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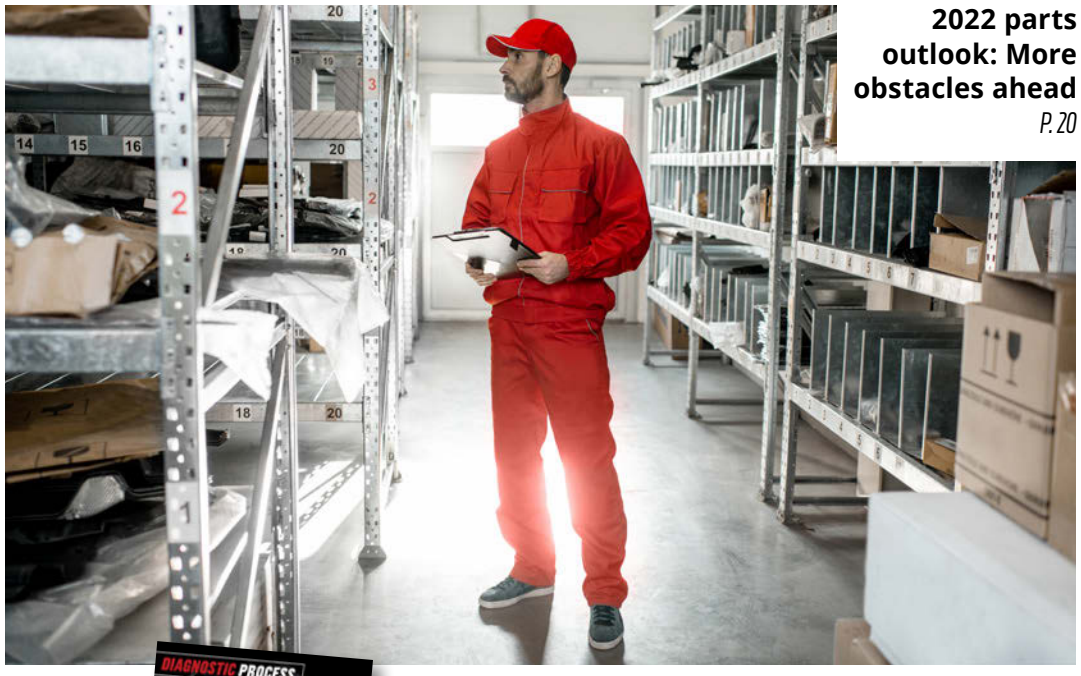

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Want to contribute? Contact us at editor@FleetMaintenance.com

DEPARTMENTS

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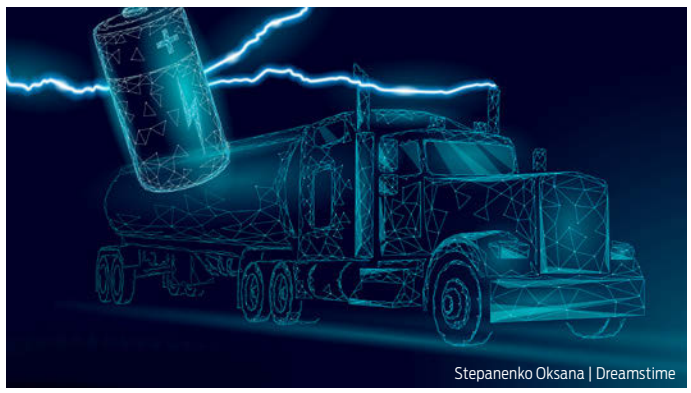
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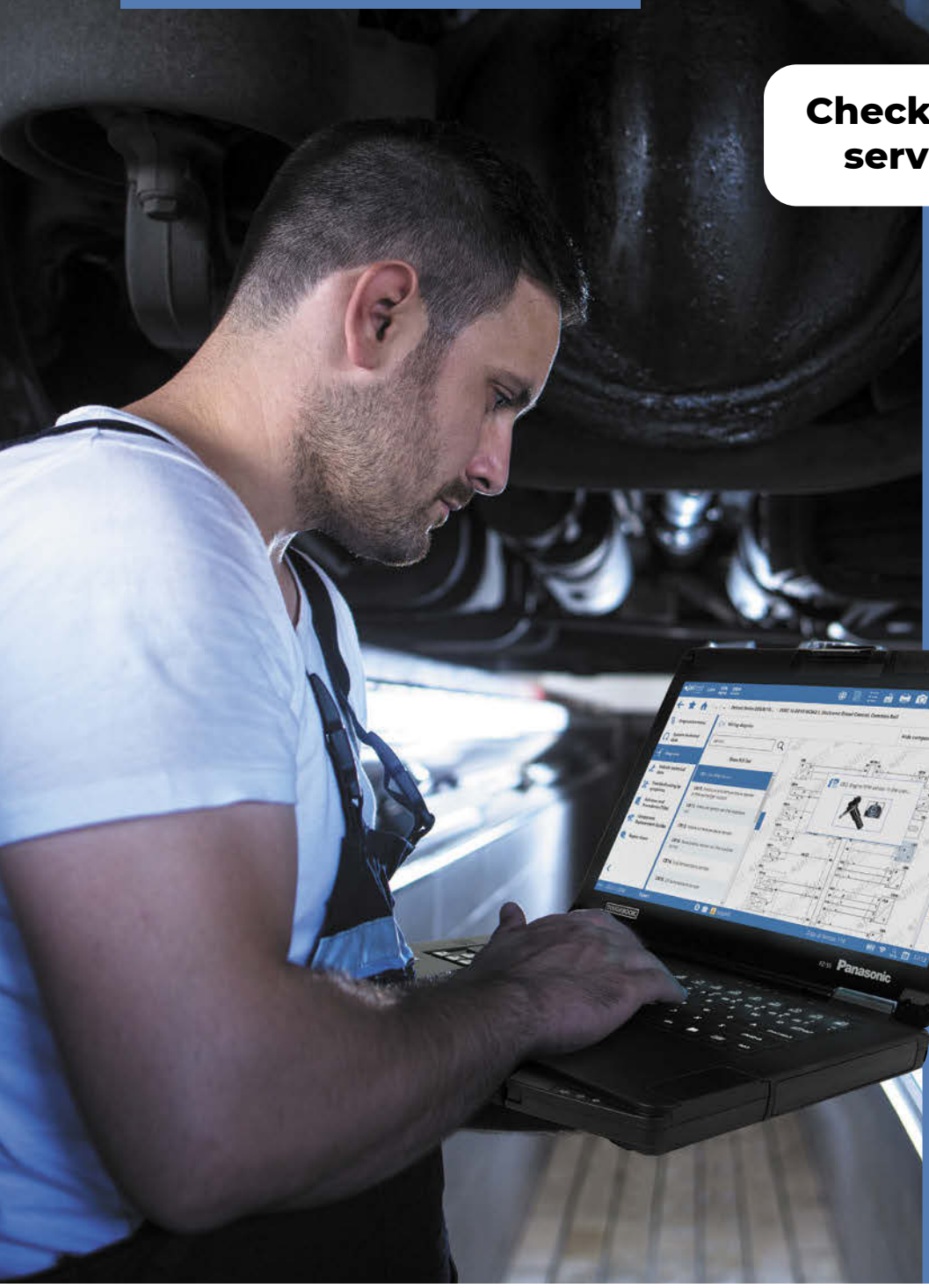

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Maintaining optimism in 2022

Even if the world seems broken, small fixes can make a big difference.

By John Hitch
Editor

@Hitched2Trucks

So 2021 has come and is nearly gone. Good riddance to ya, I say. A nation more divided, a global supply chain more severed (see page 20), and an insidious coronavirus more embedded in our every day lives. Everything everywhere seems broken.

And that must be particularly frustrating to those in the field of commercial vehicle maintenance, who are hardwired to fix and diagnose, to promote health, and foster productivity. At a basic level, maintaining trucks and vans to keep them running, and fixing them when they aren't—all so the country can keep on keeping on—is what gets you out of bed in the morning.

If the negative stuff is getting to you, my advice (for what it's worth) is to focus on all those things you can fix, rather than the things it seems nobody can, or worse, that some want to stay broken. There are plenty of ways anyone involved in CV maintenance, from the new technician to seasoned supervisor, can make things work better.

In the fleet world, a technician going above and beyond, or even just doing a job the right way, scales any good deed via the butterfly effect to one or more companies, from plants to end users, and all the people depending on that chain for goods and livelihoods.

Maybe today you'll troubleshoot the controls for a refuse truck's automated arm, change out the brakes on a delivery van, or run a series of engine oil analyses for a large carrier. None of those tasks seem all that world-changing, but who wants garbage piling up on their streets? And how would several people's world change if that van failed to brake in time when a kid ran out into the street? And those engine oil tests could spur fleetwide changes to improve overall fuel efficiency and engine life, which could scale up to benefit the planet via substantial emission reductions, or at the very least, could help your company save money.

The point is, what you do matters, even though you don't always see it. It's not just work; it's personal. I can't tell you how many times as a struggling college student or new parent that a mechanic, usually my best friend, bailed me out by finding me an aftermarket muffler and installing it for basically nothing, just so I could get to work. Even the folks at local car parts stores who take a minute to clear a gas cap fault code so you can pass an emissions check are heroes in my book. If you have ever gotten a ticket (and drained bank account) due to an expired vehicle registration—renewal hinges on a passing e-check score—you know what I mean.

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The point is, what you do matters, even though you don't always see it. It's not just work; it's personal.

By my experience, this is a trade full of way more good people than bad and the sector as a whole is all about promoting the freedom of movement and unabated transport of goods. These attributes surely provide a net benefit and are why I'm optimistic about this industry heading into the new year, even as parts experts tell me supply chain disruptions are likely to last through 2022. The people responsible for maintaining the health of its assets are problem-solvers and doers and add value in nearly every action they undertake.

And in this final issue of 2021, we hope we've provided you with some valuable content, ways to set up your team for success in 2022 and beyond. A few highlights include how to improve your tire procurement and maintenance strategies, as well as how to make your oil and lubrication program more efficient. There's also a compelling instructional guide on calibrating advanced driver assistance systems to increase road safety.

One other positive is that the long-awaited infrastructure bill was passed, providing $1.2 trillion over several years to fix roads, bridges, and other parts of the country that have been neglected.

As we close the book on 2021, let's remember to stay positive about our roles in improving the country and the people we interact with. Fix what you can, when you can, and the world will end up being a little less broken every day.

Wishing you all happy holidays and a happy New Year.

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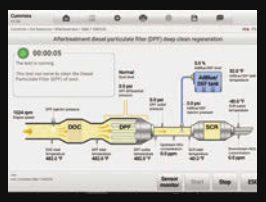

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Treading carefully

Overcoming tire supply and maintenance issues

With a mix of new technology and old-fashioned communication with suppliers, fleets can ensure they don't succumb to supply chain and maintenance pressures.

By Tyler Fussner

» Hunter Engineering's Quick Tread Heavy-Duty's camera system takes images every time a vehicle—ranging from large pickups to Class 8 tractor-trailers—passes through.

Hunter Engineering

» "Customers looking for the lowest overall driving cost should strongly consider a digital TPMS," said Tom Fanning of Continental Tire.

Continental Tire

"Everyone hates buying tires, right?" acknowledged Jason Miller, Cooper Tire & Rubber's national fleet channel sales manager to *Fleet Maintenance*. Miller has been in the tire industry for 44 years, with stints at Continental, Bridgestone, and Hankook Tire, and his experience has led him to believe fleets see buying tires as a "grudge purchase."

The reason, he said, is because fleet managers are responsible for many other areas that affect uptime, such as the diesel particulate filters, brakes, and axles, so tires can become an afterthought.

"If you aren't having a tire crisis, it tends to fall low on the priority list, until you look back over the year, and you look where you spent all your money," Miller explained. "And tires are one of, if not the single largest, maintenance expense for a fleet."

The COVID-19 pandemic has made this tightrope-walking act even more precarious, with supply chain disruptions making materials harder to come by. Rubber production has been impeded by COVID-related labor shortages at Asian rubber tree farms, along with the outbreak of a fungal leaf disease. The Singapore Commodity Exchange found rubber prices rose 70% year-over-year from May 2020 to May 2021.

"Tires are hard to come by right now; you've got higher prices and lower supplies," noted Kevin Rohlwing, senior vice president of training for the Tire Industry Association (TIA), this summer. "We can't say it's a shortage, but in certain sizes and certain styles, you're not going to be able to get them."

All the while, mileage has increased as consumer demand for goods has increased. These are problems to keep an eye on, but with the right planning, and some new automated technology to help fleets monitor their tire status, it is possible to make it to the other side.

The end goal is having tires that last an acceptable interval, cost an acceptable amount, and have an acceptable availability. Fortunately, there are tools and techniques to turn this grudge purchase into an opportunity to reduce overall maintenance expenses while improving safety and uptime.

Improving tire life cycles

How long a tire lasts usually lies with how efficiently a fleet can manage its tire maintenance.

"Proper fleet maintenance, like any element of a fleet's culture, must be cultivated and reinforced at all levels of the organization," said Tom Fanning, head of truck tires for the U.S. market at Continental Tire. "Running a properly maintained fleet is a culture change; it will not happen overnight, but it can dramatically impact the fleet's long-term success."

Part of that culture change should be centered around the importance of inflation.

The primary variable to impact life is inflation, indicated by the tire psi level. As the U.S. Tire Manufacturers Association points out, underinflated tires are not only drags on steerability and fuel economy, but the excess friction heat they generate can cause irregular wear and internal damage, and make them more likely to puncture or blow out.

According to 2018 Continental Tire data, 34% of fleets were operating with underinflated tires. These fleets are missing out on the benefits of a properly inflated tire, which include 1% better fuel economy, 15% longer tread life, and 20% longer casing life, the company noted.

The bottom line is that underinflation dramatically affects the fleet's bottom line.

"Some of these fleets are telling me that their breakdowns represent 30, 40, 50% of their tire budget, because of maintenance issues," Miller said.

He said getting drivers to do proper inspections is one way to mitigate risk and ensure proper inflation. Tire pressure monitoring systems automatically perform this task via sensors on the tire, sending that data to fleet managers for general awareness and affording them the chance to intervene when needed.

"We can't say it's a shortage, but in certain sizes and certain styles, you're not going to be able to get them."

Kevin Rohlwing, SVP of training, Tire Industry Association

"It's about being proactive and seeing the early signs that could indicate a failure down the line," said Pierluigi Cumo, marketing director for on-road at Michelin. "We have offers to address the emergency aspect with ONCall (end-to-end breakdown solution), but we also want to use that data to see maybe there's specific spots that fleets need to pay particular attention to."

Data indicates that this solution does pay off.

"Customers looking for the lowest overall driving cost should strongly consider a digital TPMS," said Fanning, citing the longer casing and tread life related to proper inflation. "One customer has told us they have reduced roadside service calls to zero by implementing our ContiConnect Yard solution. This type of service around the tire helps our customers maximize their tire investment and reduce downtime."

Inspecting tread depth also is critical.

"If we can get drivers to just walk the fleet and take a hand over the tread and measure it, we can pull a lot of cost out," Miller advised, though he admitted that is easier said than done.

Automated tire inspection systems

An emerging technology in the commercial vehicle maintenance space, these rollover systems use cameras, sensors, and software to capture critical tire data and relate that information to a fleet for actionable insight into tire status.

HUNTER ENGINEERING QUICK TREAD HEAVY-DUTY

The camera system takes images every time a vehicle—ranging from large pickups to Class 8 tractor-trailers—passes through; images can even reveal DOT violations, such as missing mudflaps, which helps to keep citations down and promote uptime.

In the ground, lasers read tire tread depth, and multiple angles capture the inboard side as well to provide wide inspection coverage. Quick Tread Heavy-Duty can read single tires at the front of the vehicle, as well as duals or super singles. Robust elemental protection allows the equipment to operate through exposure to dust, dirt, rain, and more.

Hunter Engineering

UVEYE ARTEMIS

UVeye

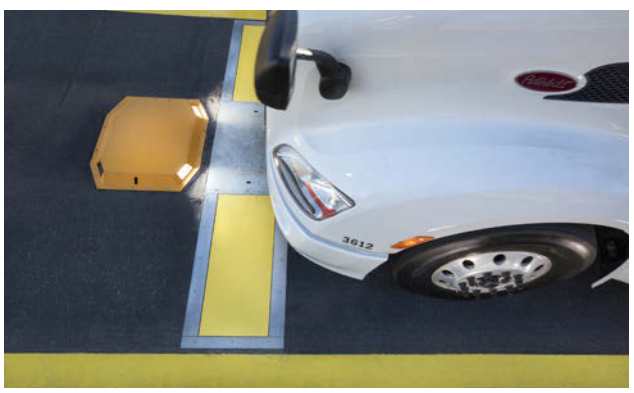
In just seconds, this tire inspection system features multiple layers of inspection technologies, such as AI, machine learning, and computer visioning, to help deliver actionable insights for any damage or issues detected on a vehicle's tires, including cuts, bulges, or chunks missing from tire. The system also detects misalignments and low tread depth.

GOODYEAR CHECKPOINT DRIVE-OVER-READER

John Hitch | Fleet Maintenance

This solution can be installed in-ground or 2-3" ramp-style aboveground, and detects tire tread depth and pressure as vehicles (Classes 1-8) and trailers roll over the micro-transducers, lasers, and cameras. Goodyear performs a site assessment to decide where to put the device, usually at a facility's inbound security entrance or dedicated inspection lane. Goodyear said CheckPoint can reduce manual inspection time by 90%.

WHEELRIGHT AUTOMATED TIRE SAFETY CHECK



Snider Fleet Solutions

The WheelRight drive over solution, developed in the U.K., captures vehicle I.D. and weight, along with sidewall damage, tire tread, temperature, and pressure data in six seconds, flagging any issues. The goal is to reduce emergency road service events and CSA violations. The drive-over technology has been used stateside by Estes Express Lines and also Snider Tire, which distributes the solution stateside and has an ownership stake in the company.

On commercial tires, such as the recently launched Cooper PRO Series Long Haul Steer 2, the company implements a Wear Square, a visual indicator on the shoulder ribs that starts as an "A," and becomes an "L" at half tread life, and an exclamation mark when it needs to be replaced. The difference between the markings on either side of the tire also indicate alignment issues. Misalignments can exacerbate wear.

Goodyear Tire and Rubber Co., which acquired Cooper earlier this year, has a handheld digital tire tool called Tire Optix, with one end to measure tread depth while the other attaches to the valve stem to check pressure. The data is sent via Bluetooth to a mobile app, which tracks what trucks have problem tires.

"We inspect about 2 million tires a year with Tire Optix, and it's all about creating efficiencies and accuracies during this tire inspection process," said Jamie Redmond, Goodyear customer engagement specialist.

The next solution: Rollover monitoring

Like materials and repair parts, finding workers has also been made difficult, which makes manual inspections more difficult for certain fleets. And TPMS isn't always the right fit for all fleets.

A new solution has emerged that is allowing fleets to quickly gather tire data without the use of onboard sensors or extra labor: automated tire inspection systems.

Automated tire inspection systems are fixed stations that detect pressure and tread status, among other data, as the vehicle drives over or through them. They offer multiple benefits to a fleet and leveraging the benefits such systems offer can aid fleets in prolonging tire life, avoiding premature failures, and creating a set of actionable data to help decision-making processes when it comes to ordering and servicing tires.

Estes Express Lines, which has 74 shops, tested the drive-through Automated Tire Safety Check system from U.K.-based WheelRight Ltd. for six months before getting a second. The WheelRight system uses pressure-in-motion technology, along with cameras, to measure tread and psi. The solution, distributed by Snider Fleet Solutions in the U.S., also delivers alerts, by tire position, when measurements fall below configurable thresholds.

"It's ineffective to do this manually and get accurate information," said Michael Palmer, VP of fleet services at Estes. "While we're still looking at the results, in one location our tire costs have dropped, especially from road calls."

Goodyear had been using its solution, the CheckPoint drive-over-reader, in Europe for several years and is now making it available to lease in North America.

Using micro-transducers, lasers, and cameras to detect tread depth and pressure, CheckPoint can be used for vehicles ranging from passenger vehicles to Class 8 tractor-trailers, with options for in-ground installation or 2-3" ramp-style aboveground option.

Austin Crayne, Goodyear business development manager, reported one European fleet using

CheckPoint "found out that they have about a 90% reduction in labor inspection time on checking tire tread pressure and tread depth."

"Tires are one of the biggest costs of fleets and labor's a little scarce, so this really helps you focus your efforts on the tires that have issues that were identified by CheckPoint," Crayne said.

Trucks can drive over the in-ground option at 11 mph, though the aboveground version requires a slower speed. Over one year, a U.S. fleet piloted the technology at three facilities and inspected 2 million tires, Crayne said. And in 2021, the solution has scanned 1.5 million tires and detected 126,000 potentially costly issues, according to Goodyear.

Manual inspections of tires can foster subjectivity, and in some cases 'pencil whipping'—completing the task quickly just to get through it, according to Michael Bush, director of U.S. fleet sales at UVeye, which makes the Artemis automated tire inspection system.

"Our system is based on the combination of artificial intelligence and machine learning and computer vision, and then through those technologies is able to understand what a normal tire should look like," Bush explained. "Through that technology, when it sees tires that don't look like that, and it has issues such as a cut, a bulge, a chunk taken out of the tire, tread that either indicates misalignment or that is of low tread depth, the technology can identify—versus a standard tire—this is not supposed to be there."

This ensures each tire was inspected accurately every time, and helps avoid roadside breakdowns caused by tire failure.

"It takes the guesswork, the subjectivity, out of a manual inspection and uses computer technology to identify those anomalies that shouldn't exist in a tire and can lead to an accident," Bush asserted. "If you're able to detect an issue, such as a cut or a bulge, you would change that tire out before the vehicle gets on the road."

Hunter Engineering Company's Quick Tread Heavy-Duty automated tire inspection system provides fleets the ability to "get a quick glimpse of the state of that vehicle within a matter of seconds as it passes through, and there is no human involvement at all," said Tommy Maitz, director of marketing at Hunter.

When using automated inspection systems, compounding planned downtime with the planning of services can lend to a minimization of vehicle-down situations.

"Vehicles that come through our system on a nightly basis after they finish their runs, and if they see something like a screw in the tire, the Artemis system can alert the fleet manager and the fleet manager would have real time eyes on the equipment, even remotely," Bush said. "They can identify the requirements for maintenance to change that tire in-between shifts, so when the next morning comes, that vehicle is going to be in perfect working condition, and you don't have the threat of a blown tire on the road.

"In terms of low tread depth, the system is going to identify if and when you should schedule the maintenance of the tires, and specifically, for changing them out," Bush stated. "So again, remotely, a fleet manager could identify which vehicles are in line for tire upgrades. It gives them that intelligence to plan accordingly."

» **Manual tire inspections can foster subjectivity, and in some cases, 'pencil whipping.'**
Yokohama Tire

Bush said fleets can customize the Artemis system according to their specifications. For example, a fleet can set up a critical alert on tread depth according to the depth they wish the alert to be sent—such as when a tire reaches 4/32.

When a fleet is trying different tires, or their routes and duty cycles have been adjusted, automated tire inspection systems can even provide insight for a fleet into which tires are performing best for their use cases.

"The other thing that we're able to do is to identify the specific type, date, manufacturer, size, load, and speed of the tires, through our detection," Bush said of the Artemis system. "You're able to understand, on a tire basis, which specific brands are performing best for your fleet."

Leveraging the data

One of the best advantages of automated tire inspection systems is the data provided.

For instance, Goodyear customers can set up the CheckPoint data to be sent to Fleet Central or another maintenance platform.

"The key part is around the connectivity of the tire to the vehicle and to the service network," noted Johnny McIntosh, director of Integrated Solutions & Tire Management Services at Goodyear. "And you're going to get more out of your tires—you're going to be able to retread more, because you're not going to be running them underinflated, or running mismatched in a dual configuration."

"If you aren't having a tire crisis, it tends to fall low on the priority list, until you look back over the year, and you look where you spent all your money."

Jason Miller, national fleet channel sales manager, Cooper Tire & Rubber

Using Hunter's Quick Tread Heavy-Duty, data is pushed to Flight Board, a portal providing an overview of the results from the inspection. Results are provided displaying pass or fails, tire status, and all data is visually represented through images and diagrams to provide quick, actionable, and accessible information.

Furthermore, reports can be customized and generated as a fleet sees fit. For instance, Maitz explained, a fleet maintenance manager can have a report generated to be sent at the end of the day containing all the results, or an afternoon report of the morning's results, or more. This flexibility allows a fleet to have the data sent to the right people at the right time to assess situations, plan procedures, and act accordingly.

The Artemis system also generates reports and provides notifications to fleets and third-parties. The ability to share that information promotes an efficient maintenance operation.

"A best practice to understand: Because we're capturing critical information, we want to make sure that we keep the right people in the loop," Bush said. "So, make sure that the appropriate team, and that could be anyone from the fleet manager, safety manager, maintenance manager, and the driver, is to be included in any critical alerts."

All industries are having to navigate a climate of supply chain disruption, and though fleets are typically looked at as a key to solving supply chain issues, they too face issues in getting the parts, and tires, they need. Working closely with suppliers, and seeking the latest technologies available for adoption, can help relieve the burden of operating business as usual in a time when things are anything but.

Additional reporting from John Hitch.

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Surmounting supply chain challenges

"The disruption caused by COVID-19 is resulting in many new challenges globally and stretching supply chains across industries in ways we've not experienced before—consequently impacting many manufacturers' ability to supply tires," said Kyle Chen, channel manager for fleet & OE TBR at Bridgestone. "Multiple constraints related to the acquisition of raw materials, recruiting and retaining employees, transportation, and imports of finished products have converged with surging demand to present new and complex challenges that we are working diligently to solve. In the short-term, our team is working diligently to prioritize key products to meet the critical needs of our fleet customers."

To avoid disruptions, Chen advised fleets consider more retreading.

"Retreading has never made more sense than it does today," Chen said. "The benefits of retreading for fleets and the community at large far exceed simply filling a wheel position—retreads are made locally, are readily available, and premium retreads such as Bandag offer performance on par with new tires. Retreads also present substantial savings for fleets and significant sustainability benefits for the environment and local economy."

Tire manufacturers attest to the power of a global footprint and the supply chain connections that come with it.

"With COVID-19, we've all now experienced some of the negatives of the recent trend in global supply chains, and how they can be disrupted as a result of a regional or global event," said Tom Fanning, head of truck tires for the U.S. market at Continental.

He said having multiple plants in North America was "a big plus" for Continental's ability to supply fleets here.

"Supply is a challenge in 2021," Fanning reiterated. "The best advice I can offer is to talk to your sales representatives ahead of time. Don't wait until you need the tires in-hand... We remain in constant and close communication with our customers, focusing our efforts on forecasting properly to have the right tires in the right place at the right time."

This was a recurring theme when *Fleet Maintenance* spoke with other tire OEs as well.

» Having U.S.-based tire production has helped Yokohama manage their customer's product needs.
Yokohama Tire

"Like everyone else, manufacturing and shipping have been negatively affected by COVID and there have been some supply chain disruptions," said Dan Funkhouser, vice president of commercial sales at Yokohama Tire. "These disruptions have been arguably worse for products that are produced offshore and can cause a chain reaction that runs through the entire distribution network.

"This makes it much more difficult and important to properly forecast short- and long-term product needs," he continued. "Balancing offshore and on-shore production to maximize supply on the highest-demand product has become critical. Thankfully, having U.S.-based commercial tire production in West Point, Mississippi, has really helped Yokohama manage the product needs of our customers."

This year, Yokohama added its fourth distribution center, a 430,000 square-foot facility outside of Dallas, to better supply customers. The three others are in California, Georgia, and Ohio.

Funkhouser said fleets will need to rely on communication with suppliers more than they may be used to.

"Working with their salesperson and forecasting their needs will help dealers and the manufacturer maintain inventory for them," Funkhouser said. "This will shorten downtime and out-of-stock situations. Big buys are not the route I suggest in this environment. Most suppliers cannot fill or commit to those. With all the supply chain challenges, it's easier to manage consistent business rather than large swings."

APPLICATION CHANGES

Needs have been changed for both fleets and tire manufacturers alike. With drastic changes in certain areas of demand, duty cycles have been adjusted and the need for specific tires have altered.

"In addition to last mile delivery, which obviously benefited from changes in consumer habits, we also saw refrigerated vans and food products are staying particularly resilient," Continental's Fanning said. "The decreased demand from chain and local restaurants has been counteracted by the surge in demand for groceries. People still need to eat."

It is not just the last mile delivery sector that was affected, though.

"The issues have affected all segments of the market," Funkhouser related. "The sudden increase in the price of oil, and thus the increase of production, has also had a positive impact on mixed service products."

Mileage has also increased due to more freight in 2021 versus 2020, putting a strain on the heavy-duty tire market.

"Larger tire sizes require more resources to produce and consequently are in shorter supply than the more common, standard sized medium truck tires," Chen stated.

The routes have also changed. Hub-and-spoke cycles have become more popular to allow drivers the ability to stay closer to home.

"Not long ago, line haul meant you get in your truck and you drive across 13 states and you drop off and pick up a trailer load and drive 13 states," said Jason Miller, Cooper Tire's national fleet channel sales manager.

This has also put more wear on tires.

"Because you're going those short distances and you're doing more stops and turning and twisting and backing and going into pickup, you're now exposing the decoupling rib to more curbs, to more turning, and more dragging," Miller explained. "When we used to look at a decoupling rib, all we really wanted to do is decouple it from the part of the tread that's supported by the belts. If you don't, every time the tire goes around, the sidewall forces push into the tread and creates a little bit of wear."

He said that "turns into an area of localized wear, and the irregular wear eventually turns into a ride disturbance."

Cooper engineered its recently launched Pro Series LHS 2 to stand up to more of these regional haul rigors by enhancing the tire compound and changing the decoupling rib design to a more robust shape that doesn't grab the road while turning, Miller explained.

SAMPA 66 – THE HEAVY-DUTY TRUCK PARTS BRAND CAMPAIGN MADE FOR AMERICAN TRUCKS, ON AMERICAN ROADS

Felipe Bumagny
President of Sampa USA

SAMPA US LLC, the heavy-duty truck parts brand, has launched a striking B2B marketing campaign known as, Sampa 66 'Made for America'. We had the opportunity to catch up with Felipe Bumagny, President of Sampa USA, to discuss the importance of this new marketing direction. And to ask him why he believes Sampa 66 will expose his brand to a wider B2B consumer base.

First of all, Felipe, what's the reason you are launching this campaign now?

"As a relative newcomer to the American heavy-duty truck parts industry, we always need to shout out loud and clear that 'we are here'. Beyond that, we also need to stand out as being the best in the market with a compelling and impactful 'call to action' message.

So, why Sampa 66 – it sounds a lot like Route 66?

"Exactly! There's nothing more American than Route 66, right? The strength behind that iconic name, the pulling-power behind all the wonderful imagery that goes with it has made Route 66 a household name, across every state in America. We are a global brand, manufacturing and supplying parts for American trucks and trailers, on American roads, but after all what is more American than a brand campaign built around Route 66? The iconic similarity between Route 66 and Sampa 66 is mirror perfect!"

The names sound alike, but are there any other similarities?

"Absolutely! Our current warehouse is situated at Frisco, Texas, where we provide over 2,500 heavy-duty SKUs [stock keeping units] for US-branded commercial vehicles. However, our new warehouse under construction will be in Illinois, right outside another iconic name - Chicago. Anyone who knows anything about Route 66 will also appreciate that Chicago is where the famous road actually begins. Perhaps a coincidence, perhaps not!"

Please tell us what we should notice from the Sampa 66 campaign?

"Confidence. Honesty. Integrity. Sampa operates within a competitive B2B environment, so robust product reputation is key. We need to talk to our customers in a language they can trust – and deliver on that trust. Therefore, the messaging tone is both confident and friendly. Whilst, the look is big-country dramatic, in a typical all-American way. Conjuring up all the great landmark images we associate with the original Route 66. But now reborn, re-energized and completely 21st century."

We are a global brand manufacturing and supplying heavy duty truck parts to American Trucks

What are the media platforms being used for the campaign?

"As I said, we are a B2B specialist. Which means that a lot of our business, but not all of it, is conducted online for direct sales and services to distributors throughout the USA and Canada. Therefore, it made good business sense to kick-start our campaign online with the 'Sampa – 66 Reasons. Utilizing our social media platforms, we are posting 66 reasons why Sampa is the No.1 Choice for Heavy-Duty Truck Parts.

So, Sampa 66 is more than a marketing campaign, more like a marketing reinvention?

"Put it this way, we are consolidating our brand reputation for being the parts supplier that only sells what it makes. Sampa 66 can resonate with all those customers who enjoy being reminded that they made the 'real' right choice by choosing Sampa for their heavy-duty operations.

Thanks to Felipe Bumagny, President of Sampa USA LLC, for giving us his valuable time, and telling us about the unique Sampa 66 campaign.

SAMPA®

Implementing an efficient oil prog in four

Purchasing, inventory, analysis, and dispensing all play vital roles in an efficient oil and lubrication program.

By Seth Skydel

[IN VEHICLE]

Rising oil prices are making headlines again. Impacted by a global pandemic, economic issues, and geopolitical factors, as well as weather-related events, we tend to think of them as mainly affecting the price of fuel. That's understandable, considering the large role that fuel cost plays as the second-highest line-item for fleets.

Oil prices, however, also impact the cost of engine oils and gear lubricants that are essential to the functioning of components in trucks and constitute a measurable part of the cost of preventive maintenance. On the road, fleets will alter fuel efficiency and costs by addressing equipment specifications, routing, and driver training, which can hold down the impact of higher fuel prices; equally effective measures in the shop can also offset oil and lubricant expenses.

To start, commercial vehicle maintenance providers should focus on four key areas.

1. Purchasing practices

The first way to keep costs down is by identifying the right product for the powertrain and the vendor best-suited to supply it.

"Fleets need to first look at the requirements set by their OEMs for approved lubricants to

Artem_Egorov | 1135799136 | Getty Images

ram steps

be used in individual applications," said Paul Cigala, commercial vehicle applications engineer at ExxonMobil. "Next, they should select a supplier based on their ability to stock and deliver, in a timely manner, all required lubricants needed in their operation. Finally, the supplier should be able to assist in making recommendations for lubricants that help increase uptime and support a customer's maintenance intervals."

There are several engine oils that promise tantalizing uptime and fuel efficiency benefits, but pouring in the incorrect American Petroleum Institute (API) rated oil, such as a FA-4 in a CJ-4 rated engine, lowers operating viscosities and may damage the engine.

"In all cases, maintenance operations should confirm products meet specifications required by engine builders," explained Benjamin Briseño, manager, lubricants technology at Citgo Petroleum Corp., which offers national coverage through distribution partnerships as well as on-highway availability.

Suppliers will also work with fleets, based on their individual scope and requirements, to implement a successful lubrication program. "All fleets are studied for engine make up and driving routes, among other things, to determine what products are recommended," related Lee Elder, director of international sales at Phillips 66, which offers national or regional programs through local marketers. "Those other factors can include oil drain intervals and preventive maintenance schedules."

2. Inventory management

Ensuring your shop has the proper stock of oil is the next step.

