

Maintenance Best Practices



Driving Uptime



Brought to you by the editors of Newcom
Trucking Group, in partnership with Chevron

In this issue



Count on Uptime

Leveraging the data hiding in your trucks' electronic control units (ECUs) can lower operating costs as much as \$4,000 annually per truck, research shows. But while the ECU can tell you a lot, you need to know what to listen for. That's why the first question you should ask yourself as a maintenance manager is what kind of data you need and to what extent it is relevant for your fleet's type of operations and equipment specs.



Fluid thinking

The arrival of new category heavy-duty engine oils, designed to work with the newest generation engines and to improve key performance attributes, presents both challenges and opportunities. For an update on the new oils and how they're performing in the field, we caught up with Rommel Atienza, commercial brand manager – North America, with Chevron.



Lab Report

Fleets that have embraced oil analysis programs are reaping the rewards. Using the data from oil analysis programs to decide when to add a fresh supply of oil is just the beginning. Each sample bottle helps to tell the story of engine wear happening well upstream of the sump.



Outsourcing vs Inhouse Maintenance

When does it make sense to outsource maintenance? Which maintenance tasks are best to outsource? And what do you need to consider in choosing the right outsourcing partner? Dig into these critical questions and make the choice that's right for your operation.

Maintenance Best Practices: Driving Uptime

No matter how much technology drives change in the trucking industry, one thing remains constant: Keeping the wheels rolling is critical to financial health. But what happens on the road is shaped long in advance by the decisions and actions taken in the maintenance shop. The maintenance strategies put in place drive profitability by driving uptime.

It's with that in mind that we partnered with Chevron to bring you this special digital supplement Maintenance Best Practices: Driving Uptime. With this supplement we get specific about what data to look for in your trucks' electronic control units and how to leverage that data to lower operating costs. This year is a year of both change and opportunity when it comes to lubrication with the release of a new oil category. We delve into how the new oils are performing in the field and also into oil analysis programs and the story they can tell you about engine wear. We also look at outsourcing. When does it make sense to outsource maintenance and which are the maintenance tasks most worth considering for outsourcing?

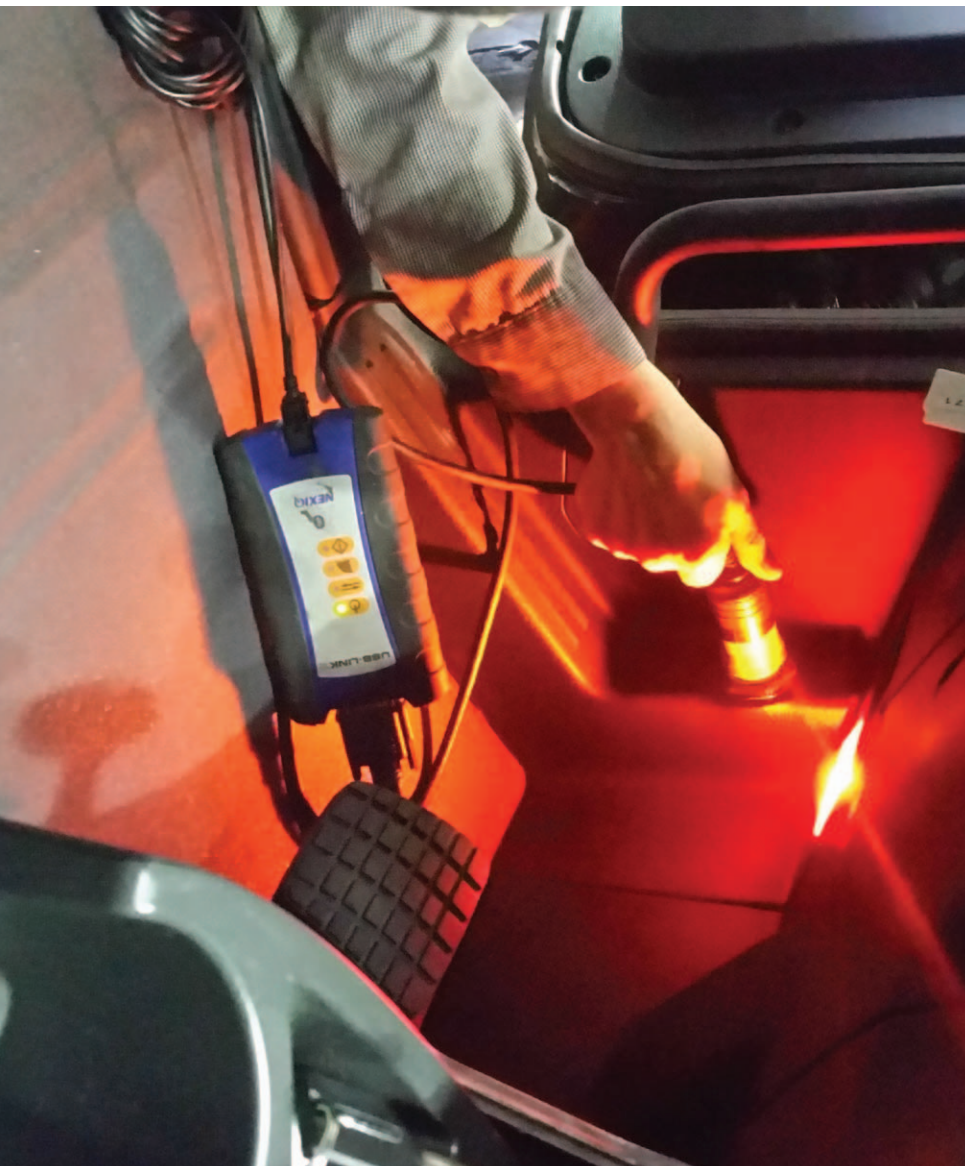
I hope you enjoy reading Maintenance Best Practices as much as we have enjoyed bringing it to you. We welcome your feedback.

