Lower Your Fleet Management Costs

By Tim Ogburn and Bob Boughton

How Oil Analysis, Higher Quality Motor Oil, and High Efficiency Oil filters can make you more competitive

Fleet management continues to be challenging because of the rapid rise of fuel and labor prices. Fleet managers must find ways to reduce business costs. The good news is there are some proven practices that save money, keep vehicles on the road with less downtime, and protect engines better by greatly extending the life of motor oil. A recent study provides further evidence that motor oil analysis, higher quality motor oils, and more efficient filters protect engines from wear, and lead to significant cost savings.

A two-year study conducted by the California Department of Toxic Substances Control (DTSC) has validated that there are multiple methods by which fleets can:

- reduce motor oil and labor costs,
- decrease service downtime,
- reduce engine wear,
- reduce hazardous waste generation, and
- obtain a reasonable economic payback.

Study Findings

Oil life extension leads to significant cost savings. All fleet managers can benefit by extending oil change frequency to warranty limits. Oil analysis programs can lead to further extensions. While HE filters can yield much longer service life, it seems to have the most value for the largest engines. Cost-benefit calculations show a reasonable payback time for several HE filter/engine-type combinations. It was found that as fleet managers become comfortable with oil analysis results, they typically reduce the number of oil analyses they need to determine if the oil continues to protect the engine. This further reduces costs of oil analysis along leading to shorter payback times than found in the study.

The DTSC study examined motor oil life in a variety of vehicles, ranging from passenger cars to large diesel buses and trucks. The 119 vehicles in the study traveled a combined total of nearly 3 million miles over two years. Laboratory analyses of the vehicles' motor oil (for both lubricating quality characteristics and contaminant buildup) produced findings that, although unsurprising, exceeded expectations as outlined below.

- **At a minimum, oil drain intervals can be simply and safely extended beyond the current level to the maximum mileage recommended by the vehicle/engine manufacturer for any type of vehicle.**

A survey of fleet managers showed an average oil change interval of 4,460 miles for passenger vehicles. This is well below the manufacturers' recommended 7,500 miles. There is zero additional cost (and in fact, substantial cost saving) by simply following the manufacturer's oil mileage recommendations derived from today's motor oils.

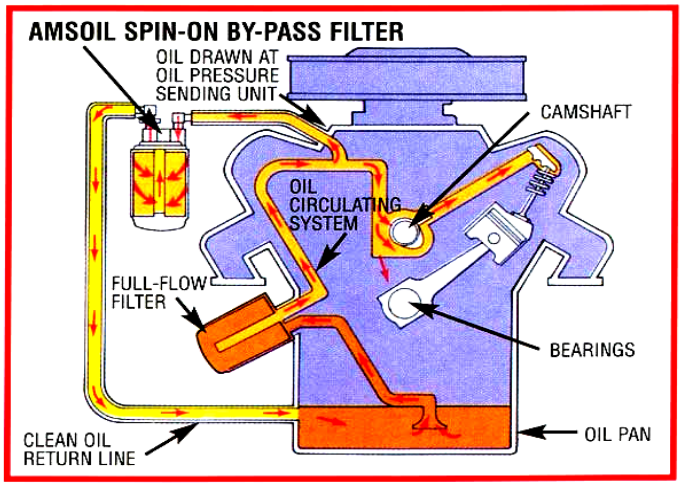
- **Fleet managers can further extend oil change intervals by using higher quality motor oil and by using oil analysis to determine optimum drain intervals.**

Higher quality motor oil can extend the service interval, especially oils with higher amounts of additives (such as those contributing to the Total Base Number (TBN)). These additives combat oil degradation by reducing acid buildup, thereby lengthening oil change intervals. Many current synthetic oils provide guaranteed oil change intervals of 15,000 miles. Oil analysis shows an engine's wear characteristics as well as the oil's condition. This helps determine optimal oil drain intervals.

- **In larger engines, HE oil filters are an effective and economical technology for further extending oil drain intervals.**

Manufacturers have promoted high efficiency (HE) oil filters, which have high particulate filtration capability, to extend oil drain intervals and reduce engine wear. HE oil filters remove small damaging particles, such as dirt and soot that accumulate rapidly in large diesel engine oil. Not only does the motor oil last longer because it is cleaner, but engine wear is reduced. HE oil filters are very practical for larger-engine buses and trucks, regardless of fuel type. DTSC's study demonstrates that, when supported by oil analysis, use of HE oil filters and higher quality oil can significantly extend drain intervals. Cost-benefit calculations show a reasonable payback time for several HE filter/engine type combinations of 1.3 to 6.8 years. Study results indicate that it is likely not economical to retrofit passenger vehicles to HE oil filters.

Several different designs of HE oil filters exist. Generally, the filters are add-on equipment that supplements the standard full-flow filter by filtering a side-stream of the oil. The figure below shows the typical oil circulation from the oil pump to the full-flow filter, and then through the engine block. After lubricating engine components, a portion of the oil is directed to the bypass filter. There, it is highly filtered then returned to the oil sump.



