IS NOW THE TIME TO ADOPT SMART TRAILERS?
Page 8

SAVING A FORTUNE WITH PREDICTIVE MAINTENANCE
Page 20

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Page 14

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FleetMaintenance CONTENTS / FEBRUARY 2023

Roadside maintenance strategies
P. 14

Trailer connectivity
P. 8

Predictive maintenance
P. 20

VIEWS FROM THE EXPERTS

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Hype is real with predictive maintenance

You have every right to get excited about predictive maintenance and the future of commercial vehicle repair, but remember to be patient as well.

By John Hitch
Editor-in-chief

@Hitched2Trucks

I always get super hyped when I get to write about complex technology, like this month's feature on predictive maintenance (pg. 20). What's great about predictive maintenance is that it can impact so many facets of the transportation industry, as it accumulates millions to billions of these data points. On their own, they may, like the flap of one butterfly's wings, barely cause a ripple on a pond. But combined, this ocean of data has the force to manifest a tsunami of positive change.

Here's a very possible scenario: A maintenance department receives one diagnostic trouble code (DTC) from a truck that lets them know something's up with the aftertreatment system. Normally, they would still have to go through a possibly lengthy problem-solving process. But their predictive maintenance platform detects other DTCs coming from that engine, and then an algorithm searches the platform's immense (anonymized) historical data spanning several fleets and finds thousands of similar cases with this combination of DTCs, with this make and model, powertrain, and mileage. With all that calculated, it can spit out the most likely cause and current level of severity. If a failure is imminent for a truck on the road, the driver now knows if it's time to head to the nearest service center or complete the route and get checked out at the fleet's terminal.

Some solution providers are already doing this at a basic level for fleets, as we detail in the main feature, but this is just the beginning. Once more data is available, like for tires and wheel ends, which will be coming as more trailers become connected (pg. 8), the solutions will have a larger sample size to work with and, thus, more accuracy.

Because no two trucks wear down the same way, due to topography and loads, trailer data will further enable predictive accuracy, according to Great Dane. The OEM's FleetPulse telematics solution provides loaded weight data, which impacts component wear.

The company said: "Two similar trailers could have each gone 30,000 miles, but if one of them is averaging 15,000 lb. more weight carried per load, its components will have more wear, and that information will let you more accurately plan its maintenance schedule."

Add work order and repair information to that, then you're really getting a clear vision of the future. That, in turn, helps a fleet avoid costs down the road.

Where breakdowns are concerned, we're talking "Minority Report" levels of prognostic clarity, though you'll be stopping breakdowns, not murders. And as we detail in our comprehensive roadside maintenance piece (pg. 14), breakdowns can be a real killer to profits, and more importantly, endanger the brave mobile service techs on the side of the road and generally decrease highway safety.

"Everybody would like to have that magic solution" to know when a breakdown will happen, noted Melanie Simard, director of compliance, client service & technical support at Isaac Instruments. "After drivers' compensation, maintenance and fuel are the two major costs, so it would really help. It's already hard as it is for a fleet to make a margin."

Prior to Isaac, Simard worked at fleets for 20 years, so she knows those costs all too well, and Isaac's future telematics solutions are becoming more predictive, she said.

To make that hypothetical future vision a reality, solutions will need to be more prescriptive. A maintenance team that leverages this form of data analytics-empowered maintenance takes real-time sensor data into account and will narrow issues down even more. This also gives a better sense of which assets have a high risk of downtime and prescribe what actions should be taken.

Maintenance solution provider Pitstop is already doing this with their predictive platform.

"We take voltage data every few seconds and come up with a health score on the electrical system of the vehicle," noted Pitstop CEO Shiva Bhardwaj. In the case of electrical DTCs, this allows the platform, to identify if the battery, alternator, or starter is the issue.

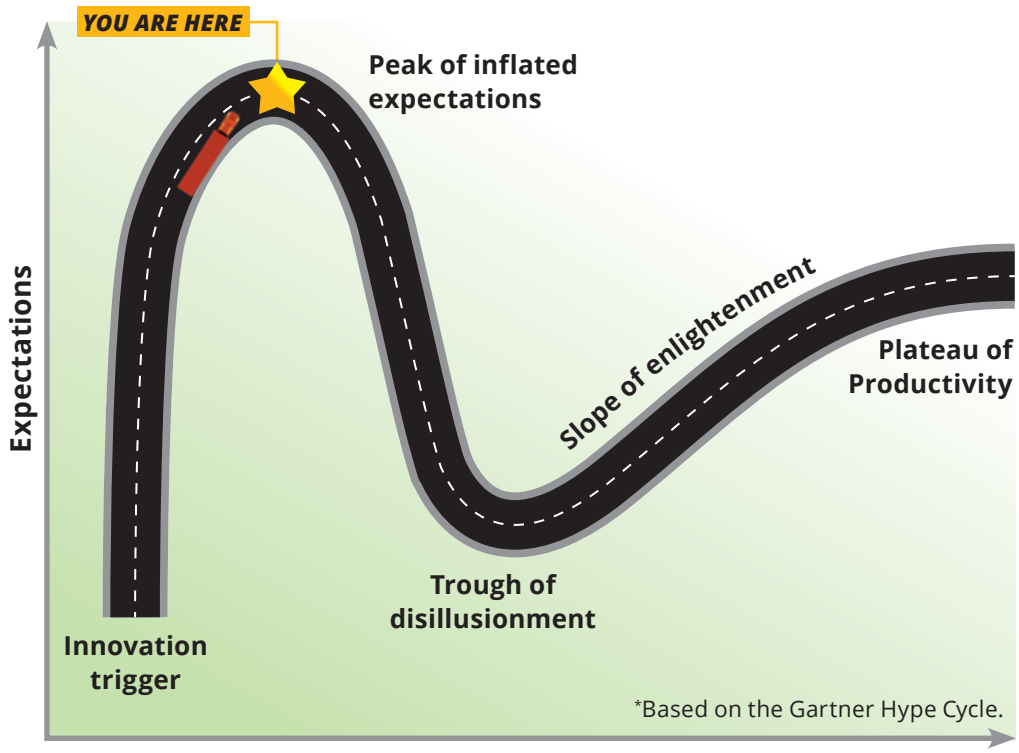
At some point, once these platforms can confidently detect the true problem on a consistent basis, they can more deeply integrate with a fleet's shop management system and ecommerce solutions to schedule work and ensure the needed repair parts are in stock.

There are some serious challenges to figure out before that happens, such as who has the right to repair. This was brought up by one maintenance executive I recently chatted with on the subject.

"Predictive maintenance is a great concept and I am looking forward to it adapting," he said. "My challenge is there are issues that come from premature parts replacements due to warranty considerations. We need the industry to begin working with predictive maintenance providers to allow fleets to change an alternator, for instance, once it is determined to be charging at a reduced rate due to the predictive maintenance reports."

After talking with several experts on the subject, my prediction is these issues will get solved in the next five years. In terms of the Gartner Hype Cycle, we are probably at the "Peak of Inflated Expectations" in the transportation industry and headed soon for the "Trough of Disillusionment." But with patience and collaboration, unexpected maintenance can be a thing of the past.

Commercial Vehicle Predictive Maintenance Hype Cycle*



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Is it time for smart trailer adoption?

The latest connected trailer offerings are ready to help fleets improve uptime and efficiency.

By Faith Boone

Trailers' jobs are pretty straightforward: Stay attached to the tractor, keep the cargo safe from point A to B, and don't cause any downtime. Refrigerated units are also asked to keep their internal environments at a specific temperature. Simple, right?

But external pressures on fleets mean this isn't good enough anymore. Any new equipment a fleet purchases needs to perform better than ever before. As fuel costs, freight rates, and just about everything else become more unpredictable, fleets need to know where their assets are and how they are doing at all times. That typically means adding smart technology that connects individual assets to the larger operation to provide their location and health, while also providing real-time and historical data.

"New technology continues to become more commonplace—there are steady increases across the industry in most items that will help reduce maintenance, increase fuel savings, or provide useful data to a customer operation," said Sean Kenney, chief sales officer at Hyundai Translead.

Fleets are likely familiar with some smart features already, such as tire inflation system monitoring or GPS sensors to assist in asset tracking.

Now, using a system such as Utility Connect, a partnership between Utility Trailer and technology provider Phillips Connect that combines Utility's wiring harness with Phillips Smart7 nosebox, they can also receive ABS fault codes and detect if trailer lights have gone out. On the operational side, they can verify if a trailer has cargo via cameras or ultrasonic sensors. And the system has the ability to evolve through over-the-air updates, which will allow management to communicate with other systems, such as Bendix roll-stability system or brake-pad wear sensors.

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» ConMet Digital's "Smart" suite can monitor wheel ends, tire pressure, axle load, and line pressure.

John Hitch | Fleet Maintenance

Other solutions include Aperia's Halo Connect and Pressure System International's TireView to monitor tire pressure and prevent blowouts and poor fuel economy, or ConMet's PreSet Plus SmartHub to get data on hub, tire, and brake performance. And then there's also Grote Industries' 4SEE Smart Trailer System and Great Dane's FleetPulse platform, which work similarly to Utility Connect. Reefer fleets can also adopt Thermo King's TracKing telematics platform for end-to-end visibility on transport refrigeration units (TRUs).

All of these choices make it difficult on the fleet personnel responsible for spec'ing new trailers or updating existing ones. Despite their complexity, because of all the benefits they afford, trailer connectivity should be strongly considered, if not now, then in the near future. *Fleet Maintenance* recently spoke with several providers to help simplify the process and make the smart choice.

The time is now

Industry experts at the American Transportation Associations' Technology & Maintenance Council 2022 Fall Meeting noted that the buy-in from fleets to adopt more trailer connectivity technology is on the rise. Rob Phillips, founder and CEO of Phillips Connect, estimated by the end of 2023 there will be 350,000 smart trailers on the road, which will grow to 1,500,000 by 2026 and 2,000,000 by 2027.

Phillips Connect anticipates that in the next three years, seven out of every 10 new trailers will include some form of telematics, a number that will increase to more than 80% within the next five years. For its part, Phillips has delivered 150,000 smart-trailer gateways to customers, along with more than 1 million sensors that connect to them. The gateways, which include Smart7, StealthNet, and SolarNet, provide fleets with trailer health data and analytic tools.

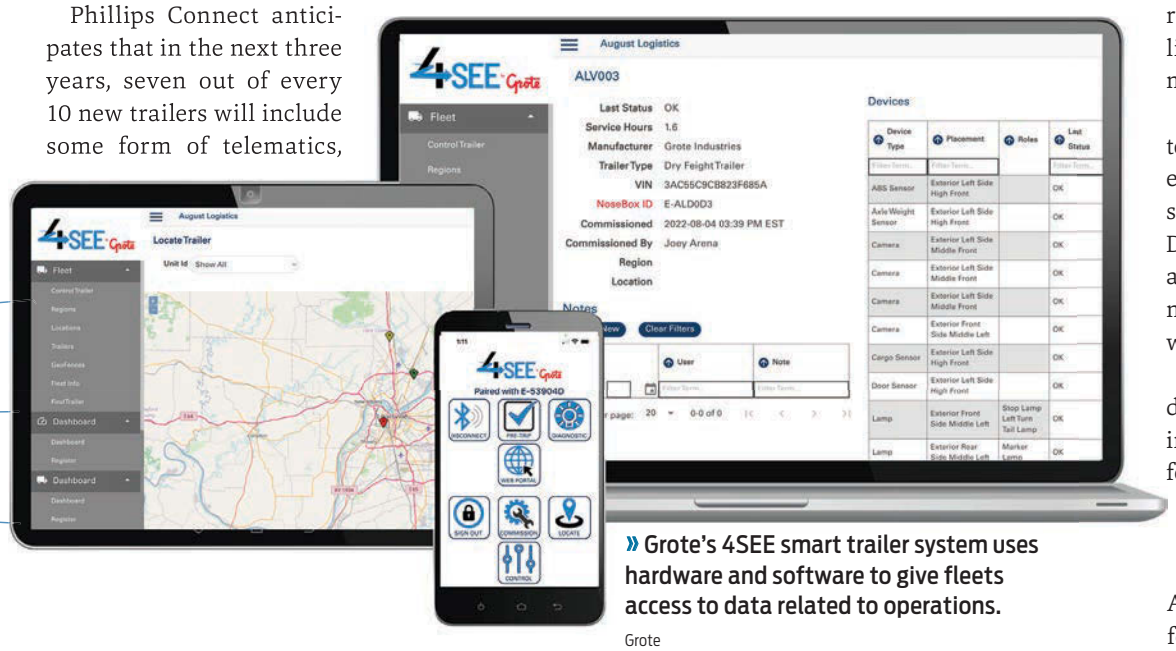
Phillips noted these tools extend beyond answering the question "Where's my trailer?" and allow fleets to identify which trailers are in need of maintenance and which are good to use. The company said its solutions have led fleets to dramatically improve trailer tire life and improve asset utilization.

"One OEM has told me that they are now putting telematics on nearly half of the trailers they ship out, and almost all of the reefers they build, and I would think that's the same for other manufacturers," Phillips said.

Particularly, Phillips found that the number of truck/trailer combos looking at overall health is increasing quickly.

"I believe we are approaching an inflection point now, where there are enough larger fleets that are talking about the benefits of smart trailers, and that this is creating a new level of momentum that will continue to increase adoption of truly smart trailer telematics, which is what we are excited about," he said.

Lance Gage, SAF-Holland product manager of trailer axles & suspension systems, Americas, said



» Grote's 4SEE smart trailer system uses hardware and software to give fleets access to data related to operations.

Grote

» ConMet customers can get a clear sense on trailer health at the touch of a button.

John Hitch | Fleet Maintenance

SAF is definitely seeing an uptick in OEM partnerships and collaborations on smart trailers.

"The fleets are telling trailer OEMs and suppliers that they are ready for this new technology and that the OEMs are late to supply," Gage said.

SAF supplies several smart trailer components in North America, including SAF Tire Pilot Plus and SAF automated coupling.

"It is not too much of a stretch to envision that all new trailers built in five to 10 years will have a suite of smart trailer options or levels from which to select that are likely tailored to their particular type of fleet application and needs," Gage said.

He added that with the benefits of smart trailer connectivity being recognized, it is time to look to the future.

"More developments in the near term will monitor key operation parameters on the trailer and will greatly enhance overall safety and fleet operational performance," Gage said. "How many times have we heard, 'If I had only known,' with regards to a pending trailer issue that could have likely been easily addressed in a safer manner more quickly and at a lower cost to the fleet?"

Drōv Technologies CEO Lisa Mullen said her team anticipates the adoption of smart or connected trailers will escalate, especially if fleets have set sustainability initiatives or autonomous goals. Drōv makes the AirBoxOne smart trailer platform, and partnered with SKF Vehicle Aftermarket to monitor vibration and temperature data at the wheel end monitoring.

"Smart trailers will need to be a part of [fleets'] decision-making now," Mullen said. "As costs increase across the industry, the opportunities for savings through efficiencies—particularly tire savings—will become more pronounced."