Fleets and service providers can purchase Shell products directly from the company, through a buying group, or through distributors, noted Jorge Piñón, key account manager for on/off highway at Shell Lubricants. "Maintenance operations typically set up inventory based on the number of trucks and their established service intervals," he advised. "Utilizing vendor managed inventory (VMI) with remote tank monitoring helps to ensure that appropriate levels of bulk products are in supply. Also, it's important to implement a first in, first out process to avoid possibly using products that may have exceeded their shelf life."

As opposed to when a drum was received in shop, Citgo recommends using the earliest

expiration date first, which is identified on the trace code comprising the batch number, plant letter code, and four digit date.

"We recommend proper storage practices, including labeled tanks and dispensing equipment to avoid accidental lube mixing," Citgo's Briseño said. "Drums and other containers should be stored under cover and properly closed. Lubricant purchases should align with consumption to not only avoid an outage, but also excessive inventory that ages in place."

Ross Tomberlin, national business development at Phillips 66, related that local marketers' programs provide for better response and service. Bulk fluids are best managed by using tank monitoring systems that can be integrated with a supplier's ordering system, he added. Packaged goods inventory levels can be determined by using monthly purchase histories. It is also important to provide training on best practices for lubricant handling and storage to ensure product cleanliness and integrity.

3. Analysis programs

Used oil analysis data can safely optimize oil drain intervals based on a fleet's duty cycle, make up, and maintenance practices, Cigala noted. ExxonMobil's program, MobilServ Lubricant Analysis, provides reports with guidance on actions to be taken.

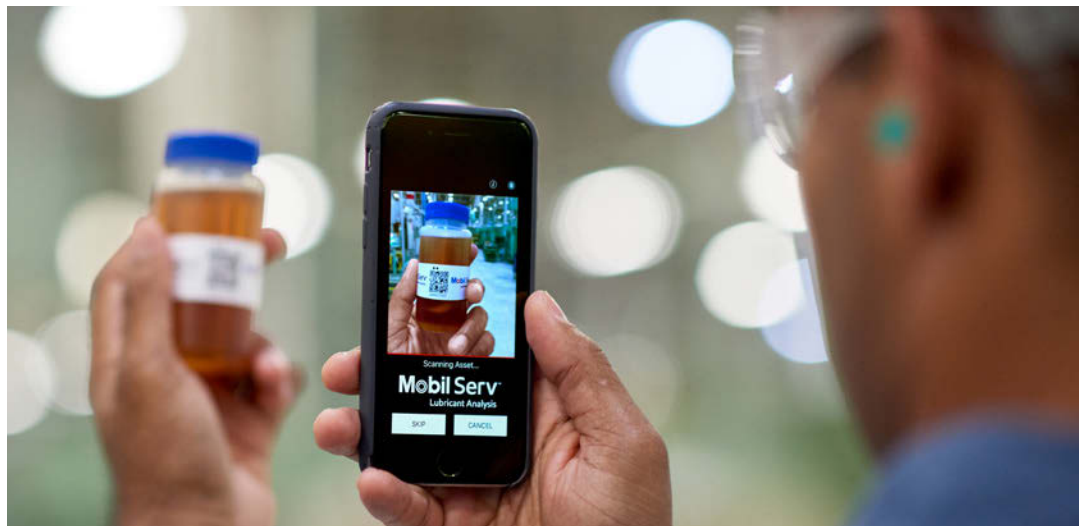
Citgo offers its LubeAlert Oil Monitoring oil analysis service for oil change interval optimization purposes, Briseño said. Phillips 66 Lubricants oil analyses are used to build the right predictive maintenance programs, including extended drains, scheduled overhauls, and equipment divestments or acquisitions.

At Shell Lubricants, account managers and technical advisors conduct fleet and maintenance shop assessments to help determine appropriate maintenance programs. The evaluations cover fleet size and age, average annual miles or hours of operation for equipment, duty type, OEM specifications and recommendations, along with shop layout, size, and bulk storage capabilities. An oil analysis program, Shell LubeAnalyst, can be used as well.

"The Technology & Maintenance Council (TMC) has numerous Recommended Practices, including RP 377 – Oil Viscosity Transition Planning and RP 510 – Maintenance Facility Development Guidelines, that can be used to guide a fleet in setting up an oil and lubricant program that best fits its maintenance requirements," Cigala said. "Lubricant suppliers can also help in this process by selecting the correct lubricants to be used to meet a fleet's maintenance goals and by continually looking for cost savings within those maintenance practices to increase a fleet's reliability and uptime."

4. Dispensing solutions

Best practices for oil and lubricant storage and dispensing are essential as well. "When possible, bulk storage should be used to limit the possibility of contamination," Piñón said. "If bulk dispensing is not feasible, closed top containers should be used."



» **A Mobil engineer using the Mobil Serv Lube analysis scanner to test fluid quality.**

ExxonMobil

» **Fleets can purchase Shell products directly, through a buying group, or through distributors.**

Shell Rotella

» **Proper storage and labeling practices can help to avoid cross contamination incidents.**

SKF

Dispensing equipment will vary depending on a shop's layout and needs, Cigala noted. Hand or air-driven pumps are most commonly used to deliver the products to their respective lubrication points. Hoses, hard piping, and reels can be used to keep the shop floor neat and free of any tripping hazards.

"All tanks and drums should be properly labeled to meet local, state, and OSHA regulations and sealed to keep out dirt, moisture, and other contaminates that could degrade the lubricant's performance and shorten its shelf life," Cigala added. "Any transfer containers should also be properly labeled and kept closed between uses."

Joe Bamford, strategic account manager for SKF's lubrication and fluid management brands, Lincoln and Alemite, believes planning for an oil and lubricant dispensing system is a concept-to-reality process. "Fluid management allows users to track fluids dispensed, which provides transparency at all levels," he said. "Integration with various data management systems offers validation functionality of dispensed fluids and automatic billing to the work order."

Shop perspective

Fleets and truck service operations employ a range of proven oil and lubricant management practices, all aimed at meeting equipment needs effectively, safely, and at the lowest cost.

AMA Transportation

"We purchase engine oil to meet OEM specs and we only use one blend in all of our trucks to avoid cross contamination," said Bill Loyd, fleet manager. "Our vendor manages the inventory and checks our supply weekly. We also compare prices against the competition once a month to make sure we're always getting the best deal."

AMA's 330-gallon bulk engine oil storage and reel dispensing system is owned and maintained by its lubricant vendor. "That way, we're not responsible if there are any leaks or tank and pump problems," Lloyd added.

Headquartered in Billerica, Massachusetts, AMA Transportation provides overnight LTL service throughout New England and expanded service to metropolitan areas in New York, New Jersey, and Pennsylvania. Its company-owned fleet consists of 55 day cab tractors and 15 straight trucks.

Estes Express Lines

At Estes Express Lines, a detailed process is used to purchase oils and lubricants. "Before selecting a vendor, we must first ensure that their product is compatible with our equipment, they offer an emergency order option, and their distribution network is able to meet our needs at more than 265 terminals and over 70 shops," said Mike Palmer, Vice President of fleet services. "We also require that bidders provide monthly and quarterly reports on the products we purchase, and oil analysis services, and training for shop personnel on proper oil collection."

Another requirement that Estes places on its oil vendors is the ability to offer three- to five-year contracts. For ensuring quality, the fleet only works with major suppliers who can provide centralized purchasing, while deliveries are made by local jobbers.

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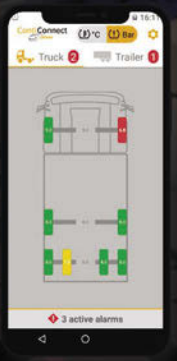

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*New tire data based on a 26-month head-to-head field test of 56 295/75 R22.5 Conti HDL 3 LTL tires vs. 48 275/80 R 22.5 Michelin X Multi Energy D (XMED) tires. Test utilized at least 12 different vehicles in 9 locations in CO, AZ, MO, TX, OH, FL, NC. Retread tire data based on a 26-month head-to-head field test of 66 240-mm Conti HDL 3 LTL-R retreads on 295/75 R22.5 Continental casings vs. 48 220-mm, 230-mm, and 240-mm Michelin X Multi Energy D retreads on 275/80 R22.5 Michelin casings. Test utilized at least 12 different vehicles in 3 locations: NC, OH, MO. Actual results may vary. 27 percent mileage advantage based on new tire and 1st retread product performance combined.

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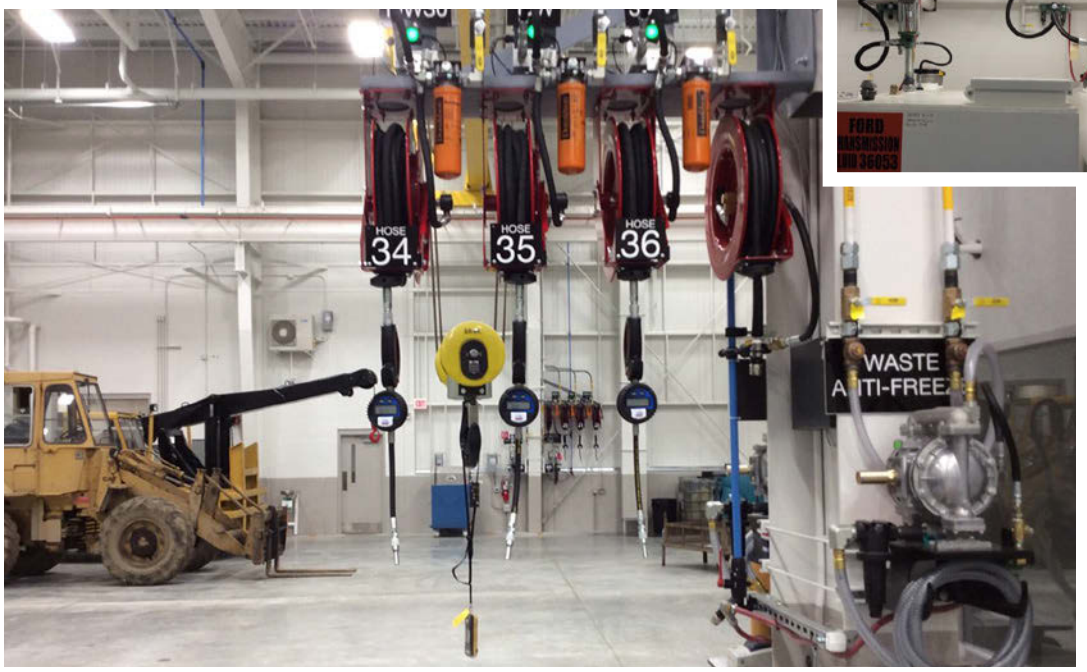

» The design of the dispensing system needs to account for many factors beyond just fluid type.

SKF

Dispensing system design considerations

The design of the dispensing system needs to account for many factors. Joe Bamford, strategic account manager for SKF's lubrication and fluid management brands, recommended evaluating the customer's full range of system requirements to ensure a proper dispensing system design that meets their needs and to consider the following components and design factors:

- Fluid type: specifications/fluid viscosity
- Length of run: vertical rise/horizontal run/drop to reel bank
- Tubing or pipe to be used/ID size
- Elbows and T's
- Filters/pulse meters/solenoid valves
- Dispense valves
- Reel: hose length/ID
- Flow rate (GPM): single or simultaneous dispense
- Tank room temperature

Taking all of this data into account, an approximate pressure drop figure can be generated. This data is then cross referenced with the manufacturer's pump performance chart to best determine what pump offering (air motor size/ratio) will deliver the required performance.

"It is advisable to work with a certified engineer to evaluate the facilities and requirements, run calculations, create performance charts, and design a system based on real data," Bamford said. "By taking an objective approach, it can be done correctly for new or existing facilities."

Brian Morgan, national sales manager at JohnDow Industries, a manufacturer of oil and lubricant capture products, said shops should first pay attention to their equipment needs. "There are different ways of capturing lubricants from vehicles and emptying them into waste oil storage tanks," he related. "And different types of lubricants need different solutions."

JohnDow offers low-profile oil drains to capture fluids from a vehicle, including 17- and 25-gallon steel oil drains that sit just ten inches above the ground and come equipped with a long reach T-handle and six-inch industrial casters for easy maneuvering and positioning beneath the unit. The company's 25-gallon model for heavy-duty repair shops comes with a self-contained electric pump evacuation system with a 10' quick disconnect evacuation hose.

JohnDow also offers air-operated grease delivery systems that fit 35-, 120-, and 400-lb. grease containers and come with a 50:1 high-pressure pump, control handle, Z-swivel, drum cover, follower plate, and an 8' outlet hose. Additionally, the manufacturer provides aboveground used oil storage systems featuring a UL Listed double-wall tank that provides 110% secondary containment. The tanks are available in 180-, 245-, 285-, and 500-gallon capacities and have an air-operated 30-gpm diaphragm pump.

Graco Inc., a manufacturer of fluid handling equipment, recently introduced EGP electric transfer and on-demand pumps. Designed as replacements for the company's obsolete APEX pumps, the EGP models offer optimized pump designs, new motors, built-in filtration, and new pressure controls for on-demand models. Available in 115VAC or 12VDC models, both EGP electric transfer and on-demand pumps are compatible with most standard electric configurations. By simply plugging the pump into a power source, an entire 55-gallon drum of 10W oil at room temperature can be emptied in less than eight minutes with the 8 gpm flow rate transfer model.

EGP pumps are also proven to be more energy efficient than pneumatic pumps, the manufacturer stated, offering an equally durable option for fleets and service providers seeking savings or who are unable to otherwise utilize compressed air.

Pump life in the EGP models is optimized with a built-in inlet strainer and motor over-temperature protection which prevent overheating, Graco added.

Richmond, Virginia-based Estes is the nation's largest privately owned freight carrier. At its shops, the fleet's fuel department manages oil and lubricant inventories for over 7,000 tractors. Orders are placed on supplier portals and only approved products can be requested. Engine oil is delivered in 500-gallon bulk storage tanks and other lubricants are supplied in sealed drums.

"All drums with axle and transmission gear lubes have air powered dispensers to reduce the possibility of cross contamination," Palmer noted. "The shops are also equipped with reels and hoses for delivering engine oil as well as chassis grease." According to Palmer, fifth wheel top plate lubricant is sourced in two ounce packets for ease of application by both technicians and drivers.

"Our suppliers perform random inspections to ensure we're following best practices in the shops," Palmer stated. "We're also just as conscientious about how we handle and dispose of waste oil. We only work with reputable companies who follow the rules about insurance and documentation and can offer nationwide service."

TravelCenters of America

"Purchasing oils and lubricants is relatively easy," said Homer Hogg, Vice President of truck service, who oversees shop operations at about 270 locations in 44 states. "But because we stock most common major on-highway brands and viscosities, our challenge is to have multiple storage containers and to eliminate cross contamination."

To meet its wide ranging engine oil inventory needs, including the smaller jugs it sells to drivers, TravelCenters is focused on the brands and viscosities that its customers want. Additionally, it also has a technical service team that looks at engine manufacturer specs. Purchases are also often driven by market conditions, and the volumes used at each shop location.

Gear lubes are mainly supplied to TravelCenters shops in 55-gallon drums. Engine oils are supplied in bulk quantities from the local oil distributor. Air pump powered dispensing systems within facilities are dedicated to each lubricant, including separate plumbing and hose reels.

"We use several brands of equipment and tools depending on the design of the shop," Hogg related. "That's determined by our construction engineering team, whose experts work with manufacturers. It's often a dynamic process."

At its shops, TravelCenters offers oil analysis and sends samples to an outside lab. The lab communicates findings directly back to the customer. Additionally, the company uses Safety Kleen to empty its waste oil tanks.

"We are focused on establishing good programs and practices for oils and lubricants by having the right equipment, organizing the systems so they can be used effectively, and making sure they are maintained," Hogg stated. "Also, our focus is on supplying what makes sense both across our network and locally by offering enough variety to serve the majority of our customer base."

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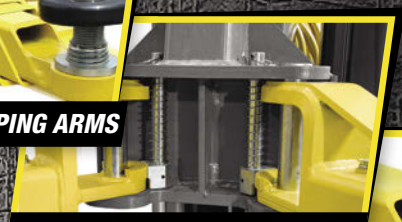

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SHOP OPERATIONS

NAVIGATING THE PARTS PREDICAMENT

The complex parts issues of 2021 may not ease anytime soon, though some solutions in the shop might help.

By John Hitch

[THE PARTS ROOM]

The parts shortage situation in the commercial vehicle sector has become quite the quagmire: New trucks languish away in OEM lots waiting for semiconductors as fleets scrounge the web to find parts to free trucks from shop purgatory, or strip one truck to get another back on the road—literally robbing from Peter(bilt) to pay Paul in the name of uptime.

"It is like a Mr. Potato Head," explained Cari Baylor, president of Baylor Trucking. "We are pulling our equipment and cannibalizing parts. We pre-bought parts and, over the past 90 days, we shipped out 57 parts to our partner dealerships. An OEM dealership doesn't have the parts, so we are shipping it to our dealer locations to fix our equipment on the road."

There are plenty of other anecdotal tales from the shop, such as Quality Transport resorting to eBay for a marked-up water pump to get a truck out of Flagstaff, Arizona, to rumblings at the Technology & Maintenance Council Fall Meeting about diesel particulate filters costing twice as much as a year ago.

These survivalist means to an end are enough to make truck part customers feel like hungry rats in a maze, trying to sniff out that elusive fuel injector like a morsel of cheese.

How did we get here? And what can fleets' parts departments do about it?

Neither answer is simple, but *Fleet Maintenance* has collected a variety of data and talked to several experts to shed some light on the issues, what's coming next in the next few years, and more importantly, provide solutions to ensure the industry can get moving again.

And because data is so integral to making sound purchasing decisions, we have included some infographics based off our own recent fleet purchasing study, along with some external data, to add even more insights into the parts situation.

And maybe, by mapping every corner and crevice of this maze, somebody can find the exit.

It was the worst of times: An overview of the problems

With certain issues in the industry, such as the driver or technician shortages, there are dissenting voices who question the severity of the problem, arguing the real issue is shorting employees a proper salary. However, in regards to the current parts ordeal, there's not a single source—from the OEMs and aftermarket to economists and fleets who we spoke to—who thought supply chain concerns are overblown.

Don Ake, VP of commercial vehicles at FTR Transportation Intelligence, said it's "the worst supply chain crisis since World War II."

He cited the backups at the Ports of Long Beach and Los Angeles, swelling from 40 container ships waiting to dock to 100 last October, as a major reason truck OEMs can't keep builds up with orders.

"There is all this pent-up demand for commercial equipment—the problem is that it's growing every month," Ake said. "That pent-up demand is building and it is going to make it tough when things finally break loose to try to catch up."

And this economist isn't the only one.

"The parts availability issues in 2021 are pretty unprecedented," explained Tim Meeker, director of product and pricing at Navistar. "At the root is a conflagration of business interruptions stemming from the COVID-19 pandemic going head-to-head with pent-up demand across virtually all industrial segments at once. It was a perfect storm."

Economist Molly MacKay, VP of operations at MacKay & Company, invoked similar symbolism, attributing the current climate to a "rainstorm of events."

She cited supply chain constraints and shortages, parts issues, hiring issues, and inflation as factors. On the positive side, MacKay & Co.'s data found the total aftermarket value increas-

2022 Fleet Maintenance Purchasing Report

In August 2021, Endeavor Business Media emailed an online survey to members of the *Fleet Maintenance* database, receiving 212 responses by the end of the month. Here is a breakdown of the participants and their anticipated purchasing behavior.

Fleet Respondents

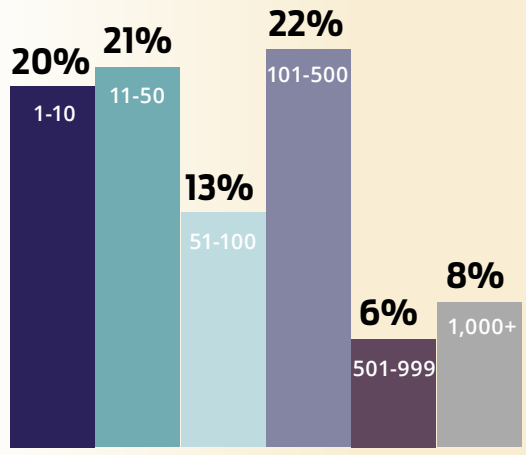
26% Owner/ Executive Level

29% Maintenance management

31% Fleet management

14% Other

Total number of vehicles in your fleet



Primary fleet

36% Heavy-duty (Class 8)

Class 8 **63%**

54% Medium-duty (Classes 4-7)

Classes 4-7 **59%**

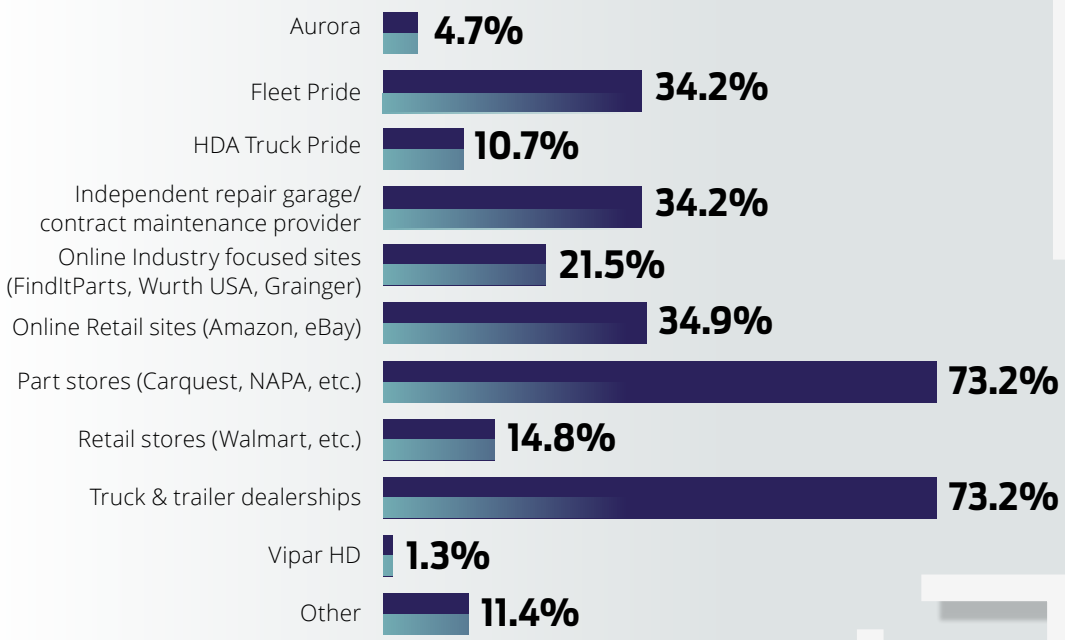
24% Light-duty (Classes 1-3)

Classes 1-3 **70%**

8% N/A

All vehicle classes within your fleet

Where are parts purchased?



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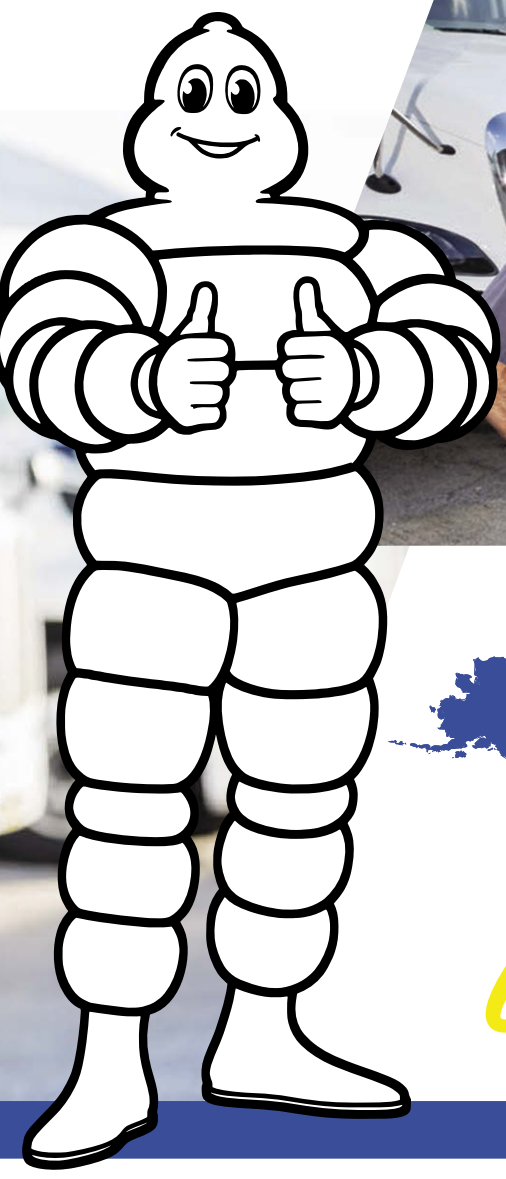

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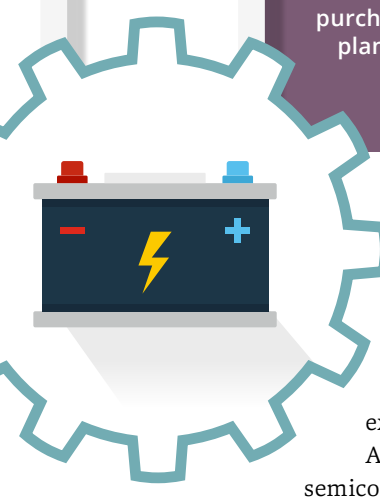
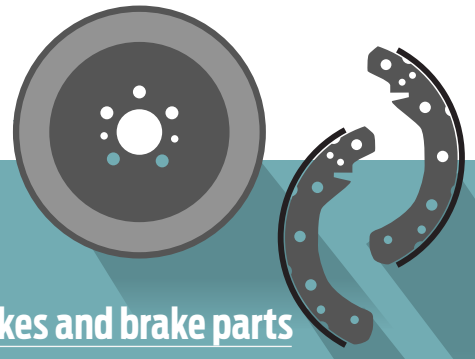
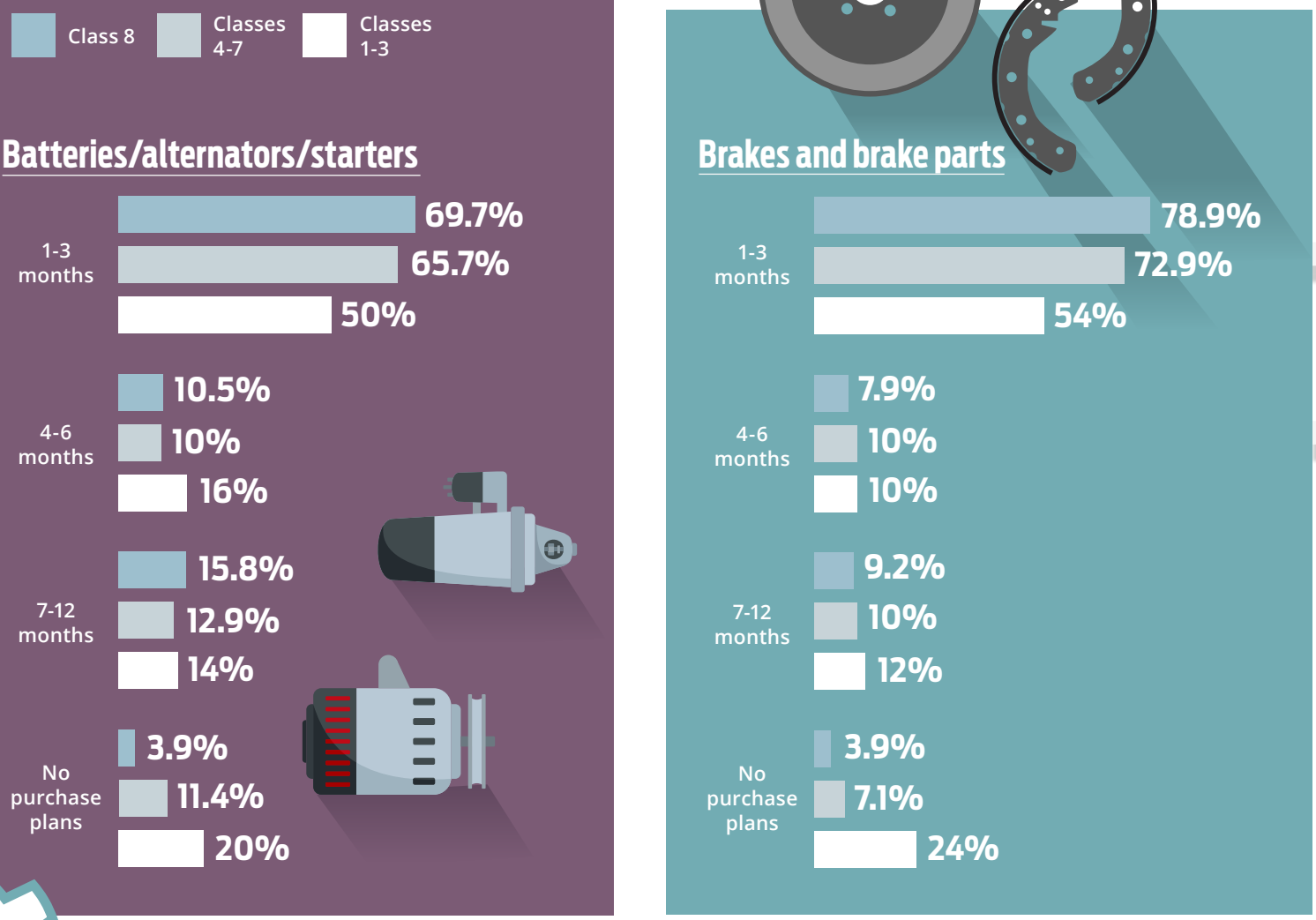
2022 Fleet Maintenance Purchasing Report







in 2021 after declining by 8.9% in 2020. The comprehensive report tracked over 800 truck, tractor, and trailer components across Classes 6-8 and several vocations and fleet sizes. Next year, MacKay expects a 7% increase.

As far as the parts shortage goes, semiconductors best represent the struggles. Along with the shocks of COVID shutdowns, there is just too much demand for chips in the automotive and consumer electronics space and not enough to go around due to the small amount of companies who make them.

And with freight rates so high, fleets want to buy more trucks, but they can't, because they are parked near the plant awaiting chips. Kenny Vieth, ACT Research president and senior analyst, said the shortage could "hobble the industry well into 2022—and perhaps even beyond."

SEMI, the sector's trade association, forecasted that two dozen 300 mm chip fabrication plants would open up between the beginning of 2021 and end of 2022.

"We're using semiconductors as a catch all, primarily because semiconductors just go into so many parts," he told *Fleet Maintenance*. "One only has to look at steel or aluminum or other commodity prices to recognize that it's not just a semiconductor issue. And the problems aren't just U.S. problems or North American problems, but really global problems."

In September, steel reached peak prices before dropping 8% in October, according to Ake. Meanwhile, aluminum prices spiked above $3,100 per ton on October 18 before falling to around $2,700 per ton on November 11, based on Markets Insider data.

Hendrickson's Rence Oliphant commented that steel, which the OE uses for springs and other suspension parts, "has basically tripled or quadrupled since the start of the year." Hendrickson sources its steel from North America, which has circumvented some of the port issues.

"We don't rely on the overseas [steel suppliers] and quite frankly, that's helped us and it's hurt our competition," Oliphant said. "You look at all those ships off the Port of Long Beach right now. We've got drums and hubs sitting there waiting to come on shore—nobody's transporting them in. So, I think everybody's had a wake-up call here that you can't be single source; you've got to have different locations."

> **"Right now, there's a 145,000-unit [Classes 5-7] backlog. In March, it was a 99,000-unit backlog. That's 8,000 units a month in backlog growth."**
>
> Kenny Vieth, ACT Research President

This isn't the first tight spot the U.S. has found itself in, and as bad as things appear, they are not WW II bad.

"I'm optimistic about the future because these things will ultimately sort themselves out," offered Vieth, finishing with an Alan Greenspan, quote: "The law of supply and demand has not been repealed."

Backlog to the future: The truckbuilder corner

"Demand is just through the roof; now we're trying to figure out supply," ACT Research's Vieth said. He said factories "swimming in inventory" are laying off workers, and when the plant needs labor again, it will be difficult to find it. Backlogs are also mounting, like rising waters behind an old dam.

Citing ACT Research data going back to the 1980s, Vieth said the medium-duty backlog is the highest it has ever been. For September 2021, the Classes 5-7 backlog (trucks, buses, RVs) was at 145,200 units. Compare that to the previous peak, the pre-buy cycle prior to the 2007 emissions standards went into effect, when medium-duty backlog was at 101,500 units.

"The last four months, the industry has been building about 19,000 trucks a month, and the order rate has been 27,000 trucks a month," Vieth said. "Right now, there's a 145,000-unit backlog. In March, it was a 99,000-unit backlog. That's 8,000 units a month in backlog growth."

The medium-duty backlog-to-build ratio, the time it takes clear the current backlog, is

typically under 3.3 months or lower. It will take eight months to clear the September backlog, Vieth said.

ACT Research data showed backlogs in the Class 8 market reached 279,300 units, 7.5% off the all-time record of 302,100 set in October 2018. The backlog-to-build ratio is at 12.6 months.

The disparity is narrowing in the Class 8 market. The Class 8 orders in September were 27,300, down 26% from the monthly average over the past 12 months of 36,800. Builds in September reached 22,200, a slight improvement over the 21,800 units per month average over the last 12 months.

"Given carrier profitability, freight volumes—everything you want to look at it in the freight market—we should be seeing record-level orders right now," Vieth surmised. "The only thing that's standing between record-level orders and record backlogs is the OEMs themselves; they're not going to over promise their backlog until they have better visibility on [the current supply chain environment]."

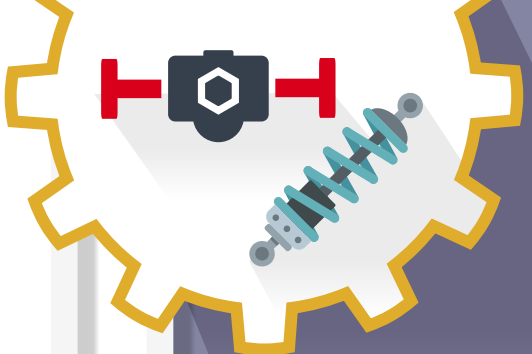
Vieth said some OEMs are more willing to open backlogs than others, adding trailer manufacturers have also pulled back, otherwise there would be record backlogs there, too.

Overall, Hendrickson's Oliphant, an industry veteran of 30 years, said the OEMs scaling back orders and build rates have actually had a positive effect on the OE.

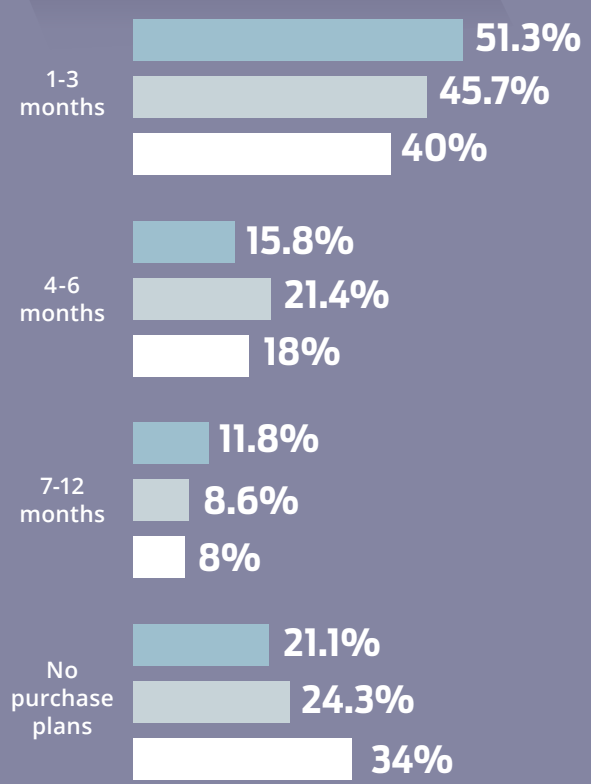
"That has allowed a couple of our plants to catch up a little bit and get on top of things," Oliphant said.

