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EFFICIENCY

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**VEHICLE
COMPLEXITY**
AND ITS IMPACT ON
MAINTENANCE

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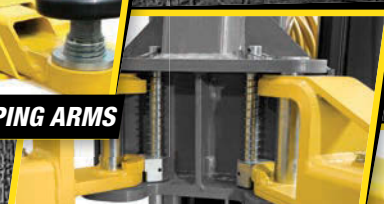
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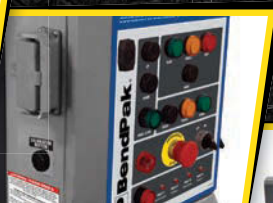
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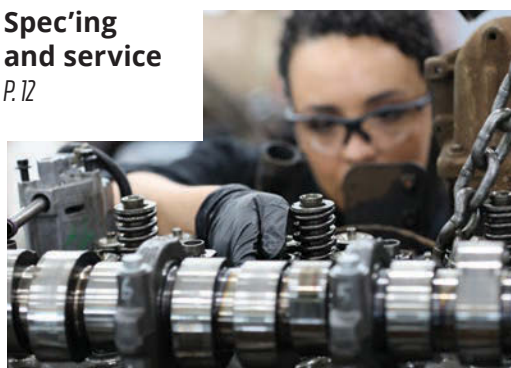


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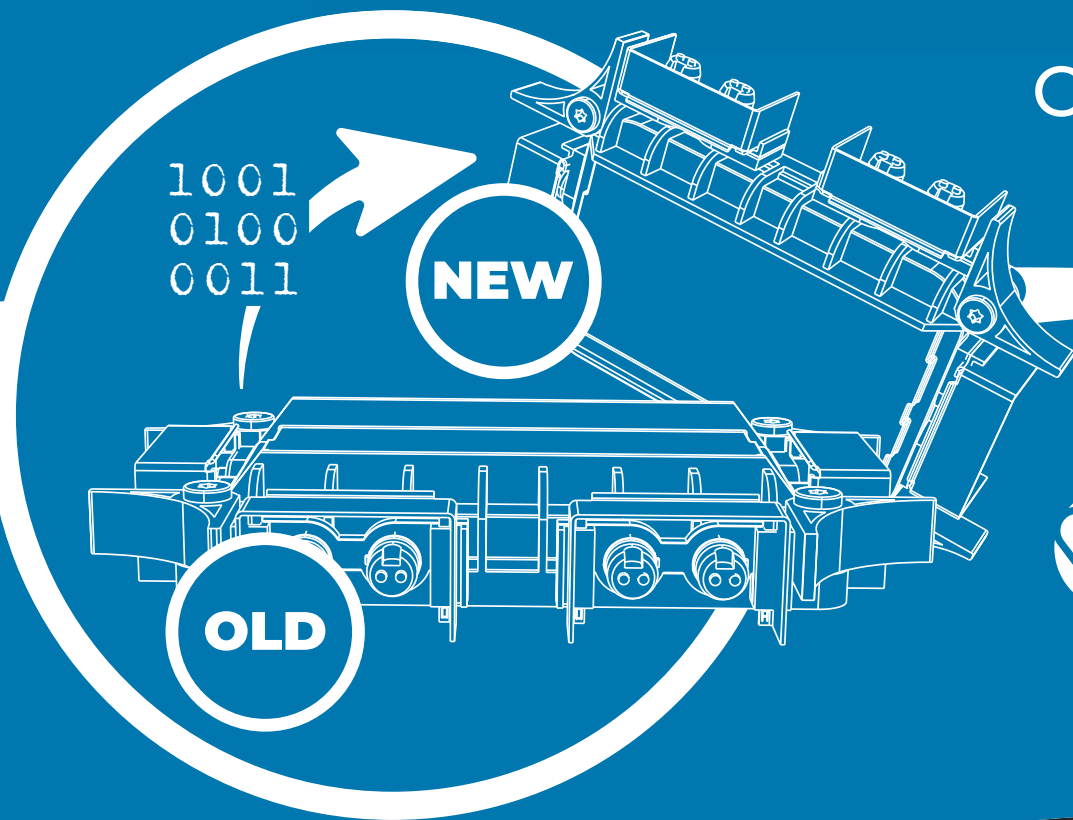
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ARTICLE

Cleaning truck cabs in the age of COVID

From bleach to bi-polar ionization, there isn't one best solution to cleaning truck cabs and combatting COVID-19. But there are good practices fleets can use to keep drivers and other staff safe.