Nicola Zingraf-Bolton, head of digital solutions for the ZF Group CVS division in the Americas, said fleets are in the business of forwarding freight and "time is money."

Trailer connectivity increases the efficiency of daily operations when it provides real-time load status and tracking information, she said.

"Continuously monitoring the trailer's technical condition allows a fleet to remotely diagnose a fault and take appropriate action to minimize downtime," Zingraf-Bolton explained. "Workshops use it to improve their service scheduling and preparations to get the vehicle back on the road faster."

Ross Froat, executive director of Great Dane's FleetPulse, said motor carriers are more interested in trailer connectivity technology today than they were back in 2016 or 2017. He said Great Dane saw an increase from competitors in 2019, especially with enhanced GPS tracking.

"A lot of things have changed because of COVID, and also that led to more attention on data and remote working," Froat said. "You can log into FleetPulse—or our competitors—anywhere you are if you have a phone, laptop, or computer, and do asset management work right there, remotely."

Connecting the benefits

More trailer health transparency should be a boon for any maintenance department. In general, having fewer tires to change out and overall trailers to manage will inevitably free up maintenance teams to focus more on critical issues. And with the help of telematics and data analytics, a trailer no longer has to rely on a human operator to discover its issues before they become full-blown disasters.

This may be most beneficial to the cold chain, where goods such as frozen foods can spoil if a TRU issue is not detected in time.

"Without telematics, the driver becomes solely responsible for setting the temperature and operating mode of the reefer unit correctly," said Adam Jaberi, senior product owner of telematics and connected solutions at Thermo King. "Telematics not only provides a second set of eyes, but also additional validation that gives drivers and fleet managers peace of mind."

He said even now, many in the industry don't fully grasp the full potential of trailer connectivity, and mainly (at least in the reefer sector) use the sensors for location and temperature data. That changes shortly after implementation.

"After this honeymoon phase, customers start to realize that telematics can be used for more than looking at temperature and that it covers all aspects of fleet operations," Jaberi said. "This is when customers start to ask questions about other use cases like dwell time reporting, geofencing capabilities, and customer reporting."

He added the new data gleaned from trailer telematics can also reveal where a fleet is underperforming.

"Fleets will start using telematics thinking that they are performing at these record-breaking levels, and then the data shows that there is room for improvement," Jaberi said. "Ultimately, this is a positive outcome that can lead to improvement. However, there are still reservations within different fleets to implement telematics because it uncovers areas like safety and fuel efficiency where there is still room for improvement."

Steven Walters, senior product owner of telematics for ThermoKing, said the company is seeing a different type of customer request telematics than in the past.

"For example, dry fleets that haven't used telematics are realizing the benefits telematics provide," he said, such as "a more holistic approach to monitoring their entire fleet."

Trailer tires are also a frequent reason for breakdowns and costly repairs, making them the low-hanging fruit of smart trailer's bountiful tree of benefits.

Jake Martin, marketing support specialist at Pressure Systems International (P.S.I.), said being able to find tires that are low or leaking allows fleets to prevent tire and wheel end events while also reducing fuel costs due to low inflation.

"A properly inflated tire has less rolling resistance resulting in better fuel economy, which is not only better for fleet costs, but is also better for the environment," Martin noted.

While almost any fleet can benefit from using connected technology, he said the value is enhanced for fleets that run long hauls, or time-sensitive or expensive cargo. Trailer fleets that don't have their own drivers pulling the trailers also see a tremendous value in having visibility to their assets when not in their possession, such as lease fleets and trailer pools, he added.

"The common denominator in all of this is to reduce the reliance on the driver in monitoring the health of various systems on the trailer and allowing them greater focus on driving," Martin said.

Prepping for adoption and expansion

"A system that interconnects a trailer can help drive down operating costs," said CJ Biank, global market manager at Grote Industries. "Potentially going into recession, you're now protecting yourself because you're ensuring that what you put on the road is operating most effectively and most efficiently."

Biank said there is clearly a huge ramp up for trailer telematics, but now the early adopter fleets are looking for "more."

"What is the nature of human beings—they want more, right?" Biank questioned. "They get something and they want more. This is where trailer connectivity adds on to telematics."

"More" may include tying in ABS, lighting, and sensors and cameras.

"That's where having some sort of standardized communication protocol is going to be so important for a trailer," he added.

In the future, look for Grote and other providers to introduce ways to push for that smart trailer standardization. And they will need to address technology, sustainability, and operational goals along with improving connectivity.

"I think you'll see fleets that have these types of goals are the ones that are the first adopters or the early adopters of this technology," Biank said.

First adopters of smart trailers will likely include tanker fleets, said SAF's Gage.

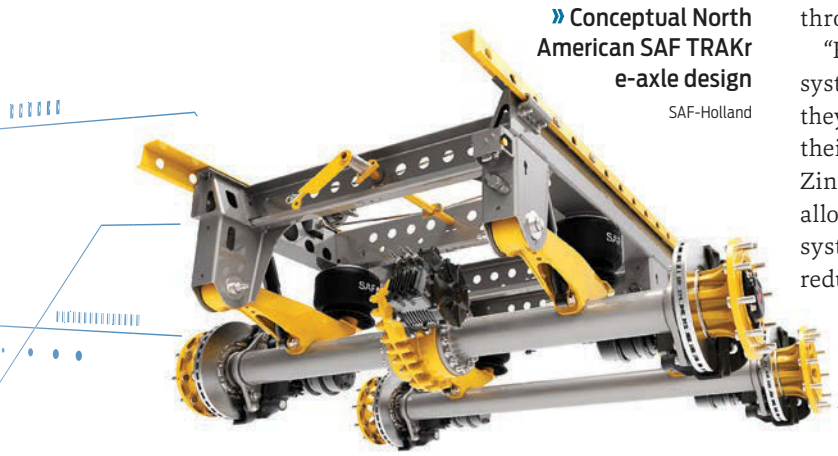
"As a highly weight-sensitive and safety-critical application, this makes the most sense for them to the initial adaptors," Gage said. "We are seeing sensor integrations from tire pressure management, including load-based adjustments, to cameras for fuel discharge."

When spec'ing these smart components, fleets should consider not only where technology is now, but how it will grow and improve.

"Fleets need to also understand the expandability of systems and whether or not their basic solution can accommodate additional integrations later on as they continue to evaluate whether or not these add-ons deliver an ROI to their operations," P.S.I.'s Martin said.

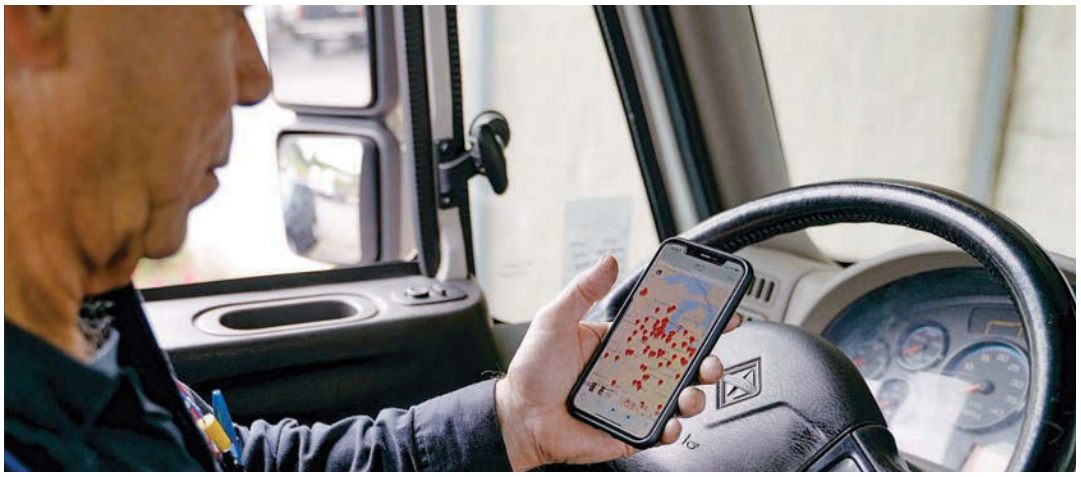
Phillips agreed.

"Starting small with TPMS is a great way to begin saving, but as technology continues to quickly evolve, it's never been more important to 'future-proof' your fleet to set yourself up for future success," Phillips said. "Some fleets aren't ready for that big investment in their trailers, but by starting with a capable harness and smart gateway, you have the ability to add sensors as you go."



» **Conceptual North American SAF TRAKr e-axle design**

SAF-Holland



» **The standard FleetPulse package includes built-in CAN harnessing so that smart sensors can be added as needed.**

Great Dane

Grote's 4SEE smart trailer system seeks to address this issue as a combination of hardware and software that gives truck fleets more access to data related to their operations.

"What we see with 4SEE is that it's one system, one common communication stream," Biank said. "That is the goal. What we want to do is create an infrastructure on that trailer that any type of component in today's world or tomorrow's world can tie into."

Final considerations

Paul Washicko, general manager and VP of ConMet Digital, said pulling a trailer into a shop for equipment outfitting is no easy feat, so it could take a long time for a fleet to roll out smart trailer technology across its existing inventory.

And after that, having access to higher amounts of data can overwhelm management. Washicko noted some fleets soon realize they don't have the proper processes or procedures in place to utilize this kind of visibility appropriately.

"[Fleets] dealt with these things in a reactionary way in the past, but now [if] you've got a tire issue, how do they work that into your normal operations?" Washicko asked. "Because that trailer has to be used as much as possible. We have to help the customers learn how to do that in their systems."

According to Gage, preventing data overload is a focus at SAF-Holland.

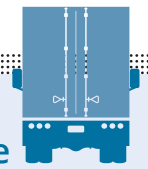
"We work with each fleet to establish which attributes are of most concern and importance to them," Gage said. "In addition, it's important to determine the notification algorithms so that only actionable issues are communicated as alerts."

Gage said as the market expands there will continue to be new signals and data integrators to manage for fleets.

When deciding which platform to invest in, customers should always strive for simplicity through consolidation.

"Fleets have been forced to deploy multiple systems on one asset to receive all the data points they need for their business, which drives cost for their monthly subscription services," ZF Group's Zingraf-Bolton said. "Telematics solutions that allow you to combine multiple features in just one system are key to control cost and significantly reduce installation complexity on a trailer."

Froat says Great Dane is able to control the costs because it is a trailer manufacturer and its integration partners are willing and able to work with the team in a lot of different ways.



Smart trailer pros and cons at a glance

Trailer connectivity features often include GPS tracking, cargo detection, and door open and close sensors. Specialized solutions can also feature electronic stability control, 360-degree video blind-spot detection, back-up cameras, and predictive tire health. Together, these assets can provide:

- Safer operations
- Better tire monitoring
- Less downtime
- Asset tracking

However, more features don't always mean better information. Regarding telematics, too much of a good thing can include:

- Overwhelming costs for various subscription services
- Difficulty integrating technology on one asset from multiple vendors and ensuring proper communication
- Extended retrofitting periods
- Information management overload

"There's ease of advancing and more data integrating and more technology integrating into FleetPulse because of owning the trailer," Froat said. "There are cons in the industry for data integration for partnering up and trying to create a product…for customers and to compete with large smart trailer suppliers."

Biank said getting everyone to play nicely together in the trailer connectivity sandbox can be a challenge.

"With there being so many different platforms, so many different offerings on the trailer space, getting everyone to play nice together is very important," Biank said. "We've taken a very agnostic approach to what we do. We've integrated all of the components that are on a trailer into our system. But we've also enabled [vendors] always to pull their data out. So when we talk back to accessibility… it's not just the end user. It's those vendors that you're integrating…they want access to their own data."

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ROADMAP T ROADSIDE

Mapping out a strategy to reduce downtime, cost, and risk during an emergency roadside event.

By Gregg Wartgow

[MOBILE MAINTENANCE]

The best preventive maintenance program in the world can't completely eliminate all emergency roadside events. Unexpected breakdowns will happen eventually, and it's important for fleets to have a well-defined response plan in place before they do.

"Emergency service can be very expensive and can have extended response times," said Joe Puff, VP of

O RESOLVE BREAKDOWNS

truck technology and maintenance at NationaLease, a provider of full-service leasing and contract maintenance services. "When a breakdown occurs, it can be quite frustrating trying to find a service provider in an unfamiliar area. That's not the time to develop a plan. Every commercial fleet should have a repair protocol playbook for breakdowns."

John Hitch | Fleet Maintenance

» Cox Automotive Mobility Fleet Services operates more than 750 mobile service trucks to provide emergency maintenance across the country. Cox Automotive also provides towing and asset recovery services.

Cox Automotive Mobility Fleet Services

According to Puff, that playbook should include a list of prearranged service providers with emergency contact information, along with a tire service, towing company, and mechanical repair provider for the areas of operation.

If a vehicle can be driven to a shop, TravelCenters of America advises that's the way to go.

"The moment you decide to try and handle an issue at roadside, the cost goes up," said Daniel Mustafa, director of technical service at TravelCenters of America, which employs nearly 3,000 technicians at its TA Truck Service Centers across the country. That's because roadside labor rates tend to be higher, and other costs like parts retrieval and drive time are often added onto the repair bill.

That said, when a vehicle can't be driven to a shop, a fleet's choice becomes roadside repair versus a costly tow.

» As is the case with out-of-service violations, tires are one of the top causes of roadside breakdowns among commercial fleets.

Transervice

Most common roadside repairs

While a vehicle could go down for a long list of reasons, there are a handful that are the most common for fleets. Matt Copot, VP of maintenance at Transervice Logistics, a provider of freight management, fleet leasing, and contract maintenance services, said the top four roadside issues they encounter are:

- Tires
- Brakes (lines and fittings, gladhands, chambers)
- Cranking system (jumpstarts, batteries, starters)
- Exhaust system (aftertreatment devices, SCR)

Interestingly, the first two items on Copot's list are identical to the top two reasons commercial vehicles are placed out of service in the U.S. The silver lining is that many of the safety issues caught at the roadside can be resolved there as well.

"The fleet has three options: fix it, float it, or tow it," said Kerri Wirachowsky, director of inspection programs at the Commercial Vehicle Safety Alliance (CVSA). Fixing it largely comes down to what exactly needs fixing, but also where the vehicle has been pulled over.

"When I used to do inspections and had someone at a fixed scale location, the technicians doing roadside work seemed to have every piece of equipment known to man," Wirachowsky said. "They could do spring jobs and repair leaking wheel seals and just about anything. But when you're at the side of the road, fixing an air hose or adjusting brakes is one thing. Doing a wheel-end job? Not so much. In that case, the fleet would typically want to have it towed."

Wirachowsky said there are other instances where a fleet may choose to have the vehicle towed to a shop. If the truck isn't too far from a shop, it could prove to be more cost-effective to have it towed a short distance so the vehicle can be repaired under a roof. But if the nearest shop is nowhere close, the fleet could be looking at a hefty tow bill in addition to the repair bill. Calling an emergency roadside service may be the best option.

