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When Should You Change Oil?

Fleets analyzing oil samples can determine if their maintenance cycles are done at the right time and also identify maintenance issues before they become bigger problems. **BY THI DAO**

“If the oil is good, why would you change it?” Gary Lentsch, CAFM, fleet manager for Eugene Water & Electric Board (EWEB), asked himself. And more importantly, how much was it costing him to change oil when it wasn’t needed?

Lentsch began asking himself this after he saw an oil analysis machine at a fleet conference. He had been [sending out oil for analysis periodically](#), but an in-house unit would speed up the process and allow him to make drastic changes to the fleet maintenance program. But at a cost of more than \$80,000, he was concerned about a return on investment (ROI).

Lentsch isn’t the only fleet manager who has been or is exploring extended oil change intervals and re-examining their fleet preventive maintenance (PM) program. A number of fleets are using oil analysis as a way to extend service intervals and reduce downtime and operating costs.

Correcting Over-Extended Intervals

EWEB has been sending out its oil for analysis at a local lab for years.

Its old light-duty PM program consisted of changing oil every 5,000 miles. Using oil analysis, the fleet determined it could extend this to 10,000 miles, with an inspec-

tion every 5,000 miles.

In July, the utility purchased an oil analysis machine that could analyze multiple vehicle fluids. Data from the machine helped the fleet see that perhaps it had over-extended its oil change intervals. With the ability to conduct nearly instant readings at every service, fleet staff saw total base number (TBN) levels in the oil were low when vehicles came in at 10,000 miles.

To compensate, the fleet is switching from a synthetic oil blend to full synthetic to make it to 10,000 miles, with the hope

changing hydraulic oil every 1,000 hours or three years. EWEB has lower-hour backhoes, and a quick analysis will determine whether that hydraulic oil really needs to be changed or if it can be used another year or two, Lentsch said.

Oil analysis tells the fleet more than just whether it’s ready to be changed — it can also say a lot about the condition of the vehicle. The EWEB fleet consists of about 260 vehicles, and its technicians are performing about 100 services and inspections per month. In three months, analysis has already helped technicians diagnose

problems, including an injector that was leaking fuel into the vehicle, and high sodium content in the oil that was traced to an exhaust gas recirculation (EGR) system failure.

Getting Deputies Back in Service

For Polk County Sheriff’s Office in Florida, the fleet’s main goal in re-examining its maintenance cycles was to keep deputies on the road longer.

“The biggest cost I have in my fleet is my deputies who drive the cars. Every time they have to bring the car in for an oil change or maintenance, it’s someone off the street, or someone being paid overtime,” said Francis Hart, fleet services administrator. The Sheriff’s Office has a fleet of 1,400 units, about 600 of which are pursuit vehicles.

Hart began [researching oil, oil additives, and filters](#) in an attempt to reduce downtime. In 2010, he began making changes. The fleet purchased an oil analysis machine, [switched to extended performance oil filters](#), and began using full synthetic



PHOTO: POLK COUNTY SHERIFFS OFFICE

Polk County Sheriff’s Office in Florida has extended its oil change intervals to 30,000 miles and filter change intervals to 10,000 miles.

of extending it out to 15,000 miles. However, vehicles still get inspected every 5,000 miles, 300 hours, or within six months.

“We’ve actually redone our whole PM program around the oil analysis,” Lentsch said.

It takes eight to 12 minutes for an in-house machine to complete the analysis, Lentsch said. Technicians take a sample at every single PM service, and they can retrieve the results before completing the service to determine if oil needs to be changed.

Staff also uses the machine to analyze transmission and hydraulic oil. With a backhoe, the manufacturer suggests

{ At a glance }

Fleets conducting oil analyses can:

- Determine if oil is ready to be changed or is past due for a change
- Identify problems with a vehicle
- Reduce downtime by extending maintenance intervals
- Save money by reducing oil use and billed technician hours.

oil. This allowed the fleet to extend filter changes to 10,000 miles and oil changes to 30,000 miles. Previously, it changed oil in pursuit vehicles every 5,000 miles and on administrative vehicles every 7,500 miles.

An in-house oil analysis machine allowed the fleet to check on performance issues. Analysis is done on “red” PM services, or the last service before the vehicles need a full filter and oil change. Hart was interested in seeing if there were metals in the oil or if there were any wear indicators from extending the oil drain. Staff noted a drop in oil viscosity — but never to a severe level — and higher-than-normal sodium content, which was attributed to an oil additive. Fleet staff determined its main-

tenance intervals were safe and effective.

While Hart oversees a maintenance facility dedicated to major repairs and equipment upfitting, preventive maintenance, tires, and minor repairs are mostly done by contracted vendors located around the county. Hart explained that the county is the size of Rhode Island, and these contracts allow officers to get PM services at the most convenient location — rather than driving 40 miles to the Sheriff’s maintenance facility. Officers are responsible for a safety check of their vehicles before every shift, including topping up on oil if it’s low.

