schedule shorter than the recommended

regular service schedule. 10% of respondents reported an oil drain interval shorter than the factory recommended severe service interval. While only 10% of respondents' cars called for an extended drain interval (10,000 miles or longer), none of those cars' owners were willing to follow it.

If MEMA employees are representative of the general automobile owning population, the idea of extended oil drain intervals may face some resistance from car owners. While conducting the study, the author heard from people who were proud of their 3,000 mile oil change. One respondent went so far as to give reasons as to why she had her oil changed every 3,000 miles. Others sited remorse at their longer oil drain intervals. "I know I should get it done every 3,000 miles" was a familiar refrain, even from those with 5,000 mile recommended drain intervals. The most pervading opinion concerning oil drain interval was that frequent oil changes were "cheap insurance" and well worth the money. Such an attitude could seriously undermine any attempt by auto makers to extend the oil drain interval beyond current levels, especially considering that many people already determine their intervals without consideration for the factory recommendations.

The implications of the extended drain interval on the automotive aftermarket are mixed. There are two clear losers – the quick lube industry and the oil filter industry. According to National Oil and Lube News, Marc Graham, president of Jiffy Lube International, has said that for every 100-mile reduction in fast lube customers' oil change intervals, the industry could realize \$105 million in sales. Clearly, the converse is true, so a widespread extension of drain intervals would have an immediate and negative impact on the industry. This could be partly offset by the need for synthetic oils which traditionally command a premium that might help compensate for the lost volume.

The filter industry is completely dependent on the frequency of oil changes for product volume. It is improbable that even the most intensive public awareness campaign could ever convince motorists to change their oil filter more frequently than their oil. However, there is an opportunity to compensate for lost volume with increased gross-dollar-per-sale items. Much like the change from copper to platinum plugs brought forth the challenge of lower sales volumes but also the opportunity to sell a higher-priced product, so too does the extended drain interval allow this possibility. This would come in the form of a premium filter that is designed for an extended drain. Extended drain interval oil requires some of the advantages of synthetic compounds, and the oil filter is expected to follow suit. Synthetic filtration fibers are at the heart of extended drain interval filters and are beginning to become more widespread in their application.

One of the more interesting developments in filter technology has apparently been driven by the need for a product that can withstand the ultra-long drain intervals of the MB 229.5 specification oils. MANN+HUMMEL has developed the filter that has a polyester fleece filter element design to work for the 30,000 kilometer (18,641 mile) drain interval, and incorporates a special support structure that helps the filter last. Furthermore, this filter dispenses with all metal – it is 100% plastic and therefore has a lower potential for environmental impact. While not widespread, the MANN+HUMMEL filter technology could be a glimpse at the future should extended drain intervals become the norm.

In spite of the growth in popularity of the synthetic filter, there are very few filters that state that they are expressly intended for use with extended oil change intervals. Fram, like many filter manufacturers, has a multi-level product offering and the premium filter is the Fram X2 Extended Guard. The X2 specifies that it is designed to offer “7,000 miles plus performance.” ExxonMobil has recently updated their Mobil 1 filter to the Mobil 1 Extended Performance Filter to match the Mobil 1 Extended Performance synthetic oils. However, while the Mobil 1 Extended Performance oil is guaranteed for 15,000 miles, there is no mileage reference for the Mobil 1 filter. Mobil 1 does report that the filter is “designed for today’s longer service intervals;” however, it does not specify an exact mileage in the same way that its oils do.

The traditional independent repair shop is the least likely to feel any effect from extended drain intervals. As it stands, oil changes are unlikely to be a profit center for them due to the constant price pressures of the quick lube industry. If the practical standard oil change reaches 10,000 miles, the impact on profit building repairs should be minimal. Even if oil service is performed every 10,000 miles, that is still shorter the interval of any other item. There may be some revenue lost to a competitor because it is more difficult to assess, for example, drive belt life over 10,000 mile rather than 3,000 mile interval and an untimely failure may put the customer in a situation where the closest facility will get the business.

The chain, multiple bay shops may have a slightly harder time with a 10,000 mile service interval. While oil change is most likely a small portion of their profit scheme as well, a major portion of their business model is the multiple-point inspection. Less frequent oil changes could lead to a drop in customer volumes and the incremental business built from the inspection procedure would decline proportionally. Furthermore, the inspection model may fail under the new conditions. Brake pads that would formerly have left the shop confident of lasting until the next 3,000 or 5,000 mile oil change may now not last through a 10,000 mile oil drain interval.