Sizing up the service call

Once the vehicle is parked safely and the emergency equipment deployed to alert motorists, the driver should do their best to identify the exact nature of the defect. This will help dispatch determine the best road service response to call in.

"If it's a tire blowout, a tire provider could be called," Copot said. It is helpful if the driver can identify the size of the tire and the proper wheel position. "Equally important is informing the road call service if the wheel has been damaged so they can dispatch the parts necessary to repair or replace."

As a followup, remember that if the wheel end is taken off for a repair, a torque check should be performed 50 to 100 miles down the road.

"Improper installation will typically result in torque loss shortly after the vehicle has returned

to service," noted Kevin Rohlwing, SVP of training at the Tire Industry Association. "A simple torque check down the road after tire service will help ensure that nothing is loose and prevent wheel-off accidents from happening."

Aside from tires, there are many other roadside repairs that are well within a good roadside service provider's grasp.

"Our mobile technicians are some of the most well-rounded technicians in the industry," said Larry Fowler, fleet service manager for Cox Automotive Mobility Fleet Services, a nationwide provider of scheduled and unscheduled maintenance for fleets. "Mobile technicians do not have the luxury of being a specialist. They are experienced and trained in all aspects of truck repair and see a full variety each day."

To that point, Fowler said Cox's mobile services include basic PMs like fluid and filter changes, but also transmission, differential, and exhaust filter services, as well as overhead engine adjustments.

Of course, there could be instances where roadside service is likely not an option. Like with tire blowouts, the driver should relay all necessary information to dispatch so the appropriate next steps can be identified.

"If there is a mechanical situation, the driver should investigate and take note of any details they may have noticed prior to the breakdown that would indicate the severity of the failure," Copot explained.

For instance, if the driver noticed a loud bang and an immediate loss of power and oil coming out of the exhaust stack, that would be indicative of a turbo failure. "In this case, it's highly unlikely that a road call would be able to repair. The best remedy would be to call for a tow truck," Copot said.

Technician safety is another consideration.

Mustafa said TA Truck Service mobile technicians typically avoid top-of-trailer repairs at roadside due to risks created by traffic and wind gusts. "But that doesn't mean we wouldn't look at making that type of repair if the vehicle were parked safely in a parking lot or something like that," Mustafa added.

TA Truck Service technicians also refrain from attempting roadside repairs when the repair itself may render the vehicle unstable. "An example would be an air spring or airbag replacement," Mustafa related. "If the vehicle is made unstable by removing its support, passing traffic could make the vehicle rock which puts the technician at risk."

Coordinating the call

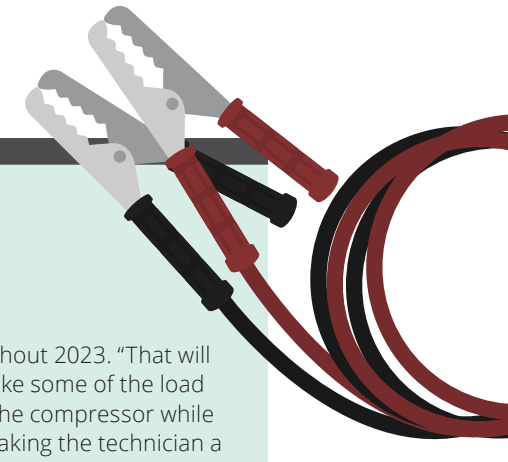
Regardless of which roadside solution is chosen, good communication is vital to ensuring an expedient resolution. Calling a service provider's 24/7 emergency hotline has been the go-to method for years. Now, digital connectivity is enabling new methods of communication that can make the entire process more convenient and efficient.

For example, Continental's TrukFix app allows fleets to submit tire-related service issues to Continental's Tire Support Unit (TSU). This eliminates any potential wait times when calling the 24/7 emergency call center.

"We now use the TrukFix app 99% of the time as opposed to calling," said Brian Rigg, fleet service center manager for Trimac Transportation, a Canadian-based bulk carrier with more than 140 branches across North America. "The TrukFix app is very simple and user-friendly. The other nice thing is that the form you fill out makes sure all of the important information is gathered so Continental can figure out the best thing to do." For many larger fleets, including Trimac, the internal process is for the driver to call their dispatch. Dispatch follows the form in the TrukFix app to ask the driver a series of questions. After typing in the information the driver conveys, dispatch clicks to submit the request to Continental, which then reviews the information and identifies the exact location of the vehicle through GPS tracking. The appropriate course of action is taken from there. "A case number is also provided should any follow-up calls be needed later," Rigg added.

According to Kaitlyn Landreth, TSU supervisor at Continental Tires the Americas, TSU staff often don't even have to speak with a dispatcher. The key is having an app that is thorough and easy to use.

"When we initially began creating the TrukFix app, we took a deep dive into not only the information we needed to provide a service technician, but also the information our fleet customers wanted



Equipping an emergency roadside service vehicle

When deciding how to equip an emergency roadside service vehicle, start with the most common reasons as to why a service vehicle is called out in the first place: tires, brakes, fuel, coolants, batteries, and aftertreatment systems.

"Our trucks are equipped with an all-in-one unit that includes a compressor, jumpstart unit, and generator, all powered by a gas engine that pulls fuel from the same tank that fuels the truck," said Daniel Mustafa, director of technical service at TravelCenters of America. "We also have a 30- to 40-gallon fuel tank with a pump."

TA's mobile service trucks are especially geared toward tire-related service. That's why they're also equipped with a mobile tire cage, as well as common tire-servicing tools such as 1" impacts, tire sockets, valve stems, and plugs.

Blaine Brothers follows the same general rules, with starting units, air compressors, and fluids on each mobile maintenance truck or van.

"For radiator hoses or belts, we will figure out the part numbers and bring the correct,or as-close-to-correct, parts as we can," said Mike Lamphier, a tow dispatcher at Blaine Brothers. "Sometimes we bring multiple parts just in case, so we can get them back on the road as fast as possible."

For issues related to aftertreatment systems, Blaine will likely tow the truck to one of its shops, but the service tech will grab appropriate diagnostic tools to verify the fault codes.

Because they offer trailer repairs as well, such as to liftgates, the vans will be equipped with welding equipment, too.

But there are other types of repairs a roadside service vehicle may also be called upon to do. In those more specialized instances, it may make more sense to simply grab any unique tools, parts, or supplies at the time the service call comes in.

Matt Copot, VP of maintenance at Transervice, believes that a reliable emergency service truck should be equipped with the following core equipment:

- Air compressor
- Starting device
- Welder
- Torches
- Air lines
- Jacks and jack stands
- Impact guns and sockets

TA Truck Service has begun testing more cordless, lithium-ion battery-powered hand tools. Untethered tools are ideal in a mobile application like roadside.

"We've used some cordless one-inch impacts that you can take truck tires off with," Mustafa said. Due to the solid performance of a lot of these tools, TA Truck Service is likely to begin purchasing more of them throughout 2023. "That will help take some of the load off of the compressor while also making the technician a bit faster and more efficient by eliminating the need to wheel out all of that airline."

Aside from tools, Copot said emergency service trucks should be stocked with the same essential shop supplies as a service facility:

- Fuel
- Starting fluids
- Penetrating fluid
- Coolant
- Greases
- Motor oils
- Shop rags
- Spill containment kits
- Scan tools and/or laptops

Finally, an emergency service truck could be stocked with commonly needed parts, including:

- Headlights, stoplights, turn lamps, mid turn lamps, and clearance lights
- Airlines
- Seven-way ABS cords
- Various air valves
- Brake shoes and drums
- Leaf springs
- Air bags
- U-bolts
- Overhead door rollers/hinges, roller door cables, and swing door hinges
- Diamond plate patches for floor holes
- Sheet metal for roof and sidewall patches

How a mobile service truck is stocked is ultimately up to the service provider. The objective is to get to the scene of the breakdown as quickly as possible and to have the items necessary to resolve the issue. —*GW*

» Continental's TrukFix app is helping expedite the roadside tire repair process by greatly reducing time spent on the phone.
Continental

to see reported back to them on their invoice," Landreth said. "We knew we needed something that would be easy for drivers and dispatchers to go, 'bam, bam, bam, done.' Additionally, the less time we are on the phones gathering information, the more time we can spend elsewhere to help get a driver safely off the side of the road."

TA Truck Service has begun testing its own web-based process for drivers and fleets to track repairs. Again, the objective isn't to replace the human beings in the 24/7 call center. The goal is to enhance the process and make it more efficient for everyone involved.

Some fleets lean on third-party roadside assistance providers for the most efficient process.

For instance, Maverick Transportation uses a service called TTN Fleet Solutions. "This web-based platform allows the driver to fill out a quick form that is submitted to TTN's driver support center," said Brent Hilton, director of maintenance at Maverick Transportation based in North Little Rock, Arkansas. Once submitted, a work order is automatically created and Maverick's maintenance coordinator is alerted. Some back and forth ensues between the driver and maintenance coordinator to better troubleshoot the situation and determine whom to call.

If it is determined that roadside service is the best option, Hilton said TTN leverages its expansive list of preferred vendors. Maverick's district service managers are tasked with building relationships with these vendors on an ongoing basis. As is the case in most facets of business, a strong pre-existing relationship with a service provider certainly comes in handy when you're in a pinch.

To establish its roster of preferred vendors, Maverick personnel fill out surveys to help grade vendor performance.

"We look at everything from the cleanliness of their shop to how nicely their technician treated one of our drivers on a past service call," Hilton said. "And of course, we want partners who do quality work safely and get our drivers back on the road as fast as possible."

When it is determined that the vehicle needs to be towed, Hilton said it goes to the nearest dealership because most of Maverick's trucks are under warranty.

"The telematics system we use allows us to pinpoint the exact location of the truck," Hilton said. "Also, our system tells us which direction the load is going so we can make sure the vehicle is towed in a positive direction, if at all possible." Maverick's maintenance coordinators then follow up to make sure the repair is completed as quickly as possible.

Another technology that is helping fleets better coordinate roadside service calls is Trimble Transportation's TMT Fleet Maintenance software. The software's Road Call functionality enables fleets to capture breakdown details, asset location, fault codes, and repair history. TMT then assists fleets in making informed decisions of how, when, and where to repair.

"Additionally, commercial location data from Trimble Maps is built right in, allowing for easy vendor selection," said Dave Walters, senior solutions engineer for Trimble Transportation, a provider of technologies that help fleets improve the routing, tracking, and maintenance of their assets.

Emerging technologies like remote diagnostics are also helping fleets resolve roadside issues faster and at a lower cost.

For example, Navistar's OnCommand Connection (OCC) is an open architecture connected vehicle platform that can collect data from factory-installed telematics devices and more than 30 commercially available telematics service providers.

When a vehicle has a fault, OCC shows the fleet manager a detailed description of the situation in everyday language. OCC also explains whether the vehicle needs to be stopped immediately or can be driven further. Finally, the system can direct the customer to the nearest repair facility with the parts, technician skillset, and diagnostics tools required to complete the repair in a timely fashion.

"Fleets acting on the insights have experienced a significant reduction in unplanned service events, reducing vehicle downtime and avoiding towing costs," said Srinivas Mallela, director of connected services at Navistar, a heavy-duty truck manufacturer whose brands include International.

Starting in 2023, all International Classes 6 through 8 vehicles will come with a factory-installed telematics device. For all other vehicles, fleets can choose an aftermarket OCC telematics device or commercially available device that is approved by Navistar's OCC team.

"We are also launching a new mobile application, recognizing that some customers don't stay behind a desk and need to understand how their fleet is performing in real time while on the go," Mallela said. "Additionally, we are constantly expanding our connected technology solutions and will be offering over-the-air software update capabilities for our new International S13 Integrated Powertrain when that enters production later in 2023."

Connectivity and technology in general continue to have a positive impact on all facets of fleet maintenance, roadside emergencies included. By leveraging some of these new tools to augment the other hallmarks of a good roadside breakdown playbook, fleets can have a little more peace of mind when something goes wrong on the road—because you know at some point, it eventually will.

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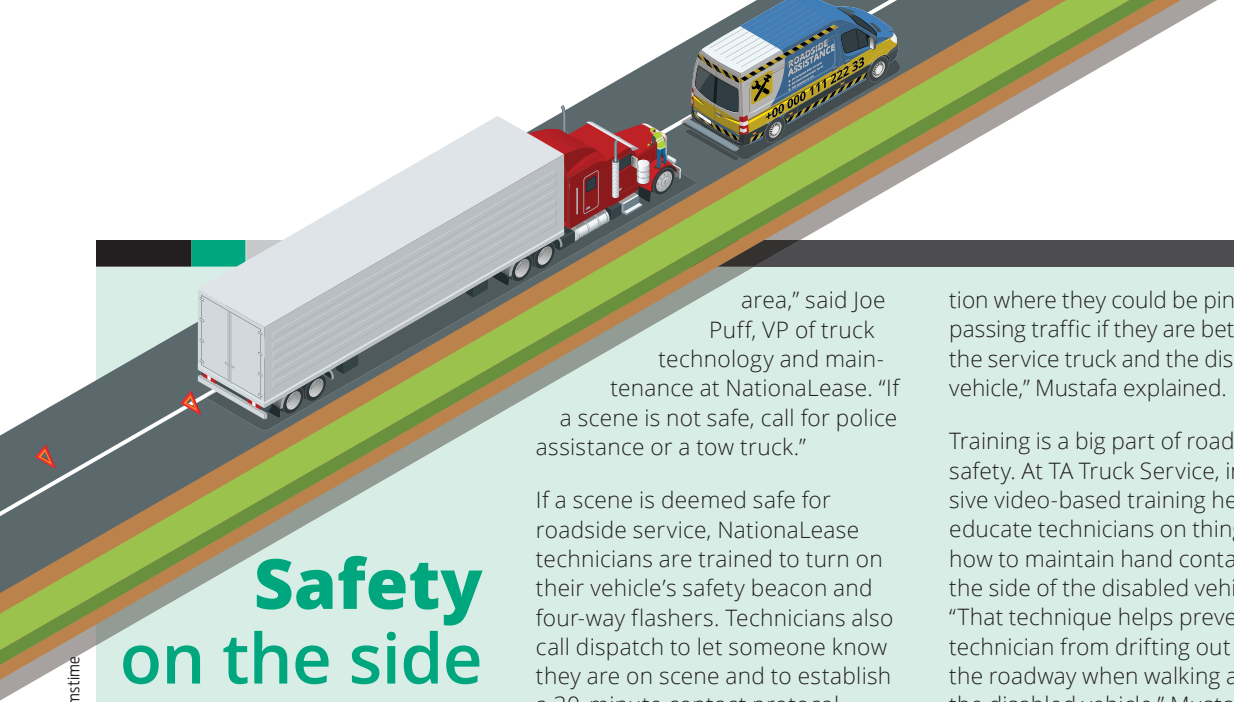

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Safety on the side of the road

Roadside truck repairs create some additional safety concerns that technicians won't encounter in a shop. Aside from the basics like hi-vis safety apparel and other recommended PPE, there are other factors that must also play into a fleet's overall safety program for mobile technicians.