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BLOG

Efficient oil removal from wastewater

Oil skimmers and oil-water separators that remove oil at tank wash facilities simplify water treatment and ensure compliance with wastewater discharge regulations.

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NEWS



Photo courtesy of DTNA

DTNA opens first heavy duty electric truck charging site

In partnership with Portland General Electric, the charging site, dubbed 'Electric Island,' was designed with heavy duty trucks in mind and will be open to public for all levels of EV charging.

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ADAS service strategies

One fleet's experience on how to spec and service heavy truck advanced safety technologies.



By Erica Schueller
Editorial Director

@CV_ESchueller



As fleets continue down the path of continued advanced driver assistance system (ADAS) adoption on heavy duty trucks, it is critical that maintenance departments consider the long-term service and repair needs for these systems.

For-hire fleet Maverick Transportation has been at the forefront of testing various advanced safety technologies, working with various vehicle suppliers and manufacturers to outfit assets with ADAS technology. Greg Johnsen, regional service manager at Maverick Transportation, recently shared insights on how his fleet has approached the spec'ing and servicing of ADAS technology on its heavy duty vehicles during the S.5 study group session at the Technology & Maintenance Council Spring Meeting.

"We're not just looking at the dollar amount, but will it help us in specific case scenarios?" Johnsen suggested. "What would the savings be long-term if we implement this technology?"

Plan outline

Maverick started testing and spec'ing various safety technologies in 2001 with the adoption of automatic tire inflation systems on its trailers. Since that time, Johnsen confirmed the company has implemented collision warning and transitioned to collision mitigation systems, forward facing camera monitoring technology, active steering, and more. Most recently, Maverick outfitted several trucks with cameras to replace mirrors and is awaiting the arrival of several units outfitted with rear outside-facing cameras.

"Maverick is going to look at anything that we can assist our drivers in being safer, or making their job easier, so we're going to continue to look at things going forward," Johnsen noted. He stressed, however, the importance of thinking beyond just the driver when widely adopting ADAS technology.

"We can put all the technology that we want to our units; if we don't have a trained staff to troubleshoot, repair, or replace and understand why we're doing that, then it is money that we're never going to get a return on," Johnsen said.

When Maverick decides to test a new safety technology on a truck, they first create a test group and add that technology to a few select units. Then, Maverick gathers feedback from drivers on the usage of that technology on the truck.

"During that time, of course, the manufacturer of that product will come in," Johnsen said. "And we will have discussions on troubleshooting guides, weak points that they may have noticed [with] other fleets that have tested this,



» Maverick began testing and spec'ing ADAS technologies in 2001 and continues to do so today.

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"We're not just looking at the dollar amount, but will it help us in specific case scenarios?"

Greg Johnsen, regional service manager at Maverick Transportation

what they have done to address those [weak points] so we know when we have a similar issue where to start looking, [et cetera]."

After gathering that information, Johnsen advised the team will set up hands-on training for technicians with these suppliers. After training is completed, Maverick creates in-house standard operating procedures (SOPs) utilizing the manufacturer's recommendations and adjusting guidelines for the specs of units run by Maverick.

One challenge Johnsen confirmed was the instances of outside service providers servicing Maverick vehicles. To plan for this, the fleet will work to educate these service providers with the necessary information Maverick has on-hand at its own in-house service locations.

"As we get trucks in dedicated locations, we will have our internal [technicians] drop by our preferred service providers and pass that training and SOP-specific [information] for our equipment on to them to assist them with getting our trucks up and running," Johnsen said.

Don't forget the parts

"When you are looking to test out some technology or move forward with technology, you have to make sure that you get parts available," Johnsen advised.

As it relates to servicing and parts availability, Johnsen said the Maverick team evaluates the top 100 parts used on the assets operated within a fleet. They then confirm with suppliers the availability and stocking levels of those parts.