In light of recent events, OE manufacturers may have to exercise greater caution when specifying extended drains. The problem of oil gellation (sludge) has appeared in three cases with three different manufacturers. Toyota experienced sludge problems with their 1997-2001 5SFE 2.2 liter four cylinder and 1997-2002 1MZ 3.0 liter V6 that were installed in the backbone of their North American passenger car and light truck lineup. Toyota has maintained that its extension of warranty and repairs were not due to any fault in its design, but rather negligent maintenance practices on behalf of vehicle owners. The scope of the problem is not to be underestimated. There were 3.3 million examples of those engines sold in the US. The popular Volkswagen/Audi 1.8 liter turbo 4 cylinder (1.8t) also experienced oil gellation problems. Much like Toyota, VW/Audi offered an extension of warranty but insisted that the problem is caused by infrequent maintenance and the use of improper oils. Most recently, Saab has notified owners of a potential oil sludging problem in their 1998-2003 2.0 and 2.3 liter four cylinder engines. The warranty on the affected units has been extended to eight years. There are also complaints filed against Chrysler for sludge problems in its 2.7 liter six cylinder, however no action has been taken and Chrysler maintains that sludge problems remain the result of poor maintenance habits.

Is the issue of oil gellation directly related to poor maintenance? The two Toyota engines have an oil drain interval of 7,500, the VW/Audis 10,000 and the Saabs 10,000 miles. With half of the engines with sludge problems having extended drain intervals, it might be tempting to draw a

connection between the two. However, the same percentage are turbo charged, and again, the same percentage are Toyotas. One of the main determinants in the formation of sludge is the quality of the oil used. As stated earlier, part of the reason manufacturers are able to recommend extended drain intervals is because of the superior properties of synthetic oils and modern additives. Recently, to prove this point, The Alliance of Automobile Manufacturers (which includes all three manufacturers with the sludge problems) conducted a study using a current API SL rated oil and an API SA oil that is said to represent 1930s oil technology. Even though no new car specifies an API SA rated oil and hasn't for decades, these oils are still readily available. Often, these are the cheapest oils found in convenience stores and auto parts retailers. When put to the test, the SA oil failed to perform to SL specifications in every analysis performed. Most telling of all, and perhaps the main reason for conducting the test, were the results of the low temperature sludge/deposit test.

Temp. Sludge/Deposit (Seq. VG) Test: Low Temp. Sludge/Deposit (Seq. VG) Test: Oil Pan

API SL (ILSAC GF-3): Pass

API SA: **Fail**

Completed only 168 hrs
of 216 hour test.

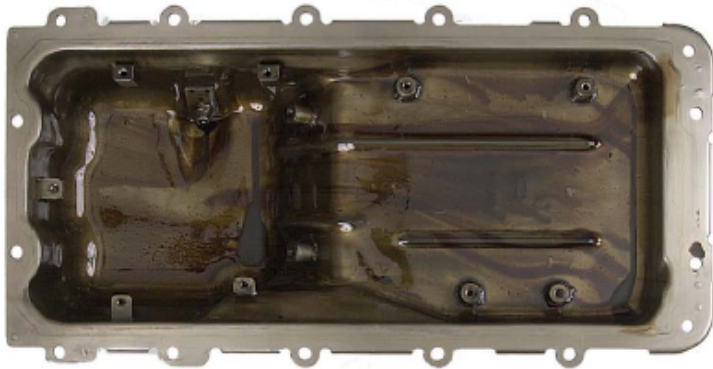


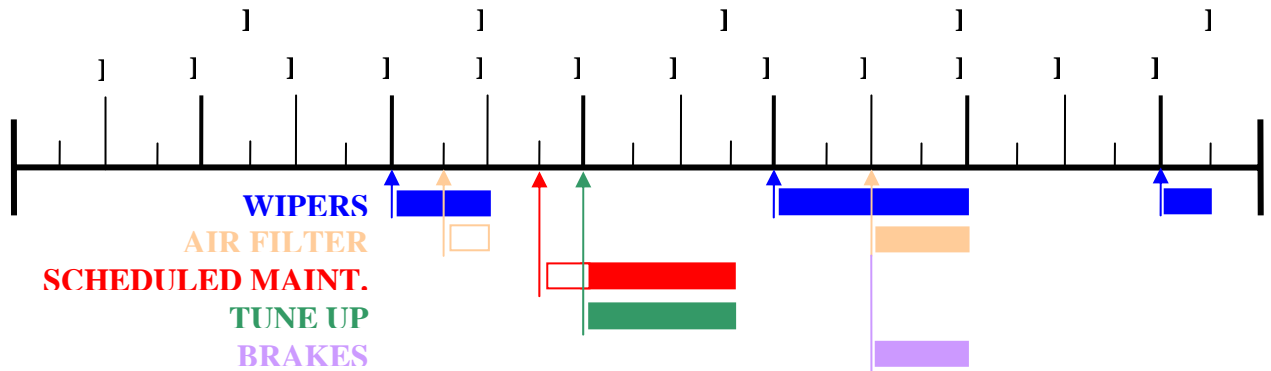
Photo courtesy of the Alliance of Automobile Manufacturers