"One of the most important safety items is a clearly defined safety culture where every technician has 'captain of the ship' authority to decide if the scene is a safe area," said Joe Puff, VP of truck technology and maintenance at NationaLease. "If a scene is not safe, call for police assistance or a tow truck."

If a scene is deemed safe for roadside service, NationaLease technicians are trained to turn on their vehicle's safety beacon and four-way flashers. Technicians also call dispatch to let someone know they are on scene and to establish a 30-minute contact protocol.

TravelCenters of America (TA Truck Service) has established a process where an advanced warning sign is set out several hundred feet behind the disabled vehicle. "Technicians also put out eight safety cones in a tapered pattern," said Daniel Mustafa, director of technical service at TravelCenters of America. "Our cone pattern is an effective, proven method developed by our safety experts over many years."

TA Truck Service technicians are also trained on how to position their service vehicle. "We don't want a situation where they could be pinned by passing traffic if they are between the service truck and the disabled vehicle," Mustafa explained.

Training is a big part of roadside safety. At TA Truck Service, intensive video-based training helps educate technicians on things like how to maintain hand contact with the side of the disabled vehicle. "That technique helps prevent the technician from drifting out into the roadway when walking around the disabled vehicle," Mustafa said.

TA Truck Service technicians are also required to go on a certain number of service calls with a mentor before they are turned loose on their own. "You can never just send a technician out roadside and say 'good luck,'" Mustafa said.

Because of its safety measures, Blaine Brothers, which offers roadside service and towing, has experienced good luck on the side of the road.

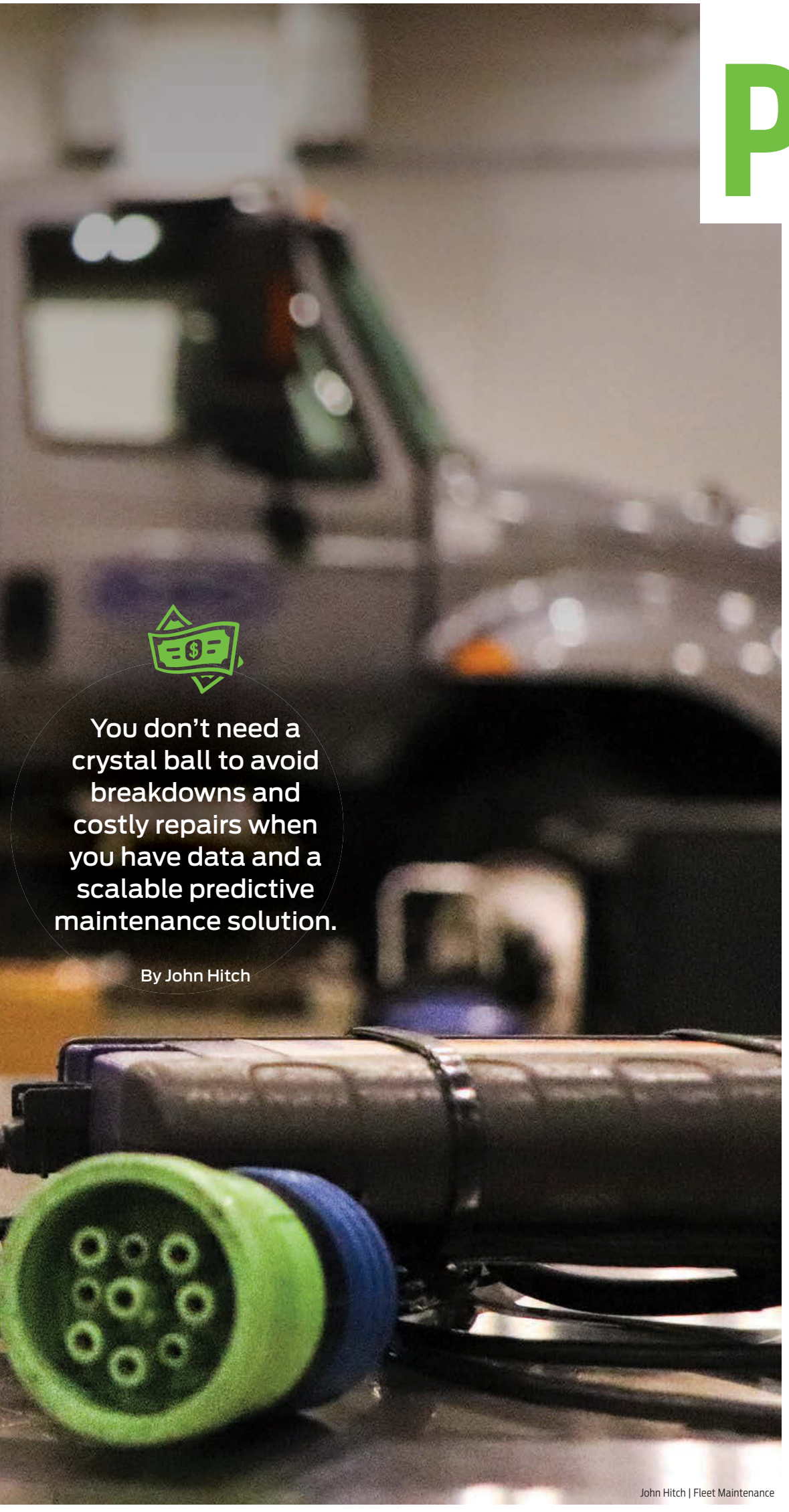
"For 40-plus years, we've had a very clean record," said Dean Dally, president and owner of Blaine Brothers. The company, completes thousands of calls per year and never says "No" to a truck in need. Back in the 90s there was an incident where a driver prematurely took off and technician was injured, but Blaine has since mitigated this through additional preventative measures.The service trucks also use warning lights to supplement the truckers' triangles.

"There is always a way to resolve the situation and make it safer," noted Mike Lamphier, Blaine's primary tow dispatcher. "If we have to go out there with a tow truck and tow it out of there to get into a safer location, we will do that. There's always an option."

He reiterated how vital it is to ensure the roadside tech is never caught between the service truck and down vehicle.

"It's a scary place, no matter what," Lamphier noted. "The main thing is to always be alert and aware. Always watch your surroundings." *—GW*

Saving a fortune with PREDICTIVE MAINTENANCE



You don't need a crystal ball to avoid breakdowns and costly repairs when you have data and a scalable predictive maintenance solution.

By John Hitch

John Hitch | Fleet Maintenance

Pitstop founder and CEO Shiva Bhardwaj, like many forward-thinking leaders, believes the future success of the transportation industry lies with predictive maintenance. And for good reason. A maintenance operation that leverages the burgeoning software tool, which prioritizes an asset's diagnostic trouble codes based on historical data and sends alerts to decision makers, knows where to focus their efforts with a high degree of certainty.

Current predictive maintenance solutions like Pitstop's platform can help fleets avoid unscheduled vehicle downtime by creating a vehicle health profile based on received diagnostic trouble codes and using data analytics to measure that against historical data.

"Our step-by-step process identifies issues, and then confirms how serious they are, and then you schedule vehicles in for service," Bhardwaj said. "This is how we're able to reduce downtime."

And this is enabled by the multiple outputs, including sensors, ECUs, telematics, and maintenance management systems. The more data plugged into the algorithms, the more accurate the analysis.

"Any asset is spitting off a lot of info, telematics, and service data, and your mechanics, external or internal, are recording a lot of information about how they're fixing these assets," Bhardwaj explained. "When you bring these things together, you can make some smart decisions."

With this newfound power to see the future, you can also succumb to the dreaded data overload, where too much of a good thing renders you directionless.

Bhardwaj has been told by customers that receiving all these fault codes "was too much," so they stopped looking altogether.

"The key is not overwhelming with warnings," he said, explaining that Pitstop "cuts through the noise" by providing, for example, three action items to address per week. "It's not about putting more alerts in your hand, it's about putting only the things that matter," he said.

Because of its wide-ranging potential, it's possible predictive maintenance will someday be as common as preventive maintenance or replace it altogether. While some fleets are already on that journey, others might be holding off, waiting for more data and certainty. The future is never 100% certain, but fleets that embrace predictive sooner rather than later will have an easier time once they get there, based on the sage advice *Fleet Maintenance* has gathered from several trailblazers in the space.

And their advice will hopefully enable maintenance departments to make the smartest decisions on how to proceed—decisions that could end up saving an operation a fortune.

How predictive works

First off, it's best to explain what predictive maintenance is and what it isn't.

"The definition of predictive maintenance is that you're using historical data to project what

the future is," said Jack Chung, VP of product management at Noregon Systems. In Noregon's case as a diagnostic provider, their historical data comes from three decades worth of DTC big data, allowing them to predict how often a fleet will see other DTCs pop up as well.

"If you have three or more DTCs, that [might] narrow it down to a specific component," he explained.

This then allows Noregon to assign a health score—color-coded red, yellow, or green based on severity.

This varies from conventional preventive maintenance, such as changing out tires or brake pads before they create issues on the road, which "is predictive in nature by using historical data, but without advanced analytics," Chung said.

The level up from that is prescriptive maintenance, which along with historical data, actively measure the components condition in real time to predict a more accurate outcome, Chung explained, adding that "prescriptive maintenance can improve your business and ROI by adjusting the operating condition for prescribed outcomes and planned maintenance."

"Prescriptive is the end goal that you want," Chung surmised.

At its core, the AI-enabled technology does all the math for you and helps humans identify patterns they could not possibly have time to analyze.

Bhardwaj noted that for decades, technicians like his father (who now owns a commercial vehicle shop) have done this manually, but it requires combining what the driver says, what a road test reveals, and then troubleshooting until the problem is diagnosed. The more experienced the technician, the faster the process.

Pitstop does this by detecting critical fault codes and alerting maintenance managers who can then take action. This might mean calling the driver and telling them to find the nearest service facility or having the truck make it to the nearest terminal where technicians are standing by to make a repair.

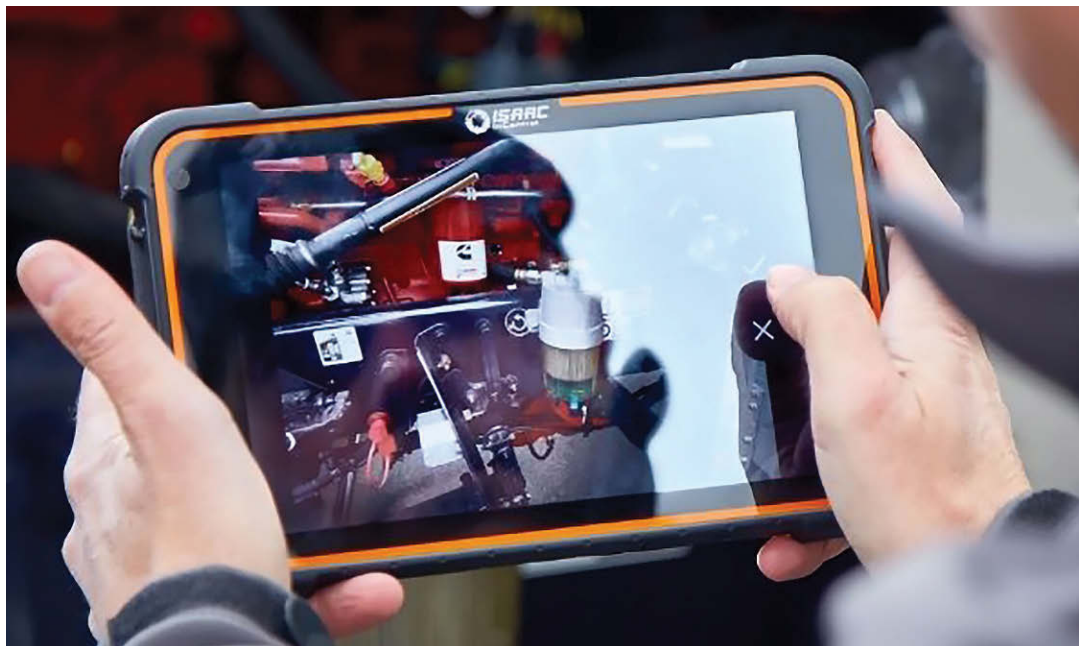
Catching issues early can also help prevent forced regenerations in the aftertreatment system by acting on issues before the DEF inducement lamp turns on, which would be cause for a forced regeneration.

"The idea is to try to identify these critical faults before the regen situation is in place, and make sure that the driver comes into the shop, because otherwise you're just going to have downtime," Bhardwaj said.

One example is catching a NOx sensor issue at the terminal as opposed to when the driver is sidelined in the middle of nowhere. A fleet that only goes by OE-recommended preventive intervals might suffer the latter scenario, while a predictive-minded one can preempt the costs associated with roadside breakdowns [see pg. 14 for more on roadside breakdowns].

Jim Rice, VP of predictive solution provider Uptake, noted this happened with one Uptake Fleet platform customer "who changed NOx sensors every 200,000 [miles] come hell or high water."

That's what the OEM recommend, so they did it this way for several years. Uptake Fleet combined their VRMS codes, work orders, and data analytics to show what the real story was.



» **Driver input and pictures from eDVIRs, along with predictive alerts, will help achieve a more accurate diagnosis in the shop.**

Isaac Telematics

"The idea is to try to identify these critical faults before the regen situation is in place, and make sure that the driver comes into the shop, because otherwise you're just going to have downtime."

Shiva Bhardwaj, Pitstop CEO

"We found they changed about 50 of those NOx sensors that didn't need it, and there were 50 that did need it," Rice explained. "There was one at 180,000 miles that needed it, there's one at 210,000 that didn't need it."

Rice noted a fleet of 10 might not be ready for such sophistication—though there are levels of predictive insights they can take advantage of. And the larger the fleet, the greater the savings. By getting advanced warning of cylinder head failures, a food and beverage fleet of 50,000 turned $50,000 engine replacement catastrophes into manageable $3,000 repairs. This failure mode happened on 80 trucks, so in four months the fleet saved $1 million, according to Uptake.

Fortune selling

Those "smart decisions" Bhardwaj mentioned often add up to saving fleets a lot of money. Pitstop's predictive platform, for example, on average reduces users' unscheduled vehicle downtime by 25%, while cutting per asset maintenance and operations expenses by $2,000 per vehicle annually. Bhardwaj noted this is a "conservative estimate," and equates to a 10x ROI.

United Road found a 4x ROI with Uptake, though Rice said even 10-12x ROI is possible, depending on how many blown engines a fleet might have repaired in the past.

"If you run a pretty good maintenance shop, there's still savings, but it may be closer to that 3 or 4x ROI," he said.

There are soft ROI costs to consider as well. Rice noted how a broken-down tractor-trailer with a brand's name on it is "not a good look" for the company, especially if that truck creates safety issues on the road.

"If I can eliminate breakdowns, there's a soft ROI just from brand image, public relations, and things like that," he said.