Sending Out Oil for Analysis

At the Orange County Sanitation District in Fountain Valley, Calif., the fleet consists of about 200 vehicles. The district has been sending out its engine oil for analysis for six years, said Jim Tintle, fleet supervisor.

Staff noted that the oil in Ford Taurus motor pool vehicles still looked clean when it was changed. After oil analysis and some experimentation, the fleet extended the oil change intervals on these vehicles from three to five months.

While the fleet still sends out its oil for analysis, which may take one week, a new in-house option has become available. Another division with oil testing equipment has begun testing the oil on select fleet assets — notably, stationary generators to make sure they’re OK to be put back in service, Tintle said.

“We set them up on rounds to go through and gather those samples for us,” he explained. “It’s a little tougher to time when the vehicles might be in the shop.”

However, if staff members from the other division are available, they’ll conduct an oil analysis on vehicles upon request within an hour or so, allowing fleet staff to make quicker decisions. Tintle expects to use this in conjunction with outside oil analysis to look into extending service intervals for light-duty trucks.

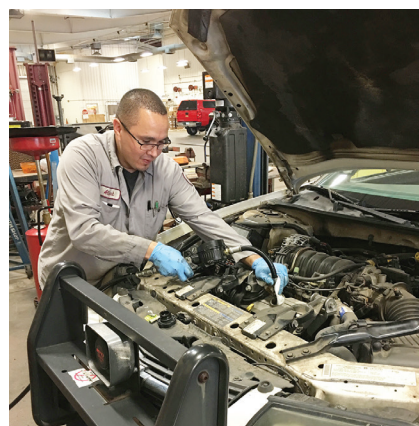
He’s also testing out synthetic hydraulic oil for several heavy-duty units, including a pull rig used to pull tires through the

sewer systems.

“The truck’s in use quite a bit, so it’s an inconvenience for them to bring it in for service. Any ability we have to stretch out their service intervals will allow them to [spend] that much more time in the field,” Tintle explained.

Re-Examining Maintenance

The City of Phoenix, Ariz., is in the beginning stages of its own maintenance changes. It has 7,300 pieces of equipment, and



The City of Phoenix is beginning a preventive maintenance overhaul — a core element is oil change intervals.

staff members are looking at oil change intervals for solid waste packers (of which there are 187) and police cars — both classes have severe duty requirements.

“We’re trying to re-do our PM program as a whole, and we want to utilize fluid analysis as a guide for when we need to do oil changes,” said Joe Oswald, methods & standards analyst. “Instead of time-based fluid changes, we’re going to try to transition to condition-based fluid changes.”

The fleet has been sending out its oil for analysis for about three years, getting results in about 36 hours. Currently, technicians take a fluid sample every time side loaders come in for service. Once the report comes in, supervisors look for any abnormal conditions in the oil as the service is being completed.

The fleet is still in the beginning stages of its change, and it’s determining how to best optimize its maintenance. The

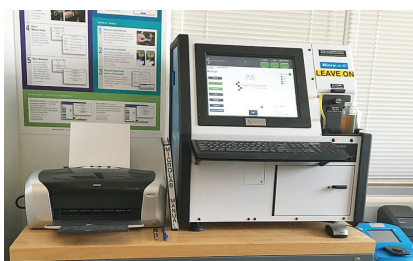


PHOTO: EWEB

Top 4 Symptoms Identified by Oil Analysis

Coolant contamination, caused by:

- Exhaust gas recirculation (EGR) system failure
- Oil cooler failure
- Head gasket failure

Wear metal contamination, caused by:

- Turbo charger failure
- Bearing failure
- Piston failure

Oil properties out of spec, caused by:

- Over-extended oil
- Fuel in the oil
- Injector failure

Dirt contamination, caused by:

- Loose clamps
- Split hoses
- Dirty air filter

Oil analysis can help fleets determine vehicle problems and allow technicians to resolve them before they become bigger issues.

SOURCE: SPECTRO SCIENTIFIC

problem with making a change across an entire class of vehicles is that their applications may vary significantly — some are used all day, every day, while others may only be used for special routes or less often by supervisors.

“What we’ve got to work out is if we extend the fluid change interval, we may not want to extend the inspection interval because wear and tear on the vehicles may necessitate for the vehicles to come in more often for inspection,” Oswald explained.

So far, for police vehicles, fleet extended the service interval from 4,000 to 6,000 miles and switched to full synthetic oil due to the severity of their use, said Gregg Duckett, Public Works operations manager.

Preliminary results indicate the city could increase [compressed natural gas \(CNG\) refuse vehicle](#) oil change intervals from 4,000 to 6,000 miles. Staff members are still determining a cycle for diesel vehicles — which run on B-20 biodiesel — to

factor in the need for inspections. Whatever they decide, the goal will be to reduce downtime, which can be very expensive as the city has few spares, and to prevent minor problems from becoming major ones, Duckett said.

Warranty Issues

How does extending oil change intervals past the manufacturer recommendation affect warranty? Fleets have differing opinions about this.