Still, from his vantage point, the industry overall has a struggle ahead.

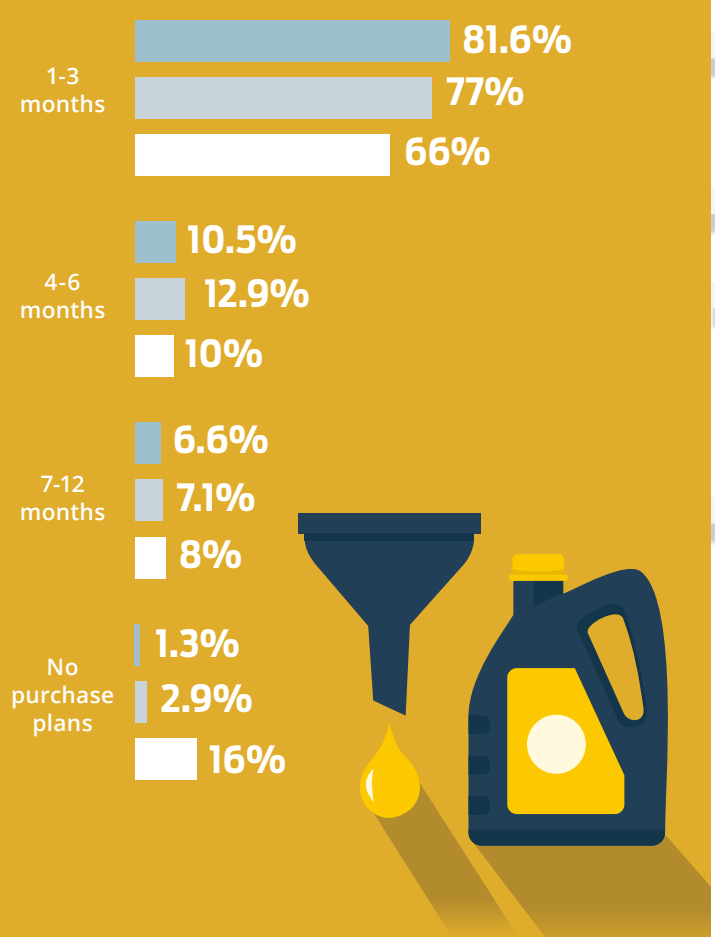
"We've never had this much demand and not been able to fill it," he said. "Fleets are making so



Chassis & suspensions



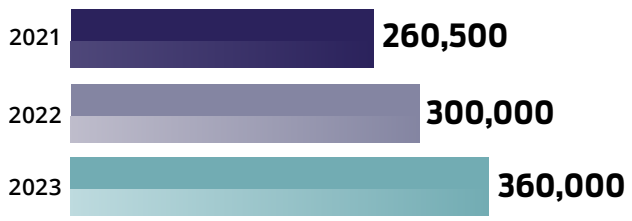
Engine oil



FTR Classes 4-8 & Trailer Build Outlook

Class 4-7 Production

Class 8 Production



Trailer Production

Source: FTR November 2021 data

U.S. Aftermarket Demand for Class 6-8, Trailers and Container Chassis

+6.9%
2018

+6.2%
2019

-8.9%
2020

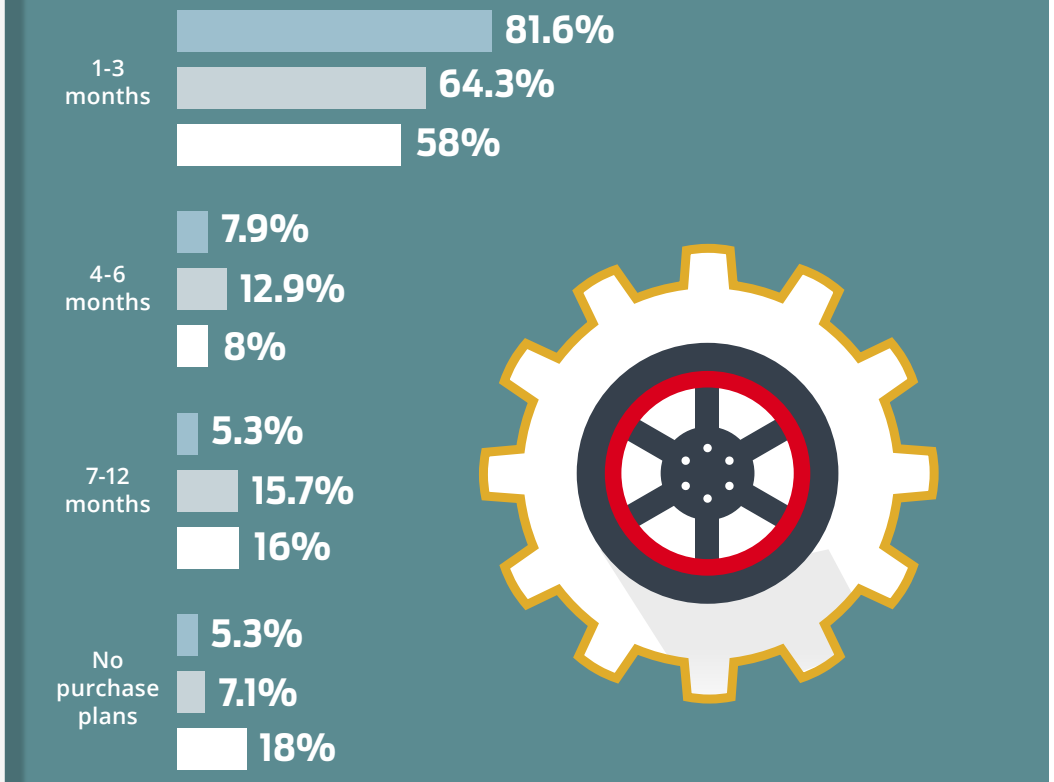
+17.2%
2021

+7.0%
2022

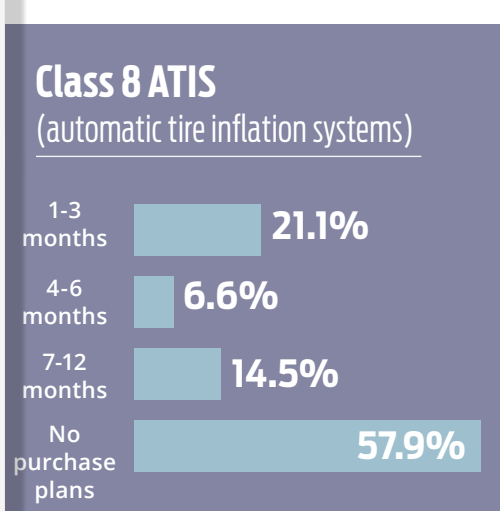
Source: MacKay & Company's DataMac

2022 Fleet Maintenance Purchasing Report (continued)

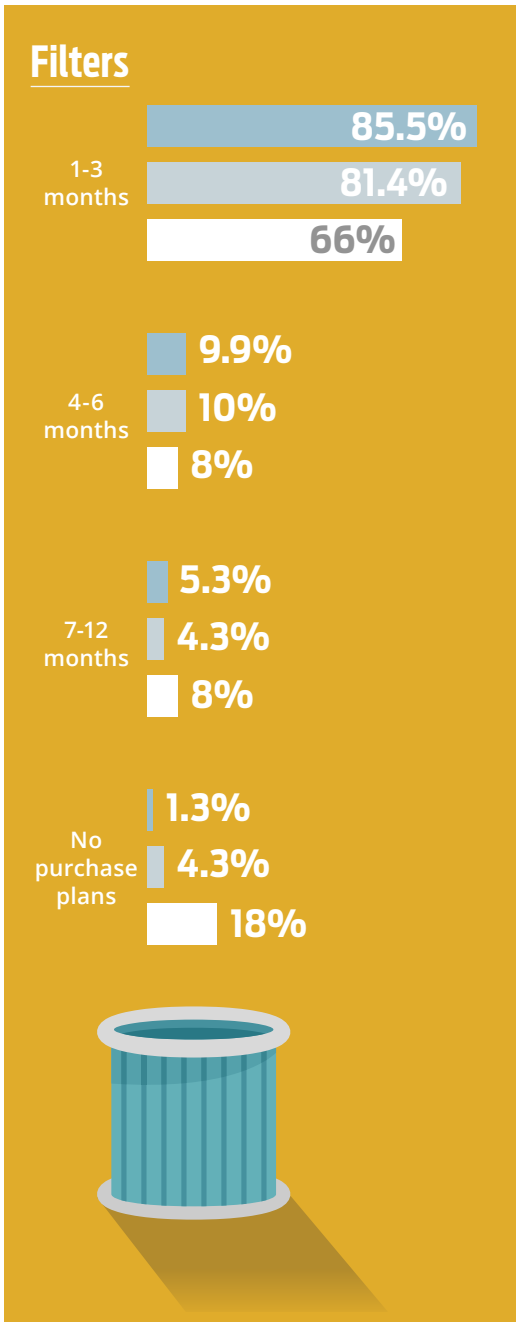
Tires



Class 8 ATIS
(automatic tire inflation systems)



Filters



"Deliveries happened like clockwork... But as soon as we started to see the disruption, the most random components that you would never expect were experiencing a shortage."

Jacob Findlay, Fullbay executive chairman

much money because the rates are high that they want to buy equipment—they want to stay on their trade cycles. They also want the depreciation that comes with the purchases, and they're unable to get it because they can't get new trucks and trailers."

Looking ahead, fleets in California, New York, and New Jersey will see a pre-buy prior to 2024 California Air Resources Board NOx emissions rules taking effect. Vieth said this could impact 15% of the U.S. market. "It's going to be made more difficult, because the industry is going to be trailing a lot of pent-up demand into 2023, so it's going to be harder to pre-buy."

Oliphant said these trucks will cost $30,000 more, not including the expected added operational cost of $15,000 over the first three years.

"Will we see a 360,000 truck build in 2023?" Oliphant asked. "We've got to ramp up to it at some point next year."

From harmony to chaos: the parts supplier side

It used to all be so straightforward. Need a part? Call up the local supplier and a van could deliver it before you hang up the phone.

"The parts shortage was never in the equation; [customers] always knew parts were available, they just needed to get it repaired and back on the road," lamented David Seewack, CEO of FinditParts on an October webinar hosted by Fullbay, which developed a heavy-duty shop management platform of the same name.

Seewack, a veteran of the parts industry for 25 years, explained one of the challenges is finding distributors who have parts in stock. Having 20 suppliers for one part was the norm, but recently only one of 14 suppliers of a Hendrickson part had it in stock.

During the webinar, Fullbay was announcing the beta version of FullBay Marketplace, which streamlines the heavy-duty parts ordering process from 10 steps, including calling a supplier, finding alternative sources, cross-referencing parts numbers, getting an estimated time of arrival and more, down to a three-step process: search, select, and order.

The key is providing visibility into a distributor's real-time inventory. FinditParts, which has a database of 10 million OEM and aftermarket parts, was the first parts provider to integrate the new tool for Fullbay customers. The ecommerce site offered 2.5 million parts in 2013.

"With the parts shortage and everything, we're working to try to be creative about solutions that can help get parts sourced faster," said Fullbay Executive Chairman Jacob Findlay.

That is to make up for the fact that certain flaws of just-in-time manufacturing, the solution to rising inventory costs, were exposed by COVID.

"You don't want to have huge warehouses full of the different components that are needed to assemble the truck," Findlay explained of just-in-time benefits. "You want the delivery, ideally, for that specific component to show up on the assembly line exactly when you need it.

"Deliveries happened like clockwork," he continued, "But as soon as we started to see the disrup-

tion, the most random components that you would never expect were experiencing a shortage."

He said it's more than just semi-conductor chips, but actually several parts.

"One little disruption in the global supply chain has a ripple effect across the board, and it's not just one disruption—it's multiple," Findlay said. "A return to the harmonic balance that we had pre-COVID is going to take a while, and in the meantime, there's just a lot of chaos."

Some of that chaos includes commercial vehicles not as well-maintained. He pondered how quickly noncritical preventive maintenance tasks, which could turn into bigger problems down the road, would be completed.

Solutions are becoming more available. Parts provider FleetPride recently came out of beta on its ecommerce site. This allows customers to search for more than 176,000 parts on Classes 6-8 vehicles and heavy-duty trailers. Search fields include part number, cross reference, year/make/model/engine type, and VIN. Alternative/associated parts are also recommended.

FleetPride's SVP of sales and operations, Mike Harris, said the company is "not immune" from issues, but the company can leverage the scale of its network—280-plus locations and five distribution centers—to have the inventory "that customers regularly ask for."

Harris said if a part cannot be found locally, a parts expert on the phone or webchat can "within just a couple keystrokes, source that part from a store nearby or across the country, or a nearby DC as well."

Leading the way: aftermarket angle

FinditParts' Seewack mentioned how suppliers were running low on a Hendrickson part. Oliphant did acknowledge supplying to the aftermarket sector has faced difficulties in the wake of the COVID-19 plant shutdowns. For one, OEMs take precedence over the aftermarket. And along with the semiconductor shortage, there have also been material delays, such as with rubber, because one supplier's rubber compounding plant in Tennessee caught fire last January.

"I am happy to say things are actually getting better for us right now," Oliphant relayed. "The lead times are starting to shrink back a little bit, so that's the good news. I think we may have hit the peak and we're coming back down to reality and normalcy again."

Fellow suspension OE Link Manufacturing has also expressed positivity, with aftermarket lead times returning to normal after seeing them expand from one week to four. Components sourced from overseas had affected those.

"Link overall has been in pretty good shape," said Mark Molitor, senior product manager for chassis at Link. "On the suspension part of it,

we've got a really strong U.S. manufacturing and supply base."

Molitor said Link has a 99.8% on-time delivery rate.

The lack of semiconductors for smart products has caused an exorbitant rise in price, said Link's VP of business development, Brian Kujala.

"We're running into that right now where we have chips that you typically pay less than $1 for, you're paying over $20—and that's one out of 96 chips on our board," he said, adding this could impact vehicle prices in Q2 of 2022.

"I think you're just going to run into some near term, temporary, inflated pricing. That should, over the course of 2022, level itself out at some point," Kujala concluded.

Common wear items, such as brake drums, have also been harder to come by.

"Brake drums, both domestic and imported, are three to four times beyond their normal lead time supplier commitments," said Todd Shakespeare, director of parts marketing, Volvo Trucks North America, which offers the Road Choice aftermarket brand. "This looks like it will improve in 2022 but will not reach normal levels until later in the year."

There are still labor issues at the ports, fleets, and warehouses, Shakespeare noted.

"This, I believe, needs to be on the forefront of the efforts to improve," he said. "If we do not have human resources, nothing else matters."

The other thing is to rethink the supply chain reliance on just-in-time. This time it was a pandemic; next it could be a natural disaster.

"If we as business leaders accept that our global economy is subject to a repeat of such risks in the future, then continuity of operations and service level becomes a focal point," Meeker said. "I would expect that businesses will focus on redundancies in the future, whether that means keeping multiple suppliers active in different parts of the world, or starting to look at making better use of manufacturing methods such as additive manufacturing."

> **"[Building relationships] is definitely not something that's going to show up on the books or on an inventory sheet, but it certainly plays an influential role."**
>
> Molly MacKay, VP of operations, MacKay & Company

The way out?

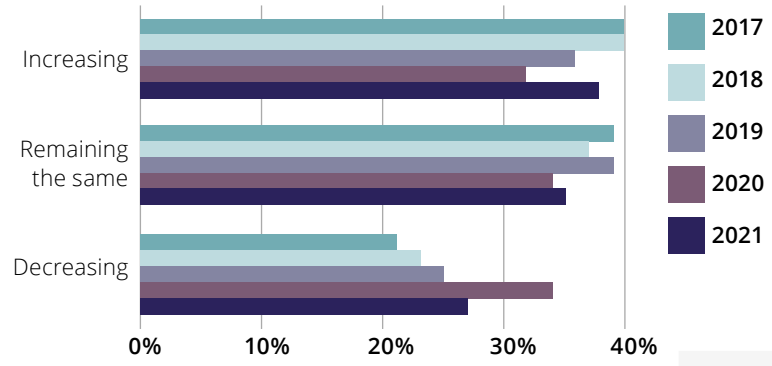
So all this sounds like a supply chain Squid Game, where threats lurk around every corner. And like in that dystopian game of life or death, forging relationships is a solid plan to survive long enough to make it out of this maze.

The longer those relationships have been, the better position the shop is in, regardless of size.

NTEA Truck Aging Insights

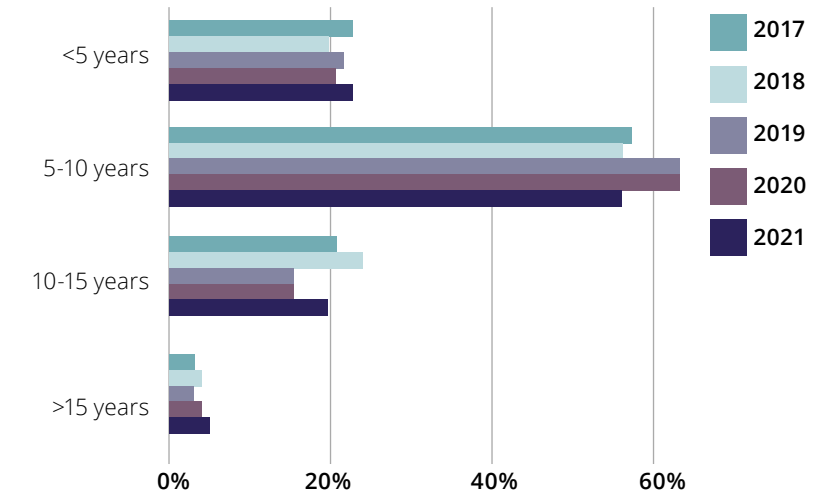
Due to the difficulty OEMs are having keeping up with demand, fleets will have to hold onto trucks they would otherwise pass on to the secondary market. NTEA noted until 2020, when utilization was affected by COVID, truck age was trending downward. These factors could create a ripple effect. "Because there's a lack of new inventory, fleets are just going to have to keep their vehicles longer, and those are now aging out of the warranty process," said FinditParts CEO David Seewack. "And when they do sell them, it's going to be an older vehicle that will then go to the second user." He noted this, combined with increased sales projections on heavy-duty parts, means "you're going to see a lot more repairs of vehicles because of the aging nature of them."

Fleet insight on truck aging



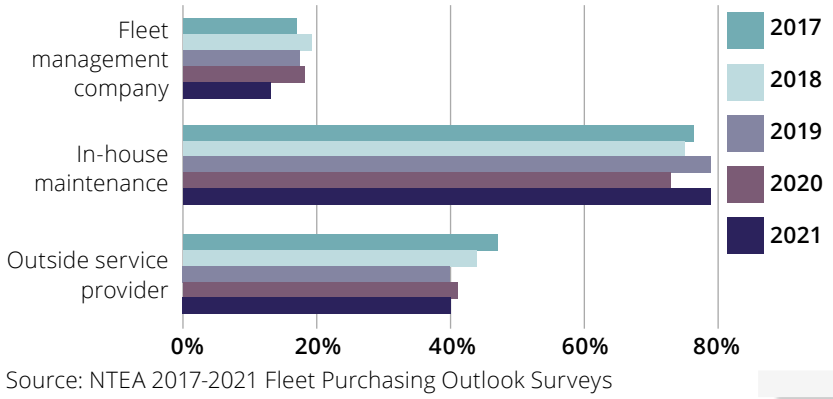
Source: NTEA 2017-2021 Fleet Purchasing Outlook Surveys

Average truck age



Source: NTEA 2017-2021 Fleet Purchasing Outlook Surveys

Truck maintenance approaches



Source: NTEA 2017-2021 Fleet Purchasing Outlook Surveys

On one of her frequent visits to shops, specifically to one in Northern Illinois, MacKay noticed this was true.

"He gets four or five deliveries a day of parts that other people can't get," MacKay recalled. "Dealers are calling him in order to fulfill their part needs."

She asked, "How on earth are you able to do this?" and he replied, "Relationships. I know where to go. I know who to call. I have people that can make this happen for me."

This is not all that common in an industry with a lot of turnover, MacKay explained, which gives him an advantage.

"Because this guy has been in his position for decades and built relationships over those years, he's able to reach out and get what he needs," MacKay said.

She said the ability to build and maintain relationships "is definitely not something that's going to show up on the books or on an inventory sheet, but it certainly plays an influential role."

While soft skills are important, software may be more so. Leveraging ecommerce platforms can give parts customers real-time visibility into supplier inventory and allow them to quickly find what they need, though not enough allow that, FullBay's Findlay said.

"Probably 80% of the parts to get ordered don't require a phone call into the distributor, and yet they require a phone call into the distributor to order it anyway," he explained. "They could eliminate a ton of the work there by just opening up their platform to allow others to connect into it to enable ordering—and the first ones to do it are going to get way more business because they're adopting the technology."

Findlay suggested the industry should rethink parts fitment and "get more aggressive at adopting ACES and PIES standards for heavy-duty, so that it doesn't require a human and tribal knowledge to identify a part."

He thinks that could reduce the amount of times a customer requires human intervention from the theoretical 20% leftover from improved ecommerce visibility to 5-10%.

That's currently out of the control of shops, but Findlay said what they can do immediately is expand their vendor list and think outside of their comfort zone.

These include local commercial shops, competing fleets, or independent shops, non-local vendors, online sources such as Amazon or Craigslist, or even salvage yards.

"Do you go get some old trucks that match pretty much what you already have in your fleet and just park them for parts?" Findlay asked.

He admitted these are "non-sexy, not super exciting suggestions, but very pragmatic."

They're also a little better than stripping your own trucks for parts, considering they will be much harder to come by for the next few years.

For related content go to **FleetMaintenance.com/shop-operations**

» Future regulations are expected to limit the amount of NOx emissions by more than 90%.

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Preparing for dual SCR

The differences between SCR and dual SCR technology, and what new maintenance will need to be considered.

By Scott Achelpohl

When it comes to reducing the nitrogen oxide (NOx) emissions of diesel-burning commercial vehicles, selective catalytic reduction (SCR) is firmly in place as today's technology. And these systems are not without their challenges when maintaining them. Soon fleets will also have a new technology with which to contend: dual SCR. Coming in the next five years—and according to two OEMs, might very well be the future—dual SCRs will come with their own unique challenges.

How dual SCR differs from today's catalytic reduction

First let's talk SCR. Current SCR is itself a quite advanced active emission control technology system that injects a liquid-reductant agent—automotive-grade urea in the form of diesel exhaust fluid (DEF)—into the exhaust stream of a diesel-burning engine. SCR technology is designed to permit NOx reduction to take place in an oxidizing atmosphere. It's called "selective" because it reduces NOx levels using ammonia (the urea after it is exposed to heat) as a reductant within a catalyst system.

When operating optimally, this aftertreatment technology cuts NOx by up to 90% and meets current U.S. Environmental Protection Agency (EPA) and California Air Resources Board (CARB) standards.

Dual SCR promises perhaps more than 90% reduction, where government rules are almost certain to land in a few years. The question for fleets is how to keep current systems working well enough to perform up to today's NOx rules? But it's also critical for them to anticipate what might arrive in their shops to fix in the next five to 10 years.

Think of dual SCR as SCR with an extra urea injector, with designs in R&D that place one injector closer to the engine and one farther away from it. The difference between the two is NOx emissions get processed by the DEF at two locations rather than one.

No heavy-duty truck in production today uses dual SCR. OEMs such as Volvo Trucks and Daimler Trucks North America, and aftermarket manufacturers such as Bosch and Eaton, are all in R&D with dual systems or their likely components. And they all anticipate a tightening of government standards in the U.S. by the EPA and CARB, which is usually even stricter.

Volvo's director of product marketing, Johan Agebrand, said regulators might also restrict the warmup periods for on-highway diesel engines, which is quite long with SCR, called the "emissions slippage" time. "They won't be allowed to have a warmup period anymore, no more emissions slippage," Agebrand said.

Volvo, which is pioneering electric trucks coming into the heavy-duty market, also is a leader in sustainability solutions for trucks that still burn diesel—and dual SCR is no exception, Agebrand said.

Daimler also helped lead the way with SCR in 2007 with the development of its BlueTec emissions technology, said Len Copeland, product marketing manager for Detroit Diesel Corp., a Daimler subsidiary and the OEM's engine manufacturer.

Copeland touted the existing SCR in Detroit Diesel power plants, its DD13 and DD15 Gen 5 engines, as already-efficient reducers of NOx with their advanced communication among various components. The two engines use asymmetric fuel injection, which "biases" fuel towards different cylinders based on engine load or through a thermal control valve, modulating exhaust flow at low load, high idle, or extended PTO operation to increase exhaust temperatures.

"While dual SCR is newer to the industry, it functions on the same principle and with the same efficiency as existing systems," Copeland added.

Dual SCR "increases NOx conversion due to the two catalysts can also be achieved by increasing the size of a single Diesel Oxidation Catalyst (DOC), where packaging permits. Newer aftertreatment systems, such as the new ATS paired with the heavy-duty Detroit Gen 5 engines, are smaller and lighter (60-plus lb. in this case) than previous generations without increased complexity or cost."

Any R&D that produces a system that cuts NOx above 90% might be a prescient investment, whichever OEM pioneers it first.

In August, the EPA announced plans to lower greenhouse gas (GHG) emissions and other air pollutants from heavy-duty trucking via several rules over the next three years. All part of the Cleaner Trucks Initiative, the first will be finalized next year and will apply starting with 2027 model year heavy-duty trucks.

The EPA said "from 2007 to 2017, NOx emissions in the U.S. dropped by more than 40%. But there is more work to be done. Heavy-duty vehicles are the largest contributor to mobile-source NOx emissions and will be one of the largest contributors to ozone in 2025. The EPA last revised NOx standards for on-highway trucks and engines in 2001."

The EPA is also developing ways to stregnthen and streamline existing technologies to further reduce emissions. SCR and dual SCR would fall under this category.

The long, long road for aftertreatment systems

The industry has also independently evolved the technology as well. Aftertreatment systems have come a long way in 14 years. With the right training, tools, and understanding of diagnostic procedures, fleets can relieve many of their common pain points.

Copeland said the most recent version of Detroit's aftertreatment system was released this year to meet GHG Phase 2 regulations.

"With this update, we are able to extend DPF replacement intervals up to 640,000 miles or more while further improving the SCR to increase efficiency at lower temperatures," Copeland said. "The DOC (diesel oxidation catalyst) has also been improved to allow for lower minimum temperatures during dosing. These improvements help the system clean exhaust better at lower RPMs."

Volvo's Agebrand points to other recent aftertreatment system improvements.

"Some major changes include the fact that the SCR catalyst actually does a catalytic conversion in an increased temperature range. Thus, more variety in load and temperature from the engine will still result in a catalytic reduction of NOx emissions," he explained.

Dosing systems have also improved in both algorithms and hardware. "This enables the systems to operate in a variety of conditions and with higher efficiency," Agebrand said. "Material production design has also facilitated more compact systems that are easier to service without reducing efficiency."

Down in the weeds with SCR maintenance challenges

In terms of the maintenance challenges between SCR today and the dual SCR of tomorrow, Volvo's Agebrand said there should not be too many differences.

SCR maintenance today is concentrated mostly on cleaning or replacing the diesel particulate filter (DPF), "except if fuel is being contaminated," which might require a deeper dive into repairing other parts of the system, Agebrand said.

Depending on the manufacturer, an SCR system can have multiple filters, complicating the maintenance challenge, said Ryan Koukal of Clean Diesel Specialists.

With any filter, maintenance intervals also are important to make sure they are doing their job properly, he said. "We always suggest the customer check with the manufacturer to confirm where each filter is and its suggested replacement interval," he told *Fleet Maintenance*.

So much else on a current SCR system can fail, thus requiring a maintainer's attention, Koukal added.

A system's DEF pump is a key cog in the system's efficiency. "It all starts at the pump. If the pump is not operating properly, the DEF injector may plug and fail or you may get a buildup of dried DEF in the decomp tube and/or SCR," he said.

The DEF injector—there would be two in a dual SCR system—should be removed and inspected when filters are being serviced. "Dried DEF buildup can lead to poor DEF atomization, which can lead to poor SCR conversion efficiency," Koukal added.

He advised to not overlook the air dryer filter in a current SCR.

"In many OEM applications, air is used to purge the DEF lines of any residual fluid. If the air filter is dirty, old, or cheap, it may contaminate the DEF system, causing further issues," Koukal explained. "It is highly recommended to use a coalescing filter ONLY, as cheaper filters may still allow small contaminants to pass through it."

An SCR system, by design, depends on heat to work properly. Exhaust leaks, another piece of the SCR maintenance checklist, equal temperature loss, Koukal noted. Temperature loss results in poor DEF decomposition, which then leads to poor SCR conversion efficiency, he said.

Also, he said, temperature and NOx sensors are the most replaced component in the aftertreatment system. While maintenance is not really an option, there's an emerging industry of aftermarket solutions.

In terms of maintenance disadvantages of dual SCRs, a maintenance technician with Aim NationaLease and a past TMC SuperTech competitor, John Norwood, said he sees only a few possible disadvantages to dual SCR over the current SCR systems: an increase in DEF consumption and added sensors and catalyst that could fail. "If an upstream contamination happens, that adds to what it could contaminate."

Norwood's and others' prevailing attitude: Follow what government regulators do. If a future dual SCR gets you there, your fleet should adopt it. Right now, SCR is the standard and OEMs have brought it a long way, but dual SCR is something to watch.

E-axles shift maintenance focus

What the maintenance sector should know about the the next evolution in driveline technology.

By Tyler Fussner, John Hitch

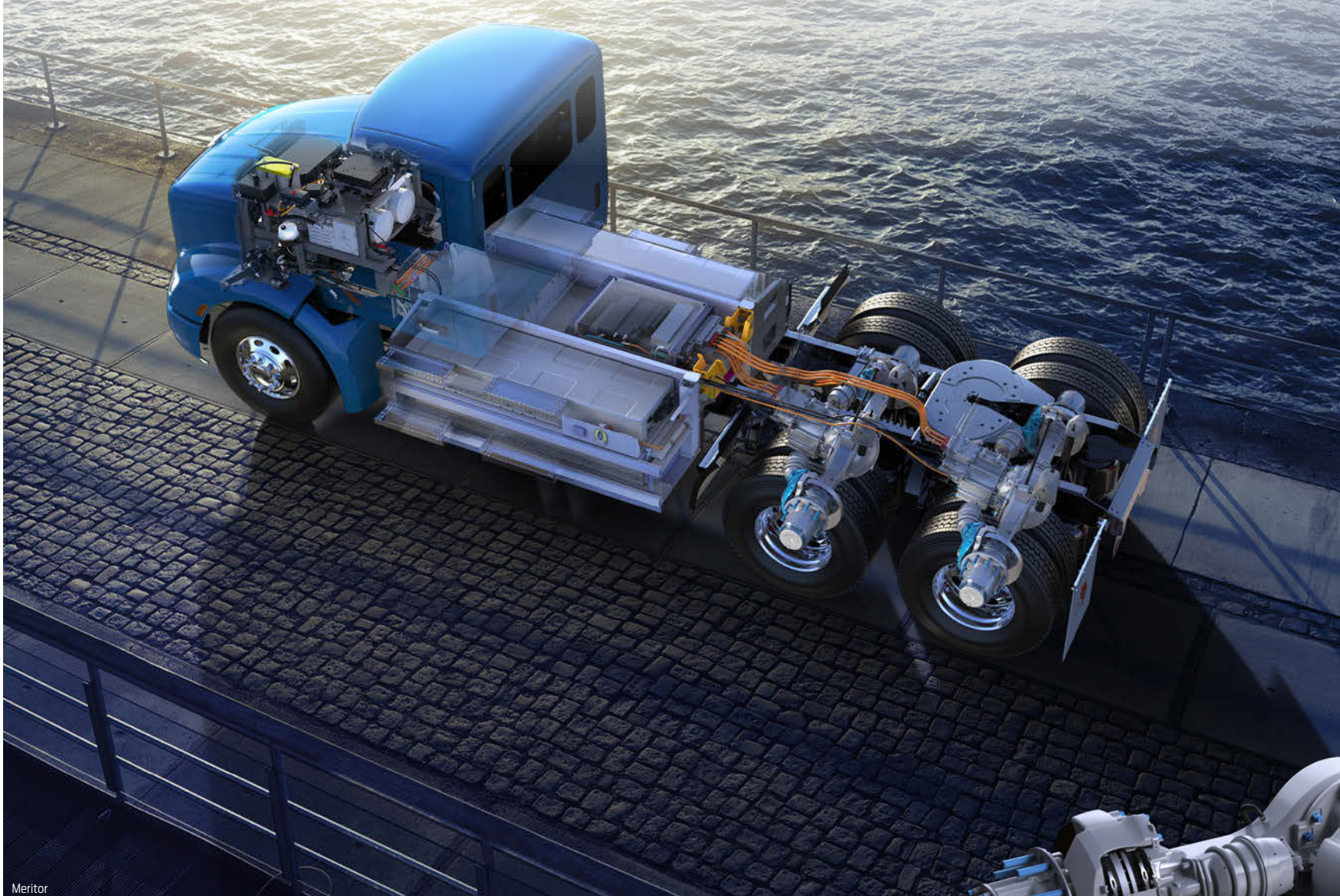
With the increase of hybrid and battery-electric trucks on the roads, it's time for the commercial vehicle maintenance sector to get up to speed on electric axles, or e-axles, and what to expect in terms of maintenance.

The first thing to know is what an e-axle is. This drivetrain system consolidates several of an ICE vehicle's major systems into one, including the motor, transmission, power electronics, and brakes. The motors also serve as regenerative brakes, which assist with stopping, as well as redirect that kinetic energy to the battery.

"You've got a lot of content that's being condensed into a small package, and replacing a diesel engine and conventional transmission and driveshaft opens up all sorts of opportunities," explained Jeremy Freznick, senior director of commercial vehicle engineering at Dana Inc., one of the more active OE's developing and manufacturing e-axles, with options for medium- and heavy-duty trucks, vans, and buses. "That's whether you want to use that [space] for additional payload or to package additional batteries in that space to get extended range."

Dana's eS9000r e-axle for medium-duty hybrids and EVs weighs 815 lbs. Its standard battery pack setup allows Classes 4-6 trucks and buses to run for up to 170 miles between charges. The first of Dana's Spicer Electrified Zero-6 e-axles line will also be used as the drivetrain for the Freightliner Custom Chassis Corporation (FCCC) all-electric MT50e medium-duty last-mile delivery vehicle. It is also the e-axle of choice for the Hyliion Hybrid truck.