Typical by-pass filter installation
(Diagram courtesy of Amsoil Corporation, Superior, WI)

Study Details and Results

The two-year study included 119 vehicles – 61 passenger vehicles, 40 buses, and 18 trucks which ran on gasoline, diesel, or compressed natural gas (CNG). Collectively, they traveled

nearly 3 million miles with no reported engine failures. The table below summarizes the study results for each vehicle type and filter brand studied, the considerable oil life extension obtained, and the expected payback period. In gasoline engines, mileage between oil changes can be extended furthest by using high quality motor oil containing a high total base number (TBN). By using HE filters, oil change mileage can be tripled in utility trucks. The largest diesel engines consistently operate 50,000 miles or more using HE filters that also maintain a high TBN.

Summary Results of DTSC motor oil life extension study

Participating Fleets	Number and Type of Vehicles	Filter Make and Model	Miles Accumulated During Study	Oil Samples Collected	Original Drain Intervals	Extended Drain Intervals	Projected Payback Period (yrs)
Department of General Services	40 passenger cars	Fram X2	798,000	212	6,000	10,000	0.2
California Department of Forestry and Fire Protection	13 two- and three-axle trucks	OilGuard EPS 60	134,980	42	5,000	18,000	3.1
California Department of Transportation	5 two- and three-axle trucks	OilGuard EPS 60	160,711	39	6,000	18,000	1.3
Fresno Area Express	10 city transit buses	OilGuard EPS 60	179,099	56	6,000	18,000	3.7
Fresno Unified School District	14 school buses	Luberfiner ZGard LPF9750	116,618	34	9,000	36,000	2.5
Long Beach Unified School District	26 school buses	Luberfiner ZGard LPF9750	505,115	57	10,000	36,000	6.8
California Department of Corrections	11 coach buses	puraDYN TF 40	949,649	100	10,000	50,000	3.6

Note: Original drain intervals taken from fleet manager survey averages. Extended drain intervals were conservatively based on oil analysis results.

Fleet Managers Surveys and Forums

A primary study objective was to assess fleet managers' perceptions regarding extended oil service life. A survey was sent to 1900+ state and local government and private fleet managers. The survey investigated fleet managers' perceptions, previous experiences, and current HE oil

filter knowledge by asking them about the importance of purchase costs and the maximum allowed payback period, and rating their concerns over reducing oil purchases, decreasing engine wear, and engine warranties. Managers were asked for their perspectives regarding reliance on oil analysis results, and the value of increased service intervals.

DTSC received more than 250 survey responses. DTSC staff also held five focus group meetings throughout California with State, local government, and private fleet managers. DTSC presented the survey results to participants and asked for their reactions.

The surveys and forum participants expressed similar initial reservations about extending motor oil service life. The most significant were:

- initial program set-up costs,
- ongoing service and analysis expenses not producing actual cost savings,
- risk in extending motor oil life,
- engine warranty invalidation, and
- HE filter performance and reliability.

Furthermore, forum participants identified these institutional/servicing barriers:

- overall economic payback period,
- altering existing maintenance schedules/routines,
- tracking oil analyses for individual vehicles in large fleets, and
- overcoming skepticism by service technicians.

At the end of the vehicle demonstration, surveys were mailed to participating fleet managers. Those responding ranked the most important benefit of HE filter technology to be “Increasing the Time Between Oil Changes,” while ranking “Decreasing Waste Generation” and “Reducing Oil Purchases” second and third, respectively. Half of the respondents stated that they believed in the benefits of HE filter technology performance and reliability, yet problems with logistics, maintenance schedules, and recordkeeping continue to handicap adopting and accepting HE filter technology as a standard fleet operating practice. This barrier should be easy to overcome if all fleet vehicles are managed under an oil extension system, rather than disrupting maintenance operations with two different schedules. The most promising post-demonstration survey results indicated that 50 percent of the respondents intended to use oil sampling and analysis for drain interval extensions for their entire fleet. Eventually, they could become advocates and industry leaders for using HE filter technology augmented by oil analysis.

Conclusions

By implementing these practices, fleet managers can keep costs in line and even lower them, protect their equipment better, reduce downtime, and become more competitive. Less frequent oil changes also mean less hazardous waste generation and accompanying waste management fees. These practices make business and environmental sense. They translate into conserving cash and oil - two high demand commodities that are in short supply all while protecting the environment by reducing the volume of used motor oil, one of California’s highest-volume hazardous wastes.

Action Steps

For more details about the high efficiency oil filter study and how you can decrease business costs while reducing hazardous waste generation, go to www.dtsc.ca.gov/technologydevelopment and click on the High Efficiency Oil Filter Study link.

Additionally DTSC promotes numerous business friendly voluntary environmental programs that protect the environment while at the same time help business increase their competitiveness. For more information on DTSC's Green Chemistry and Pollution Prevention Programs, please visit http://www.dtsc.ca.gov/PollutionPrevention/index.cfm.

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