Lou Smyrlis
Managing Director, Newcom Trucking Group

Count on Uptime

MAINTENANCE EXPERTS SHARE
THEIR DATA HANDLING METHODS

BY ERIC BERARD



Managing a trucking company's maintenance department is all about maximizing uptime so that trucks remain on the road, where they generate revenue. To achieve that, maintenance managers need to stay informed of what's happening to power units and trailers alike in order to schedule positive downtime – preventive maintenance. Negative unscheduled downtime – road-side breakdowns – can take huge chunks off a trucking company's profitability.

Contemporary maintenance managers are lucky enough to have information technology tools to rely on and maximize uptime and profit for their company. Yet, too much information can also lead to maintenance nightmares, with maintenance teams looking for problems that might not even exist inside their business.

Selecting data

Trucks' electronic control units (ECUs) can talk to you but you need to know what to listen for. That's why the first question you should ask yourself as a maintenance manager is what kind of data you need and to what extent it is relevant for your fleet's type of operations and equipment specs. Oxygen levels shouldn't bother you too much if your trucks travel on flat prairie roads, but it's something else if they are frequently running at high altitudes. That's why you want to choose your battles, focus on what really matters to you.

Filters applied to your computer equipment so you receive only the metrics you selected as relevant and important for your fleet is the ideal way to go, according to Yan Lambert, operations manager for Cascades Transport, at the recycled tissues and plastics company's Kingsey Falls, Quebec, terminal. "We have targeted exactly what we wanted to know about our trucks, in partnership and with the advice from our software provider," he says, referring to the fact that the reports he and his team use are issued on that basis.

Ingersoll, Ont., is home to Verspeeten Cartage, a carrier specializing in automotive parts transportation with 90

company trucks and 800 trailers. Steve Wilson, the fleet maintenance manager, says: “Before you choose any kind of information system, you have to know what you want at the end of the day, what kind of answers you want to analyze.”

As for the kind of data that is most valuable to him, Wilson is categorical: “First of all, I want to know fuel economy. That’s important to us. That’s where your money is.”

But knowing how much fuel your trucks burn won’t lead you very far unless you understand why you obtain these figures and how to preserve them if they’re good or correct them if they’re bad.

To do that, you need sub data. Bad fuel economy can be caused by over speeding, excessive idle time, underinflated tires, incorrect usage of the cruise control, unnecessary high RPM or injectors in bad condition and the list goes on. So you want to dig for these small pieces of sub data to understand the big picture.