Automatic transmission manufacturer Allison Transmission has also thrown its engineering



Meritor

prowess into the EV sector. The Indianapolis-based company now offers the eGen Power 100D e-Axle for 6x2 tractors and eGen Power 100S for 6x4's and heavy-duty straight trucks, along with buses and medium-duty trucks. Like their burly fossil fuel-guzzling cousins, Allison's leaner e-axles boast plenty of muscle.

"The eGen 100D features two electric motors, each capable of generating greater than 200 kW of continuous power, with peak combined power of 648 kW," Allison CTO Michael Foster noted. "This is similar power to a 15L engine paired with a 4000 Series Allison transmission, but packaged in the space claim of a traditional axle. The eGen Power 100D also integrates a two-speed gearbox in the central housing, optimizing the e-axle to enable the high starting gradeability to get heavy loads moving, while also offering the benefit of superior efficiency at cruise speed."

Hino Trucks will be the first OEM to use Allison's eGen Power 100S e-axles, which will be spec'd on Hino's Classes 6-8 battery-electric trucks.

These are just two examples. Others include Bosch, Detroit, Eaton, and Meritor, though even that list is not exhaustive.

Say goodbye to maintenance?

What's *not* exhaustive is the list of preventive maintenance items: no oil changes, fuel injector replacements, diesel exhaust fluid, nor cleaning of the diesel particulate filter, a maintenance bane of many a diesel technician.

Some OEs are claiming certain products can be virtually maintenance-free under the right conditions, but for most, there are at least a few infrequent lube changes in terms of preventive maintenance. According to the OEs, any PMs for the e-axle are more than offset by the elimination of the aftertreatment system in diesel trucks.

"Technicians can expect reduced maintenance from an e-axle when compared to a traditional powertrain," Foster asserted. "There are less moving mechanical components in an e-axle, which results in less friction and less wear and tear, leading to increased durability and a longer axle life."

Allison's regenerative braking system and gear layout "allows for maximum efficiency and 100% regeneration torque capability," which does reduce brake wear, but Foster noted the actual brake components, such as roots and pads, will still require periodic maintenance.

All told, the benefits include reducing downtime, maintenance costs, and total cost of ownership, Foster surmised.

The real work for fleets will be in spec'ing the right e-axle, ensuring it provides the best performance and range. How to do that will be a bit more complicated than the maintenance.

Everyone joining in

As far as spec'ing, a fleet will have many different options from which to choose. Like Allison, fellow transmission maker Eaton has also diversified into e-axles. Eaton's eMobility business announced a 4-speed heavy-duty transmission for EVs at the NACV show in 2019. Julie Marshaus, manager of new product introductions and systems, eMobility, for Eaton, said that the HD 4-speed transmission design is progressing well.

"It is heading to B-samples shortly and is still targeting full production in 2023," Marshaus said. "The HD 4-speed is intended for the Classes 6-8 market, with the capability of 2,600Nm input torque at 5,000 rpm. The transmission is capable of the typical applications in this class of vehicle, with expected markets in drayage and regional haul. It will easily expand to linehaul when that application is more viable for the EV space."

So how does an Eaton e-axle differ from say, the Eaton Cummins Endurant automated manual transmission?

"The major difference is that the EV transmission only needs four gears, and because electric motors spin backwards, the reverse gear and idler assembly have been removed," Marshaus explained of Eaton's EV transmission design. "The torque curve for electric motors is peak torque at zero speed and is very flat.

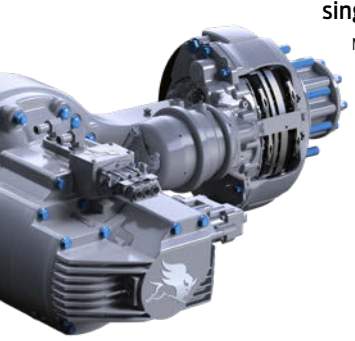
"This allows the transmission to use fewer gears because we do not have to shift to maintain a diesel engine in the peak torque range of 1,800 rpm as conventional transmissions are required to do for drivability and efficiency," she continued. "Regarding efficiency, the electric motors have peak efficiency at the higher rpm bands. Therefore, the transmission holds the top input speed as long as possible before shifting to maximize the vehicle efficiency."

The differences are found in of course the components and design, but also the efficiency and performance, as well as maintenance requirements.

Meritor is currently developing three different electric powertrain platforms under its Blue Horizon line: the 12Xe, 14Xe, and 17Xe.

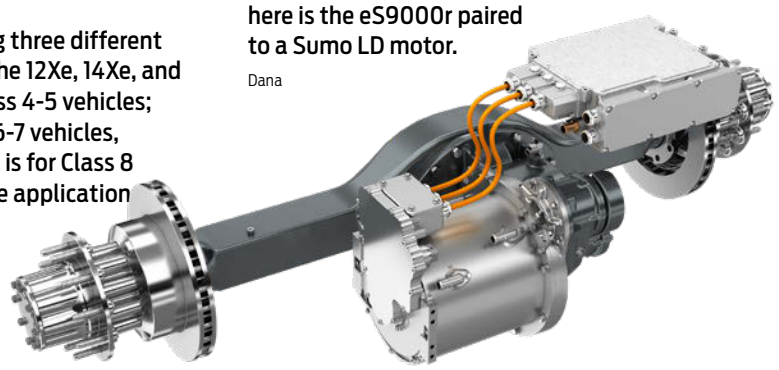
» Meritor is currently developing three different electric powertrain platforms: the 12Xe, 14Xe, and 17Xe. The 12Xe is focused on Class 4-5 vehicles; the 14Xe (pictured) is for Class 6-7 vehicles, or Class 8 as a tandem; the 17Xe is for Class 8 single axle application

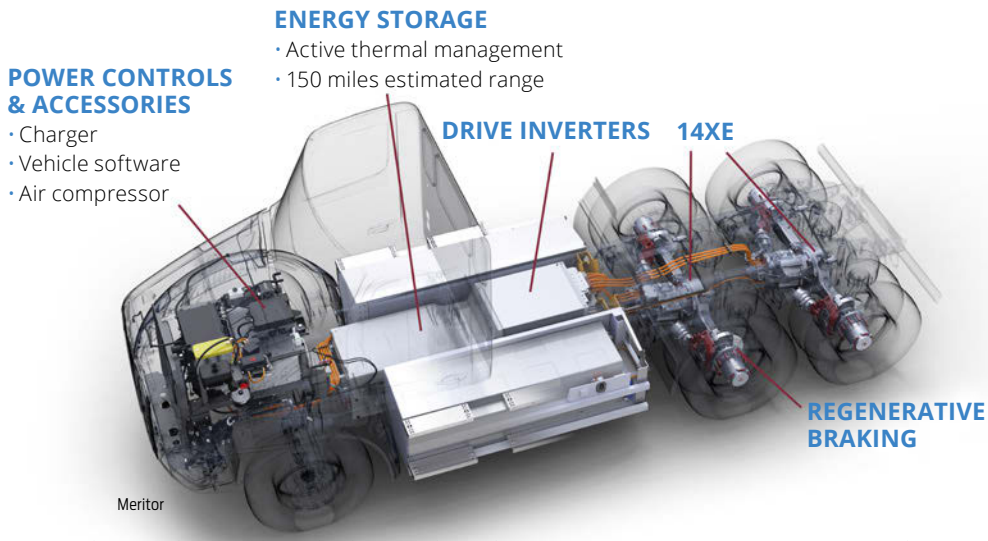
Meritor



» Dana's Spicer Electrified e-Powertrain was awarded New Achievement of the Year at the 2021 Diesel Progress Summit and Awards. Pictured here is the eS9000r paired to a Sumo LD motor.

Dana





Meritor

"The bigger the number, the bigger the vehicle that it's intended to cover," explained John Bennett, VP and CTO at Meritor. "A 12Xe has an integrated electric motor and two-speed transmission, focused on Class 4 and 5 vehicles. Our 14Xe—Class 6, 7, and then can be used as a tandem for Class 8—also has an integrated electric motor and a two or three speed transmission. The 17Xe is targeting heavy Class 8 as a single axle, so European applications which are predominantly 4x2 or 6x2, using a single driving axle. The 17Xe has a much larger motor and a larger integrated transmission available as both a two speed or a three speed."

The 17xe is being used as the e-axle for Hyliion's ERX truck.

Bennett noted that the transmission can also be configured as a single speed.

"Right off the bat you'll notice, compared to a diesel engine mounted to an automated manual transmission, that the number of speeds is significantly reduced," Bennett noted. "The reason for that is an electric motor has a very wide speed range in comparison to diesel engine, and it's very efficient across the majority of that speed range. In our 17Xe, for example, the electric motor can run up to 5,500 rpm, and it's efficient; and by efficient, I'd say over 92% efficient for about 80% of that range. So, it's highly efficient, as opposed to a diesel engine... That's a big difference with an electric powertrain—you can get away with, in some cases, a single speed, but in most cases of the heavy-duty vehicle, two or three speeds, and that's it."

Diagnostics

Utilizing diagnostic software will remain standard practice when servicing electric powertrains and e-axles. Bennett explained that a familiar process will still exist with diagnostics, as plugging in a diagnostic tool "will flash fault codes and indicate which areas are problematic or need to be serviced. That'll give a technician a pretty easy indication, very similar to today, of where to look and where to go, and what things to service, potentially."

Understanding how the system functions lends to being able to accurately diagnose performance issues.

"The controls themselves are a bit more complex," Bennett heeded. "The mechanical parts are simplified. The parts that are there are very conventional. There's no clutch in these systems. It's essentially gears, shafts, and bearings."

Bennet said while the shift rail, shift collar, and actuator will be familiar to technicians, the controls, which are clutch-less, are more complex, similar to an AMT.

"You're doing synchronization of the motor speed; you're essentially taking the motor and

Toning down the torque

While electric axles provide hybrid and electric vehicles with instant power, one of the potential drawbacks is also that they provide instant power. From a standstill, diesel drivers are used to their trucks taking some time to pick up speed; electric trucks can call on instant torque. When initially accelerating, say at a traffic light just turned green, this could create some accidental rear-end events if drivers forget this.

"That stoplight scenario is a very real thing," said Jeremy Freznick, senior director of Dana Inc.'s commercial vehicle engineering. "If a driver has a lapse in judgment and takes off from a light anticipating that it reacts like a diesel truck, and it has that instantaneous torque, they're going to move a little more swiftly than they would have with a diesel engine in there."

This could be trained out of a driver fairly quickly, but some drivers may be flipping back and forth between electric and diesel, Freznick pointed out.

Because the software within the powertrain control module is tunable, acceleration can be calibrated to throttle some of that immediate torque.

"[For] customers that have been focused on system efficiency, we'll actually implement acceleration limit logic into the software to make the vehicle react and mimic more of the diesel application," he explained.

Conversely, some fleets will want every newton available. Either way, Freznick said Dana will work directly with fleets to make adjustments. Technicians, however, will not be able to calibrate the e-axle acceleration themselves.

"There are a lot of moving pieces in there, and opening that up to customers is like opening a can of worms," he said. "All those software controls and calibration is something that we keep in house."

going into a speed mode, releasing the torque, shifting into a neutral position, then you either spin up or speed down the electric motor, depending on which way you're shifting, and re-engaging the shift collar," Bennet explained. "So, it's really coordinating and synchronizing the electric motor, which is done through your motor controls. From a system standpoint, it's going to be very simple to diagnose and easy to service."

When dealing with Meritor's "Xe" platform, especially because it will be connected to either a fuel-cell vehicle or EV, higher voltages must be considered. Proper safety training and personal protective equipment must be paramount. However, the transmission itself is not utilizing higher voltages.

"It's only low-voltage connections to the actuator and the sensors," Bennett said of transmission service considerations. "The transmission on our ePowertrains can be removed without really touching any of the high voltage system whatsoever, so it's simple, from that standpoint... The electric motor is integrated into the axle itself, but the high voltage goes through the motor, the inverter in the battery pack. Our transmission mounts on as a self-contained sub assembly, and it can be removed that way. So, disconnecting the low-voltage sensors and cable, and then popping off the transmission as a sub assembly is the way to service it."

Fleets need not expect any specialty tooling or equipment, beyond up-to-date diagnostic software, to service EV transmissions.

"One key benefit of EV transmissions is that technicians and fleets already have all of the tools and knowledge required to service them," Marshaus said. "The EV transmission, with its four forward gears, no back box, no clutch, and no clutch actuator, has greatly simplified the overall drivetrain service strategy. The transmission will only need an oil change on a PM schedule and regular troubleshooting in case of a failure."

"There are no unique tools that are required," Bennett agreed. "A standard mechanic's toolkit would suffice. You need tools; you'll need wrenches, and sockets, and whatnot, to take it apart and disassemble it, but nothing out of the ordinary... A certain diagnostic tool will be required. In many cases, the service shop will have that tool, but in the event that they don't, that is a unique tool; but once you get into the transmission itself, it's the standard mechanical stock tools that everybody would have."

Lubrication needs

With fewer moving parts, there's also less of an emphasis on lubricating them.

"Electrified transmissions will have fewer mechanical components and will require longer drain intervals compared to conventional transmissions," said Penney Do, product technology specialist at Chevron, who has been developing

e-axle and electric powertrain lubricants. "Those units will require less frequent and extensive services and will need less volume of fluids for servicing them during their effective lives."

It is important to note electric powertrains and e-axles may require special lubrication fluids.

"As electrification of driveline systems (including transmissions and axles) is getting more widely developed by OEMs at different parts of the world, Chevron is partnering with them to develop the right fluids for their evolving hardware in this space," Do said.

Allison's will require longer drain intervals compared to conventional transmissions.

"Depending on the duty cycles and vocation, the fluid and filter of the e-axles may last for a vehicle's lifetime," Foster said of the eGen line.

When it comes to the lubrication of the electric powertrain, and specifically the transmission, Meritor has simplified the design and runs the axle lube through the transmission system.

"Generally, the transmission will run on different fluids, automatic transmission fluid, for example, or some other fluid that's different than the axle lube," Bennett explained. "Because our system is fully integrated and we didn't want to have to service multiple lubes, it's just one oil, and it's typical axle oil that runs through the whole integrated system. We did that for ease of maintenance."

Dana also has simplified e-axle lubrication for fleets.

"The only standard maintenance that's required on our e-axles is your traditional axle lubrication interval," said Freznick, who added Dana also utilizes special lubricating fluid. "You do have to pay attention to some of the powertrain cooling fluid intervals, which are typically 100,000 miles."

Traditional gear oil is used in the differential, though, and has the same gear lube interval change as a traditional axle.

"You've got a typical drain plug you pull; catch the gear oil like you would with the traditional axle," Freznick advised. "You change your coolant every 100,000 miles and you're good to go."

Freznick stressed that wiring and cable checks will need to be added to the inspection list.

"There's a high voltage interlock that is the job one would do before performing any kind of checks or maintenance," he said. "Basically, it shuts down the high voltage cable and de-energizes the system. You want to de-energize your system before you're doing any of that maintenance work.

"There is always some hesitation because it's new," Freznick attested in regard of the adoption of e-axles. "But, the majority, if not everybody who's been through the safety training understands, what you need to do is provide a safe work environment. Everybody feels very comfortable with the systems at that point. Once the newness wears off, and you can appreciate that, really, once you de-energize the system, things are just like you would expect with a traditional drive axle and drive shaft."

» Answering the "why" can bring understanding to the consequences of doing a task incorrectly or differently.

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Addressing the 'why' of preventive maintenance

At what point is understanding the why of a task just as important as the how and where?

How to properly lubricate a tractor and what to lubricate on it are both important to ensure the asset's reliability and long life. There is no question about that. But what is the value in knowing why a certain interval or type of lubricant were selected?

When I review the curriculum at trade schools, there are many "how" and "where" maintenance topics. These are exercises in skill training. For a young technician to be employable when they graduate from their trade school, they must know both to do a certain task to remain valuable to an employer, such as how to diagnose and repair a small engine or where to check for leaks, for example.

In the history of maintenance, skills have been the going currency. You typically got paid more based on skill level (it certainly helped if you had a good attitude and amazing aptitude). This made sense because most of the problems could be seen and touched. Skill and experience would be the answer to the question of what to do about something that didn't work.

In the education world, there are four domains that must be considered to determine competence. The leading domains are skills and knowledge; the lessor domains are attitude and aptitude. The question "why" is in the domain of knowledge. Issues around knowledge, like why to do something, were traditionally the providence of engineers.

What would be the outcome of a preventive maintenance survey that asked how to do a certain common task and where to do it, like changing the oil? Most maintainers should be able to pass that test with flying colors. The few that can't answer these basic questions might be the source of, at least, some of your problems.

By Joel Levitt
PRESIDENT, SPRINGFIELD RESOURCES
Joel Levitt is the president of Springfield Resources, a management consulting firm that services a variety of clients on a wide range of maintenance issues. Levitt has trained more than 17,000 maintenance leaders from more than 3,000 organizations in 38 countries. He is also the creator of Laser-Focused Training, a flexible training program that provides specific, targeted training on your schedule, online to one to 250 people in maintenance management, asset management, and reliability.

Why ask why?

But what happens when you start asking why? Is there any value to knowing why a task can be done as long as it gets done correctly? Yes.

You may wonder, "Well, why?"

And I'm glad you asked. Explaining the purpose of a certain, possibly repetitive, less flashy job answers the internal question we all have at some point: "Why should I bust my butt doing this task?" People need reasons. People love reasons. They especially need reasons when no one will see what they are doing and when the task is hard, dirty, and in short, not fun.

You can have the best PM task list in the world. I imagine a company like Caterpillar spends millions behind the scenes to get the best tasking and frequencies they can. I can imagine their best engineers wrestle with the tasking to get it just right. But all their work is futile if people don't do the tasks on the list, if there's not a proper level of acceptance, or the maintainers create their own rules. It becomes a waste of money, time, and paper.

Context is decisive

There was a great TV commercial from a while back that showed an airplane mechanic looking at happy families walking down the concourse. The mechanic faced the camera saying, "That's why I do my job" (or something like that). The answer to the "why" question—keeping people safe—provided some of the motivation for doing a good job (especially when no one was looking).

The motivation comes from the story or the context, which is best answered when the answer to the "why" question is proffered. A school bus mechanic can easily see where their PM compliance is directly related to the safety of the kids. A brake PM is clearly something that could save lives.

Where does "why" live in a maintainer's mind? In one sense it lives as an explanation for our behavior. This is true in the opposite case, as well. Not doing the PM might be justified if someone feels wronged by their employer.

There is another reason that answering "Why?" is important. The "why" means you understand the meaning of the PM. With that meaning comes deeper understanding. Understanding why gives you a mental advantage over the person that merely knows what to do, but not why to do it. The why also tells you the consequences of doing the task slightly differently. The why tells you where there is no flexibility.

Maintenance is changing. Maintainers need to have knowledge because the systems are far more complicated than they used to be. Systems are more sensitive to different insults than old equipment. The best technicians want to know why.

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Untangling the supply chains

It's a mess out there, and resolution may not come until the end of 2022.

Yes, you read that right. We need to untangle the supply "chains"—plural. Because there are two chains: one for goods; one for labor.

The goods supply chain

By now, all of us have had at least one encounter with the snarled supply chain for goods. The ports are clogged, the rail yards are jammed, the freight terminals are congested, and some shelves are bare.

By Robert Dieli
ECONOMIST, MACKAY & COMPANY
AND PRESIDENT, RDLB, INC.
MacKay & Company specializes in market research for commercial trucking, construction equipment, and agriculture machinery. The company provides strategic research and analyses to vehicle and component manufacturers, distribution and service channels, industry associations, and private equity firms. With a long career managing portfolios and coordinating domestic economic forecasting programs, Dieli began RDLB, Inc. in 2001. In this role, Dieli serves as an advisor to many firms in the truck, consulting, and financial services sectors. He is also an economist with MacKay & Company.

This problem started when the forced lockdowns of 2020 brought the movement of goods to a standstill globally. Since that time, we have been working through the backlog created by the shutdown and surge generated by the reopening.

The untangling of this supply chain depends on our ability to physically move goods and little else. Already, steps are being taken to increase the hours of operation at the ports and at the major transportation and transshipment nodes.

Reinforcing the point on supply chain constraints, MacKay & Company releases a monthly publication, DataPulse Plus, where we highlight monthly data from dealers, distributors, and fleets. Since the pandemic began, we have been tracking parts shortages and the percentage of dealers and distributors that are experiencing these struggles on the front lines.

In our September DataPulse Plus (results for August), 93% of dealers indicated issues getting parts, with 53% noting that issues have remained the same. Another 47% reported worsening shortages. Shortages are seen across the board for numerous components, fluids, steel, etc.

For distributors, the picture is similar, with 85% of our distributor panel reporting parts shortage issues. Half noted that issues have remained the same and the other half indicated issues were worsening. Again, shortages are seen from bumper to bumper.

This tangle in the supply chain for goods differs from those in the past only in its scale. We have had weather-related bottlenecks, labor-related bottlenecks, and regulatory bottlenecks many times in the past. We just have never had them everywhere at the same time. We will work this out. It might be the end of 2022 before we do, but we will work this out.

The labor supply chain

The supply chain for labor is one that we usually don't think about because it operates in the background. In order for a person to take a job, they have to be part of the labor force. In the United States, that is someone between the ages of 15 and 64 who is willing and able to work. The problem now is not willingness to work, but ability to work.

In February of 2020, just before the pandemic shutdowns began, there were 164.4 million persons in the U.S. workforce. Of those, 86.9 million were men and 77.5 million were women.

In April of 2020, at the depth of shutdowns, the workforce had dropped 4.8%, falling to 156.5 million people—83.2 million men and 73.5 women.

The latest figures from the Bureau of Labor Statistics for September 2021 show a workforce of 161.4 million persons with 85.8 million men and 75.6 million women.

Why are we telling you this? Because the workforce is currently short by 3 million compared to the start of the pandemic. How and when we get the 1.1 million men and 1.9 million women back will largely determine how and when we untangle the supply chain of labor.

Just as we have all had encounters with the kinked supply chain for goods, so too have most of us become aware of the strong demand for labor—reflected in the display of help wanted signs in front of just about every commercial establishment we pass by or patronize. Where is the supply of labor to fill those positions?

In many cases, the labor supply is stuck at home with childcare obligations that would normally be covered by school attendance. In other instances, would-be workers are reluctant to return to jobs due to health and safety concerns. And, in case you were wondering, those not in the labor force do not qualify for unemployment compensation, so the existence of those programs was never a factor in this part of the labor supply chain problem.

The bottom line is the two major problems we are facing with the supply chains for goods and labor are not going to be solved by fiscal or monetary policy, by the sermonizing of politicians, or the exhortations of the chamber of commerce. The first problem will be solved by the physical movement of the goods through the system; the second by the removal of obstacles that are keeping people, especially women, from going back into the workforce and ultimately back to work.

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TOPDON

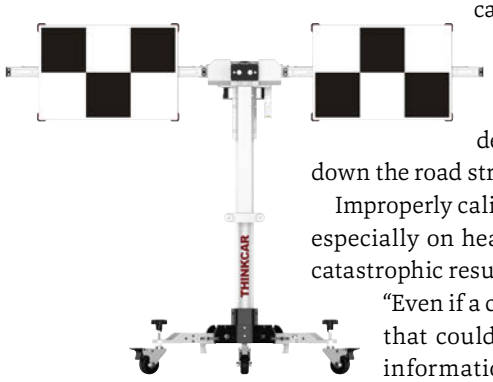
ADAS calibration: a matter of millimeters

Technicians can't be off the mark when it comes to replacing ADAS sensors and cameras after a repair job, or truck safety will suffer.

By Mindy Long

As the transportation industry continues to adopt advanced driver assistance safety systems— which include blind-spot monitoring, front collision warning, lane-keep assist, and park assist systems—the number of cameras and sensors on vehicles is increasing. Installing these measures goes a long way to improving vehicle safety, but it is vital that fleets understand that after repair work, those sensors and cameras must be calibrated and recalibrated to ensure they are functioning correctly.

"If something is off by a minuscule proportion on a camera or radar, its ability to sense what is in front of it or around it is impacted significantly," said Tom McGuire, COO of Precision Diagnostics. "If it is trying to steer the vehicle, a millimeter or two could determine if [that vehicle] goes down the road straight or not."



» Thinkcar ADAS Mobile is portable and can calibrate in seconds.
Thinkcar

Improperly calibrated sensors and cameras, especially on heavy-duty vehicles, can have catastrophic results.

"Even if a camera is off just 0.6 degrees, that could affect the accuracy of the information being received by the safety system," said Allison Whitney, content manager for Autel U.S. "And in the case of a collision warning or automated braking system, that might mean the vehicle doesn't stop in time to avoid a crash."

A lane-departure warning sensor may fail to detect another vehicle, and if the driver is depending on the system, an accident can occur, according to Brandon Alexander, marketing manager for ThinkCar.

"Improperly adjusted front sensors related to adaptive cruise control can allow the vehicle to get too close to other vehicles, making a safe 'panic stop' impossible," he said. "Conversely, out-of-position sensors may result in the ADAS becoming overly sensitive and making unnecessary corrections or warnings, causing the driver to ignore or defeat the system altogether."

"Many of us have experienced lane departure assistance in our personal vehicles where we feel the steering wheel tug while switching lanes without a turn signal," noted Jason Hedman, product manager at Noregon, which makes the JPRO scan tool. "This feeling is greatly amplified in a commercial truck, so a misaligned lane departure system can leave a truck driver fighting the steering wheel to stay in its lane."

Most if not all heavy-duty vehicle manufacturers offer radar and camera-based systems on new tractors and trailers. Plus, new technologies such as autonomous driving along with an increased attention toward safety will boost ADAS sensor implementation.

"The take rates continue to climb, driven by the fact that the systems do a good job of what they're supposed to in terms of mitigating risk," said TJ Thomas, director of marketing and customer solutions, controls, at Bendix Commercial Vehicle Systems.

"Depending on the vehicle and the equipment on the vehicle, there will be 200+ sensors with over 20 directly related to the ADAS system such as cameras using light of various spectrums and radar systems," Thinkcar's Alexander offered.

Inching toward standards

Currently, ADAS technology is not mandated by law on commercial vehicles, and is not as common as in passenger cars, so it is still new and unknown to most technicians, said Dario Peruch, managing director of TEXA USA. "However, it's here, and it's happening now. Getting familiar with it ahead of time will definitely help technicians and shops in the future," he said.

The rise of ADAS has complicated what were once routine procedures. "Traditionally, replacing a windshield meant taking out the old one and installing a new one. Today, technicians must recalibrate the ADAS and test drive the truck to ensure everything is aligned correctly before handing the vehicle back to the customer," Hedman explained.

Several services, including bodywork, windshield replacement, tire alignment, or suspension repair, require sensor re-calibration for the vehicle to return to operation safely. ADAS sensors and systems, like any other electronic component on vehicles, require the use of scan tools to diagnose the problem, find information about the issue, and, if needed, recalibrate those systems according to the OE specs.

According to Scott McKinney, senior product manager for ADAS diagnostics at Bosch, there are different distance and height requirements when recalibrating sensors, and every vehicle is different. "We're sort of in the Wild West right now for ADAS in that there isn't a lot of standardization," McKinney surmised.

He did note that the SAE and AAA have identified 20 recognized systems and five categories of systems.

"One issue with sensors is the challenge of locating them; given their size and the fact that their location can vary based on component or manufacturer, simply locating the sensor without assistance can be a difficult task," Hedman said.

Measuring success

Precision Diagnostics utilizes tools from Autel and OEMs. "We work for one large rental organization—any work we do for them has to be done with OEM equipment. Otherwise, it is not valid in their world," McGuire said, adding that technicians will also cross-reference the

materials. "Some vehicles you can calibrate more than one way. We want to make sure our techs have the best possible information."

A good diagnostic and calibration system scans the vehicle, alerts the technicians to the presence of an ADAS, and advises on the type of calibration needed for the device if a code is present. "Every technician needs to know that just because an ADAS system does not present a code does not mean that the device is operating to specifications. Even the most minor collision can misalign a sensor or camera," Whitney said.

Autel's MaxiSYS 909CV scans all the available systems and identifies the ADAS on the vehicle. Plus, it can initiate dynamic calibrations on Classes 6-8 vehicles and will soon support static calibrations on them as well, with the addition of a frame system. That includes camera calibration targets and radar calibration components.

Bosch's guided tool walks technicians through the entire process, including pre-conditions for calibration, which could be ensuring the fuel tank is filled, removing additional cargo from the trunk, and making sure the windows and doors are closed. "We auto-ID the vehicle with a scan tool, and it comes up on screen and walks you through the requirements. It really makes it simple and easy for the technician to perform the calibration and know they are doing it correctly," McKinney said.

Bendix developed its ACOM Pro tool in collaboration with Noregon, and it is based on the same platform as Noregon's JPRO. The technology has wiring diagrams, which Thomas said are particularly helpful. "They give the technician the ability to understand pinouts are there, how components are connected together so they can trace down more complicated faults," he said.

The TEXA TRUCK scan tool offers pre/post scan of all available ADAS in the market, including dynamic and static calibrations, both light- and heavy-duty vehicles. Like for other ECUs, the technician can scan the system, find DTCs related to the faulty components, and at the end of the repair, perform a new calibration. "The process is not too different from other repairs carried out in the shop. The only difference is that it's new. Instead of replacing injectors or a VGT, the tech will have to replace a camera or radar," Peruch said.

ThinkCar's ADAS calibration equipment consists of two main components; the external hardware and the diagnostic tools used to adjust vehicle sensors. "The external hardware includes frames which are placed in very specific positions relative to the vehicle to hold targets in place," Alexander said. "The targets look simple, but they are not, and it's imperative the targets are exactly the correct size and shape."

Even the environment technicians are calibrating in is hypercritical. "In our calibration centers, we are very particular about the colors we use on wall surfaces and ceiling surfaces, that type of lighting we put in and level surfaces. It is little things like making sure tire pressure is correct when you calibrate it," McGuire said, adding that fuel must be at

» **Bosch DAS 3000 allows shops to recalibrate vehicle cameras and radar systems.**
Bosch

a certain level. "That affects the weight, that affects the level."

Hedman said having the ability to use a single tool to diagnose and follow troubleshooting steps to locate the cause of the error and then calibrate the system is a significant time-saver for technicians.

Ensuring long-term functionality

What's more, not performing calibration is a serious liability for the repair facility. Whitney said good diagnostic and ADAS calibration systems provide the technician with the tools and software needed to perform the intricate ADAS calibrations as well as detailed reports documenting each step performed throughout the diagnostic, repair, and calibration process.

McGuire recommends documenting that calibrations are completed. "We'll screenshot the calibrations, and all of the scan data is included on the final invoice," he said. "If there ever were a liability question, we would be able to support what was done."

Two things can occur if the calibration is not done properly—the vehicle computer system will reject the session and/or the ADAS will not function properly, Alexander said.

The No. 1 way technicians know something needs to be fixed is a DTC light on the dash. "Our systems are designed that if something isn't working properly, they set a fault. Sometimes it happens that the driver will notice some type of performance difference," Thomas said. "That might mean a sensor is right on the edge of calibration, and you get into a situation that is on the edge of performance. Drivers are really astute. They notice everything."

Safety systems continue to get more and more integrated with the vehicle itself, Thomas said. "These systems are intertwined and interact," he said, adding that when technicians start a repair, they should look for the larger scoped DTC errors first. "A lot of times, our systems are tied to other systems. If it affects their system, you should start there. There is a cascade effect."

Thomas said it is crucial the calibration tools are updated regularly, and Bendix updates its every three to four months.

Noregon's JPRO allows technicians to see data points in real-time across multiple ECUs. "This helps technicians discover the general area of a communication failure and use a wiggle test, multimeter, or other method to pinpoint the exact wire or sensor causing the issue," Hedman said.

The ROI on an ADAS calibration system is a month or two even for shops just completing a handful of calibrations, McKinney said. "Being able to offer the service helps not only those customers who have ADAS, but also gives you an opportunity to talk about what else you offer," McKinney said.

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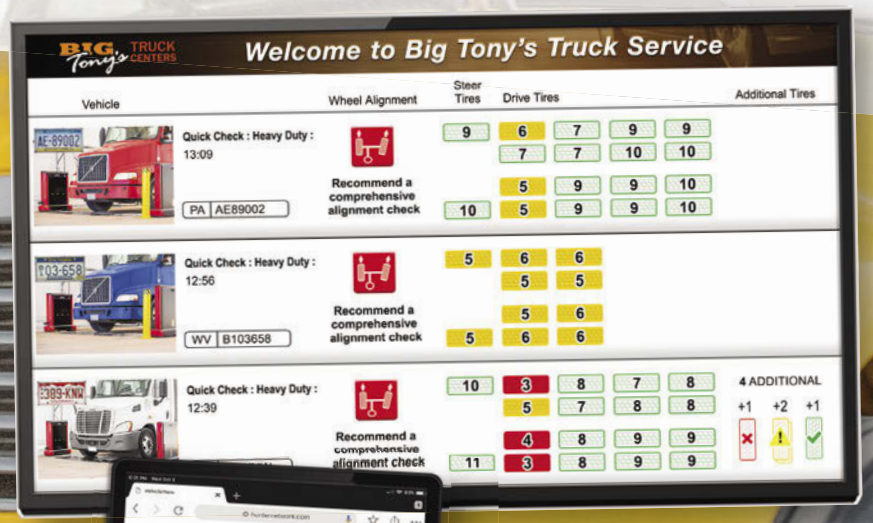

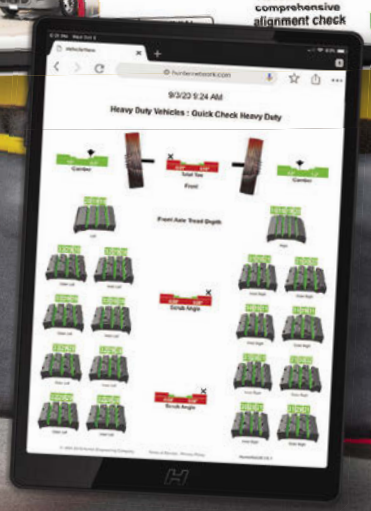

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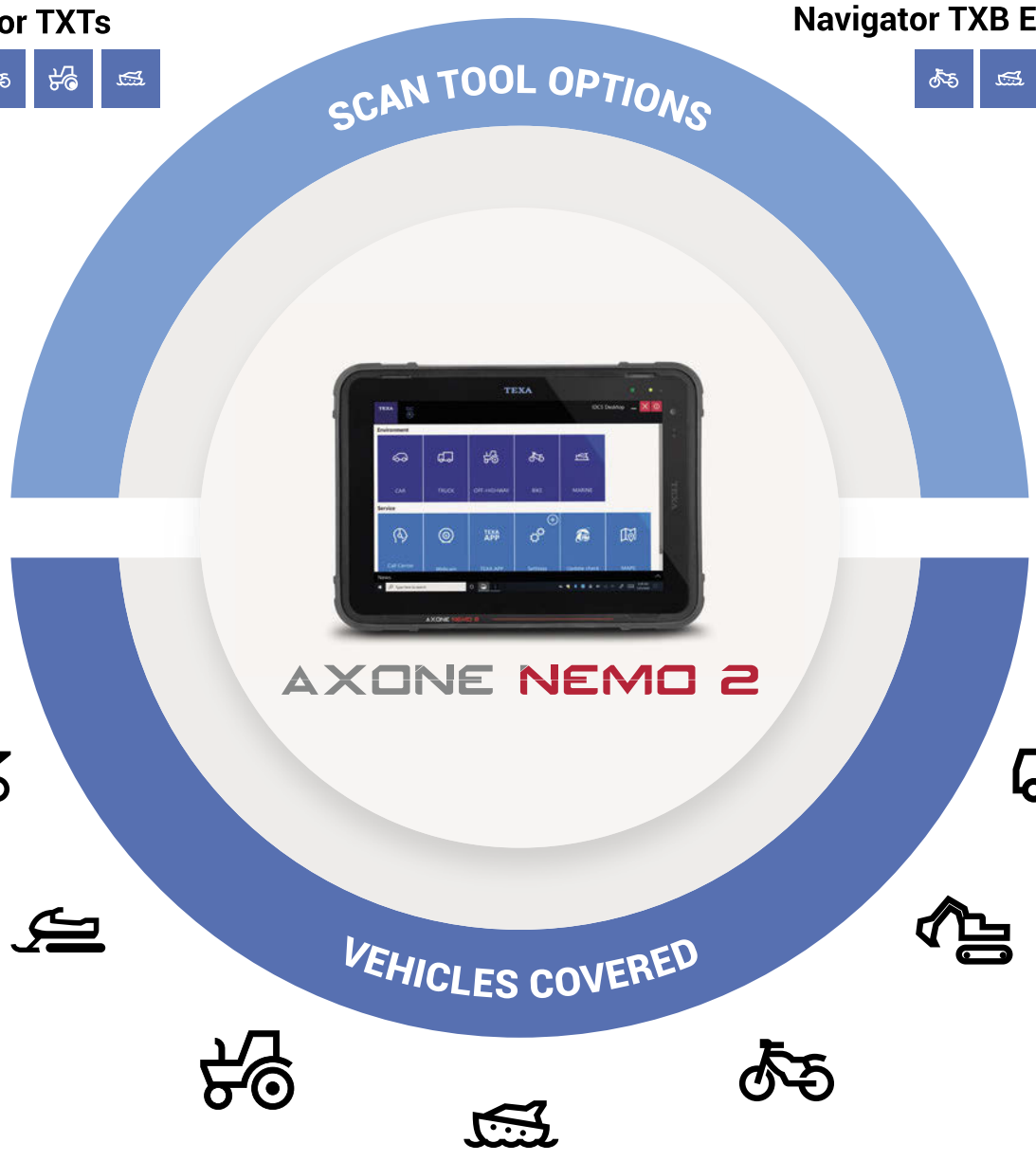

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DIAGNOSTIC PROCESS

Diagnostics are arguably the most interesting aspect of the job for any technician. It's fun to bust out the scan tool, analyze the data, and determine just what the problem may be on these modern-day computers on wheels. But diagnostics are no easy feat. How many times have you been faced with a head-scratcher that just takes so much longer to diagnose than you bargained for? In this supplement, the editors of *PTEN*, *Professional Distributor*, and *Fleet Maintenance* magazines have come together to offer up some helpful tips and tricks for making your next diagnosis a walk in the park.