"It is no different when you go to do this new technology," Johnsen said. "Ask for some additional high-rated parts that may need replacement – definitely get parts that may need replacement due to somebody backing into your unit – and strategically place those around where your test units are going to be."

Johnsen also offered one lesson from the service of collision warning and mitigation components, which his team learned: "Depending on the system that you have, and if you are stocking these components, be cautious as to where you put your barcode if you are using barcodes," he advised. "A barcode on the inside of a radar cover can throw off the radar, causing more issues down the road."

Johnsen said he has not hired additional technicians to service ADAS technologies, though he did acknowledge some technicians go through specialized training to gain a comprehensive understanding of the advanced systems.

"We have a group of people at each of our terminals who understand that technology and have training on that technology, and we try to get those units to them," Johnsen said.

And, for trucks that are down over the road, Johnsen advised, "We have a group of people in our road assist department that are trained on it as well, so they can help walk through what they are experiencing." ■

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Vocational vehicle VMRS

Tips and best practices for submitting new codes for specialized equipment.



By David Brierley
Editor



@ DavidBrierleyFM



Vehicle maintenance reporting standards

(VMRS), the coding convention used by fleets to track and analyze equipment and maintenance costs, was developed in 1970 by the American Trucking Association's Technology & Maintenance Council (TMC). TMC still manages VMRS today and keeps the standard up to date by overseeing the addition of codes for the latest equipment and technologies operated by fleets.

Jack Poster, VMRS services manager at TMC, and Joe Farke, supervisor, mechanical engineer at Altec Industries, spoke about how VMRS is kept up to date during a study session at TMC's virtual spring meeting.

Poster noted that VMRS is an integral part of most major fleet maintenance software, meaning most fleet maintenance managers and technicians have at least some knowledge of the coding system. For those not intimately familiar, however, Poster broke it down into four basic categories:

- Equipment classification codes.
- Labor codes. "This is a big part of VMRS," Poster said. "There are codes for failure, work accomplished, reason for repair..."
- Component codes. "When everyone thinks of VMRS they think of the part description codes, the component codes, the nine-digit number," he said.
- Manufacturer, supplier, brand code. "There are a little more than 11,000 manufacturers listed," Poster noted.

He went on to explain that VMRS never ends; it is a living system that is constantly being added to and updated.

"We are always adding new codes; either filling in codes that were never put in in the past or adding new codes as new technology comes into play – like electric vehicle codes," Poster explained. "On a regular basis we are adding new codes, we're trying to reflect what is going on out in the real world, and what you, as the user, need. I always stress that if I don't hear from you, the user, I have to make the assumption that everything is fine. So, I encourage you to get [in touch with] me."

Altec is one of several companies that works with TMC to keep VMRS up to date. The company designs, manufactures, and services fleets of hydraulic mobile, mounted equipment primarily serving the utility, construction, telecom, and forestry groups. Farke serves as a sort of VMRS liaison, working with Poster and others at TMC to help create new codes for the equipment Altec makes and services.

"We're very similar to standard lift equipment, but there's some additional regulations



» VMRS is an integral part of most major fleet maintenance software.

Photo courtesy of Transervice

and guidance along with that," Farke said. "Where VMRS came into play is that Altec began to look at how we can serve our customers better from a service aspect. We were getting direct requests from customers for these codes."

This was the first that Farke learned of VMRS, so he did some research and learned how Altec could get involved and submit codes for products that were not yet accounted for in VMRS. Being new to the submission process, Farke noted that there was a significant learning curve before he was successful in submitting codes.

"Our first attempt was to give some really ultra-specific codes to try to classify every option, every possible configuration of our equipment," Farke said.

It took some time to realize that "a door is a door regardless of what type of vehicle it's on." A VIN, part number, or other supplemental information can provide additional detail if needed.



VMRS best practices

Now about a year-and-a-half into working with TMC to create new VMRS codes, Farke has the process down to a science. The first step is to break the parts down into groups.