That understanding of the big picture can also save big bucks, according to Steve Wilson. “If I get a lot of failures with NOx sensors or something and I think I can get them [the tractors] pulled in at their regular maintenance interval and just say: ‘Ok, change those two NOx sensors’, it’s gonna cost me \$1,200 but, boy, it’s only half what a service call costs to do it on the road.”

“That’s all part of reading and understanding the data. There are fleets that have dedicated people that just do that, they study all those pieces of the data,” says John Pfennig, customer service director at Navistar.

Extracting data

Most medium to big size fleets don’t actually have “download sessions” to pull the information from their ECUs. Most of the time, they rely on their communications/tracking service provider to extract the data in real time and then relay it to the maintenance manager.

“It’s such a large fleet and there’s so much data, it would be very difficult for somebody to just try and do it manually. So we developed an automatic program that just downloads data, takes the in-



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**– Yan Lambert,
Cascades Transport**

formation from each truck. And each truck is tracked by unit number and by the branch it belongs to,” says Mike Royer, vice president of fleet services at Edmonton based Westcan Bulk Transport. The company runs a fleet of roughly 600 power units and 2,000 trailers - mostly tankers carrying fuel or other dangerous goods - across Western Canada, Yukon and Northwest Territories.

Smaller fleets’ maintenance managers can also download the ECUs’ data by themselves, using a simple, basic, diagnostic tool that can be connected to the vehicle’s CAN bus. Some of these units can be found online for under \$200 and offer a great return on investment with the first over the road failure they help prevent.

Interpreting and sharing data

“We monitor information transmitted by our computer system. Any event involving a given truck, such as speeding for example and anything related to safety and eco-driving. Was there any hard braking? Was a turn taken too fast, generating a



roll-over situation risk or cargo shifting?,” says Yan Lambert to illustrate that the data he collects goes well beyond the fuel economy and PM scheduling.

Truck stability is also a concern at Westcan, especially with tanker trailers having a higher center of gravity. It comes as no surprise that all the company’s trucks are equipped with roll stability systems. “We also capture any hard braking or any other yaw type stability events that the trucks and trailers are encountering,” Royer indicates.

And if you think that factors such as speed, idle time, or stability are more “operations” stuff than maintenance, think again, “It’s usually correlated,” explains Royer, as hard braking and vehicle stability affect the overall performance of the vehicle and its wear and tear. “Tires will see increased wear rates due to higher temperatures from travelling at higher speeds. Driveline and suspension components will also wear faster when subjected to higher road speeds,” he adds. Not to mention



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idle time that does way more harm than simply burning fuel. He stresses: “Excess idle time can cause more frequent regens and premature failure of expensive emission components and sensors.”

That’s why it’s so important that the information gathered from trucks’ ECUs is shared between different departments of a single company, as each can use the same information differently to improve its performance.

Human resources can benefit from that data, as it can be used as a training tool to identify driving patterns that can and should be modified by some drivers. And the same data can be used to hand out performance bonuses and recognition to the best elements, thus helping retention.

As mentioned earlier, a fleet needs to take care not to drown in data. That’s why even if information is transmitted in a continuous matter in real time, it doesn’t mean you should always be glued to the computer screen looking for its evolution. The consensus between our maintenance experts is that a weekly meeting to study the accumulated data is the best compromise between doing too much analysis and not enough.

Varying data sources

As convenient as hi-tech can be, a good maintenance manager still needs to tap into his mechanical background to run his department efficiently. “I don’t think you can just take data, strictly data and work on a graph or a chart and come

up with a game plan,” says Verspeeten’s Wilson, who thinks humans will always be a precious part of understanding the condition of a machine. Lambert is of a similar opinion: “There can be some noises coming out of the engine that the driver will notice but that doesn’t trigger any fault code, even if an engine is just about to blow on you, because of a bad rocker for instance.”

He adds that the extracted data can sometimes be faulty and shouldn’t be believed in blindly. “It happened that we obtained speed data that was simply impossible, incorrect information about tight turns with G forces that made no sense or really too many episodes of hard braking to be realistic,” he says to explain that in some cases, the errors were simply caused by a defective or badly installed sensor or a similar device gone out of its normal mounting position.