PRODUCTS

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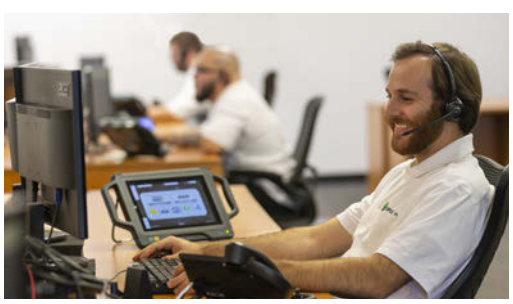

How to develop an efficient diagnostic process.
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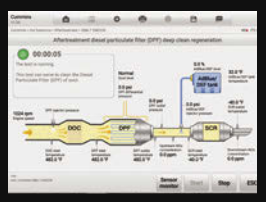

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ADAS

The human side of assistance-guided repairs

Performing static calibrations in-house and what you need to consider.

By Dave Hobbs

If you're delaying getting into servicing ADAS (advanced driver assistance systems), don't delay too long. Government safety agencies like the National Highway Traffic Safety Administration (NHTSA) and every vehicle manufacturer agree that ADAS save lives and reduce collision damage. This means they're here to stay and will continue to become more commonplace than ever in your bays. Many advanced (and profitable) repair shops are maneuvering their way through the complicated maze of ADAS sensor diagnostics and calibrations. But this will not be a simple or inexpensive endeavor. ADAS service joins a long list of other complicated technology challenges we've faced and conquered over the years in our wrenching careers. Today we'll focus on the "human" side of ADAS: static calibrations.

Radar sensors use a reflective metal surface for calibrations. This pyramid-shaped metal reflector is common to Toyota and several other OEMs. Others use a flat plate for a static calibration reflector.
Photos courtesy of Dave Hobbs

CALIBRATING SENSORS: THE 'HUMAN' SIDE OF ADAS

If every ADAS–equipped vehicle could calibrate itself as well as it robotically performs its advanced driver–assist duties, those of us contemplating working on these vehicles could breathe a big sigh of relief. There is an overwhelming number of complicated calibration procedures and tools to juggle. There are two main types of ADAS sensor calibration procedures:

- Static: vehicle parked/ system learning
- Dynamic: vehicle driven/ system learning

In most cases, both types of calibrations will require an enhanced OEM level aftermarket scan tool or true factory (dealer) scan tool. Some manufacturers require either static or dynamic calibrations, while others require both. Static calibrations (typically in your bay) require the most equipment, shop floor space, and time. If you are just beginning to do your research on what type and brand of static calibration equipment fits your needs (and budget) I must advise you of two big factors.

First, the equipment is costly. Whether you opt for a collection of pure OEM tools (as used by the dealers) or a choice from a growing list of aftermarket providers, plan on spending tens of thousands of dollars if you desire to calibrate multiple vehicle brands. But please keep in perspective that diagnosing pre–OBD vehicle drivability problems was best accomplished via a big box engine analyzer 35 years ago. The Sun machine my father purchased (and I used) in the 1980s cost more than $27,000. We made the ROI in a reasonable timeframe. With inflation factored in, that same investment would be around $87,000 today. That's more than enough to handle your

ADAS equipment needs with money to spare. Variations and choices are abundant in ADAS camera/radar static calibration equipment. The choices can be broken down into several categories and subcategories starting with OEM and aftermarket.

- OEM/dealer equipment: OEMs mostly use a geometry–based target placement process using common carpentry tools such as a plumb bob to find the exact center of the front (and back) of the vehicle. This allows a technician to locate and mark the vehicle's geometric center. Lines are then drawn on the shop floor (i.e., chalk lines/tape/markers) along with various angles to set the camera static calibration target(s) and radar sensor reflector (mounted on stands) at precise position/distances in relation to the vehicle. A factory scan tool is then connected to issue bidirectional requests to the ADAS sensor being calibrated. The scan tool tells it to lock on to that target to finish the static calibration process. Laser measurement instruments may be employed to speed up this time–consuming process.
- Aftermarket – Stand–alone target frame: An aluminum "frame" with arms to mount targets, lasers, and tape measures is set in place in front of the sensor being calibrated. As with OEM's static calibration equipment, the position of the visual (camera) target(s) and/or reflector (radar) target must be precise. Wheel–mounted heads (with clamping brackets resembling chassis alignment heads) in conjunction with tape measures/lasers may speed up the process of finding the center of the vehicle. This is required to geometrically place the calibration targets in the precise location in front of the vehicle. This emulates the vehicle manufacturer's target placement position but can often take less time to accomplish compared to some OEM methods.
- Aftermarket – Target frame with chassis alignment equipment integration: Because ADAS calibration procedures require the vehicle to be on a level surface, alignment racks (which must keep the vehicle perfectly level anyway) have recently become a handy piece of equipment to add ADAS calibration tools to. Several chassis alignment equipment companies are getting into the ADAS calibration tool market. Some aftermarket stand–alone ADAS calibration systems (i.e., Autel) can adjust the height of their target frame arms (and tool calibration software) to accommodate the raised height of the vehicle WHILE parked on an alignment rack.

The second consideration is weighing OEM vs. aftermarket ADAS calibrations. Some deem this a modern–day Hatfields vs. McCoys. While the OEM

vs. aftermarket parts, info, and equipment debate is nothing new to our profession, ADAS has heated this feud. In the ADAS calibration debate, the "McCoys" cite the obvious; we've been using aftermarket tools to work on other safety systems for decades without the auto repair field turning into a disaster akin to the bankrupt asbestos industry. The OEM "Hatfields" cite multimillion-dollar lawsuits being filed (and won) by victims of accidents blamed on non-OEM service procedures. A Texas couple suffered severe injuries in 2013 after a near-fatal crash and resulting fire. Their attorney was able to put 75% of the blame on an OEM dealer's collision center for using non-OEM body repair procedures on the vehicle before the couple purchased their used vehicle. The couple was unaware of the previous body damage when purchasing the vehicle from the dealer.

On the previous collision repair, the OEM recommended the roof of the vehicle be welded in place. The insurance company paying for the prior owner's repair would only pay for the roof to be glued on, so that's what the collision shop did. The result was the roof collapsing, which in turn caused other even more serious damage during the collision, resulting in a fire. The driver causing the head-on crash was only 25% to blame, according to the jury. Proof and blame don't always align perfectly in the courtroom.

Vehicle manufacturers have amassed a very large variety of camera calibration targets. Pictured is an OEM camera target for Honda static calibrations.

Traditional carpentry tools such as a plumb bob and a tape measure can be used in ADAS calibration set-up procedures.

Static calibration on this Delphi (now Aptiv) long-range radar for Ford's ACC can be achieved via a common carpenter's level.

READY TO GIVE UP ON ADAS? DON'T!

If your business has a large volume of GM, Ford, and some FCA vehicles, complicated (and expensive) ADAS static calibration equipment is not required in many cases for the forward (windshield mounted) camera and long-range radar sensor (i.e., adaptive cruise control). Cameras in the outside rearview mirrors used for "around view" (a.k.a. surround view/bird's eye view) may still require camera targets (visual pattern target mats) positioned at specified distances from each side of the vehicle for static calibrations.

Some Honda and Subaru models may also require both static (in the shop) and dynamic (on a road test) calibration procedures on their ADAS sensors. Toyotas are coming standard with ADAS these days and require static calibrations on their camera and radar sensors. Their factory calibration equipment is not overly expensive and any J2534 programmer will work well with a Toyota factory scan tool software (TechStream Lite) subscription.

CHASSIS ALIGNMENT

Many OEMs advise performing an ADAS calibration if a chassis alignment changes the vehicle's ride height. All OEMs (that I'm aware of) stipulate the thrust angle must be correct (no dog tracking) before performing an ADAS calibration. This makes total sense even if the steering wheel is not visibly off-center while driving straight. ADAS radar and camera sensor static calibrations rely on their targets being placed in exact positions relative to where the vehicle will be moving.

Why go to the trouble of lining up the exact center of the front and rear of the vehicle in your ADAS calibration if that center line is not where the vehicle's camera and radar sensors will be looking? On vehicles with negative thrust, the vehicles' sensors will be looking toward the right instead of the vehicle your customer is following.

- The static calibration completes/passes on the scan tool, but the process was flawed.
- The OEM static calibration angle specifications state 2–3 degrees of sensor offset is acceptable, but the vehicle says "no" regarding the calibration process. In other words, the actual calibration process displays "fail" on the scan tool. If we had a preference between these two problems, most of us would rather fail a calibration that is more particular than the OEM numbers than have a calibration that says "successful" but is flawed.

According to Dirk Fuchs, I-CAR ADAS instructor, off thrust lines or ADAS sensor calibrations that are 1 degree off equate the potential for up to a 1.5-meter lateral miscalculation at 100 meters of distance between your customers' vehicle and another vehicle. The result might be a false ADAS intervention (vehicle braking/stopping for no reason) or worse yet, an accident.

ADAS CONFIDENCE

Confidence is not just a software level in an ADAS. Confidence is another human side of the ADAS equation. Overall, ADAS features input far more positive variables into our customers' safe driving experience than negative ones.

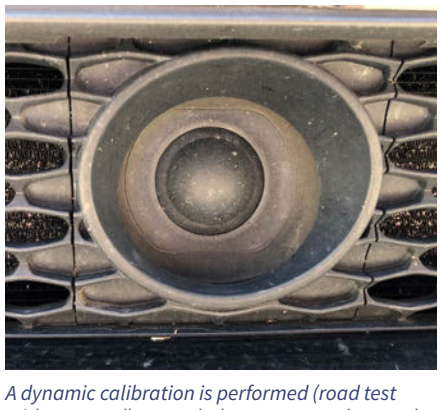
As repair techs, we mostly deal with broken vehicles and vehicle abuses. We rarely hear the positive side of vehicle safety systems–the injuries avoided and lives saved.

The worst thing the repair industry can do is to become a negative factor in the ADAS equation. Going forward, we must continue our education on the subject, carefully research (and purchase) quality calibration equipment, document every process involved, and follow every instruction from the vehicle manufacturer whenever performing calibrations.

Dave Hobbs is senior technical trainer and curriculum developer for Delphi Technologies Aftermarket at Borg-Warner Inc.

A static calibration can also be completed more easily with a modern digital angle gauge. Turn a screw and adjust the ACC radar module's vertical aim.

Advanced carpentry tools such as laser distance finders can increase efficiency in OEM style geometric static calibrations.



A dynamic calibration is performed (road test with scan tool) to teach the sensor to adapt and function properly. This is Chrysler Pacifica's ACC radar sensor.

How to combat electrical issues on modern trucks

New technology on trucks is creating new challenges for proper electrical system maintenance. Here's how to stay ahead of the curve.

By James Alfred

Electrical issues have been giving truck technicians sleepless nights ever since the first magnetos and primitive wiring harnesses were run through a chassis to provide power for lights, instruments, and other vehicle systems. Today, with trucking in the midst of an accelerating technological revolution centered on ultra-fast, highly complex electronics, they don't seem to be getting any easier to troubleshoot and repair.

Photo from 1211849855 | Ivan-balvan | GettyImages

GETTING PAST THE PAIN POINTS

"Although we've seen a lot of advances in electronics troubleshooting over the past several years, the reality is that these systems will always be a time–consuming problem for most fleets," said Kristi LaPage, business manager, commercial vehicle group, Mitchell 1.

As vital as electrical systems are in our society, the simple fact is they do not do well in the harsh work conditions commercial vehicles are forced to endure. Electrical systems, wiring, conductors, and connectors do not like excessively hot or cold temperatures. They don't like the elements. And they don't like vibrations. Their necessarily delicate protective casings often allow water, dirt, grease, soot, and other contaminants in, which quickly leads to failure. And despite countless efforts to design and deploy wiring that can withstand these harsh operational realities, the fact remains that electronics are a vital, yet unbelievably delicate and temperamental operational system on vehicles that work in some of the toughest, and most unforgiving conditions on earth.

To make things even more frustrating for technicians, conditions that can cause electrical system failures are often highly intermittent in nature, explained Jason Hedman, product manager for Noregon. For example, he noted, a wire that is wet may carry a current just fine when it is dry. Likewise, a failure caused by a wiring harness vibrating rapidly at highway speeds may be undetectable when the truck is sitting still in the shop.

Additionally, corrosion has made testing components difficult for two reasons, explained Cory Adams, vice president of engineering, Peterson Manufacturing. First, he explained, separating corroded components can be difficult and sometimes impossible without breaking the connectors and components. "And second," he said, "trying to find a damaged wire across hundreds of feet of wire on a trailer is tedious and time–consuming which causes extended trailer downtime and increased cost to repair. Checking each and every wire in a system while trying to track down electrical issues can prove to be quite laborious."

Another problem is that new technology often means relearning maintenance truisms and procedures that have been in place for decades. A good case in point, the introduction and fast adoption of new LED lighting systems.

"The issue is that conventional, incandescent light bulbs draw more power than LED bulbs–which is one of the key benefits to switching over to LED systems," said Kyle O'Dell, director of engineering and new product development, Optronics International/USA Harness International. "However, some self–diagnosing vehicle systems interpret that low power draw as a signal that a perfectly healthy bulb is out all the time because the old power draw simply isn't there. And you end up with technicians chasing ghosts for hours over a fundamental misunderstanding of the differences between LED and incandescent lighting systems."

Mitigating electrical issues by periodically check all connections and plugs on a fleet's vehicles and replace them with newer, more weather- and corrosion-resistant components.
Photo courtesy of Peterson Manufacturing

A BLEND OF OLD- AND NEW-SCHOOL PROCEDURES

Although lighting and electronics systems will likely always be a bottleneck in fleet maintenance operations, maintenance system service providers and OEs alike are working continuously to make troubleshooting and repairs faster and easier to complete.

Perhaps the greatest advancement in recent years has been telematics systems on trucks, which relay vital information about component failures back to fleets, service providers, and OEMs in real time. As a result, Peterson's Adams said, the time to track down electrical issues on trucks has been reduced. "Additionally, smart trailer systems will also warn drivers and fleets when there are problems, and most problems are easier and less expensive to fix if you find them early," he added. "This goes for driver routine maintenance as well as technician level maintenance, such as the need [to add] air to a tire before it overheats, lube hubs before they cause a thermal incident, and other issues."

New remote diagnostics are now playing a major role in improving vehicle safety by catching electric or lighting issues as they happen–or in some cases, before they even malfunction.

As Hedman explained, because truck lights are now attached to smart systems, they can send fault codes to the user, so fleets don't have to wait for the driver

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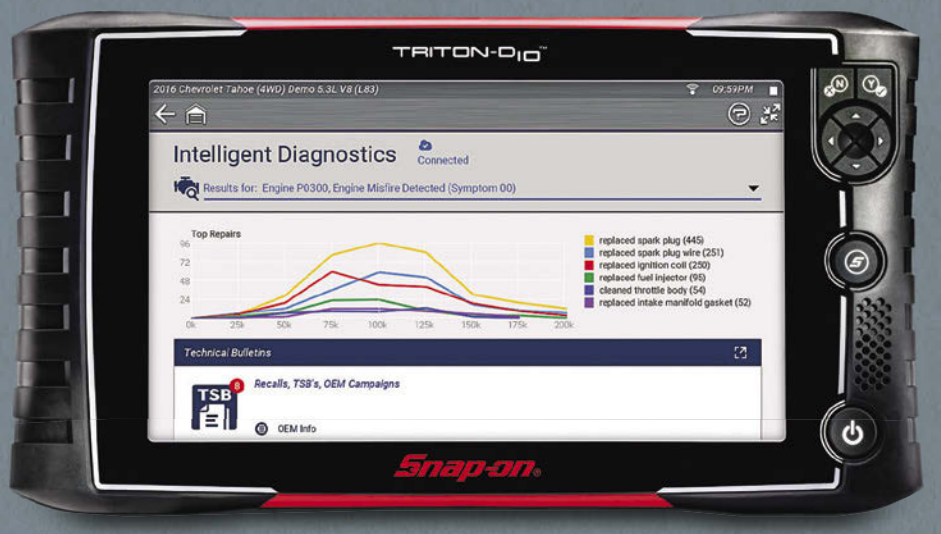

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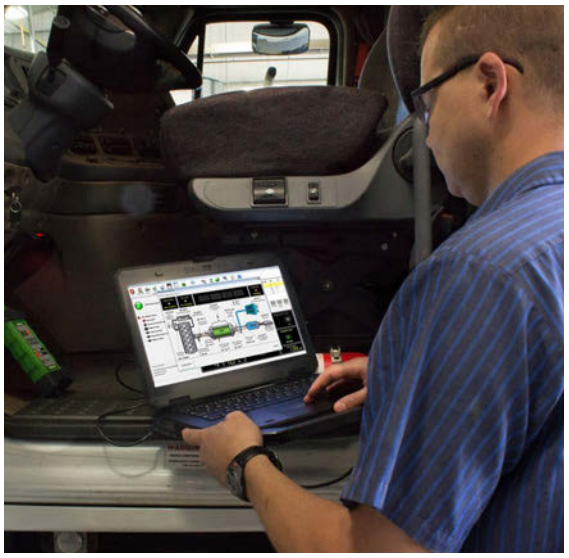
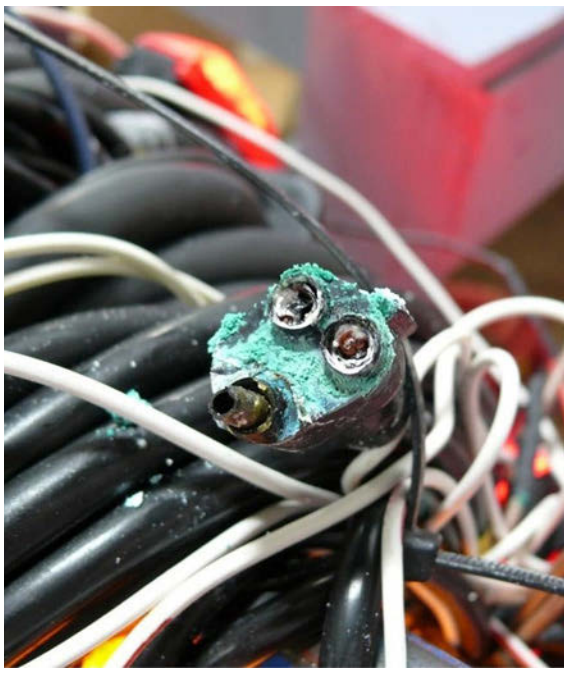


New diagnostic tools and interactive wiring diagrams are making troubleshooting and repairing electrical issues on trucks easier and faster than ever before.
Photo courtesy of Noregon



Plugs and connectors are a common weak link in vehicle electronic systems.
Photo courtesy of Optronics International

For solving electrical issues, it is strongly recommended to invest in tools that facilitate holistic diagnostics.
Photo courtesy of Power Probe

or to notice a burned–out light. In some instances, intermittent faults may hint toward a looming failure and prompt the fleet to change the bulb or make a repair before it becomes a safety concern.

"Advanced aftermarket diagnostic tools have not only made it easier to detect electrical issues by simultaneously scanning all components, but have also improved in capabilities that assist the user with the diagnosis," Hedman added. "Technicians can use a single application to scan the truck, locate the affected wiring harness using suggested troubleshooting steps, view the harness's wiring diagram, and then chart data points or use relevant bidirectional commands like a wiggle test to find the damaged wire."

Using this new technology, Phillips Connect has introduced its Light Out system, which Cliff Creech, director of sales engineering at Phillips Connect, said continually monitors the lights on a vehicle and stores a 30–day history of faults that are continually reported to fleet operations.

"When the vehicle is serviced, this information can be accessed by the technician giving them a clear indication of what the problem is, which they can then address and fix," he noted. "This saves time and more likely results in the proper lasting repair."

Just as vital, Creech said, are new data management and storage capabilities offered as part of maintenance diagnostic systems today, which can also cut critical time off electronic troubleshooting and repairs.

"When fleets have to rely on outsourcing their maintenance, either as a regular practice or because of on–road issues including having the vehicle put out of service at a checkpoint, lighting and electrical issues can become something of open–check for the provider and resurface down the road if the right repair is not made," he noted. "Without the monitoring documentation new telematics systems provide, it's unknowable if the service being provided is appropriate to the problem and can lead to lost time trying to repair a 'ghost' issue."

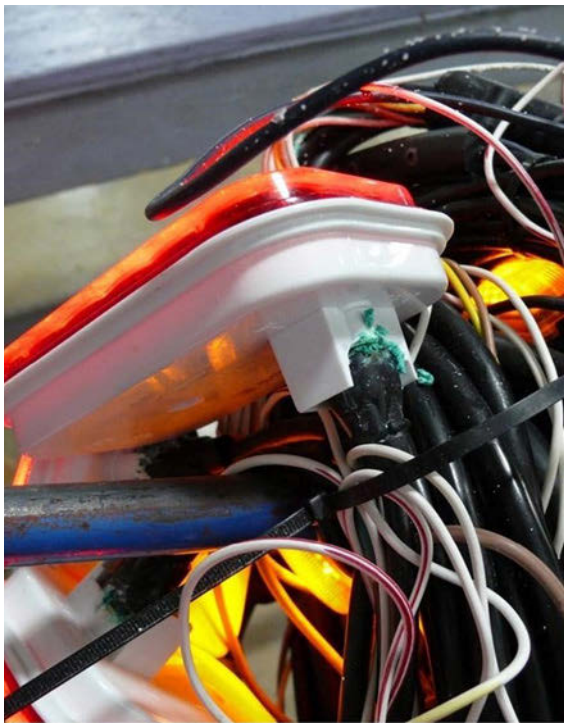
Other telematics solutions like Phillips Connect Smart7 Remote Pre–Check advises a fleet if one of their trailers has lighting or electrical issues before it is dispatched to haul freight, Creech added.

"In addition to not wasting the time of the driver to pull a trailer that is not road–ready, the data can also suggest to the fleet what is wrong, so when maintenance is scheduled they know what they need to fix," he said.

Also important is expediting how technicians access the complex information required to track down wiring issues. To help, LaPage said Mitchell 1 is also leveraging new technologies like its interactive wiring diagrams, which she said can significantly save time in diagnosing and repairing electrical problems.

"When viewing one of our wiring diagrams, technicians can click on any component or wire within the diagram to see a pop–up menu with selections to learn more about specifications, component location, connector views, guided component tests, and more," she said. "There is no need to exit the wiring diagram to find related information needed to diagnose the issue. And if that examination turns out to be a dead–end, the technician is automatically returned to the correct diagram to continue checking for other issues–all without having to initiate a secondary search."

Many technicians have struggled with diagnosing electrical systems on trucks because they either selected



One approach for cutting down on electrical issues is to adopt a dedicated PM program and swap out older style plugs and connectors for newer ones that offer greater protection from the elements.
Photo courtesy of Optronics International

the wrong tool or were never properly trained on essential tools like a digital multimeter (DMM), Creech said. "Too often, technicians poke around a wiring harness until they're able to detect a problem, which can lead to bigger issues such as damaging the harness or other wires," he notes. "Using the tools at their disposal, such as a diagnostic application and a multimeter, takes much of the guesswork out of diagnosing electric systems."

For solving electrical issues, Creech said Phillips engineers strongly recommend investing in tools that facilitate holistic diagnosis.

"Because communication issues can affect multiple systems on a vehicle, the ability to simultaneously diagnose all truck components helps uncover the root cause of electric problems," Hedman said. "That is why we feel it's best to invest in a diagnostic and repair tool that provides the user with everything they need in a single application to complete the job. For example, [Noregon] JPRO's Fault Guidance feature presents the user with troubleshooting steps, plus valuable information like full–color wiring diagrams to improve technician efficiency."

Optronics' O'Dell said that in his experience, the weakest links in a truck's electrical system are the links between wiring and vehicle systems–the molded plugs and hard–shell connectors that often attract dirt and debris, or allow water inside. He recommended replacing them with more modern, and better protected connectors as part of a prescribed preventive maintenance (PM) regimen for the fleet.

During this electrical PM inspection, O'Dell said technicians should go through every connector and light socket on the vehicle and–at the bare minimum–have them simply pull the plugs apart, inspect them for damage, clean them, and put new electrical grease in to help protect them from the elements.

"And that's a good time to swap out any older connections for newer ones," he said. "It's a simple, old–school approach to dealing with electronic ghosts."

James Alfred is a freelance journalist with more than 15 years of experience in the trucking industry.

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Data from another angle

Sometimes it's the tools we use that give us a different perspective and lead to a diagnosis.

By Brandon Steckler

I remember the days when data-gathering and analysis were something I considered to be very challenging. This was before I learned to implement that game plan that we frequently reference in the pages of *Motor Age*. Of course, having that game plan in place keeps us focused and avoids those times where we tend to drift off into the weeds. On occasion, though, I still find myself faced with a challenging driveability fault. Sometimes it's the tools we choose to implement and the results of a specific test that brings it all to the surface for us and provides that "nail in the coffin," a diagnosis. Stick with me and I'll show you how viewing a piece of data from a different perspective gave me the confidence I needed to condemn an ECU, while the other available data left me pacing back and forth.

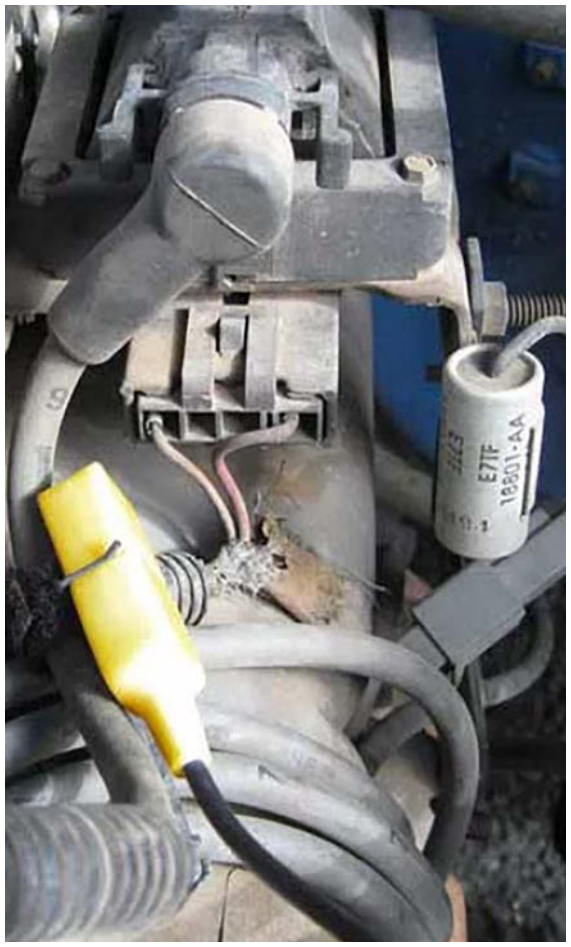
A neighbor complained his van would cut out and then regain consciousness.
Photos courtesy of Brandon Steckler

TODAY'S CHALLENGE

The vehicle that drove me nuts on this particular occasion was a beat up contractor's van. Yes, we all have that neighbor that we like to assist. Well, this was that neighbor's van, and I agreed to assist. The subject vehicle was a 1994 Ford E250 with a V8 engine. The complaint was that the vehicle idled rough and, on occasion, the engine would cut out and then regain consciousness. After speaking with my neighbor, it was determined that the engine would actually "stall and come alive again as if someone had shut off the key momentarily."

One thing I will state about a vehicle of this era is that it is pre-OBD-II, and the available data is very slow and not what we are privy to on today's more advanced vehicle technologies. With that said, troubleshooting from the driver's seat will not yield me what it typically does. I will have to get my hands dirty on this one.

Performing some preliminary research is where I always begin my diagnostic approach. Understanding what systems the vehicle is configured with allows me to determine what preliminary testing can be carried out easily, especially considering I'm at home, not at the shop. Of course, I began with a basic visual inspection. What I discovered was a catalyst (CAT) that was not doing its job. The fumes from the tailpipe were enough to choke a horse! Many of you realize that a CAT is a sensitive device and needs proper feed gas (from the engine's output) to function properly. I was not yet concerned with the CAT's performance, as I had realized it was likely a victim of the rough-running condition. Monitoring the HO2 sensors (pre- and post-catalyst) showed them to be operating erratically, and there were no DTCs flagged in the PCM's memory. To me, this was a clue of a loss in fuel control. Again, I figured this to be the effect of the rough-running condition but not the cause. The vehicle was more frequently in open-loop than in closed-loop, so "faulty HO2 sensors" was near the bottom of my list of components to test.



Connecting the ignition scope and the distributor coil input cable using a capacitive lead.

This vehicle is equipped with a distributor ignition system. With that being said, the result of secondary ignition analysis was definitely of interest to me. Let's face it–it's easy to obtain and easy to analyze. A lot can be learned about the conditions within the combustion chamber derived from ignition analysis. With the capturing of the secondary ignition waveforms and performing a throttle snap test, we can stress the ignition system to simulate a light load and also one that demands a lot of fuel. Reflecting on the results of the captured waveforms and a bunch of practice, we can learn to determine many things due to an understanding of the physics involved:

- Low cylinder compression/timing faults
- Worn ignition components (cap/rotor/spark plugs)
- Rich conditions
- Lean conditions
- Weak coil output
- Open/hard spark plug cables/poor connections
- Excessive resistance
- Short circuits
- Bent distributor shaft

Since the distributor is at the front of the engine, it was very easy to access. A simple connection was made between my ignition scope and the distributor coil input cable using a capacitive lead. Simply clipping this lead around the coil input cable offers a view of the electricity within the cable. This serves as a "cousin" of the actual kilovolts (kV) traveling within the cable's insulation. Using the coil input cable, I was able to view the ignition events for all cylinders from just one

testing location. The engine was started and the data was captured for a few seconds and stored within the scope buffer. A view of the waveforms indicated very high firing kV. This was indicative of the ignition system having to work very hard, simply trying to fire the spark. Conditions like high compression, lean air–fuel mixture/large air gaps, and retarded ignition timing can create this situation. This capture is not from the subject vehicle but from similar circumstances.

I decided it was best to inspect the spark plugs, as they were not too difficult to remove, and the results of ignition analysis justified it. Not only were the spark plugs worn to an extremely large gap, but they were also white as ash, which provided evidence of a lean air/fuel mixture. I replaced the secondary ignition components to be sure they were not going to contribute to the symptom I was pursuing. After starting the vehicle, the engine still exhibited the same symptoms. Although the firing kV was still abnormally high, the properly gapped new spark plugs and fresh secondary components lowered the firing kV considerably. Of course, we should realize not only that the replacement of the components was necessary but also that their wear was a result of the underlying lean condition.