Uptake also claims its predictive platform, Uptake Fleet, improves customer uptime by 8%. Extrapolating that to the overall industry, the 12 billion tons of freight demand in 2021 could have been achieved with 288,000 fewer Class 8 trucks, according to Uptake. Some other stats Uptake boasts include decreasing roadside breakdowns by 20% and maintenance costs by 12%, while increasing technician efficiency by 9%.

The technician efficiency aspect comes from prioritizing assets that need maintenance based on what the ECM and historical data say, and not an OEM's broad best guess.

Uptake's customer that saved on the engine replacements is so confident in the software that they have integrated the predictive insights with their transportation management system to automatically create work orders, and the private fleet's techs can work on issues as the trucks come back that night.

Rice said the leased model is maturing as well.

"There's an extra couple layers of dynamics as to who owns the maintenance," Rice said. "We have some companies that will sign up with us, and then will share the information with the leasing company."

That data helps the leasing customers detect problems and figure out if the leasing company is responsible for the maintenance costs, Rice explained.

Noregon found a rental fleet using TripVision remote diagnostics, which provides health monitoring via DTCs, creating an additional revenue stream, according to Chung.

The rental company has employees monitoring TripVision fault codes and contacts the customer to alert them to critical issues, and then can also provide the maintenance.

"They're charging for this service to their customer," Chung said. "That's a very creative way that we didn't intend to have people using [TripVision]."

He reiterated what really drives the move to monitoring DTCs and predictive maintenance is "all about cost savings," and even more will be had as predictive parts ordering comes into play.

"If you combine e-commerce, that's a very good way to increase your parts efficiency, because you know that certain faults were going to occur before you have to do maintenance," Chung noted. "If you know that, you can start looking at your parts inventory, and how you can reduce your stock, and how you can drive down cost."

Rice noted tracking when fleets replace parts can also help them keep proper inventory levels. He said a fleet that swaps oil filters at 25 weeks can find how many trucks are approaching that interval, and ensure enough stock when that time comes.

"It really improves efficiency because you're not waiting on parts," Rice said. "Clean data allows you to now analyze not just the predictive maintenance side, but the predictive repairs and what it's costing you, and when you need to repair it."

While e-commerce platforms such as Daimler Truck North America's Excelerator are also working toward becoming more predictive, it's still being figured out.

At Heavy Duty Aftermarket Dialogue in January, DTNA director of parts marketing and strategy, Brad Williamson, noted once that happens, "We can save a lot of downtime if it's scheduled downtime."

He wouldn't predict exactly when that time will come, but said, "We're getting close."

A forecast you can count on

Pitstop's Bhardwaj noted managers unfamiliar with predictive might be skeptical.

"There's obviously skepticism [from fleets] who have been burned by software vendors promising things and then not getting stuff," Bhardwaj said.

"They might think, 'There's no magic crystal ball in the world—how can I believe this?'" he said.

He said it's better for now to look at the tool "like a weather prediction," where meteorologists will give a best estimate on the weather based on data such as wind, precipitation, and temperature.

"Now for my next week, I can plan what to wear when I go outside," Bhardwaj said. "It's not 100%, but it's much better to have a weather prediction than to not."

And with this type of maintenance forecasting, a fleet can be alerted to future trouble even if the sky looks clear now, as that could merely be the eye of the storm.

"[Intermittent engine- or tire-related DTCs might not] mean anything for you to act on in the short term, but could escalate and get worse over time," he warned.

Pitstop focuses on the DTCs that first indicate immediate danger, and then what the data says will likely lead to problems, which he demonstrated on the platform with real-world data.

"Based on the next 30 days, here are 70 vehicles that we've got to probably pay more attention to and within those, there's some that have more potential to break down versus others, and we rank those in order," he said.

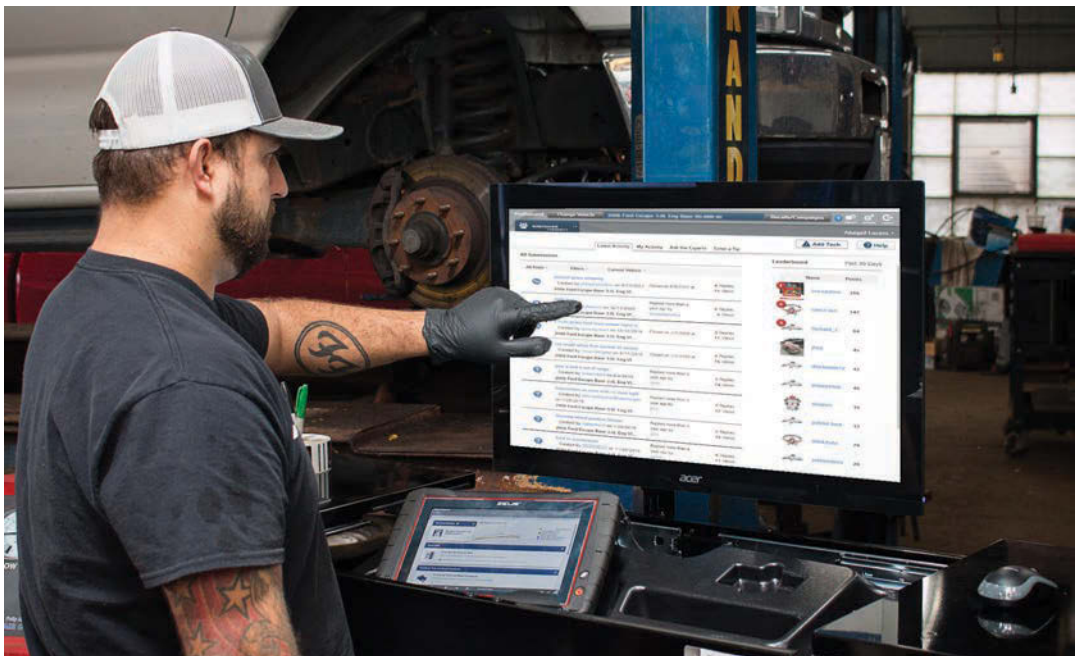
Suggestions are then given, such as get to a shop right away or ask for driver input, who will have a much better sense of what's happening with the vehicle in real time.

And while a five-day weather forecast ends up being about 80% accurate, Pitstop claims 94% accuracy for issues in general, and nearly 100% with "very rare, critical issues," Bhardwaj said.

Uptake Fleet, which had 70% detection accuracy on all failure modes previously, used a new configuration to improve to 90% detection accuracy for the cylinder issue to save that large fleet so much money.

Data overload

"With any data-based solution, there's a lot of data you need to filter out," advised Jean-Phillipe Bertrand, operations director at Isaac Instruments, a telematics and ELD provider for the U.S. and Canada. He likened taking in all the raw data to drinking from a fire hydrant."



» **The SureTrack feature of Mitchell 1's ProDemand allows users to narrow down the root cause of a fault based on historical data.**
Mitchell 1

Bertrand said to keep from being flooded with non-value data, a fleet should highlight only the data most important to their operations, especially if they are new to the technology.

A fleet should do this through KPI benchmarking and identifying the biggest cost center, and then choosing three or four specific areas and relevant fault codes to reduce cost, recommended Melanie Simard, Isaac's director of compliance, client service, and technical support.

"This will establish your baseline when starting with a new solution," Simard said. Various fleets might need to focus on tires one year and aftertreatment or fuel filters the next, she added, recalling her previous 20 years of fleet experience in Canada.

Once these are picked, a fleet should automate related reports, such as historical costs on costly components, and send those to key managers.

Database size matters

Predicting future downtime is easier said than done. Because data and probability are involved, sample sizes matter with a trustworthy predictive solution. The more historical data that's available to analyze, the more accurate the prediction will become.

"You've got to have a certain amount of history to train the system so that it kind of understands what the trends are," explained Ben Johnson, Mitchell 1 director of product management.

Because of this, at Mitchell 1, "there's nothing commercially available, but we are evaluating who to partner with and how to bring to bear more predictive analytics," Johnson noted.

Even so, Mitchell 1, which leverages repair information from its ProDemand platform, has more than enough to data to make highly accurate predictions when a solution is commercialized.

"In our data pool, we've got around a billion repair orders (and it grows by about 40 to 50 million a year) that we derive value from," said Johnson, who added that the company invested "a ton of money" into an artificial intelligence that focuses on transportation.

Consumer vehicles, along with lighter commercial vehicles up to Sprinter vans to Ford F-350s, have by far the most data collected.

"On the light vehicle side, you give me any year, make, and model and ask me when something's gonna break, and I can tell you," Johnson asserted.

There is still work to be done in heavy-duty, though.

"It's just a matter of getting the amount of raw data to run through an AI system so that we know that we can trust the results," he said. Another major challenge for predicting heavy-duty more accurately is the variety of duty cycles and regions. The same truck with the same engine will wear differently based on regional or longhaul, as well as in the mountains versus mostly flat terrain.

Even with that confidence in light-duty, he said Mitchell 1's insights are used more reactively when a vehicle comes into the shop. If, hypothetically, a pickup comes in with a mass airflow sensor trouble code, and the technician also receives a certain power supply DTC, then the software can narrow the problem down.

On a virtual call, Johnson brought up the ProDemand light-vehicle tool SureTrack, and selected a 2016 6L Chevy Silverado, which had 138,000 different repair orders. Johnson demonstrated how a user can obtain data on the most frequent trouble codes, replacement parts, and symptoms.

After a few clicks he found for a certain DTC that a defective mass airflow sensor was the most prevalent culprit. Based on that, Johnson said a technician can validate and prove if that is the real root cause.

"We can look to see what the mileage is that this sensor typically fails at, and it looks like around 100,000 miles is the peak of it," Johnson said while diving into the data. "So, if you're dealing with a vehicle with only 40,000 miles, you might look at connectors or something like that, because the sensor is really not in its normal failure range."

In this low-level use of predictive data, the human element is still very critical.

"We never ever say, 'Because of this code, replace that part.' You do still need the human to pop the hood," Johnson said. "You need the human to say, 'Yeah, the AI didn't see that mice got in here and chewed up the wiring to this mass airflow."

Johnson also stressed, as far as Mitchell is concerned, AI and predictive tools "will never replace the human and we don't intend to."

Instead, these should be looked at as the ability to help narrow down a location from a global perspective to a country-, state-, and county-level.

"We might get them into the right house," he reasoned, "but even if we can't get them there, we've done so much for them instead of making them try to navigate that world and figure it out."—*JH*

"If you've tackled three or four major maintenance points, then you can maybe add another code and another and build your program this way," Simard suggested. "This way, you're not inundated with data."

She said for small fleets in particular, data overload can sink a predictive program. "When you have one maintenance person, you don't want that person to start wanting to work on every single thing that they receive from the telematics."

Fleets can also better validate the root cause of DTCs by integrating with a transportation management system and looping in electronic driver vehicle inspection reports (eDVIRs) to validate issues. A picture taken by a driver on a tablet, paired with the data, helps narrow down possible issues.

Isaac can work with fleets as small as 20 assets in Canada or 50 assets in the U.S.

"We still need the drivers' eyes to report with the telematics," Simard said. "Not all drivers have the same level of mechanical savvy, but with the pictures and with what you can do with the ELD, the fleet can look at the historical data of this truck [combined with] the pictures [and] that code. It's all connected."

Uptake's Rice stressed that whatever solution a fleet chooses should match their capabilities, and the "Cadillac premium version" isn't right for everyone.

Uptake has worked with fleets with 35 units using its analytics capabilities and telematics data fleets are likely already receiving.

"If you're using very basic spreadsheets and whiteboards, it's going to be very hard to transition to a very robust, completely integrated work order system with closed-loop functionality," he said. "There are baby steps in between."

Rice posed the prediction that someday, everybody will be running these algorithms ragged like digital thoroughbreds, and data efficiency will be as valuable as fuel efficiency. Whether that's 10 years from now or 50 all depends on two things, he said.

First, as with all new technologies, people expect fully mature magic bullets out of the box, and get frustrated with the reality of product development. Users will have to temper their expectations.

"You'll often see people trying to do too much too soon," Rice noted. "It really becomes a little bit of a burden for them."

And second, the momentum leaders in the industry must work together to find clear use cases and share the results.

"You need a few big names to say, 'This is really doing it,'" Rice said. "And then what you see is kind of a waterfall effect and this fast momentum, which is what we're expecting in 2023. I think it's the next wave of big trucking technology."

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Improving engine efficiency and service life

Engine experts discuss ways to hit higher levels of efficiency.

By Seth Skydel

Every fleet strives to achieve two things when it comes to engines. The first is to maintain efficiency in order to reduce operating and service costs. The other is to ensure the longest possible service life.

The first objective is a long-standing and important one. With the supply chain and new vehicle production issues of the past few years, the latter has taken on even greater importance.

For engine manufacturers, such as Detroit Diesel, it begins with product design.

"Typically, it takes all engine systems to support the most efficient maintenance practices," said Len Copeland, Detroit marketing manager. "One specific design feature is the coolant system, because optimized distribution keeps the engine cool where it needs to be cool and hot where it needs to be hot—with minimal restriction. That allows the engine oil to be stable for long periods and is a big contributor to extended oil drain intervals."

Designing for less fuel in the aftertreatment system will also extend diesel particulate filter maintenance intervals, Copeland said, as this prevents soot and ash buildup in the DPF.

"We also recommend fleets follow prescribed maintenance intervals for each engine and proper fluids recommendations," he said. "Intervals are much longer these days than they were years ago, and the newest diesel technologies require the most up-to-date and advanced fluids to keep them operating at peak performance."

Mark Ulrich, director of customer support at Cummins, also pointed to control system features that reduce ash load as a way to promote longer DPF life. This allows manufacturers to accurately predict when to maintain the DPF versus a preset interval, he explained.

"Today's aftertreatment systems also have fewer failures, which is no small feat considering the increased number of parts, system complexity, and controls required to meet emissions regulations," said Kris Ptasznik, powertrain TCO and consultancy leader at Cummins.

Duane Tegels, product marketing manager–powertrain / VHD, VNX, VAH at Volvo Trucks North America, noted the importance of turbo compounding. This technology brings the added benefit of more efficient heat recovery because it allows the engine to produce horsepower from wasted heat in the exhaust stream.

"That not only increases efficiency but also reduces pressure on the engine's revolving assembly, resulting in fewer revolutions per mile," he explained.

Reaching optimal performance

Proper maintenance is critical to achieving optimal performance and reliability, said Mike Furst, director of contract service and business technology solutions at Mack Trucks.

"Items that can reduce performance if not maintained properly include engine air and fuel filters, drivetrain fluids, exhaust and intake systems, and DPFs," Furst explained.

When in doubt, just follow the OEM recommendations.

"Not following published maintenance intervals can decrease operational efficiency when it leads to either unplanned downtime due to avoidable failures or, in some cases, performing maintenance too frequently," Cummins' Ulrich stated. "In addition, in winter months it's important that fleets ensure their fuel is properly treated. Improperly treated diesel fuel can lead to unplanned downtime due to fuel gelling and fuel filter plugging."