Humans are fallible, too. “That’s why I sit down weekly and look at some data with my managers and say: ‘Well this is getting all screwed up, how come we have so much of this this week or what’s going on here?’ Then we can go back and talk to the drivers or talk to the mechanic who didn’t see anything in the first place,” Wilson says.

Of course, another valuable source of information for maintenance managers takes the form of communications coming from truck manufacturers that capture fault codes emanating from the trucks and can notify you in a matter of seconds, via e-mail for example.

“In the event a vehicle needs support, the fleet manager can drill down deeper using the event view,” says Kurt Swihart, Kenworth’s marketing director, about the TruckTech+ tool. “Armed with this information, the fleet is able to make an educated decision on what course of action to take.”

Navistar also proposes proprietary solutions. “We have what we refer to as our ‘Health Report’ software. So any time that you hook a diagnostic tool to the vehicle, that health report looks at every module that’s on the vehicle and it gathers a list of active or inactive codes,” says Pfennig. “If you look at the data properly, it will tell you when the truck is sick. And in a lot of cases, depending on what we refer to fault code action plan, it will tell you what you need to do to fix it.”

Steve Wilson says he appreciates that kind of added value brought by OEMs. “As far as breakdowns go with our newer equipment, all that comes directly from Volvo. Volvo notifies me by e-mail and phone call if, let’s say a check engine light goes on in a truck.”

Our maintenance experts also agree that the compiled data should be carefully stored for future analysis – month over month or year over year - to identify any maintenance events trends, either by truck brand or specs packages.

Lab Report

EVERY OIL ANALYSIS OFFERS INSIGHTS INTO DIESEL ENGINES. BUT WHAT IS THE STORY TELLING YOU?

BY JOHN G. SMITH



Fleets that have embraced oil analysis programs are reaping the rewards. According to a 2015 benchmark study by Polaris Outlook, 69% of surveyed operations have used the results to extend oil drain intervals, sometimes even doubling the traditional timeframes. Eighty percent used the data to maximize uptime, and 77% used it to improve maintenance programs.

Using the data to decide when to add a fresh supply of oil is just the beginning. Each sample bottle helps to tell the story of engine wear happening well upstream of the sump. Specific wear metals are more than a source of abrasive material, after all. Every abrasive flake came from somewhere. Act on the results soon enough, a costly catastrophic breakdown can be avoided.

In general, an oil analysis looks at a variety of issues. Wear metals are typically caused by friction or corrosion of specific components. Other metals can emerge through contamination, whether it's in the form of dirt through an air intake, contaminated oil storage, coolant additives, or even the casting sand that can be traced to the building of the engine. Then there are the metals that you want to exist, which are added to lubricants to help combat wear or disperse detergent.

Metals are not the only source of potential trouble. The analysis will also be measuring soot generated through the combustion process, unburned fuel that can come from something like a plugged injector nozzle, water, and the all-important viscosity that measures a resistance to flow and how well the oil will coat internal components.

Pointing a finger

As cliché as the comparison may be, each analysis is much like a blood test. The presence of one material or another – particularly a sudden or unexpected shift compared to a previous baseline – can point toward specific health problems.

Traces of iron in an oil sample can come from liners and rings, crankshafts and camshafts, valvetrains, oil pump gear or wrist pins. Rising levels

of chrome can indicate problems with liners and rings, exhaust valves, or plated shafts. Higher levels of aluminum are a little easier to pinpoint. Here, the wear metals likely come from pistons, bearings and bushings.

Now consider some of the metals found in your wallet. Nickel isn't worth five cents in this case. It probably came from valves or the steel alloy on a crankshaft. Copper offers, well, another penny for your thoughts. It's likely linked to main bearings, but could also come from an oil additive.

Engine manufacturers will help to identify wear rates that should be accepted or expected.

Silicon, meanwhile, tends to be one of the clearest signs of dirt that has been drawn in through the engine's air intake – maybe because of a poorly sealed housing -- but it can also come from gaskets, sealants, and coolant inhibitors.