Clearly, the manufacturers' claim that sludge formation can be caused by use of improper oils is no exaggeration. In order for extended drain intervals to be successful, the Alliance's call for removal of SA rated oils from circulation must be heeded. Deposit formation of this magnitude would cause serious engine damage for which, based on recent history, the manufacturers might have to accept responsibility. The likelihood of manufacturer recommending extended drains could be hampered by continued availability of inferior grade oils.

The key for the entire industry is to ensure that an extended oil drain interval does not extend the maintenance interval of other critical parts. Inspection procedures will have to be revised in order to synchronize with the longer time between professionals looking at the car. Should extended drain intervals become widely recommended and, more importantly, followed by consumers, an industry wide effort to educate consumers on the need to monitor other parts on their vehicles would be necessary. With the amount of maintenance that already goes unperformed, it would

behoove the industry to develop firm guidelines for the service and all of all components that can be set to a timed interval. Clearly, if the extended drain interval lengthens the time between service visits, it becomes imperative that vehicle owners are made aware of the other needs of their vehicle that must be addressed.

We can observe the effects of extended drain intervals if we plot them versus a 5,000 mile interval on a timeline. Then, using the MEMA Replacement Rates of U.S. Automotive Parts 2004, add in other services to gauge the potential impact an extended drain interval could have.



The timeline’s small divisions are three months, the large six months and the bolded full years. The “R” on the top of the timeline represents a regular (non-extended) oil drain interval, while the “E” is an extended drain. To arrive at the hypothetical extended drain interval, the MEMA Replacement Rate Guide number was multiplied by a factor of 2.5. Applying this factor to the National Oil and Lube News interval of 4,372 miles equates to a drain interval of 10,930 miles; only slightly above the 10,000 mile cutoff and by no means an aggressive extended drain interval. The shaded bars represent the hypothetical extension of the selected service items assuming that those service items are synchronized with oil changes. The un-shaded boxes represent those areas where current maintenance habits do not coincide with oil drain intervals and therefore do not have any effect on a potential increase in unperformed maintenance.

Perhaps the most important lesson for the industry can be found by examining the relationship between the wiper blade replacement interval and the extended oil drain interval in our hypothetical timeline. Based on current patterns, wiper blades are replaced on average every two years. With the regular drain interval occurring every six months, there is no likelihood of a wiper change at a non-oil drain interval. However, switching to an extended drain interval of over a year causes the wiper blade change interval to not match the oil drain interval. Under the extended drain schedule, the first time wipers would be replaced on the current schedule, the car would not be due for an oil service for another six months. At the second wiper replacement, there is a one year lag until the next oil drain interval. The critical lesson for the industry is that the vehicle was in for an oil service just three months prior to this need for wipers. This is a clear example of how if extended oil drain intervals become prevalent, our industry must enhance existing efforts to educate the consumer on the importance of vehicle maintenance rather than just repair.

Extended drain intervals remain a viable topic of discussion for the automotive industry. The pressure to reduce waste continues to rise across the globe, and manufacturers recognize that used motor oil can be seen as another form of pollution by governments. The European Union

has already set that precedent. Consumers continue to demand less involvement in the maintenance of their cars. At the current time, the oil change is the most frequent maintenance item required, so it is logically the place manufacturers will look for extended service capability. With oil sludging becoming an issue in some very popular engines, there may be some doubt in the manufacturer's mind as to value of extending intervals with continued availability of lower quality oils. Every portion of the service aftermarket depends on the oil service in one capacity or another. Extended drain oils are often tied to a manufacturer's specification, the proliferation of which could result in a SKU growth for oil retailers and installers. However, understanding the impact to all service is the most important challenge for the industry. Should extended oil drain intervals become a reality, it will be imperative that the preventative maintenance inspection procedures are enhanced and that the industry educates the consumer regarding their importance.