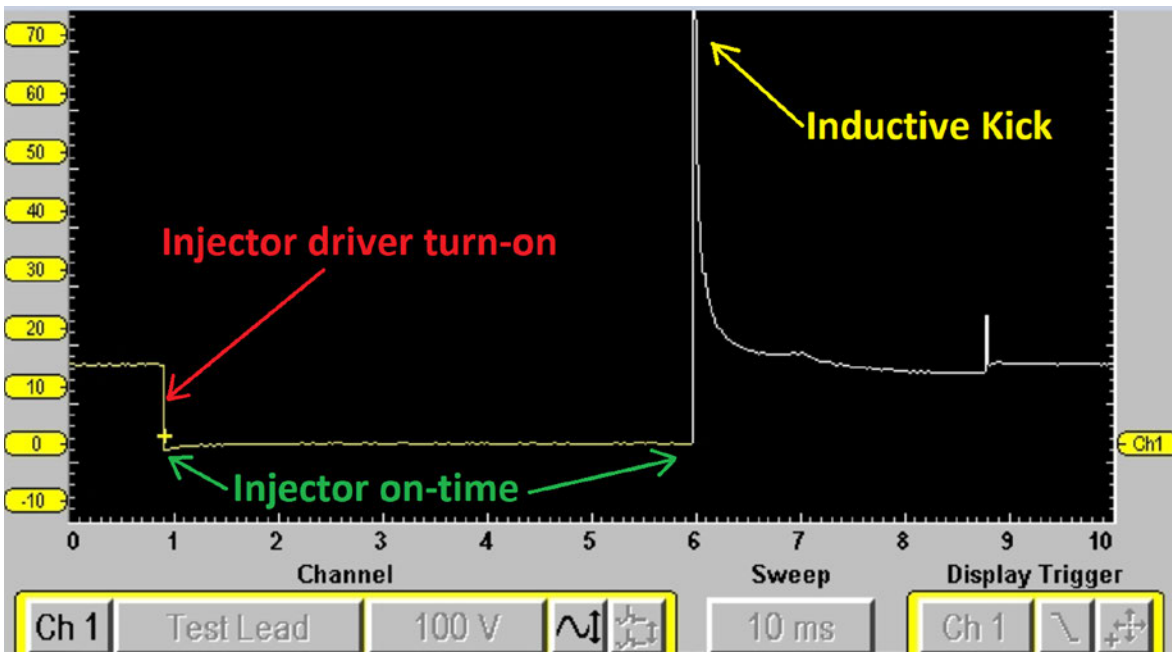
IN PURSUIT OF THE LEAN CONDITION

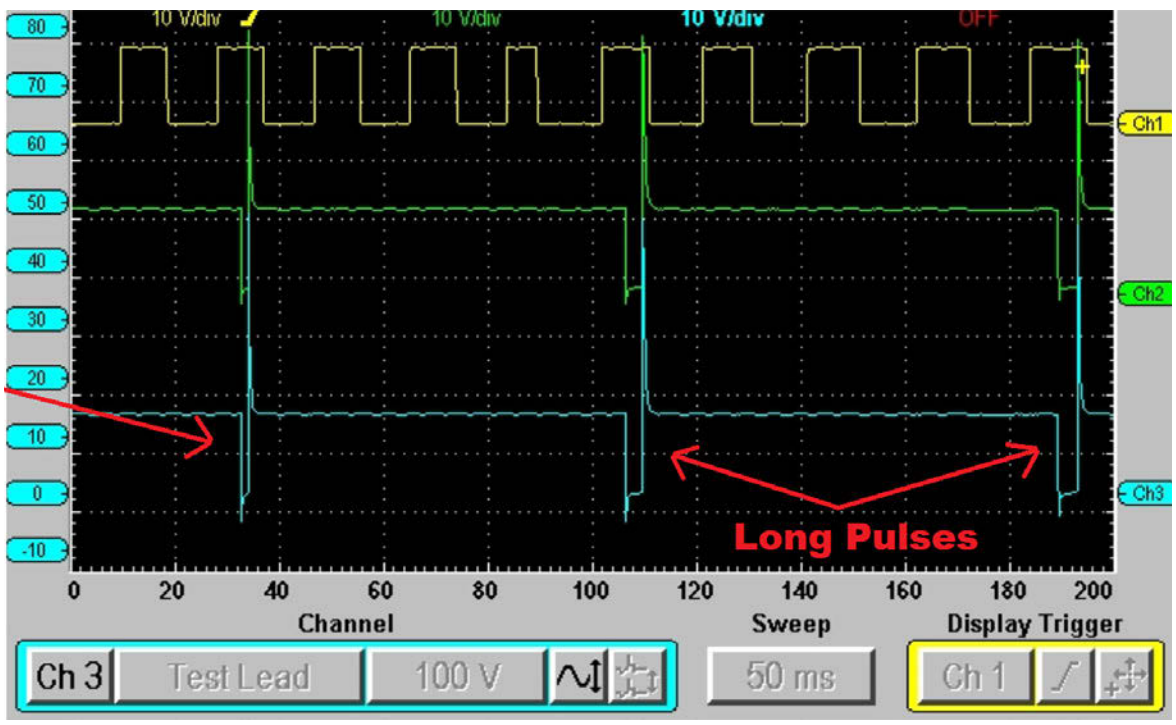
This is the analysis point where many techs get ahead of themselves and take on the idea that a cylinder(s) is under–fueled because of an injector restriction. For those of you that were thinking this, I'm not going to say you are incorrect. However, I will suggest that rather than jumping to a pinpointed test like "injector balance," consider if the injectors are under–delivering. It may be due to an insufficient command from the PCM (an insufficient injector pulse width or INJPW).

Capturing this data is quite simple. With the use of the lab scope and referencing the wiring diagram, we can determine where to place the probes so that the scope can display the fuel injector waveforms for all the fuel injectors, with only two test locations. This same diagram allows us to also see how the PCM strategizes to control the fuel injectors. It can be seen that all eight fuel injectors are controlled on the ground side by only two individual injector drivers within the PCM. One driver provides the ground path for all four banks 1 fuel injectors. The other driver shares the same responsibility but for all four banks 2 fuel injectors. Simply back probing these two wires allows us to see the command for all eight injectors as well as the pulse width. A fuel injector, being an inductive device, takes on the current through the bobbin (a winding of wire to carry an electrical current and take on a magnetic field). As the ground side controlled injector is provided a ground path, the voltage on the controlled side (ground side) drops across the injector. During this time the circuit is held near ground potential and is known as the injector on time. When the PCM determines the end of the injector operation, the ground path is removed and the current ceases to flow. As a result, the magnetic field collapses and is converted back to electrical energy. This is the high inductive kick visible in the pattern.

Viewing the amperage trace on the lab scope can be carried out as well, but I chose not to in this case (for no particular reason). If I chose to deploy the vertical measuring cursors, I could plot them between the point in the waveform where the injector was energized and where the injectors were de–energized to offer me a measurement of delta time (the elapsed time between the cursors). This would offer the actual measured INJPW. However, simply viewing the three successive injector events, it's clear to see that their on–time varies greatly.

- YELLOW = CKP/CMP input





(profile ignition pickup–described shortly)

- GREEN = Bank 1 Injector driver at PCM
- BLUE = Bank 2 Injector driver at PCM

As I scrolled my way through the captured data, I had a realization. These injector commands continued to vary as the engine ran with no change in driver input or load. Although not displayed, the same variation was going on with the ignition coil current ramps as well. Something very odd was going on here.

I referred back to the available engine data and saw no real change in any key inputs affecting the calculation for injector pulse width. I began to suspect that the PCM may be malfunctioning, whether due to an underlying fault or internal to the PCM itself. I ruled out system voltage/alt. output as a potential fault, and it proved to be sufficient. I was left with nothing to measure but the inputs responsible for the timing and duration of both the fuel injectors and the ignition coil. These inputs are the PIP and the SPOUT signals.

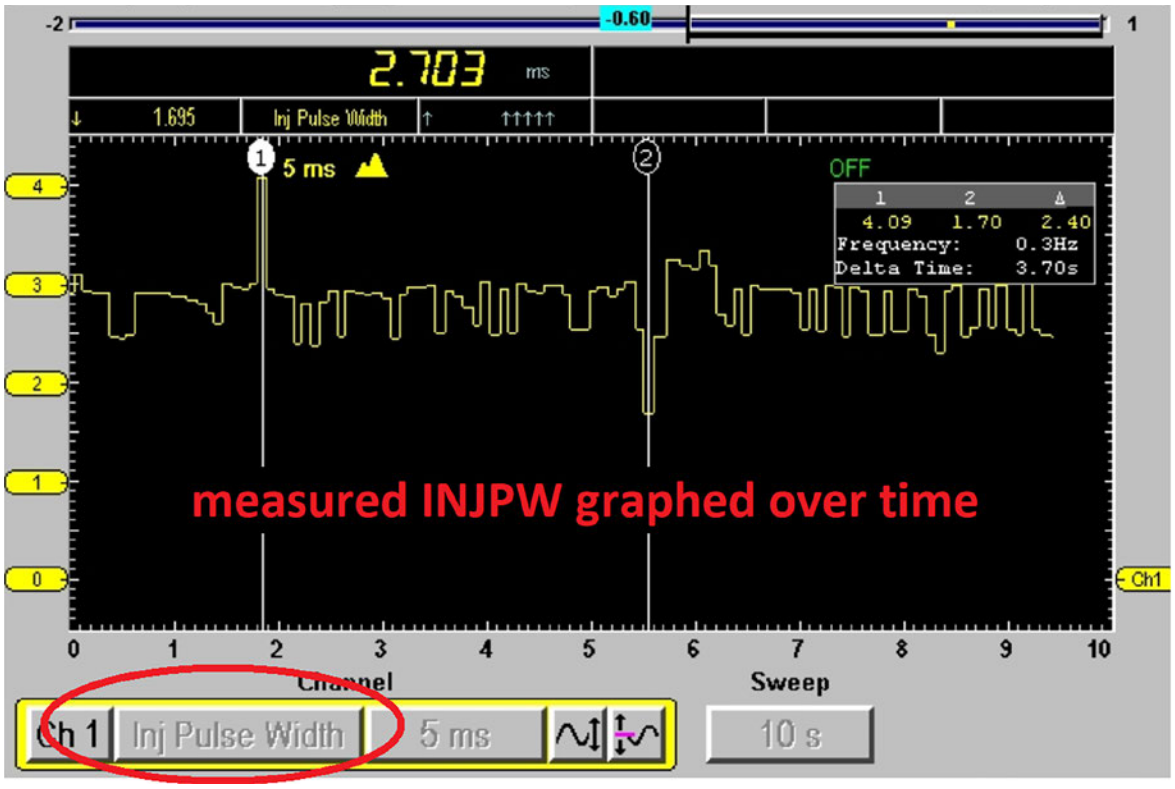
TRACKING THE ROOT CAUSE

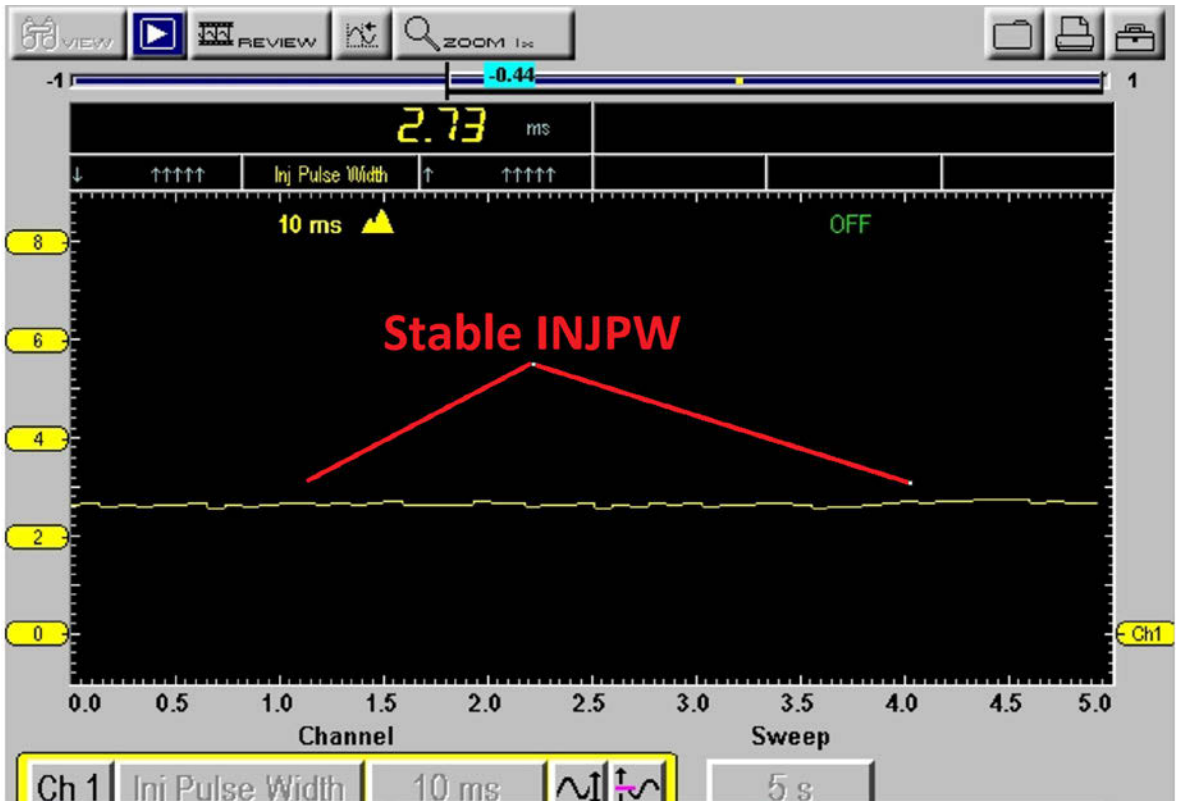
The PIP is a camshaft position sensor/crankshaft position sensor, and it is internal to the distributor. It reports to the PCM and is used to determine the base timing and duration of the injectors and coil. The PCM uses other inputs to determine how to modify the injector pulse width and coil control for timing advance. The PCM will output a spark output (SPOUT) to the ignition control module to modify the timing of the coil and this same modification can be seen in the INJPW. The PIP input looked unblemished, but the erratically operating coil/injectors seem to follow the modified SPOUT signal (not displayed). I then decided to unplug the SPOUT connector and prevent the modified signal from reaching the coil. The coil dwell began to normalize and operated with a fixed dwell. However, the symptom still existed and the injectors continued to dwell erratically.

The good news is that I proved the PCM's modified SPOUT signal elimination had the effect I anticipated. This led me closer to believing the PCM had an internal processing fault. The bad news is that a "faulty PCM" is still a hunch and at this point, I'm not ready to commit. I still desire more evidence to condemn the PCM, but how?

With my lab scope still connected to an injector driver circuit, I recall scrolling through the channel menu of the scope. There, I found a selection to place the channel in a domain to display the measured INJPW in "milliseconds" over an elapsed time (very similar to PicoScope's math channels).

What I'm eluding to is a vehicle that is at a steady state operation with no change in load or fuel demand should display the graphed data in a straight line (fixed pulse width) as time elapses. I hypothesize that the subject vehicle will output an INJPW that is not a fixed pulse width and will be reflected accordingly as graphed data that varies in amplitude as time elapses. Of course, this is just the hypothesis, but perhaps it will lead to a more confident diagnosis?





Since both injector control circuits reported the same activity, I chose only to monitor one circuit for the experiment. I started the engine and began to collect data for 10 seconds across the scope screen. What I saw gave me great confidence. Using the vertical cursors to measure the difference in amplitude, there was a variation in INJPW of 3.7 milliseconds, in only two seconds of elapsed time. If this were truly called for, there would have to be a significant increase in load. And with the fuel system in open loop, I could immediately rule out the feedback system as the cause. It was time to shut the door on this case and call for a replacement PCM.

With the new PCM installed, the same test was carried out and the graphed data of INJPW exhibited a steady amplitude with no change in load. Along with that, the vehicle ran great, and the exhaust no longer smelled. The HO2 sensor operation as well as that of the CAT was restored and my neighbor was doing backflips!

Sometimes it simply takes a different perspective to allow you to see what once seemed not so obvious but is now clear as day. The functionality of the tools we have in our possession is not typically fully utilized. I urge you as a technician to spend some time with the tools you currently have and increase that return on investment. Being familiar with your tools of choice could save you time, make you money, and grow your knowledge simultaneously.

Brandon Steckler is a technical editor for Motor Age.

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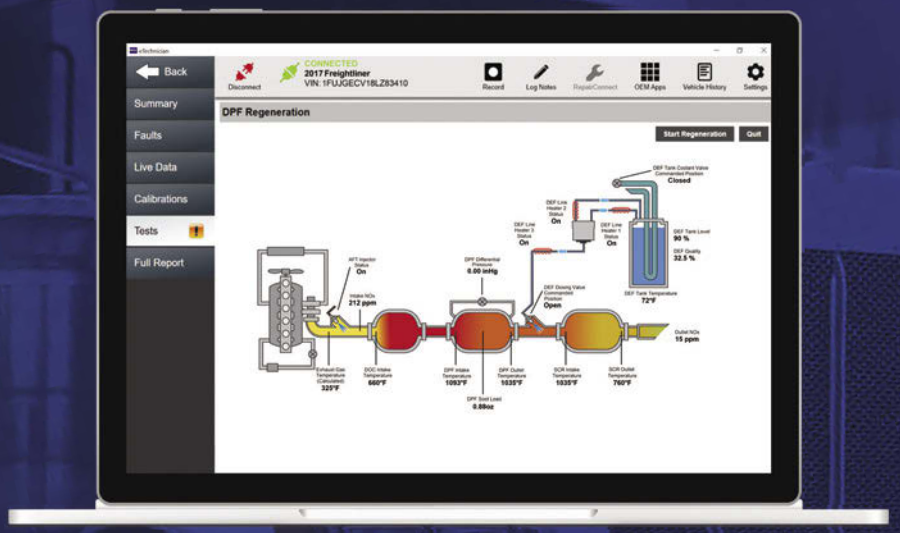

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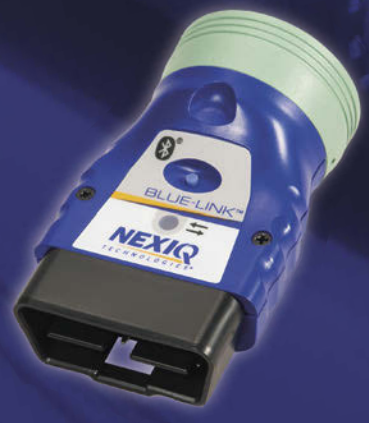

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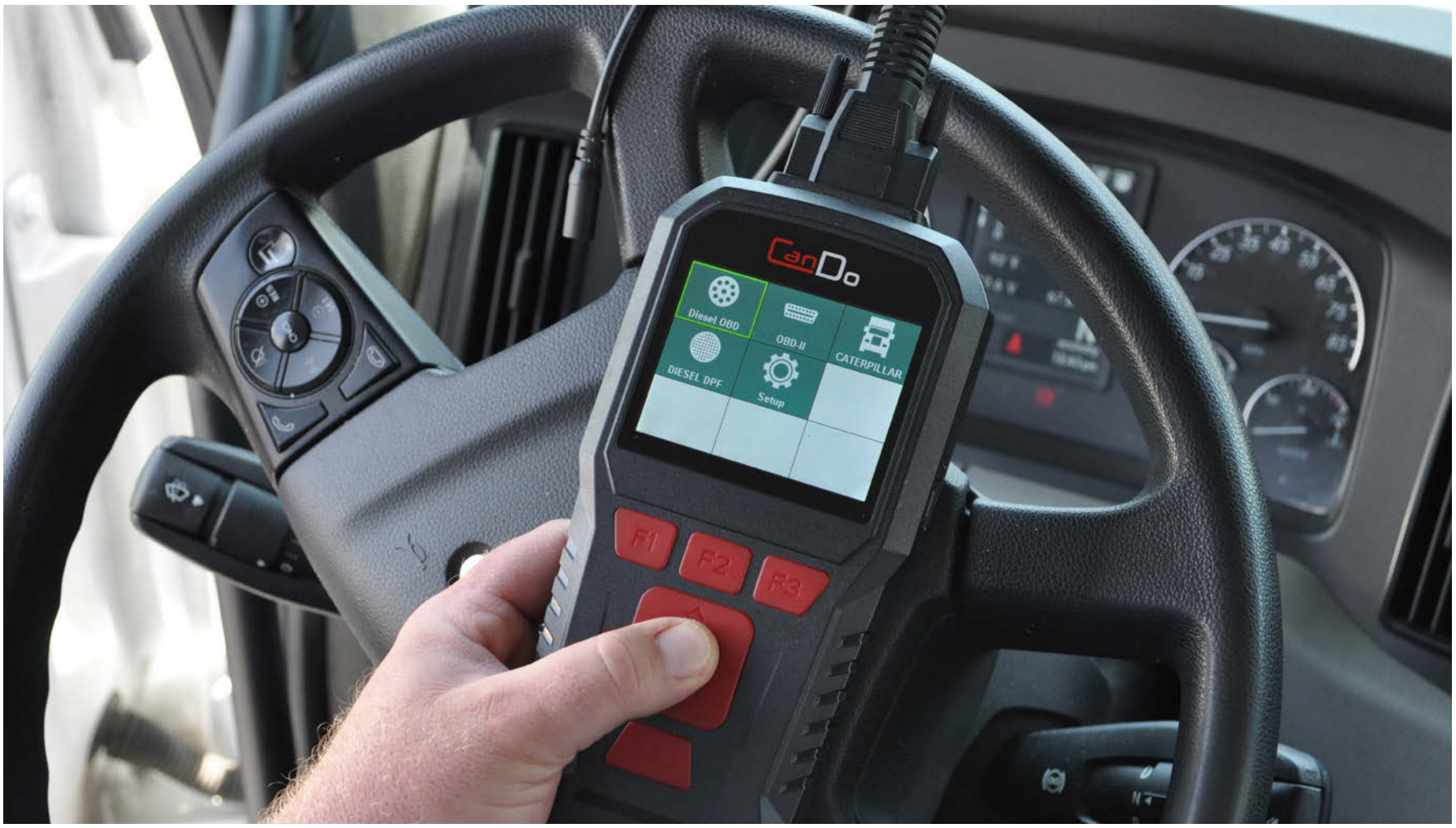
How sensors impact heavy-duty scan tools

Complex electronic components, sensors, and ECUs demand more from advanced diagnostic scan tools.

By Mindy Long



Increased information from scan tools can help technicians minimize the risk of making a mistake.
Photo courtesy of CanDo

Truck technology is increasingly complex, and significant growth in component electrification, sensors, and electronic control units (ECUs) has made diagnostic scan tools essential to repairing and servicing vehicles.

"Electronic components and sensors have seen a dramatic growth since the 1980s, when a few sensors started to be used on the vehicles," said Allison Whitney, a spokesperson for Autel, a developer of intelligent diagnostics, detection, and analysis systems. "Today, most vehicles have in excess of 80 sensors and a myriad of components, including those used in advanced driver assistance systems, such as cameras, radar, ultrasound, and lidar devices."

Duane Watson, technical trainer for Bosch Aftermarket Service Solutions, said there has also been exponential growth in vehicle comfort features and solutions designed to improve fuel mileage, such as variable flow A/C compressors or electronically controlled radiator shutter vents that streamline aerodynamics. This has added even more electronics and sensors.

Thomas Kotenko, general manager for NEXIQ Technologies, said the number of electronic sensors on equipment will continue to increase. "We've all heard about the move to electric vehicles," he said, adding that vehicles are essentially becoming moving computers.

Jason Hedman, product manager at Noregon, a diagnostic, repair, and data analytic solutions provider, said the days of fixing a truck with a basic scan tool and a wrench are gone. "There are so many ECUs and sensors on a truck that a tool with guided diagnostic features and troubleshooting assistance is now a requirement for all shops."

Repairing a truck today is a matter of signals, said Bruno Gattamorta, Vice President of sales and marketing, Cojali USA, which manufacturers the Jaltest Diagnostics tool. "If you can't read a signal, you can't get the results. You can't read the signal without a computer."

Now, a seemingly simple task, such as an oil change, might necessitate a technician use a scan tool with service capabilities to connect with the vehicle and reset the engine service light, Whitney said.

Even if a repair entails physically wrenching on a part, more often than not the truck's computer has to be told that the repair has been done, followed by clearing the corresponding code. Plus, replacing certain parts requires a relearn or recalibration of the part, which involves using a diagnostic tool, said Victor Rivilla, marketing director for CanDo International.

"One typical example is chasing a misfire and finding that it is caused by a faulty injector. In most cases, the injector cannot simply be swapped in and the truck driven," Rivilla explained. "Trim file codes need to be programmed into the injector, which entails the use of a diagnostic program or scan tool."

CanDo's Pro Tab and HD Pro III cover Classes 4 to 8 commercial vehicles and off-highway equipment. "Engines, brakes, transmissions, body controls, and basically everything that has a sensor or module can be scanned and diagnosed. Both tools also offer full bidirectional testing of components and special functions, such as relearns, calibrations, and parameter changes," Rivilla said.

DEMANDING MORE FROM SCAN TOOLS

Scan tools have advanced significantly in recent years.

"Originally, there were simple engine code readers that were essentially used to detect emissions issues and resolve issues preventing vehicles from passing state inspections. Next came four systems readers to detect faults in engines, transmissions, ABS, and

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SRS (airbags)," Autel's Whitney said. "Today, technicians need all-systems scanners that can detect faults in every available system on that vehicle."

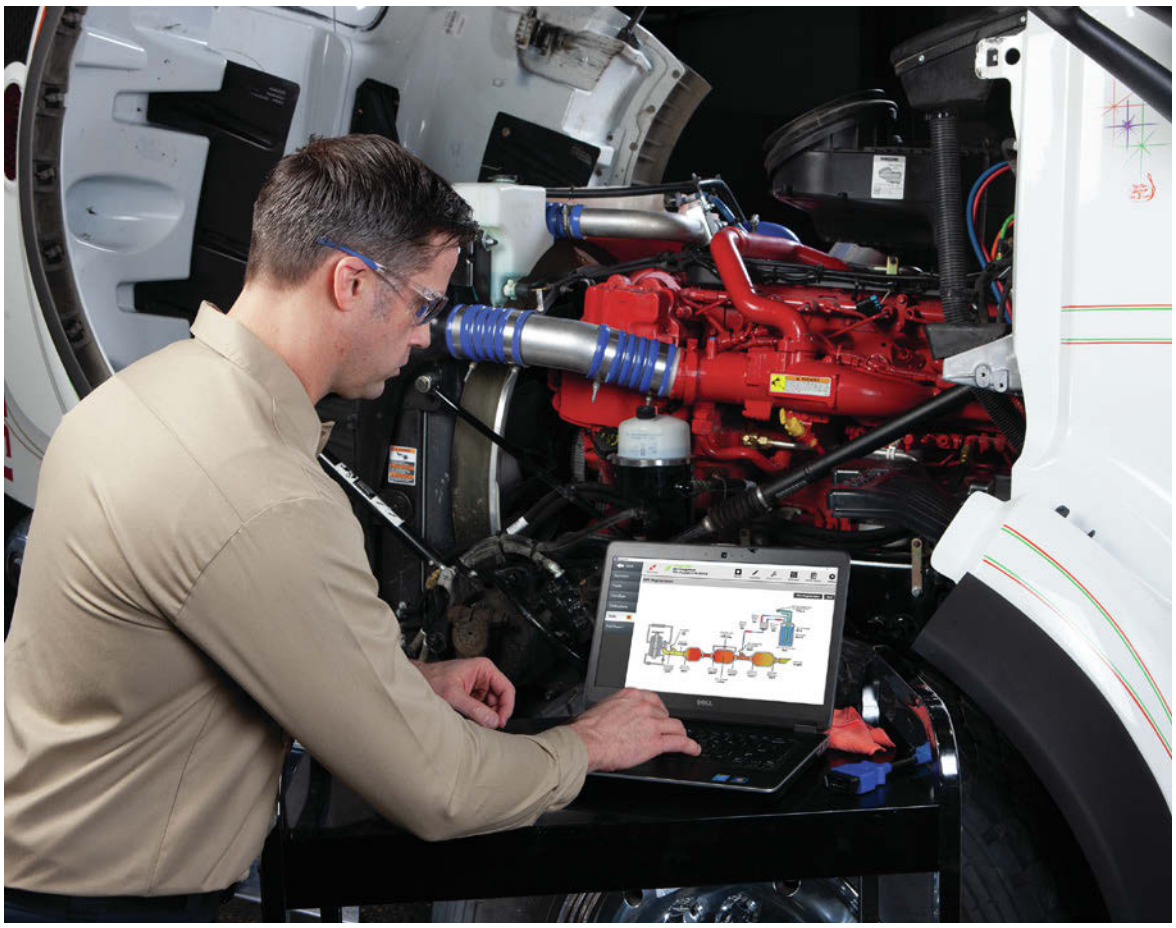
With more electric components comes more information, trouble codes, inputs, and outputs that technicians have to decipher.

"When an input or output fails, that's when you get that trouble code," said NEXIQ's Kotenko, adding that the code will identify the area or sensor experiencing a failure. "The trouble code would state the O2 sensor has trouble. As you drill down, it could be the wire or something else, but it will certainly give the technician a general area of where to seek that fault."

Not only are there more ECUs or modules, but the systems are talking to each other, which means the health of the CAN bus is critical, Kotenko said.

A good diagnostic tool should identify the fault, enable the tech to view the associated system operations at the time the code was set, and test individual components to see if they have failed. "More advanced tools should support accessory diagnostic tools such as battery testers, oscilloscopes, and CAN bus testers, enabling technicians to take a deeper dive into the communication and hands-on component testing," Whitney said.

Autel's MS909CV tool, which includes a module topology map and ADAS calibration, will automatically identify the vehicle identification number (VIN), then scan all modules within the vehicle system and show a single screen visual map of how all the modules are connected on different lines to each other. Using color-coded identification, the tech can see which modules are operational or have different issues, or if they are present but not responding at all, giving the technician a new way to diagnose possible vehicle issues.



NEXIQ's eTechnician provides real-time diagnostics so technicians can diagnose any vehicle that comes into the shop, even if they haven't worked on that make or model before.
Photo courtesy of NEXIQ Technologies

PREVENTING MISDIAGNOSIS

Increased information can help technicians minimize the risk of making a mistake. For example, Noregon's Watson said a technician who doesn't know how to diagnose an A/C system with a variable compressor could easily make a misdiagnosis.

"Having a scan tool that will give them all the correct data of the A/C system, including inputs and output data, and utilizing the correct tools to validate the pulse width modulated solenoid that controls the flow rate that is built into the compressor with a tool, such as the Robinair EVDC100, that can help validate that solenoid as well as the wiring to and from the body control module and the A/C compressor," Bosch's Watson said.

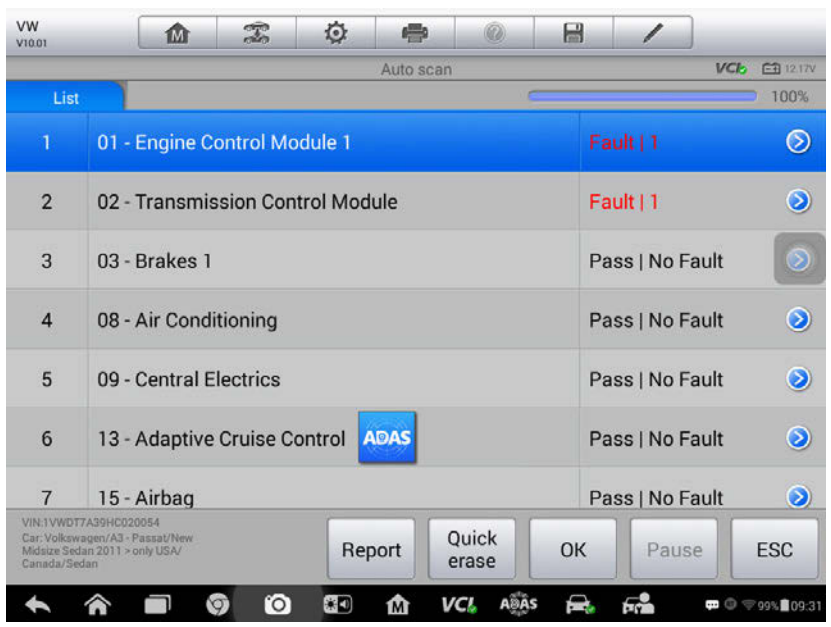
Because demands on vehicle battery systems have increased, battery analysis tools are becoming more critical. Autel offers a line of starting and charging analysis tools that can walk technicians through the process of analyzing each of three components that comprise the starting and charging system–the battery, the starter, and the alternator–providing an analysis of each system along the way. The testers use adaptive conductance to measure battery health, comparing its ability to conduct energy today to when it was purchased, Autel's Whitney said.

SAVING TIME

Uptime is critical for fleets, and diagnostic tools are designed to help technicians diagnose and repair equipment faster. Noregon's Hedman said a technician using a diagnostic application will locate the root of a failed sensor exponentially quicker than one without, while committing fewer mistakes during the process.

Noregon's JPRO includes a troubleshooting module called "fault guidance" that guides the user down the optimal troubleshooting path to find the root cause.

"Without that guidance, a technician may attempt various repairs until something works," Hedman said. "A technician might try replacing six different sensors and a wiring harness before the problem is corrected. Introducing guided diagnostics to the equation lets the user determine the cause of the failure before replacing a failed sensor or wiring harness."



The Autel MaxiSys ADAS provides the original complete diagnostic functionality as well as comprehensive and precise ADAS calibration.
Image courtesy of Autel

Bosch's ADS525X and ADS526X tools provide a large amount of live data, so technicians visually see what is happening, Watson said. "These same tools can be outfitted with electrical wiring diagrams right on the tool to help them trace or track electrical issues as well as having a built-in Bosch repair source that can give step-by-step diagnostic and repair procedures right at the scan tool," he explained. "They no longer have to leave the vehicle and possibly lose their focus going to another computer or book to find this information."

STAYING CURRENT

Close working relationships with equipment manufacturers are critical to securing the latest information and updating technology, NEXIQ's Kotenko said.

Cojali's Gattamorta noted this is an ever-evolving industry, so tools have to be updated as equipment advances. "Our tool updates three times a year," he said.

Autel releases software updates to its tablets monthly, enabling users to perform the needed diagnostics and services on the latest vehicles as well as the systems updated by the OE, Whitney says.

Mindy Long is a freelance journalist covering the transportation industry.