Then there's the matter of fuel that's made its way into an oil sample, indicated by the fluid's lower flashpoint. Traditionally, this is the sign of an engine that has suffered through cold starts and heavy idling; of leaking injectors, failing pumps, and worn rings. But even the engine's application will make a difference in the type of results that are acceptable. Unlike a linehaul truck, the engine in a pickup and delivery application won't generate the high and steady temperatures that evaporate trace levels of fuel.

Trucks that make a lot of short trips can also expect higher volumes of water in an oil sample. In any engine, the source of the water can often be identified by looking for other unexpected trace materials. The presence of water and phosphorous, for example, could be a sign of the cleaners used at a truck wash. If the water comes with silicon, coolant can be the source. And that's particularly bad news.

But remember that some material can be traced to the oil itself. Additive packages, for example, can include phosphorous and zinc to fight wear. An unexpected shift in such materials could be the sign of someone changing the type of oil that is being used, com-

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pared to the baseline established during a previous oil analysis.

Soot, generated through the combustion process, could be the sign of mechanical issues such as plugged injector nozzles or restricted air intakes, or maybe wear in rings, turbocharger, or valve guides.

As telling as the source of such material can be, the unwanted oil content can accelerate other damage. The same soot generated through incomplete combustion will thicken the lubricant. Wear metal scraped from the surface of a component is abrasive in its own right, further accelerating wear. As for the water? It is a precursor of corrosion and oxidation. And any unwanted fuel can affect the oil's viscosity, introducing unwanted friction.


Spikes in nitration can be the sign of exhaust gases that slip by pistons, cylinders and rings, and are typically matched by increases in aluminum, iron, and chrome because of it. As troubling as this wear might be, it can also cause unwanted sludge and varnish to form on component surfaces.

Clean and consistent

Like any scientific process, consistent test procedures will deliver consistent and reliable results.

One way to ensure trustworthy comparisons is to take oil samples the same way every time, and when the engine is still warm. Sample bottles should be kept close until the last-possible minute, and then capped right away to block any debris that might be blowing around the shop.

A clean source of data is just as important. Those who refer to the same power units the same way, using both the engine model and serial number, will help to ensure that results can be compared. Accurate data about kilometers of service, any changes in oil formulas, and references to any oil that has been added since the last reading will all contribute to better results.

It's also a good idea to test the source of the oil before it runs through a crankcase. Checks on the supplies from bulk tanks in the shop will help to ensure that contaminants are not floating inside the storage system itself. 

Fluid Thinking

December 2016 ushered in the arrival of new category heavy-duty engine oils, designed to work with the newest generation engines and to improve key performance attributes. The CK-4 category oils were introduced as a straight replacement to the 10-year-old CJ-4 category fleets and owner-operators were accustomed to. At the same time, a new FA-4 category oil was introduced to optimize fuel economy in the latest heavy-duty diesel engines. Chevron opted to continue offering its CJ-4 oil to help customers with the transition. For an update on the new oils and how they're performing in the field, we caught up with Rommel Atienza, commercial brand manager – North America, with Chevron.



Q: The new category CJ-4 and FA-4 oils have now been in the market for several months. How are they performing in the field?

A: We're getting really good feedback. It's still fairly early, but all indications show the oils are performing as expected and there have been no issues. So, we have no indications that lead us to believe that there are any issues at all. For us, the large national fleets have transitioned to the CK-4 product and there have definitely been no issues there.

Q: Chevron took a somewhat unique approach to the roll-out of the new category oils, opting to continue production of CJ-4 as well. Are the majority of your customers choosing to remain with CJ-4 until the new category oils are required?

A: We are still seeing a lot of folks staying with our Delo 400 CJ-4 product. The large national fleets made the transition to Delo 400 XLE 10W-30 CK-4 product, but a lot of off-highway customers are continuing to use the CJ-4 product because they're not necessarily getting the same pressure to move and they see a lot of value in that product.

A lot of our customers made the hard transition in December 2016. Now we're starting to see the rest of the transition happening, but at a slower pace. At the end of the day, our team is out there still trying to make sure the customers that are on the CJ-4 product understand there are performance benefits of the CK-4 product that would benefit them and their equipment as soon as they're ready.