"Look at the categories," he said. "How would you disassemble your equipment? What would it look like if you laid all the pieces on the floor; could you put them into piles or buckets? ... Think about, from an intuitive level from your technicians where you would put those components. Also, get their feedback. If you've got access to any technician groups or other user bases, that was really a great content check for us."

It is important, however, not to take coding too far, Farke noted.

"Creating codes just to create codes doesn't necessarily benefit anyone," he said. "The codes need to be sought after by technicians. They can always be added later if you don't have them. This is a living process; you won't get everything on the first pass."

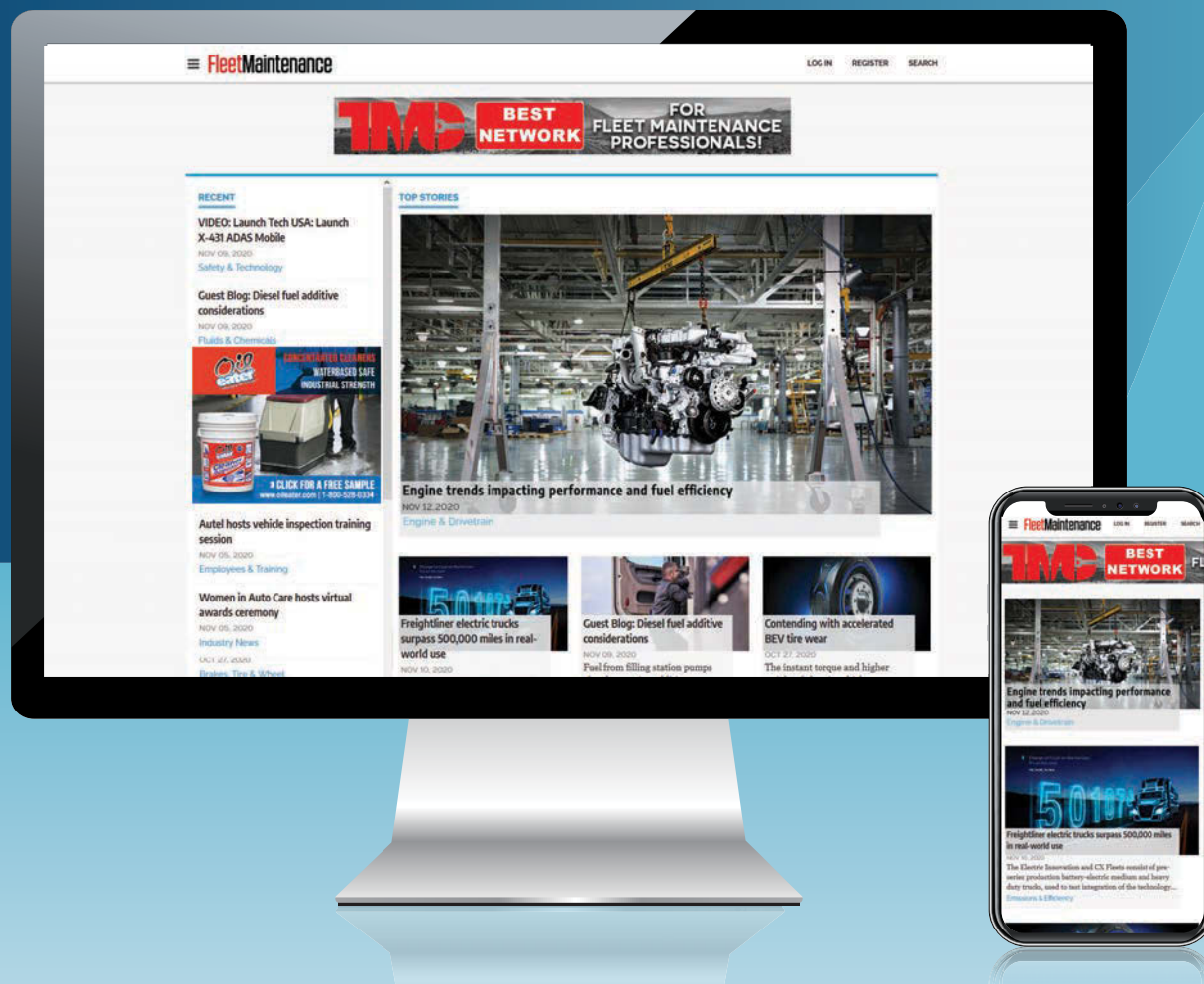
If a part will typically be replaced as part of a larger assembly, it's not necessary to break the code all the way down to the nuts, bolts, and washers, Farke described as an example. It is important to look at what technicians are going to be doing and what the manufacturer is going to recommend for a routine maintenance procedure.