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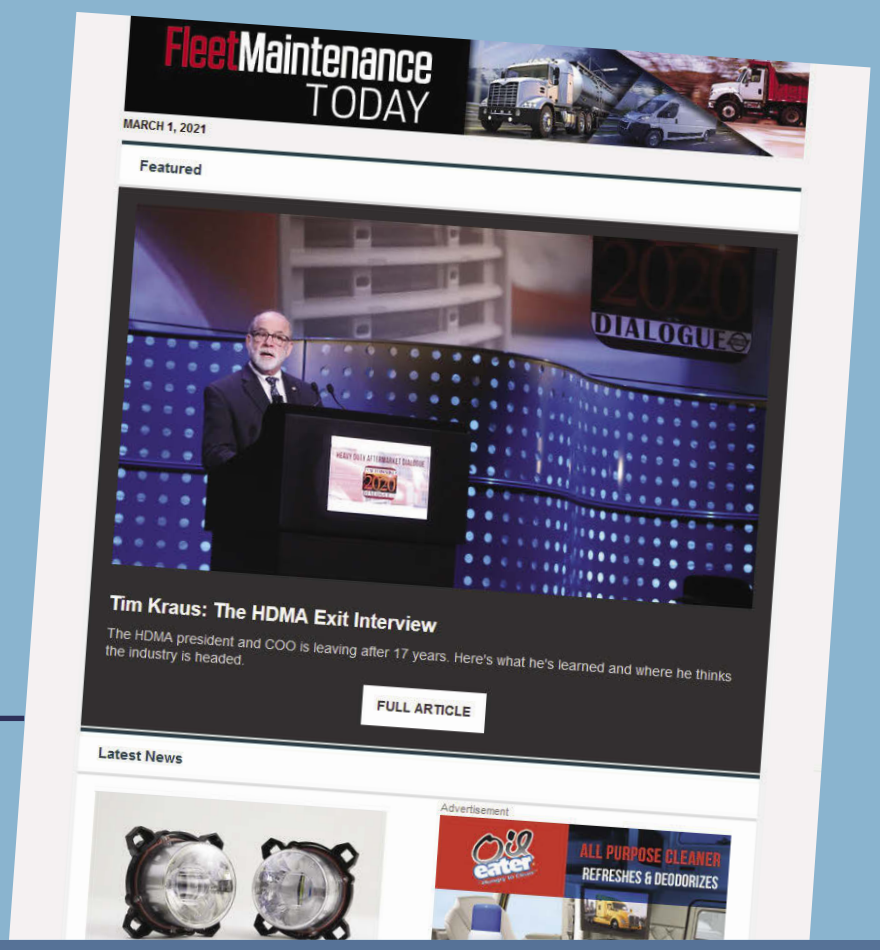

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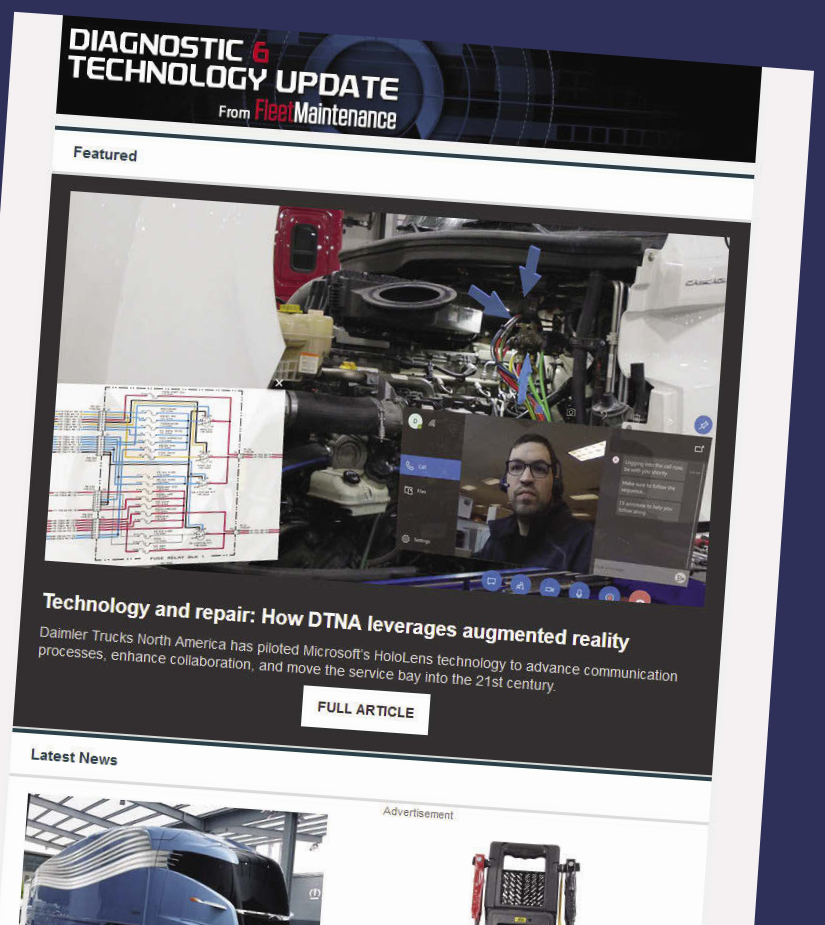


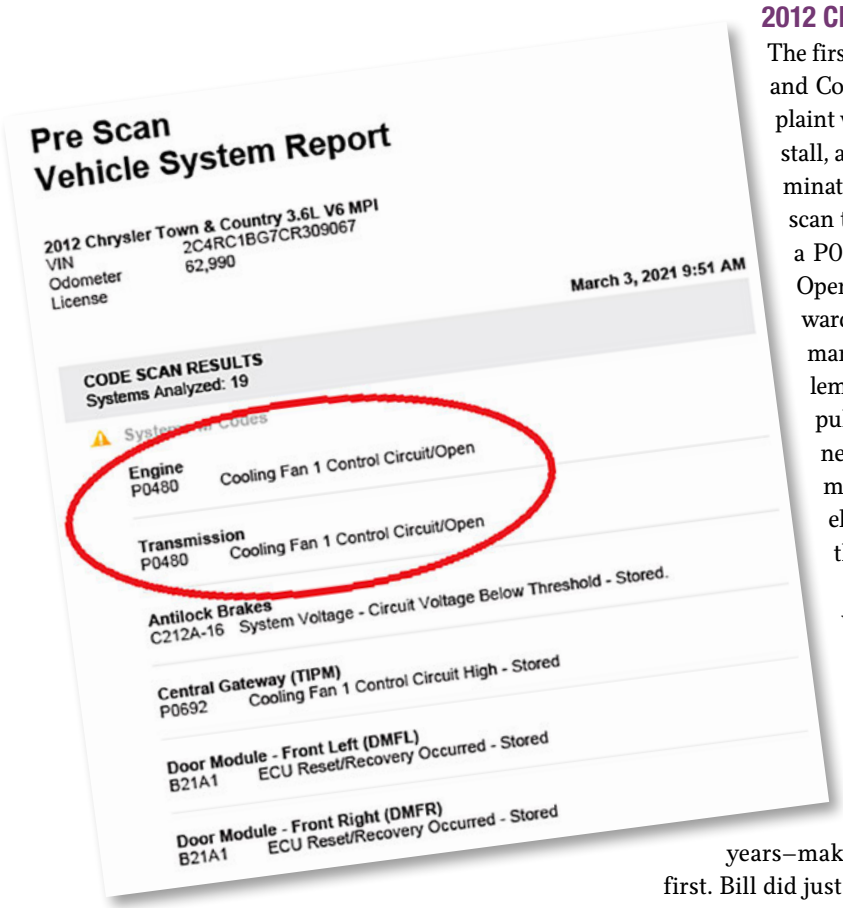
Mining for the right data

Know what tests to perform on challenging vehicles to confirm your diagnosis

By G. Jerry Truglia

Photos courtesy of G. Jerry Truglia

Everyday diagnosing and working on vehicles is a challenge, to say the least. Most days it's a satisfying experience, but some days are a nightmare. We all have those days no matter how experienced, well trained, and how good you think you are. You're going to get your butt kicked. Some vehicles just seemed to be possessed, where nothing you do goes right, or the vehicle still has an issue.



2012 CHRYSLER TOWN AND COUNTRY

The first nightmare was a 2012 Chrysler Town and Country 3.6L van. The customer complaint was that the vehicle would sometimes stall, and the check engine light would illuminate. My tech, Bill, connected one of our scan tools to the vehicle and came up with a P0480 "Cooling Fan 1 Control Circuit/Open." At first glance, it seems straightforward because it is a common problem on many Chrysler products. When the problem is intermittent it becomes difficult to pull the trigger on an expensive component (such as a totally integrated power module or TIPM), especially when an elderly woman on a fixed income owns the vehicle.

To make sure the TIPM was bad, we had to test and not guess, so Bill put together his game plan for how he was going to proceed and test it. After many test drives, he still had not uncovered the problem. One of the first steps that Bill performed was what I've taught in my class for years—make sure the load is good by testing it first. Bill did just that and applied voltage and ground to the disconnected fan circuit. He found that it worked as designed and was not pulling excessive amperage.

His next step was to look at the wiring diagram and hook up the eScope to the terminals of the low cooling fan relay (while the engine was cold). He then monitored the signal as it warmed up. With the scope connected and the engine warmed up, the waveform confirmed that the relay was not receiving the command signal from the TIPM. There was no ground path being provided for the controlled side of the relay. Bill previously confirmed all the necessary voltage and ground supply as well as continuity through the load. The conclusion of his testing after multiple road tests (cool downs and warm ups) confirmed that the correct call was to condemn the TIPM. He concluded that the TIPM's circuit board couldn't complete the relay's path to ground.

Bill made the right call because the new TIPM confirmed the fix. With the new part installed and the vehicle test driven, all monitors turned "Ready" along with the vehicle passing the NYS inspection without a problem.

2013 DODGE DURANGO

Our next nightmare vehicle was a 2013 Dodge Durango 5.7L that had an illuminated MIL and a P0750 "Low/Reverse Solenoid Circuit" DTC. The vehicle was stuck in third gear via limp-home mode. The first step was to review scan data and freeze frame to see if the information would shine further light on the problem.

Bill's next step was to consult our service information. We used ALLDATA, ProDemand, MotoLogic, and Identifix to see if there was any more information that could assist his diagnosis. After researching the different systems and reviewing the wiring diagrams, Bill located the correct pins and proceeded to perform the recommended test.

The test that was recommended by all the information systems specified a resistance test that had to be measured at the PCM connector. The specific resistance specification for a good solenoid is 1.7 ohms. With the computer connector removed, Bill performed the test, finding that all the solenoids measured 1.7 ohms at the recommended temperature range.

Bill was perplexed by the test reading. He thought that one of the solenoid readings would be different since the computer was throwing a DTC and was in limp mode. He shared the problem with me and got me up to speed on the test results. I am not a big fan of resistance testing in most cases, and this was one of those. I suggested to Bill to connect an amp clamp and scope the current to compare a good solenoid to the suspect solenoid. The comparison game is a good one to use since it is a direct comparison between a good and suspect component.

Bill proceeded to reconnect the wire harness connector to the computer so he could start the engine up and test the current draw of the solenoids. With two amp clamps attached to the eScope, he came up with the waveforms that told the whole story. After we reviewed the results, Bill was still unsure if he should pull the trigger on such an expensive part. The reason he was thinking that way was that the recommended resistance test passed. I reminded him that the resistance test was not valid in this case since the dynamic nature of the current draw test revealed the solenoid was drawing 19 amps.

He knew that he was the tech who would be speaking to the customer and had to make the correct recommendation. Bill asked for my take; I believed it looked bad and there was a possibility that the wire could be shorted, but the more probable cause was that the solenoid was shorted internally because the current indeed "ramped up" (as inductors should).

I suggested to Bill how to confirm if the wire was good and the solenoid was bad. He would have to remove the wire for the high current draw solenoid and switch it with a known-good solenoid wire. If the reading from the suspect solenoid wire was good while energizing one of the other known-good solenoids, then the wire was not shorted. That would prove the solenoid was the problem.

There are so many different connectors that have different release mechanisms, and along with the dirt and warpage, it becomes a big pain in the butt removing wires from a connector plug. With a bit of patience and time, Bill successfully removed the wires from the computer connector and switched the bad one to a good one. He took the wire from the high-drawing solenoid (19 amps) and moved it to another solenoid (low-current drawing, 7.9 to 8.5 amps) and did the reverse by installing the wire from a proper-working solenoid and on the high-drawing solenoid.

The results were that both the wires were confirmed good while the high-drawing solenoid was confirmed bad. Understanding the circuit and using simple logic nailed down the correct diagnosis. The circuit that was pulling the 19 amps was caused by a shorted solenoid, resulting in the DTC and limp mode. Our pinpoint test confirmed the actual problem was the solenoid. Bill was now confident to make the call to the vehicle owner and explain the problem, along with selling him the necessary repair.

With the owner's approval, Bill removed the valve body, ordered a new one from the Dodge dealer, and installed it. After the installation of the new valve body,

filter, and fluid, we rechecked the current draw from the same solenoid's circuit. We found that the new solenoid current draw was 8.5 amps.

With the MIL extinguished and the vehicle out of limp mode, it was time to test drive the vehicle. After a few successful test drives, we were confident that the root cause of the fault was rectified and the vehicle could be returned to the customer.

2011 NISSAN PATHFINDER

Our next difficult vehicle was a 2011 Nissan Pathfinder 4.0L that came in with the customer complaint of the MIL on and a low-power issue. After connecting our scan tool, we uncovered one of the most common DTCs on a Nissan vehicle, a P0101 "Mass Air Flow Sensor Range/Performance." Freeze frame indicated the following:

- *712 RPMs*
- MAF = 3.5 GPS (that is under the 1 gram per liter rule on a normally aspired engine).

After reviewing the freeze frame information, Bill knew the next thing he should check was the condition of the air filter and the MAF sensor itself. After the inspection, Bill decided to check the actual volumetric efficiency (VE) of the engine using the eScan VE test. The VE test confirmed that the MAF was underreporting, so Bill ordered an OE replacement part from one of our distributors.

With the new MAF installed, the VE test was repeated and looked just about perfect. But the MIL was still illuminated, which would prevent the vehicle from passing an emissions test. Bill found that there was a TSB NTB12-051k regarding PCM Reprogramming for MAF code P0101. He performed the procedure that extinguished the MIL, but there was still a problem. With the MIL off, the vehicle was test driven multiple times trying to set the monitors to "Ready" only to come up with the same issue of "Not Ready."

With a customer who was starting to lose faith, Bill thought that the next best thing was to drive to the Nissan dealer and purchase a new MAF. However, the part number on the new Nissan part did not match the original MAF that Bill had already replaced. The Hitachi sensor sold by the distributor as the OE part had a different part number than the dealer's. This was a first for us. With the second new MAF installed, the vehicle was test driven again only to report the same results, monitors "Not Ready." The pressure was on and Bill had to think fast.

He contacted the Nissan hotline, which told him to remove the battery cables with the key off and touch the cables together for a few minutes. This should reset the computer back to base settings. I always teach this very thing in my classes, but I add an extra step for safety. I advise connecting a 1 ohm 10-watt resistor in series with the battery so the computer capacitors can be drained slowly (rather than instantaneously, possibly spiking the computer and causing damage). Using the resistor is a preferred method that many OEs recommend for setting the computer system back to the base setting.

With the procedure completed, the three monitors that were not able to run before (and even after a dealer MAF was installed along with the PCM being programmed) were finally able to run. The OPUS IVS support line Nissan tech told Bill that they have documented this issue before and suggested to only use the MAF purchased from the dealer. They suggested verifying it is the same part as the one being replaced.

This was a lesson learned and one remembered. Always *RTFI* (read the friggin' information) and follow the procedure.

G. Jerry Truglia is an ASE World Class Triple Master Technician Auto, Truck & School Bus, L1, L3, F1, A9, X1 C1.

FOR 12V AND 24V APPLICATIONS

The **Electronic Specialties Relay Fuse Buddy**, No. 316, is a diagnostic tool that features an on/off relay bypass switch and live current meter. The tester will normally connect at the fuse panel, where most vehicle relays are found. Relay Fuse Buddy has many applications and can assist in determining whether the problem is the relay, the circuit, or the component. It can be used to turn on/off DC motors, fuel injectors, and fuel pumps, for example. Adapters are included for six of the most common types of relays, providing wide test coverage. An amp probe is not required. ■

PROVIDES HI-RES IMAGING FOR FULL UNDERCARRIAGE VISIBILITY

The **UVeye Helios Underbody Scanner** is a drive through solution designed to scan the underbody of any vehicle for mechanical issues including leaks, rust, broken parts, or modifications. Helios can be installed in both a stationary or a mobile version at the entrance of repair shops or dealership lanes. It provides transparency and certainty exposing any issue within seconds with no need for heavy machinery, the company said. Reports can also be sent directly to the customers and save technicians time while improving efficiency. ■

COMPATIBLE WITH MANY LIGHT-, MEDIUM-, AND HEAVY-DUTY VEHICLES

The **Autel MaxiSYS MS909CV Commercial Vehicle Diagnostics Tablet** is compatible with more than 80 models of light-, medium-, and heavy-duty vehicles. With a 9.7" wireless, Android-based touchscreen, it performs extensive diagnostics, including the ability to read/erase codes, view and graph live data, and perform active tests. The tablet includes a Bluetooth-enabled VCI/J2534 Pass-Thru programmer, MaxiBAS B200 battery starting/charging system test device, and a multimeter. The tablet also includes ADAS calibration software for Class 3 to 5 vehicles and Class 6 to 8 vehicles with dynamically calibrated systems. The MS909CV includes one year of free software updates. ■

INCLUDES THE NITRO XT DIAGNOSTIC TABLET

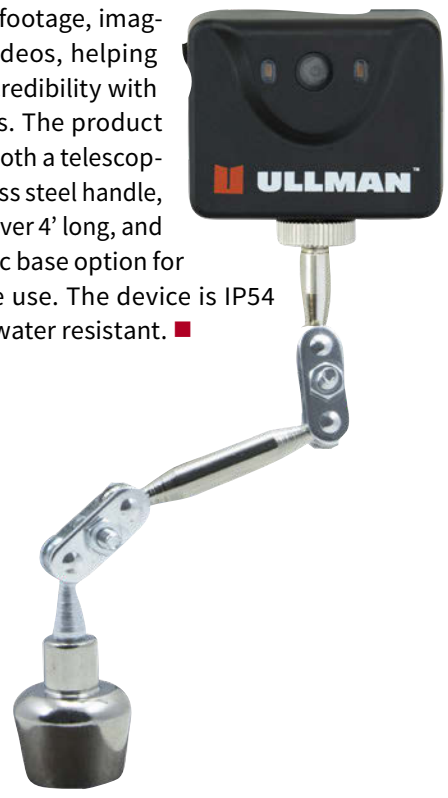
The **XToolUSA Key Making System** contains the hardware necessary to cut and program vehicle keys as well as keys and remotes for common vehicle types. The system includes the NITRO bidirectional scan tool, Triton key cutting machine, and Nitrous Keys. The NITRO features key programming functionality, while the Triton key cutting machine is able to originate and duplicate most key types including coupes, sedans, motorcycles, SUVs, pickups, vans, RVs, heavy-duty trucks, construction equipment, and more. It can also duplicate house keys. ■

ALLOWS USERS TO EVALUATE PERFORMANCE WITH COMPARATIVE DATA

The **Snap-on TRITON-D10** scan and scope tool is ideal for shop owners and general technicians that need scope functionality, intuitive diagnostic testing, and system verification from a single source for more all-around certainty, even on complex repairs. TRITON-D10 allows users to dig deep into vehicle systems and evaluates performance with comparative data, and Snap-on's Fast-Track Intelligent Diagnostics helps to streamline the diagnostic process. In addition, the tool features rugged hardware designed specifically for the shop, fast two second boot-up, and a 10" capacitive touchscreen display. ■

TELESCOPING STEEL ANTENNA

The **Ullman Devices Digital Diagnostic Mirror**, No. E-DM-1MB, is designed to help technicians see into those tight spots, even handsfree. The digital camera is attached to a dual point 360-degree rotational knuckle and connects to smartphones and tablets through the Ullman DM App, available in Android and iOS app stores. The 720p camera has LED illumination and captures live footage, images, and videos, helping increase credibility with customers. The product includes both a telescoping stainless steel handle, reaching over 4' long, and a magnetic base option for handsfree use. The device is IP54 dust and water resistant. ■



FOR MORE INFORMATION ABOUT ANY OF THESE PRODUCTS, CLICK ON "PD E-INQUIRY" at VehicleServicePros.com.

INCLUDES A FOUR-CHANNEL OSCILLOSCOPE AND BATTERY ANALYZER

The **Matco Tools Maximus 4.0 Scan Tool** features a 13.3" screen, FCA security gateway access, CAN FD, battery analyzer, four-channel scope, carline software, and MaxFix. The included Bluetooth battery tester enables technicians to identify battery system issues quickly. Technicians can also receive Tech 2 Tech Remote diagnosis with the ability to consult and collaborate with expert technicians remotely for information sharing and identifying complex issues and repairs. ■

USERS ABLE TO UPDATE THE SOFTWARE, ADD LICENSES

The **TEXA USA AXONE NEMO 2 Truck** features a 12" capacitive screen protected by Gorilla Glass, making it visible in bright sunlight. Its Windows 10 Enterprise operating system is powered by an Intel Pentium quad-core N5000 processor with 8GB DDR4 RAM and 250GB SSD storage. It's Wi-Fi and Bluetooth enabled and has two cameras, useful to create detailed customer reports or take pictures. The AXONE NEMO 2 is engineered to military standards, making it resistant to impacts and falls. It offers coverage including: live data, DTC codes with descriptions, troubleshooting, wiring diagrams and repair procedures, interactive bidirectional, advanced resets, injector coding, ADAS calibrations, and more. Users are able to update the software and add licenses. ■

EASY-TO-FOLLOW DIAGRAMS

Noregon's latest scan tool update, **JPRO Professional 2021 v2**, features updated coverage and new bidirectional tests for many major component manufacturers, including emerging advanced driver assistance systems (ADAS). The latest release offers user-friendly features and design to help technicians diagnose issues related to coolant, oil, and fuel systems. These interactive screens present live key data points in easy-to-follow diagrams to help uncover irregularities. Additionally, starting with this release, authorized users can submit information to Trimble's TMT/TMW service and to existing databases such as Decisiv, Bendix, and others. Active subscribers can update JPRO via a prompt in the application when they have an active internet connection, or manually update online. ■

ALL SOFTWARE IS PRELOADED

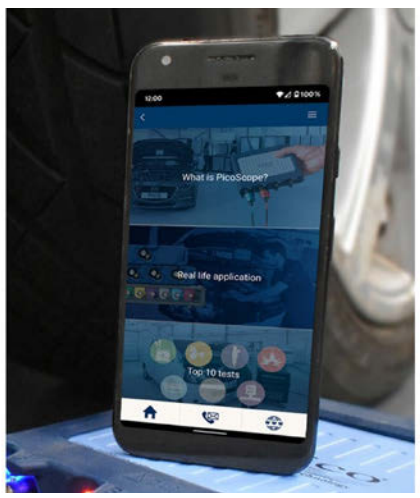
The **FCAR Tech USA F7 Series Truck Scanners** are designed to cover all major truck applications including all domestic and imported trucks. It provides OEM-level diagnostics in calibration, actuation, resets, DPF regeneration, SCR, DEF, and many other bidirectional functions. All the software comes preloaded and never expires. The scanners are simple and easy to use, saving on time and money for any shop, the company said. ■

FEATURES 28 MAINTENANCE RESETS

The **Thinkcar Platinum S20** features a large 13.3" screen, OEM full system diagnostics, 28 maintenance resets, and bidirectional functionality. Upgrades from the Platinum S10 include passenger car plus heavy-duty coverage, quad-core processor, 256GB memory, magnesium alloy exterior, web browser, email, and square point of sale app. The included oscilloscope, TPMS communicator, videoscope, and EZ Battery tester combined with ADAS support make the S20 a versatile tool. ■

OFFERS EASY ICON NAVIGATION

The **Hamaton H56 TPMS Service Tool** is designed to continuously adapt to a technician's needs, making TPMS handling quick and easy. The tool programs and configures Hamaton's U-Pro Hybrid 2.0 universal sensors within seconds and reads 100% of OEM sensors, the company said. The H56 features easy icon navigation, TPMS help and training, part number look-up, vehicle VIN scan, relearn procedures, TPMS service history up to 60,000 vehicles, frequent updates, multiple languages, and Wi-Fi updates and history transfers. It covers American, European, and Asian vehicles. ■



OFFERS TIPS ON HOW TO USE PICOSCOPE

The **PicoScope Automotive App** from **Pico Technology** is designed to provide new users everything they need to understand PicoScope no matter the level of their diagnostic experience. The app allows users to learn about the different kits available, the use of their top ten guided tests, and tips on how to use PicoScope. Other key features include how to get started with PicoScope, waveform analysis, popular case studies, training videos, and real-life workshop applications. ■

SUPPORTS J2534 INTERFACE STANDARDS

iSCAN SF Scan Tool from **Autoland Scientech** is designed to bring big power to a shop in a small format (SF). The iSCAN SF comes in two different configurations. The iSCAN SF Euro kit's integrated diagnostic software covers European and supercar while the iSCAN SF Full kit's integrated diagnostic software covers domestic, Asian, European, supercar, and medium-duty truck. The iSCAN SF offers advanced bidirectional controls, coding, programming, integrated J2534, and Support On Demand (SOD). ■

FOR MORE INFORMATION ABOUT ANY OF THESE PRODUCTS, CLICK ON
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ABLE TO MANAGE UP TO 22 WHEELS

The **HD TPMS** from **CanDo** is an activation tool with functionalities designed for the maintenance of trucks and buses. The unit reads sensors for psi, temperature, sensor ID, and battery status. It works for twin wheels and is able to manage up to 22 wheels. The tool is compatible with today's leading truck and bus TPMS sensors and can be updated with new heavy transport vehicles as soon as they are introduced, the company said. ■

INCLUDES TWO YEARS OF FREE SOFTWARE UPDATES

The **TOPDON Phoenix Plus Diagnostic Scan Tool** is an advanced professional level diagnostic scan tool, providing the latest OE level coverage for Domestic, Asian, and European vehicles. It has a rugged industrial design with metal alloy bracket and surrounding rubber to ensure durability. It includes a wireless VCI for OBD-II vehicle connection and has a topological graphing feature that provides a single screen display of all modules in the vehicle system and how they are connected. The Phoenix Plus is approved by FCA to unlock Secure Gateway Module protected vehicles. Features include 28 reset functions, advanced coding, adaptations, bidirectional controls, AutoVIN (2006+), AutoSCAN, printable/shareable diagnostic health reports, and access to all modules in all systems. ■

IDEAL FOR LIGHT-, MEDIUM-, AND HEAVY-DUTY VEHICLES

The **Launch Tech USA X-431 Torque AutoHD** is designed for diagnosing automotive and light-, medium-, and heavy-duty vehicles. It has the ability to read and erase DTCs of Class 4 through Class 8 commercial vehicles such as Cummins, Detroit, Freightliner, and more. The X-431 Torque AutoHD comes with an Android 9.0 system and Octa-core processor. Notable features include: wireless Bluetooth communication and optional ADAS calibration. ■

PROVIDES STEP-BY-STEP CALIBRATION GUIDES

The **Cojali Jaltest ADAS** is an ADAS calibration system for heavy-duty trucks. It includes all the software and targets needed to calibrate the ADAS systems on fleets. Jaltest ADAS connects to the vehicle, scans, and performs both static and dynamic calibrations to ensure sensors (cameras, radars, and more) work for a safe driving process. The portable equipment helps users in correct and precise calibrations in which targets and metrics are needed. The system provides step-by-step calibration guides, instructions for the preparation of the Jaltest ADAS structure, and more. ■

FCA SECURE GATEWAY COMPATIBLE

The **ADASLink Diagnostic Scan Tool** from **Hunter Engineering** is designed to help technicians setup and calibrate ADAS quickly. The 10” full scan tool is powered by Bosch and is not limited only to ADAS. It is pre- and post-scan ready and FCA secure gateway compatible. Additionally, dynamic (driving) ADAS calibration coverage is included while static (fixture) ADAS calibration is available with DAS 3000. It’s for use in any bay, with or without the Hunter aligner. ■

FOR MORE INFORMATION ABOUT ANY OF THESE PRODUCTS, CLICK ON
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PROBE CAMERA CAN BE BENT IN TWO DIRECTIONS

The **Oasis Scientific Vividia W2240 Wi-Fi/USB Wireless 2-Way Articulation Borescope for Diesel Engines** features a small camera (less than 4mm/0.157" diameter) at the end of a 39.4" long probe. The small diameter is ideal for diesel engine applications such as cylinder inspections. The probe camera can be bent in two directions with a turning wheel from 0 degrees (front view) to 180 degrees (rear view) each direction. The insertion probe is flexible for easy operation and insertion. Users are able to record and save photos and videos. The built-in Wi-Fi and USB connection is compatible with iPhones, iPads, Android devices, Windows PC, MacBook, and Chromebook. ■

FLEXIBLE TO INSPECT HARD-TO-REACH AREAS

The **ANSED Diagnostic Solutions Hi-Res Digital Video Scope Kit with 4.5mm Dual Camera Probe**, No. DVSK-45DC, is a versatile and flexible videoscope used to monitor, capture, and inspect hard-to-reach spaces and cavities. The video monitor features a 3.5" full view IPS LCD screen, 1280 x 720 resolution, and supports 13 languages. The small diameter, high-definition digital videoscope kit comes with the 4.5mm diameter dual camera imaging probe, allowing the user to view forward and side views with just a flick of a button without the need for a mirror or multiple probes. It also includes an 8G SD mini card, USB cable for charging, and a manual in a zippered carrying case. ■

OFFERS FAST ALL-SYSTEM SCANS, LONG BATTERY LIFE

The **Bosch ADS 625X Diagnostic Scan Tool** delivers flexibility, speed, and access with its secure access to unlock FCA Secure Gateway Module, software subscriptions options, fast all-system scans with Quick-Scan, and weeks of battery life. The scan tool provides technicians advanced vehicle coverage across a broad range of domestic, Asian, and European vehicles dating back to 1976. The ADS 625X includes the same features as the ADS 525X in addition to expandable memory, updated software capabilities, a larger screen display, and a docking station, providing technicians with a seamless and straightforward experience. ■

PROVIDES LIVE ACCESS TO EXTENDED VEHICLE DIAGNOSTIC DATA

The **Continental Autodiagnos Drive** is a remote vehicle data solution designed to deliver advanced diagnostic information that service providers, fleet managers, and repair facilities can use to maximize their data-driven services. The easy-to-install, plug-and-play technology provides users with live access to extended vehicle diagnostic data for all popular makes and models of passenger cars, light trucks, and commercial vehicles. Autodiagnos Drive helps customers increase productivity, reduce downtime, enhance customer service, and gain better insights into the condition of the vehicles they service or manage. ■

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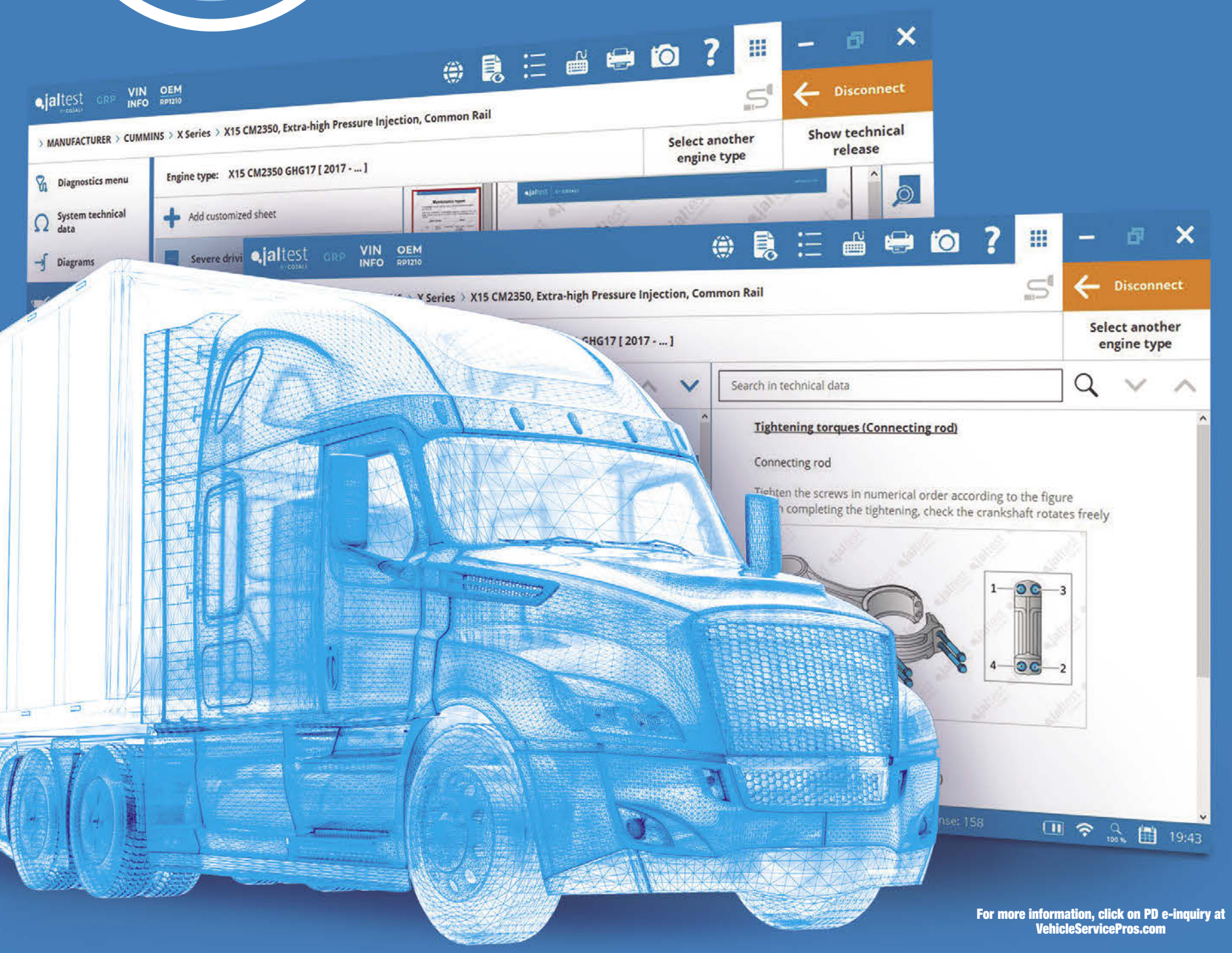

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cojali USA

info@cojaliusa.com

TOOLS & EQUIPMENT

A roundup of the latest tool and equipment offerings.

Features a 3.5" stroke length

The **Mighty Seven Heavy Duty Air Hammer with Long Barrel**, No. SC-212C, features an industrial-grade aluminum body, alloyed steel cylinder, and hardened piston. It delivers 2,200 bpm and has a 3.5" stroke length. The air hammer comes with a 4-pc round shank chisel set, designed for cutting and shearing various surface and material. It's held by a spring-type quick-change retainer and has a one-year warranty.

For more information visit **FleetMaintenance.com/21214287**

Allows oil pressure gauge attachment

The **OTC Oil Pressure and Prelube Adapter**, No. 7297, installs in place of the spin-on oil filter to allow existing oil pressure gauges to attach and test oil system pressure. It can also be used to connect prelube equipment to the engine. For use on 2005 and later GM Gen IV and Gen V engines: 4.8L, 5.3L, 6.0L, and 6.2L.

For more information visit **FleetMaintenance.com/21217227**

Includes a large parts tray

The **Mechanic's Time Savers 52" 7-Drawer Heavy Duty Toolbox and Workstation** features a heavy-duty work surface with a vice mount that can be mounted in four locations. The toolbox includes a locking pry bar box and 8" heavy-duty casters. It offers lots of storage space and also includes a can holder tray and large parts tray that can hold gallon jugs. The tough toolbox provides the ideal spot for technicians to work on and store their tools all in one place, the company said.

For more information visit **FleetMaintenance.com/21217234**

Clip provides handsfree use

The **Ultra-Compact Pocket Mate** from **Streamlight** is a weather-resistant, USB rechargeable personal light that delivers 325 lm and offers convenient handsfree options. Small enough to carry in a pocket, the Pocket Mate features an anodized spring clip that attaches to zippers or key chains, and clips onto hats, visors, and clothing. The light is powered by a bright white LED that offers high and low modes, and has a lithium polymer battery. It charges from any USB power source and includes a charge status indicator. The Pocket Mate is available in silver, red, blue, and pink.

For more information visit **FleetMaintenance.com/21220505**

Rated for use with diesel, grease, kerosene, and oil

The **JohnDow Industries Air-Operated Diaphragm Pump Evacuation System Kits** are available in UL and non-UL Listed options and feature leak-free, all-bolted solid cast durable aluminum construction for use in automotive applications. Rated for use with diesel, grease, kerosene, and oil, these pumps offer O-ring seals and Nitrile diaphragm material, making them ideal for low-viscosity petroleum fluids. Both the JDI-DPES and the JDI-DPES-UL kits come with an air-operated double diaphragm pump, 2" air hose, high-efficiency filter regulator, wall mount bracket, 6' delivery hose, 10' suction hose with hose bracket, and a ground wire.