But the feedback we received from our customers was that they weren't necessarily ready to make that transition; they wanted to understand the benefits were going to be there with the CK-4 product over the CJ-4 product, so we kept it out there to help our customers transition when they were ready.

Q: What are the performance benefits fleets are seeing from the new category oils?

A: When the CK-4 products were developed, they were developed specifically for improved oxidation stability of the oil and improved aeration control and that's what customers are seeing. It allows them to realize longer oil life and in many cases, extended drain intervals. With the new CK-4 product, a lot of OEMs have extended oil drain intervals, so our customers are able to take advantage of that.

Q: We haven't yet touched on FA-4 oil, another new category designed for use on new engines and with the ability to optimize fuel economy. How has the uptake been with FA-4?

A: FA-4 has definitely had a slower uptake. Large national fleets that cycle through their trucks every 400,000-500,000 miles are considering the FA-4 product for their new equipment and we would expect them to be the first movers on the product, however we anticipate a slower transition from owner-operators and smaller and mid-sized fleets, especially those that are buying used equipment and still have older equipment. They're starting with the CK-4 product for now.

The large national fleets with 1,000-plus tractors out there are realizing the potential fuel economy benefit whereas the small fleets and owner-operators are not necessarily going to see that value. FA-4 provides about a 1-2% fuel economy improvement over the 15W-40 CJ-4 products. A lot of that depends on the drivers themselves, and there are some other factors that play into it, but assuming all things are held constant, using the FA-4 product can get that 1-2% fuel efficiency improvement.

Q: Are there lingering concerns or misperceptions about the new oils you'd like to address?




“When the CK-4 products were developed, they were developed specifically for improved oxidation stability of the oil and improved aeration control and that’s what customers are seeing.”

– Rommel Atienza, commercial brand manager, North America, Chevron

A: There still are concerns. There's still the old-school mentality out there that a 15W-40 viscosity grade oil will protect engine components much better than lower-viscosity oils, but what we are starting to do is show proof of performance. Showing just how well the 10W-30s are performing. Utilizing used oil analysis to show the product is performing as well, if not better, from a durability standpoint in terms of protecting their equipment. The data continues to come in to support that and customers are realizing the lower-viscosity oils can provide as much protection if not more than 15W-40 products.

Q: Canadian customers have some unique challenges, not the least of which is extreme cold weather. Are thinner oils able to perform in extreme cold?

A: Yes. It's all about low temperature fluidity. Lower viscosity oils provide what we call improved pumpability at colder temperatures. So temperatures that are 5-10 degrees colder would see improved pumpability from a 10W-30 over a 15W-40-type product. They do definitely provide much better protection and pumpability at those cold temperatures. 

Getting help

COULD YOUR FLEET MAINTENANCE OPERATIONS BENEFIT FROM OUTSOURCING?

BY JAMES MENZIES



To outsource, or to not outsource?

It's a question most fleet maintenance managers have struggled with at some point. With increasingly complex vehicles and an expanding array of maintenance services provided by companies such as Ryder and Penske, it's also a topic worth revisiting periodically.

Paul Ayotte, director of operations for Ryder System in Canada, said fleets that don't consider maintenance to be among their core competencies should consider the benefits of outsourcing some or all of their maintenance.

"One of the trends that we're seeing in the industry, is that it's harder now to keep up with changing complexity," Ayotte said, referring to engines, emissions aftertreatment systems, and new regulatory requirements. "I think companies whose core competency hasn't always been fleet maintenance are finding it difficult to keep up with those changes and to keep a dynamic maintenance program – especially around preventive maintenance (PM). If you've had the same preventive maintenance checklist for your vehicles for the past two years, you're definitely missing an opportunity to reduce maintenance costs, increase uptime, and keep drivers safe."

At Ryder, PM forms are frequently updated to maximize uptime, Ayotte explained. "And I feel that companies really need to be doing that."

Many companies that provide truck maintenance have tailored their product offerings to become more adaptable and offer fleets greater customization. At Ryder, for instance, you can choose from various SelectCare offerings ranging from full-service maintenance, to preventive maintenance, to mobile coverage – and anything in between. Long-haul fleets, for example, may want to keep preventive maintenance in-house but require the assistance of a third party to manage breakdowns that occur far from the home terminal.