In spite of how cliché it may sound, always return to the basics, noted Tegels. Regardless of the component, using the correct oil or lubricant is always a good place to start. Make sure your filters are clean, and adjust the overhead per manufacturers' recommendations. Too much valve clear-

ance can result in poor performance and, over the long term, cause damage to valves, camshaft lobes, or rocker arms.

"HVAC maintenance is a common area that is often overlooked," Tegels continued. "A dirty or unmaintained HVAC system can cause the compressor to run longer than it should. Make sure the evaporator and condenser coils are clean, allowing for correct temperature transfer, and ensure the refrigerant level is correct. Additionally, be sure the fan clutch is operating correctly, so the fan runs only when needed."

Impact of the driver

Service life and maintenance intervals are also affected by how a driver treats the engine on the road and before taking off.

"When thinking about driver behavior and efficiency, we typically view the correlation between the foot and the throttle, often underestimating that small inputs have a big effect," Tegels stated.

Heating the cab in the winter just to get it warm before starting a route takes a significant amount of time, related Ptasznik, but the best way to generate cab heat is to get the engine under load.

"The best way a driver can increase efficiency is also the safest way to drive," Ptasznik added. "Leaving a proper following distance reduces engine and foundation brake use where kinetic energy is dissipated as heat. A steady state is always more efficient than throttle-brake-throttle operation."

When the drivetrain is tuned optimally, Furst added, driver behavior becomes the major contributor to efficiency. Driving smoothly, maintaining speed, and avoiding abrupt changes in speed are all behaviors that optimize efficiency, he said.

"Some things drivers have an effect on include throttle aggressiveness, brake usage, and idle time," Copeland said. "All of these factors will cause hydrocarbons, which will need to be dealt with sooner rather than later."

Follow the data

Fuel economy is one of the best indicators of an optimally performing engine, and it can be monitored via a telematics system that also detects problems, Furst noted. A dealer can also provide benchmarking data and check to see if the truck's settings are optimized for maximum performance, he added.

"Fleets can pull data remotely to gain insights by using a comprehensive suite of connectivity systems that provide real-time, actionable information about vehicle performance," Copeland said. "That empowers effective decision-making, resulting in less downtime and a better bottom line."

As to the future, Ptasznik emphasized the importance of updated maintenance monitors on next-generation products to maximize efficiency, time between intervals, and long engine life.

"Modern advances with prognostics provide the ability to predict a hardware failure before unexpected downtime occurs," he said. "Combined with future maintenance monitors, an unexpected repair turns into a one-stop service event when it is convenient for your business."

Fluid factors

Engine oil, gear lubricant, and coolant quality are central to optimizing efficiency and performance and often are determining factors in establishing maintenance intervals. Effective fluid service practices also promote longer engine life.

For advice on these topics and how fleets can monitor performance, *Fleet Maintenance* turned to a select group of experts:

- Shawn Whitacre, senior staff engineer, Chevron
- Paul Cigala, senior CVL applications engineer, ExxonMobil
- Karin Haumann, OEM technical manager, Shell Global Solutions

Fleet Maintenance: How do engine oils, gear lubricants, and coolants impact efficiency in terms of reduced service and longer life?

Whitacre: Fluid selection can have a significant impact on vehicle efficiency. For engine oils and gear oils, it is important to identify the viscosity grade that is most appropriate for your specific hardware and operating climate. The correct fluids may also enable extended change intervals that reduce maintenance costs and improve equipment uptime.

Coolant can also affect engine performance. It is critical to maintain the water/glycol balance that is appropriate for the season and operating temperature. Keeping an eye on additive levels as well as pH can help ensure that the coolant is providing adequate protection without contributing to deposit formation or metal corrosion.

Cigala: Using higher-quality lubricants can help in safely extending service intervals. Extended-life coolants, which need minimal servicing or additive replenishment, can also decrease related breakdowns. These coolants still need to be tested for freeze point, color, clarity, and proper additive levels.

Haumann: Using full synthetic or synthetic blend engine oils can provide performance and protection benefits because they perform extremely well in heavy-duty diesel engines, even in extreme temperatures, without compromising engine durability. Axle oils that are formulated with synthetic base oils and additive technology can improve the lubrication of the drivetrain, lower the operating temperature, and help promote longer life for the equipment.

For coolant, a typical recommendation is to use a 50/50 mixture of ethylene glycol and water, which gives a good combination of heat transfer and effective freeze protection. In some extremely cold environments, fleets may want to consider a higher concentration of ethylene glycol.

FM: What ineffective fluid maintenance practices can decrease efficiency?

Cigala: Servicing units outside of OEM-recommended intervals can decrease equipment availability and tie up valuable technician time.

Haumann: Not maintaining recommended drain intervals for engine oils can result in wear, reduced efficiency, and potential engine failure. Focusing only on the price of lubricants can result in wasting money on unplanned downtime and higher maintenance costs.

Be careful when having multiple coolants in stock because there is always the chance of a mix-up, and different extended-life coolants often don't use the same additive chemistry. If two different coolants are mixed together, the additive chemistry will be diluted, likely to the point that it is no longer as effective.

Whitacre: It is critical to make sure that fluids and filters are changed to avoid any impact on engine performance. Over-extended drain intervals can cause the fluids to become thick and corrosive and diminish their wear protection. Allowing the fluid to become corrosive can damage bearings and bushings, reducing their operating life.

For coolants, having an improper water/glycol balance can affect freeze protection in winter months. Using tap water instead of distilled water in the coolant mixture can lead to deposits inside the cooling system that can damage the radiator and inhibit heat transfer, leading to progressive damage to the engine itself.

FM: How can fleets monitor these factors, resolve issues, and validate performance?

Haumann: With longer drain intervals now common, we recommend regular oil analysis to detect contamination or conditions that need to be corrected so that severe engine issues can be avoided. A consistent oil analysis program can also assist in optimizing drain intervals, increasing equipment reliability, and minimizing unscheduled downtime.

Cigala: Establishing a used-oil analysis program and aligning with a lubricant supplier to assist in monitoring equipment and oil health can help identify internal coolant leaks, fuel dilution, and excessive wear metals. It can also assist in setting proper oil change intervals, which increases equipment uptime, frees up technicians, and decreases breakdowns.

Whitacre: Employing a fluid analysis program allows fleets to optimize change intervals while providing pre-emptive insight into equipment issues before they become more serious. Many fluid providers and OEMs offer turnkey programs that facilitate sample collection and shipment, and easy-to-use online tools and apps that report the data along with a diagnosis and recommendations. Partnering with your fluid provider is a great way to make sure that your fleet has the right product mix along with the tools that track their performance, unlocking improved efficiency, product durability, and uptime. —SS

» The maintenance department should place emphasis on prolonging the life of the casing when servicing retreads.

Bandag

Reduce, Reuse, Recycle:

Retreading commercial tires

Retreaded tires can deliver a lower TCO than purchasing new—without a sacrifice in performance—as well as offer a boost in sustainability efforts and lower maintenance costs.

By Tyler Fussner

Fleets must always find ways to efficiently operate assets while actualizing the best margins on expenses. Tires, of course, are atop the list of fleet expenses. Today, retreading is a viable and reliable option for fleets looking to cut costs while also delivering on a positive environmental impact. With advances in material sciences and technological developments in production processes, fleets can leverage retreads knowing that they will prove equal performance at a fraction of the price versus purchasing new.

Retreading & TCO

So, what can retreading offer a fleet?

"Retreading has two fundamental benefits for a fleet, with the first being the total cost of ownership (TCO) savings utilizing the full life-cycle value of the casing," said Jaye Young, B2B marketing director, On Road, Michelin. "With technological advancements in retreading over the last few decades, a fleet can reliably retread on the drive position, spreading the initial cost of the casing over several lives and leading to significant cost savings."

Lowering TCO is always a bonus, particularly when it cuts away from one of the most expensive aspects of operating a fleet.

"Tires are the third-largest expenditure for a fleet behind people and fuel," explained Brian Cunningham, VP of fleet solutions at Bridgestone Americas. "Commercial truck fleets can improve their total cost of ownership by incorporating retreads into their tire program. With many retreads selling for 30 to 50% less than comparable new tires, while performing equal to or better than some quality new tires, retreads provide commercial truck fleets the ability to reduce costs without compromising on performance."

And as costs are lowered, so too are the materials and waste from using retreads.

» According to the Retread Tire Information Bureau, each retread tire saves almost 40 lb. of raw material, including rubber, steel, carbon black, as well as 15 gallons of oil.

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» When working with retread suppliers, understand their inspection and repair practices.

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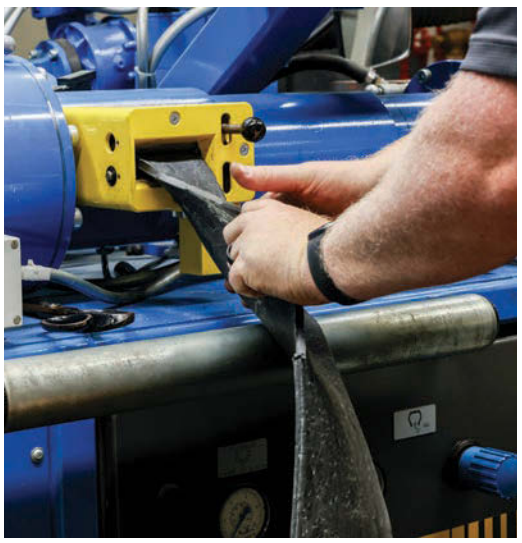

» Retreading helps reduce landfill waste and raw material usage.

Bandag

“With many retreads selling for 30 to 50% less than comparable new tires, while performing equal to or better than some quality new tires, retreads provide commercial truck fleets the ability to reduce costs without compromising on performance.”

Brian Cunningham, Vice President of Fleet Solutions, Bridgestone Americas

“The second benefit,” Young followed, “is for companies that are prioritizing sustainability, as retreading helps to reduce landfill waste and raw material usage.”

Shaun Uys, head of U.S. market replacement truck tire at Continental, concurred.

“Fleets should consider that retreads provide sustainability improvements,” he said. “Each retread tire saves almost 40 lb. of raw material, including rubber, steel, and carbon black, as well as 15 gallons of oil, according to the Retread Tire Information Bureau.”

The economic benefits of retreading, along with the advancements in retreading and the additional sustainability improvements, make it an ideal component to be incorporated into any commercial vehicle fleet.

In late 2021, Penske Truck Leasing extended their contract with Bridgestone Americas to test, develop, and deploy Bridgestone advanced fleet technology and mobility solutions. As part of the agreement, Penske also remained a preferred customer of Bridgestone’s commercial tires and Bandag’s retread tires. In 2020, as a result of the relationship and through the use of Bandag retread tires, Penske—a fleet of more than 415,000 vehicles—was able to decrease tire waste by 11.5 million pounds.

“We continue to build upon the partnership,” said Chris Hough, VP of maintenance design and engineering at Penske Truck Leasing. “Just shy of 96% of all our drive tire and trailer tire replacements, [size] 19.5 and up, are retreads. It’s a very high percentage for one reason: it works. We wouldn’t continue to build upon the relationship and try and utilize as many recaps as we do if it wasn’t as reliable and dependable, not only for us, but for our customers.”

As part of this program, Penske is closing in on half a million retreads annually, explained Jason Roanhouse, executive director of Bandag Operations. “If you put that in economic and environmental terms, that is a huge, huge sustainability impact… Some of that savings always finds its way into the market at the end of the day. So, not only does it have the huge environmental benefit, but it’s got the economic downstream benefits that play out as part of it.”

“Also, if you’re getting the same performance at a lesser cost, it improves your bottom-line performance while you’re doing the right thing for the environment,” Hough stated. “It all rolls together.”

Managing a retread program

There is a lot to consider for fleets looking to bring retreading into their operations. It starts from the top down, Uys related.

“Making retread a part of a fleet’s program begins at the top with the fleet owner and maintenance manager selecting tires that can be retreaded and aligning their organization with a retread network,” Uys said.

“With fleets utilizing equipment for longer periods of time and with more frequency, service partners are key. Whether that’s the manufacturer or dealer, this relationship can improve total cost of ownership,” said Aaron Murphy, SVP, Double Coin. “Choosing the best performing and retreadable tire for each application is pivotal; [the] lowest price is not always the answer to driving down maintenance costs.”

Penske’s Hough suggested meeting with suppliers directly.

“I think feeling comfortable with your tire supplier is step one,” he said. “Go visit. Go do a plant tour of the retread plant. I’ve been in a lot of retread plants over the years. You walk into some, and you want to turn around and walk back out. Today, if you were to walk into the Bridgestone

retread plant, it's clean; it's well lit; it's organized. That impression is reality. If they're clean, well lit, and organized, the chance of you getting a better product is much higher."

First impressions on the plant and organization aren't the only thing to bear in mind when touring, Hough continued. He suggested learning how that plant is performing their casing inspections and believes that shearography (a non-destructive inspection that looks for separations in the casing without having to disassemble the casing to do so) inspections are of much higher quality than just visual inspections.

Furthermore, this relationship building is an ongoing process—one not sustained through only an initial plant visit. And the continuous face time and communication will yield results, Hough continued.

"Our team visits on a monthly basis," he said. "We look at every tire that they couldn't recap, and we understand why. What happened? Was it something that our customer did? Was it something we did? Did we run it too low for some reason? We want to understand, and they are very good at helping us understand exactly.

"And, from time to time, we will tweak our parameters a little bit," Hough said. "During those visits with our tire team, we work together very closely. And if Bridgestone has something new or something they think we can do better, maybe stretch a parameter or our specs, we do that. We're going with their advice because they're the tire experts."

"And lean on those guys," Roanhouse concurred, speaking on supplier relationships. "They are resources. They're consultants. They're there to educate on how to use less of the product, because it's time over money. Those good commercial tire dealers that are out there with their expertise—

» Penske Truck Leasing, operating a fleet of more than 415,000 vehicles, retreads close to half a million tires annually. Nearly all the fleet's drive and tire replacements size 19.5 and up are retreads. In 2020, this resulted in a decrease in tire waste of 11.5 million pounds.

Penske Truck Leasing

lean into those folks. Their job is to maximize the return on your tire investment."

Uys concurred on the importance of relationships, saying that fleets should leverage frequent communication with dealers, particularly in the forecasting process. "This is more important now than ever to ensure they receive the right products in this unprecedented environment," he said.

And, when purchasing a new tire, fleets should consider it as two purchases, Bandag's Roanhouse suggested. The casing, he said, is the asset to be managed—the raw material. The tread is the other piece of the purchase, and it is designed to be replaced and perform the functions it needs to—whether that be traction, wear or fuel efficiency, driver confidence, etc.

"Tires, like anything else, are return-on-investment items," Roanhouse emphasized. "You don't check your oil by hitting the engine with a hammer, and tires are much the same. You don't check your air pressure by kicking it with your boot or using your highly calibrated sledgehammer to hit the tire. It just doesn't work that way. You have to manage the program; you have to manage the tires; you have to invest, like Penske does, to get the return on investment of what you've purchased initially."

Roanhouse added that the management of the tire program is multifaceted. A fleet must consider the corporate initiatives around tire maintenance, as well as working alongside the maintenance department to focus attention on tire monitoring and proper maintenance.