For more information visit **FleetMaintenance.com/21224375**

Shares results wirelessly via app

The **Snap-on 1,000 PSI Wireless Diesel Pressure Tester Set**, No. EEDF700, is designed to diagnose engine performance issues. With a range of 0 to 1,000 psi and 0 to 30 inHG, it stores results for viewing on the tool or shares them wirelessly via a free app on Bluetooth-enabled Android or Apple devices. The tool measures in psi, kPa, Bar, mBar, inHG, inH20, and cmH20, and graphs and stores up to 12 readings, so writing the results isn't required. Lift tank fuel pump, engine return flow, and flow restriction testing adapters are included in the set.

For more information visit **FleetMaintenance.com/21221171**

Designed to stop quickly for added safety

The **Milwaukee Tool M18 FUEL 4-1/2" / 5" Braking Grinders with ONE-KEY**, Nos. 2882-22 and 2883-22, are available with paddle switch, no-lock and slide switch, lock-on options. The grinders generate 11A corded power, deliver 8,500 rpm, and feature a RAPIDSTOP brake to quickly stop accessories with an abrasive disc. Both grinders also offer the company's proprietary Powerstate brushless motor, Redlithium battery pack, and Redlink Plus intelligence. For ease of use, the grinders feature tool-free adjustable guards and accessory changes to provide quick guard installations and adjustments. FIXTEC Nut technology allows for tool-free accessory changes while remaining compatible with common accessories.

For more information visit **FleetMaintenance.com/21224378**

No air, hand pumps, or spillage

The **Macnaught BOPHV High Viscosity Battery Oil Pump** is designed for dispensing oil from 5-, 16-, and 55-gallon containers. It's good to 140W/ISO680 oils delivering 40 gallons on a full charge at 1.5+ gpm. There is no need to use cumbersome and difficult-to-dispense hand pumps or transfer oils manually to smaller containers, the company said. Simply place the BOPHV into the container, flick the powerhead on, and engage the on-demand flow nozzle.

For more information visit **FleetMaintenance.com/21220509**

Available in seven colors

The **Cornwell Quality Tools PLATINUM 84" 14-Drawer Triple Bank Cabinet** is powder coated inside and out and available in seven colors. With a cage frame construction, the drawers are supported by 260-lb. capacity ball bearing slides with an integrated TLC mechanism. Each drawer features a 4mm thick, non-slip liner and a full-length pull with decorative end caps. Electric power strips, each with five standard outlets and two USB outlets, are positioned in two locations: a drawer with storage capacity for battery powered tools and a repositionable housing at the back of the cabinet's work surface. A polished electronic lock with built-in cam provides keyless security.

For more information visit **FleetMaintenance.com/21220695**

Contains spills up to 110 gallons

The **Andax Industries Big Containment Pac** is a spill kit that can contain spills up to 110 gallons and fits in an 18" by 15" by 5" vacuum-sealed package. The kit includes three 48" oil-selective Sorb-Sox (mini-booms), 20 15" by 19" oil-selective absorbent pads, a disposal bag and tie, protective gloves, plus a 60" by 10" high pop-up containment pool with a carrying case and CO2 cylinder. In the event of a spill, the mini-booms and absorbent pads can be used to block off a storm drain or waterway while the inflatable pop-up pool can contain the bulk of the spill.

For more information visit **FleetMaintenance.com/21220701**

Equipped with a locking spindle system

The **Chicago Pneumatic CP74 Series Pneumatic Die Grinders** are designed to optimize productivity and operator comfort. Delivering up to 20% more power than the CP91 range and with a collet design for quick and easy burr changes, the CP74 pneumatic die grinders can help optimize productivity in metal fabrication applications, as well as vehicle servicing and repair. The CP74 Series of 1/4" and 6mm pneumatic die grinders offer six different heads, including short/long and straight/angle (120 degree, 90 degree). The die grinders operate between 22,000 and 28,000 rpm depending on the model. With the smallest grinder in the series weighing 1.1 lbs. and the largest grinder 2.43 lbs.

For more information visit **FleetMaintenance.com/21225062**

For Ford gas 4.6L, 5.4L, and 6.8L engines

The **ProMAXX Rocky ProKit** is designed to assist the automotive technician in reducing cost, risk, and liability in the repair and replacement of broken exhaust manifold mounting studs. It's for Crown Victoria, Mercury Grand Marquis, Mountaineer, Ford Explorer, SportTrac, F-series, Super Duty Ford trucks, Ford Econoline Vans, and Ford drive chassis. Rocky offers speed, efficiency, and accuracy in drilling and subsequent assistance in the removal of the remaining portion of a damaged exhaust manifold mounting stud. There's no need to use a center punch to mark the damaged stud, the company said. It can be mounted in any of eight orientations, accessing every stud.

For more information visit **FleetMaintenance.com/21224826**

Includes three tool chests and cabinets

The **GEARWRENCH GSX Series Tool Storage** includes three tool chests, each compatible with one of three rolling tool cabinets to provide maximum storage capacity that is easy to access. The GSX Tool Chests are made from 20-gauge steel for durability and strength. Gas-charged lift support struts offer easy opening and closing. The GSX Tool Cabinets roll on heavy-duty industrial casters for easy mobility around the work site. Drawers are made from 22-gauge steel and ride on ball bearing slides for ideal load capacity and easy slide action. The GSX Chests and Cabinets come in matching sizes (26", 36", and 41") so they can be paired together for even more storage.

For more information visit **FleetMaintenance.com/21217759**

Portable power with Bluetooth battery testing

Great for weekend warriors and technicians alike, the **TOPDON Volcano2000 ProS** 2000A peak current lithium polymer battery charges 12V (car, truck, motorcycle, boat, ATV, and more) batteries. When Bluetooth enabled, it detects electrical issues before charging—all right from the device. It can wirelessly charge smartphones.

For more information visit **FleetMaintenance.com/21226690**

Three-position flex head design for easier access in tight quarters

The **AIRCAT 1/4" Flex Head Ratchet**, No. 811, provides 35 ft-lbs. of torque and features a three-position flex head design for easier access in tight quarters. The ratchet has a feather trigger design and patented ergonomically-engineered handle to relieve stress and fatigue on the operator's hands, wrists, and arms. The 811 is designed with AIRCAT's patented quiet-tuned exhaust which allows discharged air to pass without developing back pressure, thus retaining more power, while significantly reducing noise, the company said.

For more information visit **FleetMaintenance.com/21225934**

Adjustable from 48.75" to 74.5"

The **BendPak MLS-18 Mobile Jack Stand** is designed to provide added support and peace of mind when working on a heavy-duty vehicle on a lift. Each MLS-18 Mobile Jack Stand has a rated capacity of 18,000 lbs. and can be adjusted from 48.75" to 74.5" in height to reach lifting points more than 6' in the air. Additionally, it features a tripod design, foldaway transport handle, and 3" diameter wheels. It's ideal for use in sets of four, six, or eight.

For more information visit **FleetMaintenance.com/21217431**

Creates 360-degree wire seals

The **S.U.R.&R. Universal Clamp Making Tool Kit**, No. CT500, is designed to quickly create 360-degree wire seals to hold a wide variety of objects securely together. The CT500 kit includes the clamp making tool, 18-gauge stainless steel wire, a wire nut, and mini diagonal cutters. The kit is ideal for repairing CV boots, coolant hoses, air hoses, and more.

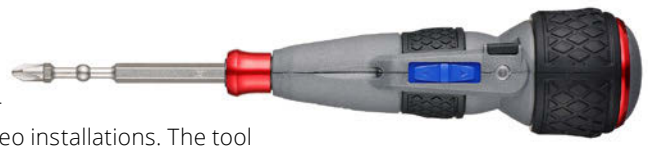
For more information visit **FleetMaintenance.com/21230635**

Each tool measures 4.25" in length

The **Mayhew Tools Low Profile Screwdrivers**, Nos. 16990, 16991, and 16992, include a #1 Phillips, a #2 Phillips, and a flat tip. The low-profile design provides performance in hard-to-reach areas. The 10mm alloy steel bit is compact while still affording full engagement to the screw at a 90-degree angle. The tools measure 4.25" in overall length and have a contoured handle. The handles have been heat treated to enhance the tool's durability and strength.

For more information visit **FleetMaintenance.com/21223702**

Features a built-in LED



The **Vessel Ball Grip Cordless High-Speed Screwdriver**, No. 220USBS-1U, is a battery powered or manually driven cordless Ball Grip screwdriver ideal for inserting screws such as those used in electronics and radio/stereo installations. The tool features a Ball Grip and has a charging port and charging indicator with a slide on/off switch. It's slim and compact with a 1/4" hex bit insert. The cordless screwdriver has a built-in LED and comes with a USB charging cord.

For more information visit **FleetMaintenance.com/21222449**

Sets in aluminum and steel rivets and rivet nuts

The **Marson HP-4x4 Multiplex Hand Tool** from **Howmet Fastening Systems** features a patented design that allows this single tool to set in a variety of sizes of both aluminum and steel material rivets and rivet nuts. The adjustable jaw system and variety of mandrels, sockets, and nosepieces are easily changed to set blind rivets up to 3/16" diameter, rivet nuts up to 1/4-20 size, MET series external thread stud rivet bolts up to 1/4-20, MQN jack nuts, and MXN series rivet nuts up to 1/4-20. Available as a kit, No. M39410, which comes in a molded plastic case with a small plastic box to hold parts and adjustable jaw system.

For more information visit **FleetMaintenance.com/21227558**

Comes with a universal hose clamp cable

The **Mueller-Kueps Hose Clamp Compressor**, No. 500 007, is designed to reduce the difficulty faced by technicians when removing or installing hose and spring clamps which often provides a challenge in hard-to-reach areas. The set comes with a mechanical handle and a universal hose clamp cable. The patent-pending tool is quick and easy to use, offering the technician a safe solution for removing and installing hose and spring clamps. Other cables with different clamping jaws are available for purchase.

For more information visit **FleetMaintenance.com/21231815**

Vapor-blasted tips for added protection against corrosion

The **Mac Tools 12-pc Soft-Grip Combination Screwdriver Set**, No. SDB12DG-S, features a 360-degree ergonomic, textured soft grip for comfort for high torque applications. The nylon-alloy soft-grip handle is chemically resistant to gasoline, disk brake cleaner, brake fluid, motor oil, hydraulic fluid, ethylene glycol, and acetone. Each tool has a molded tip ID for easy recognition of tip type in the vertical position. The tips are also vapor-blasted for added protection against corrosion and improved gripping force. The screwdrivers feature a high-quality alloy-steel bar with hex bolster for additional torque application. The set includes six slotted and six Phillips screwdrivers.

For more information visit **FleetMaintenance.com/21226683**

High-impact thermoplastic work top

The **Beta Tools C24IT Mobile Tool Chest** features a 5/8" recessed, high-impact thermoplastic work top to keep projects and tools from rolling away. The drawers come with ball-bearing slides for smooth operation and include foam rubber mats to prevent tools from sliding around. Additionally, the tool chest has a front centralized safety lock system, attachable side bottle holder, four 5" diameter casters (two fixed, one free swivel, and one swivel with brake), and threaded hole pattern on each side for a roll towel dispenser (dispenser not included). It has a 1,763-lb. load capacity and is available in five, seven, and eight drawer configurations. Colors include: orange, gray, red, and blue.

For more information visit **FleetMaintenance.com/21228109**

Patented impact mechanism reduces tool vibration

The **Matco Tools 16V Cordless Infinium 1/2" Drive Stubby Impact Wrench**, No. MCL1612SIK2, features a brushless motor capable of high torque and extended durability. The impact wrench measures 5" in length and offers 300 ft-lbs. of breakaway torque. It has a glass filled nylon housing with overmold to provide all day comfort, a patented impact mechanism that reduces tool vibration, and dual element LEDs to light the work area. The kit includes tool, two batteries, MCL16CHRG charger, and a carry bag.

For more information visit **FleetMaintenance.com/21229419**

Formulated with calcium sulphonate

Fifth Wheel Lubricant from **AGS Company** is formulated with calcium sulphonate base grease with moly additives. According to the company, calcium sulphonate offers higher load capabilities, lower drop point/higher temperature range, ideal at lower temperatures, provides corrosion control, long lasting, and is hydroscopic (absorbs moisture and expands lubricant). The lubricant is packaged in single-use packs.

For more information visit **FleetMaintenance.com/21228099**

Quickly installs U-joint bearing cups on 1610-1880 series yokes

The **Cal-Van Tools Bolt Retainer Cup Installer**, No. 18510, is designed to make fast and easy work of installing bolt retained bearing cups of 1610 to 1880 series full-round yokes commonly found on Class 6 to Class 8 vehicles. It uses the bolt holes of the flange to ensure proper alignment of the cup and eliminates damage to cups, seals, and needle bearings.

For more information visit **FleetMaintenance.com/21234683**

Shatterproof shock absorbing alloy backbone

The **Century Drill & Tool** 2-pack 14/18T x 9" **Metal Series Reciprocating Saw Blade**, No. 07898, features a 1/2" universal shank with a 5% tilt angle for fast cuts and skid-free starts. With a 1" width and heavy-duty blade thickness, it's able to cut clean with less vibration in heavy metal cutting applications. Additionally, its bi-metal blade offers cobalt high speed steel teeth and a shatterproof shock absorbing alloy backbone.

For more information visit **FleetMaintenance.com/21228106**

Features topology mapping

The **Launch Tech X-431 PAD VII Diagnostic Tool** features a 13.3" touchscreen, 32 service functions, and Smartlink remote diagnosis. The outer shell is designed to withstand workshop hazards such as water and dust damage and is in compliance with IP65. The X-431 PAD VII uses a high-capacity and high power battery to ensure a longer battery life with a shorter charging time. The tool offers topology mapping and a new module 'MALL' for users to expand and upgrade the tool with more diagnosis software. The X-431 PAD VII supports ADAS calibration and eight extended modules such as videoscope, oscilloscope, sensor box, TPMS tools, key immobilizer, and battery tester.

For more information visit **FleetMaintenance.com/21225937**

Reaches difficult line nuts with an offset punch

The **Lock Technology 12-pc Metric Shockit Line Wrench Set**, No. LT1930, is designed to loosen fittings on steering, brake, AC, and fuel systems. It uses the force and vibration of an air hammer. With a compact design, its able to reach difficult line nuts with an offset punch. The LT1930 is built to precise ISO 1174-2 DIN tolerances and has indexed holes to keep Shockit Punches from slipping off line wrench. The set must be used with Shockit Punches (sold separately) for maximum performance and warranty coverage, the company said.

For more information visit **FleetMaintenance.com/21235561**

Offers handsfree lighting

The **WT25R Adjustable Head Flashlight** from **Fenix Lighting** features a 105-degree adjustable head, allowing users to put light where they need it. The flashlight can attach to most metal surfaces with its built-in magnet to offer handsfree lighting and offers four brightness levels (emitting up to 1,000 lm). The WT25R is rechargeable and has a battery level indicator. Additionally, the light has a built-in body clip, lock-out function, and an IP66 rain resistant/dustproof rating.

For more information visit **FleetMaintenance.com/21231826**

Includes complete set of dies

The **FJC Handheld Hydraulic Crimper Kit**, No. 2806, is lightweight, portable, and ideal for all shop and field applications. Its made of durable aluminum alloy and can reach up to 53 HRC, ensuring a thorough crimp. For use with standard and reduced barrier hoses and fittings, the kit is easy to use and is suitable for even narrow spaces. The kit includes a complete set of dies that doesn't require pins or screws and can be quickly snapped into the pressing tool. The kit comes in a convenient, custom-molded protective case.

For more information visit **FleetMaintenance.com/21236739**

Tablet-operated wheel alignment system

The **Rotary R1065 Mobile Tablet Aligner** is designed to offer shops of all sizes an easy-to-use solution for performing wheel alignments. The tower-free alignment system doesn't require a minimum bay size and comes on a portable, compact cart with sensor chargers built in. It features four-point wheel clamps and wireless measuring heads. It's also tablet-operated, Wi-Fi-enabled, and is magnetized, allowing technicians to perform wheel alignments anywhere in the shop. With the system's sensor technology, technicians can make live adjustments quickly and accurately. Once the work is completed, the technician can email or print a personalized alignment.

For more information visit **FleetMaintenance.com/21225930**

Ideal for 3/4- and 1-ton trucks

The **Specialty Products Company HD Low-Profile Pitman Arm Popper**, No. 73150, is designed to help technicians save time on pitman arm removal jobs. Made with forged steel jaws, the low-profile design removes the need to remove the steering box. The tool is ideal for work on 3/4- and 1-ton trucks of most makes and models.

For more information visit **FleetMaintenance.com/21239647**

Ability to connect to Wi-Fi 6 and Bluetooth 5.1

The **Panasonic Updated Semi-Rugged TOUGHBOOK 55 Laptop** incorporates an 11th Gen Intel Core i5 and i7 processor and double the standard memory from the last version while increasing speeds by 50%. The upgrade includes Thunderbolt 4 and an NVMe OPAL SSD to deliver performance with added security and device management benefits. With the ability to connect to Wi-Fi 6 and Bluetooth 5.1, the updated TOUGHBOOK 55 offers enhanced connectivity. Mobile workers can conduct their workday uninterrupted with all day battery life.

For more information visit **FleetMaintenance.com/21236024**

Includes durable latching case for storage

The **Sunex Tools Simple Torque Indexing Torque Wrenches** are designed with a 16-position torque selecting mechanism that adjusts the torque and locks it into place with a simple press and slide of a button, reducing time and allowing users to go from minimum to maximum torque in less than a single rotation. Each torque wrench includes a durable case with latches for safe storage and are pre-calibrated to accuracy ±4%. The torque wrenches include: 1/4" Dr. 25-250 in-lbs., No. 10250; 3/8" Dr. 5-80 ft-lbs., No. 30580; and 1/2" Dr. 10-160 ft-lbs., No. 21160.

For more information visit **FleetMaintenance.com/21234687**

Real-time battery life indicator

The **Coast XP18R Rechargeable Dual Power Flashlight** offers a turbo mode that emits up to 3,650 lm in addition to standard modes. With Coast's Rechargeable Dual Power technology, the flashlight runs on a Coast ZITHION-X battery or standard alkaline AA's. Power is monitored with a battery life indicator, enabling users to be ready at all times. Users are also able to transition between a spot and flood beam with a push or pull of a finger via Coast's Slice Focus system.

For more information visit **FleetMaintenance.com/21236382**

Eliminates broken fasteners

The **Lisle Corporation Long Door Panel Tool**, No. 35600, measures 19.75" in length making it ideal to reach upholstery clips in the middle of a door panel. Its square notch design removes both plastic and metal clips on cars and trucks. The tool helps eliminate broken fasteners and is easy to use. Simply place the tool under the edge of the door upholstery panel, insert into the fastener as far as possible, and then simply pry up. It's heat treated for durability.

For more information visit **FleetMaintenance.com/21234679**

FLEET PARTS & COMPONENTS

What's new in products for more efficient fleet operation.

For 2008-03 International VT365

The **EGR Valve**, No. 904-5038, from **Dorman Products** is designed to match the fit and function of the original valve on specified vehicles. Made of quality materials, it is engineered for reliable performance and durability. The valve is engineered to withstand extreme heat and carbon buildup and is a reliable replacement for a failed original EGR valve.

For more information visit **FleetMaintenance.com/21231107**

SmartWay Verified steer tire

The **Roadmaster RM832+ EM** steer tire from **Cooper Tire** is SmartWay Verified and features 18/32 of tread depth, along with a wide footprint, to help distribute weight more efficiently and ultimately improve treadwear. In addition, it features a patent-pending decoupling rib, which promotes even wear on long-haul journeys and helps give the tire added durability against curbing when driving in urban areas. These features result in fuel efficiency and long miles to removal. The tire is available in seven sizes in the U.S. and Canada: 295/75R22.5, 11R22.5, 11R24.5 in Load Range G and H, plus in 285/75R24.5 in Load Range H. Size 295/75R22.5 is available to order.

For more information visit **FleetMaintenance.com/21240916**

TotalArmor W7
Where Innovation Lives

Prevents gelling and icing

LSI Chemical's **TotalArmor W7** is a winter blend diesel fuel aftermarket additive. Engineered to provide consistent winter operability, this additive also increases cetane up to seven points for improved power, fuel economy, and cold starts. Formulated with cloud point and pour point depressants, anti-settling agents, detergents, and a lubricity improver, it prevents gelling and icing by dispersing moisture in freezing temperatures, minimizing the size of wax crystals and preventing paraffin wax precipitation.

For more information visit **FleetMaintenance.com/21231172**

Adjusts trailer tire pressure based on load

The **Hendrickson Trailer Commercial Vehicle Systems TIREMAAX PRO-LB** system builds on the technology of TIREMAAX PRO, which inflates, relieves, and equalizes tire pressures across all wheel positions with the added benefit of load-based pressure adjustments. The company said TIREMAAX PRO-LB helps eliminate the guesswork of tire pressure management by monitoring the pressure in the air springs and reacting to changing loads automatically. The system can react to trailer loads, so fleets can more accurately achieve optimum tire pressures across all driving conditions—hot and cold, at sea level and at altitude, and now, empty and loaded.

For more information visit **FleetMaintenance.com/21239632**

Built for durability and reliability in all-weather conditions

ClearContact Commercial Duty Wiper Blades from **Continental** are specifically designed and engineered for applications on commercial trucks, RVs, transit buses, and motor coaches. They are designed for fast and easy installation and built for durability and reliability in all-weather conditions. They feature an aerodynamic design that's engineered to deliver windshield wrap, a reinforced steel frame for strength and durability, and a precision-cut natural rubber blade for consistent, edge-to-edge wiping performance and long service life. Four different wiper blade designs are available, including flat, five bar, wide saddle, and hook configurations. Custom bundles are available for fleets, bus and motor coach operators, and recreational vehicle dealers.

For more information visit **FleetMaintenance.com/21245381**

Diesel-powered truck refrigeration unit

The **Supra S10** diesel-powered truck refrigeration unit from **Carrier Transicold** features refrigeration and freezing capacity for larger trucks while also offering improved efficiency and fuel economy. The fifth model in the Supra line will be available through Carrier Transicold's North America dealer network in early 2022. Key features of the Supra S10 unit include 37,000 BTU capacity at 35 degrees Fahrenheit, three engine speeds, streamlined weight-saving architecture, and APX control technology, providing intelligent performance optimization, automatic trip data recording, and enhanced system diagnostics. The Supra S10 offers reduced service requirements, including an extended oil service interval of 2,000 hours and a greater use of maintenance-free components.

For more information visit **FleetMaintenance.com/21245389**

Eliminates condensation and dissolves sludge in the fuel tank

Desl-Shok from **USA Fuel Service** is an easy way to increase fuel economy, extend component service life, and reduce hard starting and engine downtime. Desl-Shok eliminates condensation and dissolves sludge in the fuel tank. The formula cleans injectors, carburetors, and fuel lines to promote a cleaner burn that, in turn, reduces carbon build-up in the motor and exhaust. It also decreases smoke and engine noise. Regular use of Desl-Shok stabilizes and boosts cetane levels and acts as a lubricant throughout the fuel system. The formula contains no acids or alcohol, so it won't harm gaskets, hoses, seals, and other components.

For more information visit **FleetMaintenance.com/21245378**

Full synthetic, heavy-duty automatic transmission fluid

SYNDURANCE 668 ATF from **CITGO** is a full synthetic, heavy-duty automatic transmission fluid approved by Allison Transmission (668-10051021) for service fill on transmissions requiring a TES 668 approved fluid. It is fully backward compatible for transmissions requiring a TES 295 fluid. This fluid offers extended drain intervals and demonstrates shear stability, oxidation resistance, and low-temperature fluidity.

For more information visit **FleetMaintenance.com/21245386**

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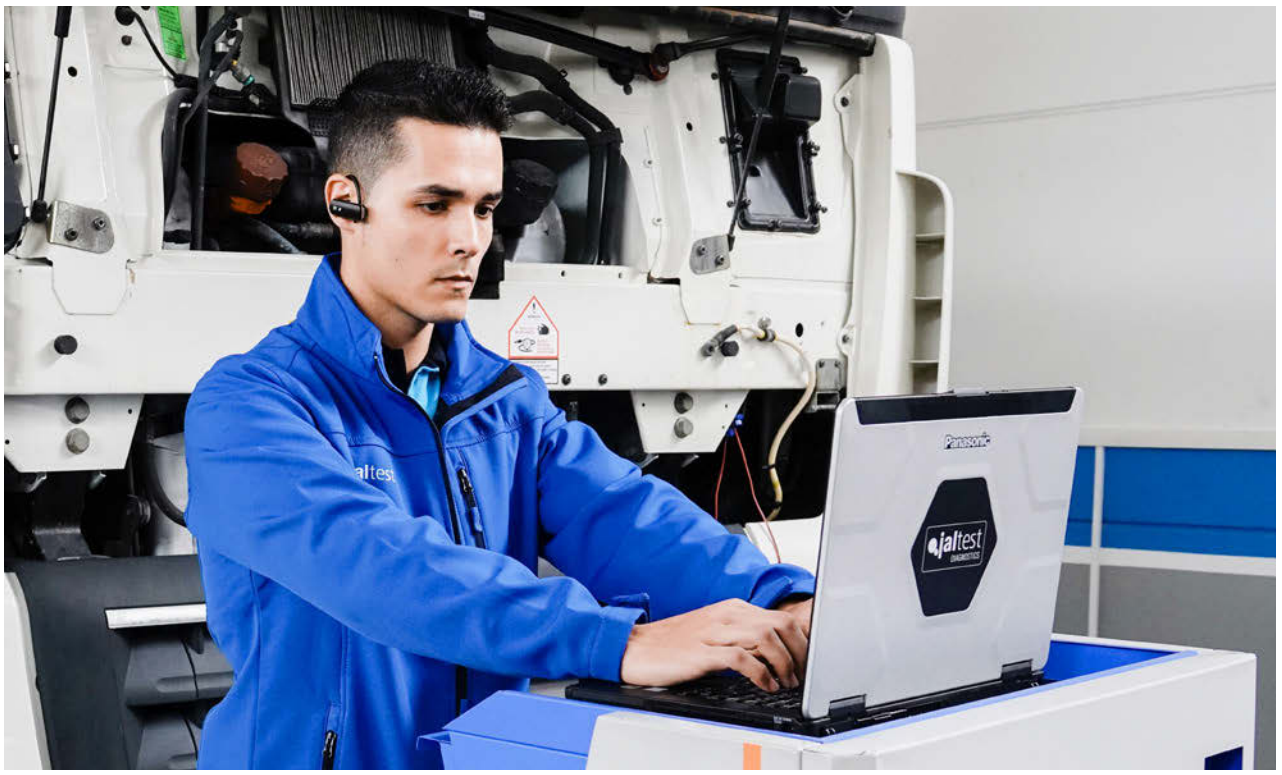


Diagnostic tools are a technician's sidekick

Key factors to consider when choosing the diagnostic scan tools right for your shop.

At 10 minutes before closing time, the last truck of the day comes in. It is from one of the local fleets, a larger company that normally takes its business elsewhere. You are surprised, but you go check it out. This could be a great opportunity to take on some of their business.

The problem turns out to be an aftertreatment issue—on a Volvo. Your shop never works on those because you do not have the right tools. This was your opportunity to bring the customer in, but you have to reply: "I'm sorry, we don't have the tools to work on a Volvo. You can head down to the dealer for them to check it out." Just like that, an opportunity is lost. Maybe next time you will have the right tools.

Today, virtually every vehicle system is electronic or controlled by electronics. The days when trucks could be fixed without computers are gone, as are those where a shop could survive with just two or three OEM diagnostic platforms to repair most of the issues in the area. The industry has changed, and mixed fleets have increased, so why not change with it? Maybe it is time to give this some thought.

When we look at the field of repair, there is more and more complexity and, therefore, more confusion, frustration, and ultimately, many hours lost. Therefore finding an ally is key. Looking for and finding the right diagnostics tool is like finding a good second chair; the Robin to your Batman. Modern diagnostic tools cannot just be code readers that provide a code and then let the technician figure out the rest. The right diagnostic tool needs to be like a second technician: the one who looks up the operating specs, the one who remembers the procedure for changing an oil temperature sensor, the one who knows where the wires connect, etc. Your tool is your key to success.

When we look at diagnostic scan tools, there are some key elements to focus in on; elements that that might pass unnoticed but that can make a big impact in the bay. When looking at these tools, it can be easier to find the right one by focusing on three factors.

» **Key elements to consider when selecting a diagnostics tool include the user interface, the makes it services, and its functionality.**

Images by Cojali USA

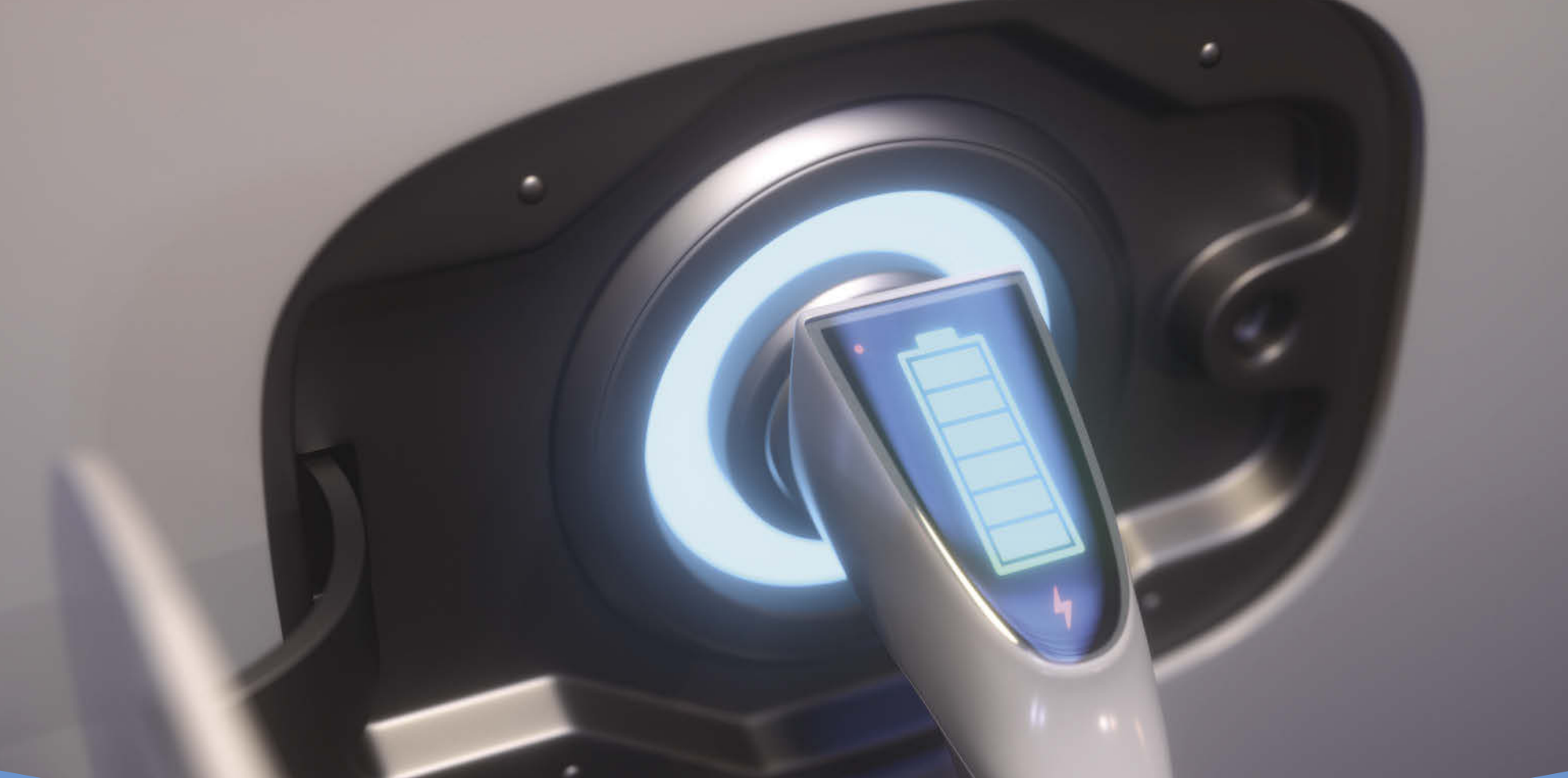
- For starters, look at the **user interface**. Using a diagnostics tool needs to be simple, it cannot be rocket science. The interface needs to be clean and intuitive. It should be easy to navigate and not take too long to learn. It should also be consistent across the board, regardless of the manufacturer, whether it is an engine or a transmission, or what year it is.
- This brings us to another key factor: the scan tool needs to be able to **service all makes**. Many technicians are taught that the dealer is the best when it comes to diagnostics, but some all-makes tools are virtually dealer equivalent. Today, these tools cover roughly 98% of a shop's needs and are capable of performing advanced actions that were previously only available at the dealer.
- Lastly, the right scan tool needs to offer **more than just diagnostics**. When we get in a jam, we can search for the right information on the internet, but are we looking at the right system? How can we be sure? The internet is not always a safe option while working on a client's truck. Having the right information segmented by the right vehicle in the right moment is a key factor. It can mean the difference of knowing the specs and getting the torques right instead of using the "tight enough" approach we so often see.

» **Today's diagnostic tools need to function as a second technician.**

A diagnostic tool can be the Robin to your Batman

When searching for a diagnostics tool, you need to know it is the right one—a tool that makes the technician better at what they do. It is important to measure these elements, know the ins and outs, and always have a support team when the task becomes too difficult. Cojali's Jaltest is designed with these factors in mind, to help solve those issues and to never have to turn down a job.

By Bruno Gattamorta
VICE PRESIDENT, COJALI USA
Cojali has been an aftermarket provider in the heavy-duty industry for 30 years. Starting in the fan clutch business, diagnostics soon became the company's primary focus. With an integrated all-makes solution, Cojali has helped shape the aftermarket diagnostics Industry. Bruno Gattamorta is the Vice President of Cojali USA. With a background in engineering and an MBA, he has been catering to the aftermarket industry for the last five years, training customers, developing products, and being a part of this growing community.



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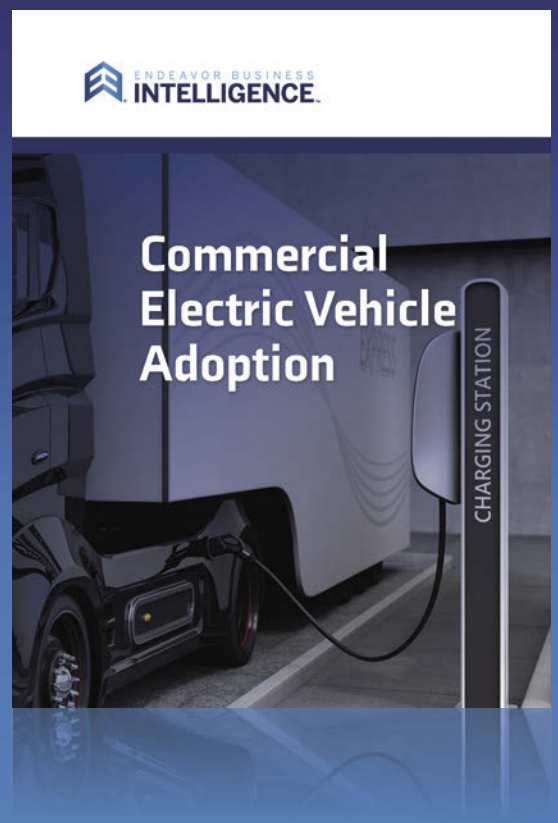

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