Large maintenance providers also participate in parts purchasing programs that can bring economies of scale and associated cost savings to the maintenance operation. But not all fleets are

willing to take the plunge. Some fear a loss of control when outsourcing and others just feel they can manage maintenance more cost-effectively on their own. Jim Pinder, corporate fleet director for Erb Transport, says the fleet will outsource the occasional major job that would tie up one of its repair bays for weeks at a time, but it prefers to do most work in-house.

“Our hourly cost compared to a retail cost down the street would be \$130 an hour there, and we’re in the \$50 to \$60 an hour range here,” he reasoned.

Pinder’s not alone. A Fleet Benchmarking Report for Commercial Vehicle Maintenance, produced by CK Commercial Vehicle Research with FTR, found 42% of responding Class 8 fleets do 90-97% of their maintenance in-house. Only 7% outsource more than 50% of their maintenance activities and 79% do more than half in-house. Responding fleets said they generally found it more cost-effective to do their own maintenance.

“This survey, as well as regular surveys conducted by CK Commercial Vehicle Research, continue to indicate that in-house maintenance is the preferred choice,” the report found. “Most fleets, especially if they have this capability now, believe they get the highest quality service done in the shortest period of time at facilities they control; and, for the most part, it’s also cost-effective. Most don’t trust the work they get done elsewhere, and when they do have to do this...many times they bring the vehicle back in-house anyway to check the work to make sure it was done correctly, which makes the process less cost-effective.”

When choosing a vendor to whom to outsource maintenance, surveyed fleets said their priority is quality of work, followed by timeliness, technical expertise, location, and then cost.

But Ayotte said large providers such as Ryder can contribute expertise difficult for a fleet to match. While many fleets struggle to keep their technicians fully trained on emerging technologies, at Ryder, it’s a priority.



“PM is complex, and it’s critical. It’s the best way to reduce breakdowns, reduce service events, and keep drivers safe.”

– Paul Ayotte, Ryder System

“At Ryder, we have mandatory training,” he said. “If you want to work on our vehicles as a technician, we have a set training schedule from basic to advanced, and it includes all of the OEMs. We actually have Ryder-specific preventive maintenance courses and these courses are built with all the information we see in North America. We have data from all our vehicles in North America as opposed to one fleet or one OEM type of equipment. So, we can train our technicians on every different OEM platform, which is especially important to our customers who have a mixed fleet.”

And, Ayotte added, many fleets when evaluating the benefits of outsourcing maintenance fail to fully appreciate the costs of doing it internally.


“Companies often underestimate not only the resource it takes to provide maintenance, but also to coordinate maintenance,” he said. “Companies often underestimate the time it takes, and I’m talking about things like tracking your PM scheduling, abiding by safety policies, and other regulatory requirements.”

Some fleets have gotten creative in trying to achieve some of the benefits of outsourcing aspects of their maintenance programs, while also maintaining control over processes in their own facilities. Gloria Pliler, director of parts procurement with Swift Transport, says

the company now has dealer-employed technicians working out of Swift maintenance facilities.

“We can control our downtime a little better” when the work is done at Swift’s shops, Pliler noted, when speaking at this year’s Heavy-Duty Aftermarket Week in Las Vegas, Nev. Consider it a form of hybridized outsourcing.

Whatever your opinion on the issue, Ayotte said it’s a topic fleets should regularly revisit – especially if your fleet maintenance operations aren’t “world class” or aren’t keeping up with the rapid pace of change.

“One thing we often see when fleets aren’t outsourcing, when they’re doing maintenance internally, is they keep their PM form static and they’ve been doing the same preventive maintenance for years,” he concluded. “We know that PM isn’t just dropping the oil, greasing the truck, and putting some filters on. PM is complex, and it’s critical. It’s the best way to reduce breakdowns, reduce service events, and keep drivers safe. So, for companies that are doing it themselves who haven’t changed their PM form, they’re missing a huge opportunity to reduce maintenance costs and increase uptime. And if they don’t have technicians who are up to date on the new engine technology, then they’re going to miss stuff not just in repairs, but on preventive maintenance.” 



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