Maintenance considerations for retreads

There are not many changes for the maintenance team regarding tire maintenance when it comes to servicing retreads, but the emphasis will be placed on prolonging the life of the casing.

"The integrity of the casing is key to retreading," stressed Tommy Bazzell, director of national account, truck stop & trailer OEM sales, Yokohama Tire. "Proper psi, proper matching of duals, proper mounting techniques, proper casing repair practices, alignment of equipment, and operational tire awareness of drivers (i.e. safe driving techniques) can prevent impact breaks and reduce flat spots due to excessive braking.

"Proper brake adjustment practices can help prevent flat spotting. This condition can reduce or prematurely end the life of the casing," Bazzell continued. "Maintaining proper psi through technical means or through pre-, in-, and post-trip inspections will ensure the integrity of the casing."

In-shop activity and establishing strong maintenance practices for a fleet's tire program will help get the best TCO out of the tires.

"When that truck is in for an A, B, or C preventive maintenance—really pay attention to what those tires are telling you, because spending a little bit of time looking for different, irregular wear patterns will really help you understand how to maximize what you get out of it," Roanhouse said, continuing that tire rotations, matching of tread depths, and inflation monitoring are critical.

"Pressure. Pressure. Pressure," he stressed. "Tires are expensive; air is free; keep some in 'em. You don't have to be perfect about your tire program, but find an inflation pressure that that aligns with your typical loads and run that pressure and you'll eliminate the vast majority of the issues that you face."

Penske's maintenance team will immediately pull a tire from service for repairs if it reads an inflation pressure at a 15% loss below the recommended level, Hough explained.

Timing is everything, and keeping a tire operational for retreading down the road is different than maintaining a tire until end-of-life.

"There are a few ways to ensure that commercial truck drivers and fleet managers can be proactive in their tire management to improve their total cost of ownership, and it starts with properly maintaining the tire casing," Bridgestone's Cunningham said. He continued with vital tips on properly maintaining a tire casing to ensure fleets get the most out of their investment, such as:

- Avoid exceeding the tire's recommended maximum speed.
- Choose the right tire for the job by considering its load carrying capacity, tire size, speed capability, and service type.
- Regularly inspect tires for harm such as penetrations, damage to the sidewall, and inadequate tread depth.
- Regularly check and adjust tires to the appropriate cold inflation pressures before each trip.

"In order to provide commercial tires with the best chance for being retread, proper tire maintenance—including managing proper air pressures—is key," Cunningham emphasized. Also increasing retreadability rates of tires are properly maintained wheel alignments on tractors and trailers, as well as tire rotations at suggested mileage intervals, he continued.

Tread depth monitoring will determine the retreadability of casings. Hough explained that Penske, generally speaking, will pull casings from service at the 5/32 mark for retread.

"We don't let them run down to DOT level because we want to maintain that casing integrity," he reaffirmed. "The lower the tread gets, the more susceptible it is to damage. Over the years, we've learned that we're better off pulling it a little bit early versus what the DOT requires."

"A $100 casing can get a lot more life if you avoid punctures and impacts and stone drilling and other things by spending $3 of tread pulling it a little bit early," Roanhouse furthered, speaking on tread depths. "So, do you want to run three more dollars of tread per 32nd? Or do you want to save a $100 casing? And that's the question that you have to ask yourself."

Proper training for drivers and maintenance personnel, along with the use of technology where applicable, can help to better monitor and prolong the life of casings, as well as lower maintenance costs, explained Double Coin's Murphy.

"Casings are assets. So, driver training on pre-trip checks is very important," he said. "In addition, auto-inflation systems pay for themselves by offering warnings and solutions when a tire is failing. Anytime you can use technology to preserve a casing, you're driving down maintenance costs."

"The key is to get the most value out of the casing after the original tread life has been utilized, whether through retreading or selling the casings," Bazzell concluded. "Having the opportunity to retread the casing multiple times will improve the total cost of ownership."

» Robert Dieli discusses economic trends at Heavy Duty Aftermarket Dialogue 2023 in Grapevine, Texas.

John Hitch | Fleet Maintenance

Estimating odds of recession in 2023

Understanding the Federal Reserve's recession indicators.

Having spent almost all of 2020 under various forms of lockdown, the global economy began to regain its momentum in 2021. But by late 2021, new instability, most visible in the supply chain disruptions, was threatening further growth.

New patterns of demand, together with uncertainty in supply, brought about changes in prices that quickly coalesced into enough inflation to attract the attention of the Federal Reserve, which began to raise interest rates early in 2022.

The single-most important factor in determining the start of a recession in 2023 is how, when, and why the Federal Reserve stops raising the Target Federal Funds rate. Unless there are exigent circumstances, all announcements about monetary policy will take place at the regularly scheduled meetings of the Federal Open Market Committee (FOMC). At those meetings, the Committee examines a host of economic statistics as well as anecdotal information about business conditions to decide what the risks to stable economic states are and how to meet those risks.

The first economic statistics the FOMC gives a close reading to are the employment figures published by the Bureau of Labor Statistics, usually on the first Friday of the month. We say "close reading" because the headlines on the report are the least valuable piece of information in the report. The size and, most importantly, the composition of the change in employment is what matters.

Over the past several months, the number of people on payrolls has been increasing by about 250,000 each month, a pace consistent with an expanding economy. Because the FOMC has stated a desire to see the pace of expansion slacken, it will take a smaller number to convince them of that fact.

The second report the FOMC will look at, also in minute detail, is the rate of inflation as calculated by the Bureau of Labor Statistics in the All-Items Consumer Price Index Report (CPI). The CPI is a measure of the cost of living. The year-over-year percent change in the CPI is the most widely known measure of inflation. The FOMC uses the CPI rate of inflation, together with several other indexes, to assess current and prospective price pressures in the economy. Rising inflation is a risk to economic

» MacKay & Company's leadership during HDAW 2023: (L to R) John Blodgett, Stu MacKay, Robert Dieli, Molly MacKay-Zacker, and Dave Kalvelage.

John Hitch | Fleet Maintenance

stability. And because the FOMC is charged with protecting against risks to economic stability, it responds to changes in the level of inflation.

While we have recently seen considerable improvement in the headline rate of inflation, which has come down from 9.0% in June 2022 to 6.4% in December 2022, one might ask how quickly the CPI might go back to 2%, which is the FOMC's target rate of inflation.

Based on what we can see in the latest report, the answer is "not soon." While gasoline and used-car prices have abated, we still have significant pressure from the shelter and food components of the index, all of which suggests a headline rate of 5% or higher during the first half of the year.

Which brings us to the process under which the FOMC will discuss and decide what their next course of action will be.

Since 1987, it has been the practice of the FOMC to engage in an interest rate management strategy known as "pause and pivot." Each of the episodes in which they have engaged in a campaign to slow the economy through higher interest rates has contained an interval where they held interest rates steady (the pause) before they lowered them (the pivot). Jerome H. Powell, Chair of the Board of Governors of the Federal Reserve System, has indicated that they intend to continue raising rates during both the January and March FOMC meetings.

Because the FOMC wants to avoid surprises that might disrupt the smooth functioning of the financial system, they will go through a rather elaborate procedure of communicating a policy change.

The first step of that process will involve having the presidents of the 12 regional Federal Reserve banks who have a vote on the FOMC make speeches about the need for a change in policy.

The second step will have one of the members of the Board of Governors of the Federal Reserve continue that discussion. We might also see a dissenting vote or two at a meeting to emphasize the point that changes are being debated.

The final step is for Chair Powell to make the announcement that policy has been changed and to provide the forward guidance that will be used for further policy action.

Based on what we know now, the pause will not come before the May meeting. If, indeed, that turns out to be the beginning of the pause, when the pivot happens will depend on what has taken place with both the employment and inflation measures the FOMC follows.

By then, we should have a much better idea of what the true odds of a business cycle peak in 2023 really are.

By Robert Dieli
ECONOMIST, MACKAY & COMPANY AND PRESIDENT, RDLB INC.
MacKay & Company specializes in market research for commercial trucking, construction equipment, and agricultural machinery. The company provides strategic research and analysis 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 trucking, consulting, and financial services sectors. He is also an economist with MacKay & Company.

» DPF cleaning and replacements range between $2,500 to $8,000 per vehicle. Pre-heating the engine with a fuel-operated heater can increase their lifespan and reduce maintenance departments' repair load.

Webasto

How fuel-operated heaters ease aftertreatment issues

Diesel particulate filter issues can be the bane of a maintenance department, but pre-conditioning engines can drastically (and economically) improve efficiency.

Fuel-operated heaters have been around for decades, but it's surprising how little many maintenance professionals know about them and the benefits they provide. Let's change that right now with a pop quiz.

First, here's a simple question. Which runs dirtier: a cold or warm diesel engine? Of course, you know that a cold diesel engine puts out a lot more soot and particulate matter. Folks always answer that correctly when I ask.

Here's another. Which uses more fuel and puts out more emissions: a big diesel engine or a tiny fuel-operated heater? The big one, obviously, as the heater burns relatively very little fuel, and thus a small fraction of the engine's emissions output. Most get this one right as well.

How about a tougher math question: How much does your fleet spend annually on DPF cleaning? If you're anything like 87% of the maintenance professionals surveyed in a recent fleet study conducted by Webasto—in conjunction with *Fleet Maintenance*—you *don't* know the answer to this very important question. You probably should.

By Duane Bratvold
WESTERN REGIONAL SALES MANAGER, CUSTOMIZED SOLUTIONS, AMERICAS REGION, WEBASTO GROUP
Duane Bratvold serves as Western regional sales manager, customized solutions, Americas Region for Webasto Group. Bratvold uses his expertise in emissions standards to provide FOH and other emissions management solutions for fleets of trucks, buses, and off-highway equipment.

And how much does your fleet spend annually to replace damaged and inoperable DPFs? According to the survey, 65% drew a blank on this question as well.

Finally, do you have any idea how many hours longhaul trucks spend idling each year and what percentage of a vehicle's running time this represents? According to the U.S. Department of Energy, a longhaul truck idles about 1,800 hours per year, and uses about 1,500 gallons of fuel to do so. And industry experts suggest that it's not unusual for idling time to represent as much as 45 to 50% of a vehicle's running time. Don't feel bad if you didn't know the answer to this one either, most maintenance folks don't.

The down and dirty on DPFs

Let's start with some very basic, but important, facts. Until an engine is operating at between 842 to 1,112 degrees F, which is common at road speeds and well above idling temperature, the DPF is essentially used as a 'garbage can' for the collection of soot and PM. The DPF is a temperature-dependent device, so without sufficient exhaust operating temperatures, the lifespan of every DPF will be negatively impacted by lower operating temperatures.

Cold starting or idling a diesel engine basically turns it into a soot- and smoke-generating machine that feeds directly into the DPF. The combination of un-combusted fuel and PM create a heavy, wet, and dense coating that forms on the surface of the DPF. The contaminants increase backpressure, resulting in significant reductions in engine and DPF efficiency. Face plugging and filter overload are generally the byproducts. Cold starts also create the need for more frequent DPF cleanings, which cost fleets time and money, while shortening a DPF's effectiveness and its lifespan.

Temperature-related issues can also occur in vehicles with short duty cycles, such as last-mile delivery. Frequent throttle-on and -off sequences create the same type of sub-optimal temperature and increased emissions environment. The DPF's catalyst can't maintain regeneration temperatures and the DPF becomes overloaded, and plugging can result.

If one factors in downtime for DPF cleaning and replacement, costs can range between $2,500 to $8,000 per vehicle. It also adds up to a lot of extra work for fleet maintenance folks–work that could otherwise have been avoided.

As one fleet professional put it: "If you can reduce the crud that's coming out of the stack before it goes into the DPF, you've just won half the battle right there."

Needless to say, I agree.

Pre-conditioning prevents DPF problems

But how do you win the battle? The economical solution is to pre-heat or pre-condition a diesel engine using a fuel-operated heater. These compact devices warm the engine and its fluids to about 160 degrees F and keeps it there until the engine is started. These devices operate on diesel fuel drawn directly from the vehicle's primary fuel tank.

Common solutions, such as the Webasto Thermo Top Evo coolant heater, have been proven to reduce cold dense soot by up to 66% during engine startups and reduce NOx emissions by up to 40% (which was tested by an independent lab according to TMC recommended practices 432A and 1102).

By raising the initial engine temperature at startup, FOHs can also help shorten the time it takes for the DPF to become active, reducing the "wet stacking" often produced by cold engine starts and significantly increasing the time between cleaning intervals.

When operators start a pre-heated engine, they also immediately get warm air from the HVAC system, so they don't have to wait for the engine to warm up. Coolant heaters and fuel-operated bunk heaters can also be controlled manually or through the use of Bluetooth-enabled controllers.

By pre-heating the engine block, oil is warmer, piston rings remain sealed, and engine blow-by is diminished. The amount of carry-over oil in the exhaust stream is also reduced. Warmer injectors mean increased fuel efficiency, and DPF tanks and injectors won't freeze in cold climates. However, one of the most important advantages of pre-heating is reduced maintenance costs on DPFs and the rest of the aftertreatment system.

Outside of the initial purchase and installation cost, these heaters only require about a half cup of fuel per-hour to operate. If a gallon of diesel costs roughly $5, then this equates to about $0.16.

So, the final question I have is this: how much is reducing DPF issues worth to your fleet?

» Webasto coolant heaters and fuel-operated bunk heaters like the Webasto Air Top 2000 STC can be controlled manually or through the use of Bluetooth-enabled controllers like the Webasto SmarTemp 3.0 Bluetooth.

Webasto

» The Thermo Top Evo and other coolant heaters have been shown to reduce cold dense soot by up to 66%.

Webasto

FLEET PARTS & COMPONENTS

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

Applications in popular Ford, GM, and Dodge brands

Hydro-Boost Power Brake Assemblies from **Bosch** are manufactured in the U.S. with 100% new components, ensuring the best performance and proper fit, form, and function. The Bosch Hydro-Boost program offers 21 part numbers and covers 21 million vehicles across truck and SUV applications in popular Ford, GM, and Dodge brands. These include the Ford F-250, F-350, GMC Sierra 2500, 3500, the Ram 2500, 3500, and more. Hydro-Boosts are designed to provide optimal brake system performance to vehicles up to 8.7 tons. Bosch manufactured these systems to exceed 500,000 strokes to ensure OE quality and performance, increasing safety and peace of mind.

For more information visit **FleetMaintenance.com/21292474**

0.5, 1, and 2TB models in SSD and HDD formats

The **MDR 644** digital video recorder from **Brigade Electronics** offers high-quality recording functionality with a range of new features, including 4-channel analogue AHD and 4-channel IP camera inputs, which are AHD compatible with Brigade's 360-degree camera system, the Backeye360; 4G and WiFi options for remote connectivity while the vehicle is traveling or automatic downloading at the depot without having to go to the vehicle; h.265 video compression, helping to reduce file sizes and create more than 30% additional storage space; MDR dashboard and mobile app; and 0.5, 1, and 2TB models in SSD and hard disk drive formats.