To truly understand VMRS and be successful at creating new codes, you need to "immerse yourself in the process," Farke said. Do your homework, ask questions, don't overthink it, and keep it simple.

"Get involved with TMC," Farke advised. "Learning the process, the code submission templates, the nomenclature of VMRS was important. I started off by becoming VMRS certified and learning the codes, the structure, the intent of that from a core standpoint. That was very educational and helpful, and that paved the foundation for how we go about creating codes for the future." ■

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Vehicle complexity and its impact on maintenance

Considerations for spec'ing,
servicing, and maintaining today's
more complicated vehicles.

By David Brierley



[CHASSIS, BODY & CAB]

In the early days of heavy duty commercial trucks, fleets could choose from a fairly wide variety of options from different manufacturers to customize a vehicle that suited their needs. The truck could be fairly complex, but that complexity came in the form of mechanical components that most technicians could easily service.

Today's commercial trucks are still available with a certain level of intricacy on a basic mechanical level, but it is the newer, more advanced technologies that have been developed over the past decade or two that makes these vehicles truly complex. Systems that fleets have come to rely on to make trucks safer, more operationally efficient, and more comfortable than ever are driven by complex electronics, sensors, and electronic control units (ECUs) utilizing miles of wiring.

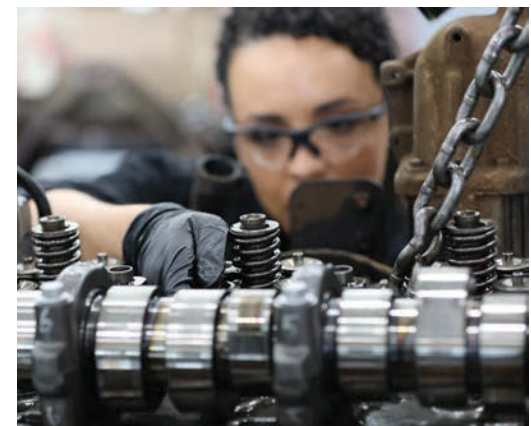
"As the industry has evolved and grown, customers have become much more sophisticated in thinking about their vehicle as a business solution and are spec'ing their vehicles based on their specific application," said Ryan Major, on highway marketing manager, Daimler Trucks North America.

Fleets are also spec'ing trucks with the driver shortage in mind, making them easier and more comfortable to operate with features such as advanced driver assistance systems (ADAS), automated manual transmissions (AMTs), and more complex infotainment systems.

"You've got computers for collision mitigation, roll over control, tractor-trailer combinations, ABS," said Tim Bauer, vice president aftermarket North America, Eaton. "Then you've got ECUs that manage the engine-to-transmission coupling and transmission of power and the automatic shifting, so there's another ECU there."

» (Left) Today's commercial trucks are still available with a certain level of intricacy on a basic mechanical level, but it is the newer, more advanced technologies that have been developed over the past 10 to 15 years that makes these vehicles truly complex.

Photo courtesy of Mack Trucks



» As the complexity level of a vehicle increases, so too does the skill and knowledge necessary to maintain, diagnose, and repair it.

Photo courtesy of Mack Trucks

Service and maintenance considerations

As the complexity level of a vehicle increases, so too does the skill and knowledge necessary to maintain, diagnose, and repair it.

“Adding features to the truck certainly has its benefits: improved fuel economy, enhanced safety, increased connectivity, and better driver comfort are a few of the key ones,” said Brett Fincham, director, fleet field service, Daimler Trucks North America. “However, with these features usually come additional maintenance requirements and additional failure modes and codes, especially for those features with electronic controllers. This can therefore change fleets’ maintenance cycles and practices.”