“In our case, if you’ve got a document that proves the condition of the oil, you have something factual that basically says you’re taking care of it,” Lentsch said. Since technicians perform a fluid analysis every single time the vehicle comes in, and the fleet saves the documentation, Lentsch believes the dealership will be more receptive to warranty-related issues.

In the six years since Hart has extended oil change intervals for Polk County Sheriff’s Office vehicles, he hasn’t had sig-

nificant warranty issues related to engine performance. If something does happen in the future, he also believes oil analysis records will prove that the failure wasn’t caused by extended oil change intervals.

The Orange County Sanitation District keeps vehicles for a long time, so warranty hasn’t been an issue — the Ford Taurus vehicles that have extended service intervals are already off warranty, Tintle said.

Duckett and Oswald are both concerned about potential warranty problems and intend to stay within OEM recommendations for oil changes, for vehicles on and off warranty.

“We have a mixed fleet of old and new, and we don’t differentiate between old and new vehicles” when they come in for service, Duckett said. With 190 technicians at 15 locations, this keeps things simple and consistent.

Spectro Scientific, which manufactures oil, fuel, and fluid analysis instruments, tells its customers to check with OEMs regarding warranty.

“We always recommend companies check with their equipment OEMs when considering extending their oil drain intervals on equipment that is under warranty,” said Janet Keefe, global product manager, Spectro Scientific. “We have many customers who have very effective PM programs that utilize oil analysis to determine extended oil drain intervals on equipment post-warranty, and we are always able to assist customers in making those determinations when they are just starting up.”

Determining Cost & ROI

The cost of an oil analysis machine can range from \$60,000 to \$100,000. Sending out oil for analysis can cost between \$10 and \$18 per sample. An in-house machine provides nearly instant results, but fleets may be hesitant because of cost.

For EWEB, Lentsch estimates he’ll see an ROI in less than two and a half years through reduced oil use, oil analysis costs, and, most importantly, labor costs (see table “Return on Investment by Using On-Site Oil Analysis” at left.)

As a utility in the Pacific Northwest,

Return on Investment by Using On-Site Oil Analysis

	Oil Changes Under Normal PM Program			New Oil Change Interval	
	Average Cost of Labor & Material	No. of Oil Changes per Year ¹	Annual Labor & Material Cost per Year	Estimated No. of Oil Changes per Year ²	Annual Labor & Material Cost per Year
Light-Duty Fleet (170 units)					
Motor Oil and Filter	\$47.75	385	\$18,384	130	\$6,208
Transmission Services	\$112.39	46	\$5,170	23	\$2,585
Heavy-Duty Fleet (55 units)					
Motor Oil and Filter	\$193.58	135	\$26,133	45	\$8,711
Transmission Services	\$263.50	18	\$4,743	9	\$2,372
Construction Equipment (35 units)					
Motor Oil and Filter	\$104.20	70	\$7,294	24	\$2,501
Transmission/Hydraulic Services	\$391.80	10	\$3,918	5	\$1,959
			\$65,642		\$24,335
	Estimated Annual Cost Savings from New Oil Change Interval				\$41,307
	Purchase Cost of In-House Oil Analyzer				\$83,500
	Return on Investment (years)				2.02

¹Based on oil change intervals of 5,000 miles, 300 hours, or 6 months

²Based on oil change intervals of up to 15,000 miles, 900 hours, or 18 months

This example of return on investment is based on labor and materials cost associated with doing oil changes in a scheduled preventive maintenance (PM) program vs. a PM program where oil is changed only when needed. This is based on the Eugene Water and Electric Board’s data for labor and material for a fleet of 260 vehicles and equipment.

DATA COURTESY OF EUGENE WATER & ELECTRIC BOARD

labor costs are high. Every time a technician doesn't have to do an oil change, the utility saves money.

"When you look at labor rate, that's where you get your return," he explained.

For Polk County Sheriff's Office, it's all about deputy time. Savings do come from reducing the amount of oil and filters used, but Hart is mostly concerned with getting deputies back on the road. A routine PM may take 45 minutes to 1 hour, 15 minutes. The fleet has halved that downtime for pursuit vehicles.

Phoenix is working on analyzing the cost of conducting more thorough, but less frequent, inspections. Duckett said staff will take into consideration oil costs as well as the downtime costs of keeping vehicles longer for a thorough inspection every time it comes in.

"We'll probably take the current fleet and

perform regular PMs on it, then try the all-inclusive inspections and condition-based fluid change, and we'll compare the cost per mile for maintenance," Duckett said.

Although it's sending out its oil for now, the Phoenix fleet had been loaned an oil analysis machine for four months. Staff members were happy with the quick results, but fleet management doesn't have the capital to purchase a machine right now, Duckett said.

Results Vary for Different Fleets

Oil change intervals can be different for each fleet and vehicle application, and what may work for one fleet may not work for another.

While Hart has had success with extended oil service changes, his specific maintenance cycles probably won't fit every fleet, he warned.

"This might not work well in a very urban environment with rough stop-and-go driving all the time. We're rural and we drive a lot of distances, so it works well for us," he said. "It's something each fleet has to look at on an individual basis and decide if it works for them." ★

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