For more information visit **FleetMaintenance.com/21292484**

New formula and capless bottle design

Hot Shot's Secret announced a reformulation of their popular **Gasoline Extreme** complete fuel system cleaner. The new formula improves on the performance of the original formulation and is being introduced in a new, easy-to-pour, 12-oz. bottle design that is compatible with capless fuel tanks. Gasoline Extreme is now infused with Hot Shot's Secret's LX4, a premium lubricity additive that prevents wear and provides excellent fuel system protection. This also acts as an upper cylinder lubricant, an added benefit to improving fuel economy. The one-tank clean-up formula features a Polyetheramine (PEA) detergent to thoroughly clean valves, pumps, injectors, rings, pistons, and upper cylinders.

For more information visit **FleetMaintenance.com/21292485**

Keeps power steering seals soft and pliable

The **Bar's Leaks Power Steering Stop Leak Concentrate**, No.1630, is designed to stop leaks in seals and O-rings caused by normal power steering system wear and age. The non-corrosive, non-clogging, and non-foaming formula works on rack and pinion units, gear boxes, and pumps. It keeps power steering seals soft and pliable. It also works with all domestic, import, and heavy-duty power steering fluids, including petroleum, mineral oil, synthetics, and ATF automatic transmission fluid. One bottle treats up to 3 qt. of fluid.

For more information visit **FleetMaintenance.com/21290689**

Direct replacement for Freightliner Cascadia model year 2022-2018

The **Heavy Duty Pressurized Coolant Reservoir**, No. 603-1316, from **Dorman Products** is a replacement engine coolant reservoir manufactured from quality materials. It is engineered to withstand underhood stresses such as extreme temperatures and engine vibration. This direct replacement is designed to match the fit and function of the original part with seamless installation. Features a maximum pressure rating of 20 psi and a 12.8L capacity.

For more information visit **FleetMaintenance.com/21292466**

For select Cummins, Volvo, and Chrysler engine configurations

The **Diesel Exhaust Fluid (DEF) Urea Filter Kit**, No. 904-7934, from **Dorman Products** is designed to match the fit and function of the original equipment filter to effectively prevent crystals and contaminants from entering the DEF system. This filter kit has been on-vehicle tested to ensure a quality fit and long service life and is made with quality materials and components for reliable service.

For more information visit **FleetMaintenance.com/21292468**

Available in Standard or Bolt styles

EGR USA offers the **BASELINE Fender Flares**, which are available in two styles: Standard or Bolt. BASELINE Fender Flares are manufactured to OEM quality from ABS material and CNC robotically trimmed for a precise fit. Designed with a textured black finish to match the truck's original equipment accent pieces, the flares are available for late model RAM, Chevy Silverado, Ford F-150, Ford Ranger, and Toyota trucks. BASELINE Fender Flares provide a quick and easy way to customize while providing excellent tire protection. They install stress-free with corrosion-resistant hardware.

For more information visit **FleetMaintenance.com/21292477**

Weatherproof from lens to bullet

The **Peterson Manufacturing Heavy Duty Dot Light 177-HD Series**, available in amber (No. M177A-HD) and red (No. M177A-HD), provides extreme weather protection with molding of the grommet to the light, molded sheathed wires, overmolding of the bottom bullets, and molded custom strain relief. These lights are completely weatherproof from lens to bullet. Made in the U.S.

For more information visit **FleetMaintenance.com/21293145**

TOOLS & EQUIPMENT

A roundup of the latest tool and equipment offerings.

Transforms a smartphone into an IR thermal camera

The **TOPDON TC001 Device** is a TC Series device designed to transform a smartphone or computer into an infrared (IR) thermal camera. Offering image rotation, enhancement, and an ultra-high IR camera resolution of 256x192, the device provides users with ideal image quality to assist in diagnosing a wide variety of issues within a vehicle. Compatible with Android phones, tablets, and Windows devices, the small and portable tool can be plugged directly into the device's USB-C plug in.

For more information visit **FleetMaintenance.com/21285262**

Measures current and pulse width modulation

The **Power Probe PPTAMP and PPTPWM Adapters** are designed to cut diagnostic times and increase diagnostic accuracy. The PPTAMP allows any Power Probe circuit tester to read current. When a component powers up, users can monitor its current to determine the health of that component up to 20A and as low as one milliamp. The PPTPWM allows any Power Probe circuit tester to use pulse width modulation, a feature used to control new vehicle components with an adjustable duty cycle.

For more information visit **FleetMaintenance.com/21285263**

Holds up to 18 one-quart bottles

The **JohnDow Industries Oil Container Drainer**, No. JDI-CD21, allows technicians to safely and easily drain oil bottles before recycling by placing them upside down on the Oil Container Drainer pegs to drain excess oil. Because repair facilities must properly drain or remove oil to the extent where there are no visible signs of free-flowing oil remaining in the bottle, the Oil Container Drainer easily connects to a drum to provide a safe way to drain and dispose of excess oil from the containers. Notable features include heavy-duty steel construction, capacity up to 18 one-quart bottles, easily secures on drums with 2" bung adapter, side support bars keep lid open at 45 degrees, and the lid is secure and is easy to lock.

For more information visit **FleetMaintenance.com/21285264**

Features a 3/4" bore size

The **Ingersoll Rand 135MAX Heavy Duty Air Hammer** is ideal for vehicle, truck, bus, and heavy machinery repair. Weighing in at 4.5 lb., the 135MAX HD Air Hammer delivers 2,600 bpm, with a 3" piston stroke. It also has a feather-touch trigger for jobs that require light handling. Featuring a 3/4" (19mm) bore size, the air hammer is available in a convenient kit that includes five chisels and the air hammer in a carrying case or as an individual tool.

For more information visit **FleetMaintenance.com/21287252**

Has an oil-free pump

The **Forney Industries Fornair 4.5 CRM Air Compressor**, No. 555, is built to last with its 4-gallon steel tank for durability and lower rpm output for longer motor and pump life. The air compressor features a built-in moisture separator and an oil-free pump for maintenance free operation. It provides optimal psi (120 maximum psi) to operate pneumatic tools and has large gauges for easy monitoring of tank and line pressure. It also offers an auto on/off option, two built-in 1/4" air outlet quick connects, and includes a wheel kit and luggage handle.

For more information visit **FleetMaintenance.com/21287257**

Includes a variety of sizes

The **SP Tools USA 12-pc Screwdriver Set with EVA Foam Tray**, No. SP34003G, is designed to fit into technicians toolboxes by utilizing its EVA foam holding trays. The set includes a variety of sizes from stubby for confined workspaces with limited access to extra long for increased torque and extended reach. The handles are made from polypropylene and the shafts are made from SVCM steel, offering extra strength and durability to get the job done effortlessly. Precision-made magnetic tips ensure ideal fastener control. EVA foam housing measures 22.5" by 10.5" by 1.25".

For more information visit **FleetMaintenance.com/21287268**

Lifts both internal combustion and electric vehicles

The **BendPak AP Series Two-Post Lifts** are designed to make lifting internal combustion and electric cars, trucks, and vans safer, easier, and more efficient. The series offers patent-pending features, including nested arms, an automatic swing arm restraint system, and an automatic safety lock system. The AP Series includes three 10,000-lb. capacity models. The standard 10AP has a 73" lifting height and an overhead beam height of 145". The 10AP-168 also has 73" of lifting height plus a crossbar that is positioned 2' higher to accommodate high-roof cargo vans. The 10APX is a high-rise model, offering 79.5" of lifting height with a 157" top beam. The 10APX-181 has a 79.5" lifting height and increases the top beam height to 181". All are ALI certified.

For more information visit **FleetMaintenance.com/21289560**

Equipped with both cold and hot glue pulling options

The **Dent Fix Equipment GLUEMAX Glue Repair Station**, No. DF-GM/DXE, is a pulling station equipped with both cold and hot glue pulling options to repair damage in automotive steel and aluminum panels while preserving OEM coatings and interior integrity. The station can be used for application from heavy-duty glue GPR pulls to cosmetic PDR corrections. With an enclosed and lockable cart, the GLUEMAX Glue Repair Station protects its tools from the shop environment.

For more information visit **FleetMaintenance.com/21287270**

Services both R-134a and R-123yf

The **TEXA Konfort 780 Dual Gas Touch A/C Recovery Machine** is designed to allow users to alternate services on vehicles equipped with refrigerants R-134a and R-123yf, since it has two tanks and two separate circuits for recovery, recycling, and recharging. The service process is automated. Other notable features include airtight oil bottles, a scale locking/unlocking device, a refrigerant weight accuracy check system, and an automatic cleaning device for all the hydraulic ducts. The Konfort 780 Bi-Gas Touch also sports a 10" color multi-touch-screen display, Wi-Fi connectivity, and a Bluetooth module which allows users to connect the station with several accessories such as an A/C efficiency kit, a built-in thermal printer, a dedicated phone app for remote access, and more.

For more information visit **FleetMaintenance.com/21287273**

Removes EGR valve on select MaxxForce, N9, and N10 engines

The **OTC EGR Valve Puller**, No. 5865, is designed to remove the EGR valve on 2010 MaxxForce 10, 9, and DT engines as well as 2013 N9 and N10 with SCR engines. The tool is similar to Navistar OE tool number ZTSE4941. Made in the U.S. with global materials.

For more information visit **FleetMaintenance.com/21289839**

Designed to reduce fatigue

The **Vessel Ball Grip Ratchet Screwdriver with 10-pc Bit Set and Bit Belt**, No. 2200MBH120K01, features a bit size of 1-3/16" and offers smooth operation with its 36-teeth gear design. The ratchet mechanism has a forward, reverse, and stationary positions on the dial. The Ball Grip ratchet style is designed to reduce fatigue when using to insert a lot of screws. The kit includes a SL#6, T10, T15, T20, T25, T30, SQ2, PH1, PH2, and PH3 bit. The ratchet screwdriver can also be used as a stubby screwdriver and the Impact Torsion bits can be used with power tools.

For more information visit **FleetMaintenance.com/21289555**

Large intuitive OLED digital interface

The **Chicago Pneumatic CP86 Series Cordless Torque Wrenches** feature an automatic release reaction arm and a large intuitive OLED digital interface. They offer CPLinQ connectivity, an application designed for managers looking to control processes and quality while decreasing errors and rework. Additionally, the CP86 Series offer a high precision with +/- 4%, up to 5,970 lb.-ft. of torque, and a lightweight construction of 11.7 lb. thanks to the compact CP battery.

For more information visit **FleetMaintenance.com/21289558**

Gives techs a more hands-on approach

The **Maverick Tire Changer** from **Hunter Engineering** is a center-clamp tire changer that shares many features with Hunter's standard-setting Revolution tire changer, but gives technicians a more hands-on approach and freedom to adapt the process to their own precise needs. With its four-joystick layout, the Maverick provides tactile feedback with one-handed control. Its leverless head utilizes a Revolution-style tool and hook mechanism for maximum wheel protection, while automatically articulating to maintain ideal wheel alignment. A lifting ledge in the pusher foots saves additional time and effort. Additionally, it features HunterNet 2 connectivity, a compact size, and hydraulic cylinders that deliver force and precision over air cylinders.

For more information visit **FleetMaintenance.com/21287725**

Features a 200 lm top flashlight

The **Matco Tools Pro-Charge Wireless Rechargeable 1,000 lm Worklight**, No. PCWORK, includes a 200 lm top flashlight. Featuring an articulating base magnet that allows the light to bend 180 degrees as well as dual rear hanging hooks, this worklight can go right where it's needed. The worklight can easily recharge wirelessly using the company's Single or Dual Smart Charge Pads (sold separately).

For more information visit **FleetMaintenance.com/21289844**

Insulated up to 1,000V

The **GEDORE VDE Tool Assortment Hybrid**, No. 2979063, is a comprehensive kit for repair and maintenance work on all hybrid and electric vehicles. All tools are insulated up to 1,000V according to EN 60900/IEC 60900 (up to AC 1,000V and DC 1,500V). The tools also comply with the Equipment and Product Safety Act (GSPG) according to testing and certification office. The kit includes 3/8" VDE screwdriver bit sockets, cable cutters, various pliers, and more.

For more information visit **FleetMaintenance.com/21289848**

Measures internal and external brake pads

The **Tool Aid In-Line Brake Pad Gauge**, No. 65300, is calibrated for standard 6mm backing plates and measures both internal and external brake pads. The in-line style allows readings to be taken without removing the wheels on many vehicles. The metric, color-coded scale allows for quick, at-a-glance readings.

For more information visit **FleetMaintenance.com/21287724**

ADVERTISER INDEX

Alignment tools

Hunter Engineering Company WinAlign HD Alignment Machine

The **WinAlign HD** from **Hunter Engineering** allows technicians to align trailers without unhooking from the tractor by affixing to the trailer wheels and connecting to a broad specification database for easy alignment. Additionally, the tool features HD QuickGrip Adaptors for fast installation and can produce printouts of the alignment. "It's a time saver—it allows my alignment guy to be able to squeeze in two more alignments a day," said Kevin Davis, owner of Cowser Tire & Service. "[The machine] has six heads, [so] you can do all three axles at the same time without having to stop and recalibrate."

For more information visit **FleetMaintenance.com/11234831**

Bee Line 22000 Rear Axle Aligner

The **Bee Line 22000 Rear Axle Aligner** lets users position the rear axles perpendicular to the vehicle's centerline within a few minutes. The tool provides alignment printouts after the job is complete and can be used without a computer while still providing accessible notifications as well. "With the quick glance feature, the light goes from blinking on the target to solid, and that tells you that you're in," said Chris Meyer, owner and operator of Meyer Truck and Alignment. "Then you can go to the computer and double check, but it's kind of a nice quick feature when you're gauging it out."

For more information visit **FleetMaintenance.com/21068915**

Enerpac SCR Series Porta Power Kit

The **Enerpac SCR Series Porta Power kit** (SCR102H) is a handheld hydraulic cylinder, enabled by hand pump or air-over hydraulic pump, that allows the operator leverage up to 10 tons of push or pull force to get an axle into alignment. Easy to use and, when paired with air-over hydraulic foot control, the kit leaves hands free for cylinder maneuvering. "These save time by eliminating the need to pull another technician off of what they are doing to help move something that would take more strength than one person can provide," said Tim Lamoreaux, truck service manager at North American Trailer.

For more information visit **FleetMaintenance.com/21293587**

Ingersoll Rand MAX Series Vibration Reduced Air Hammer

The **MAX Series Vibration Reduced Air Hammer** from **Ingersoll Rand** provides up to 3,530 blows per minute to loosen difficult joints for manual alignments and comes with a quick-change retainer and chisel set. "Up here in the snowy Midwest, we run into a lot of rusted, corroded, and stubborn nuts, bolts, and joints," Lamoreaux stated, explaining how a good air hammer is a tool that all new technicians are shown on their first day and is never far from the alignment bay.

For more information visit **FleetMaintenance.com/10325069**

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