Maintenance and repair technologies have evolved along with the vehicles to provide technicians with products such as advanced diagnostic scan tools, but that is not always enough to make a proper diagnosis. Sometimes, no matter how many diagnostic tools are used, technicians hit a dead end.

“I think that complexity is really making it more difficult to service the vehicle,” Eaton’s Bauer said. “There is a very high percentage of electronic components that get returned – no matter who the supplier is – under warranty, that when they come back it’s, ‘no fault found.’”

As difficult as today’s vehicles can be to service, there are actions fleets can take to ensure maintenance and repair are handled properly and efficiently in order to maximize uptime.

Vehicle spec’ing

There is no getting around complexity in modern trucks, especially when spec’ing to fit the needs of a fleet. Fleets can, however, order as many vehicles as possible with a similar spec in order to streamline maintenance and service. If a number of the fleet’s trucks will be performing the same duty cycle, they should all be spec’d identically to simplify vehicle maintenance.

“While some changes to vehicle specifications are necessary due to where they operate geographically, both drivers and technicians benefit from uniform spec’ing because they become familiar with the specifics of the product,” said Phil Cary, Southeast regional fleet service manager for Mack Trucks. “A consistent spec also allows common parts to be used throughout the fleet, allowing fleets to keep fewer unique parts in their inventory, thus saving money over time.”

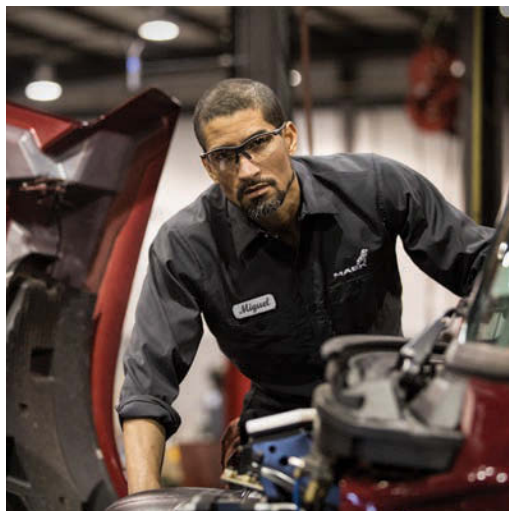
Navistar’s John Crichton, director of fleet service, and Adam Krey, senior technician training manager, added that more stable prediction of costs is another benefit to operating similarly spec’d vehicles. With similar spec, it becomes easier for a fleet to estimate what parts and service will be required for each vehicle.

“When you’ve got similar specifications or some combined specifications, from a fleet maintenance director standpoint, [it is easier to predict] what you can expect in terms of how vehicles wear, what are the replacement items, what are the intervals for your preventive maintenance, because I think those are all different based on



» If a number of the fleet’s trucks will be performing the same duty cycle, they should all be spec’d identically to simplify vehicle maintenance.

Photo courtesy of Mack Trucks



» Experts agree that proper training is one of – if not the most – important consideration of complex vehicle maintenance and repair.

Photo courtesy of Mack Trucks

the application and the supplier for the different components,” Bauer confirmed. “The more you can simplify the specification of the vehicle, you start then consolidating some of the challenges.”

Spec’ing similar vehicles has other benefits as well, such as reliance on fewer suppliers and fewer specialized tools needed for service.

Perhaps the most important benefit of consistent vehicle spec’ing, however, is the ability to streamline technician training. With fewer variables throughout the fleet, technicians can be better trained and become more familiar with the systems used fleet-wide.

“From a continuous training standpoint, consistent spec’ing of trucks reduces the new material

“Technicians with a strong electronics background, proper training, the right tools, and strong supplier engagement will find these future vehicles and systems exciting to work on.”

Chuck Brodie, Field Service Team Leader, Commercial Vehicle, ZF

technicians need to learn due to the reduction of variances a tech would come across in servicing a vehicle,” Crichton and Krey explained.

Technician training

Experts agree that proper training is one of – if not the most – important consideration for complex vehicle maintenance and repair. No matter how intricate vehicle systems become, technicians will need to know how to service them.

“We can’t emphasize enough the importance of proper technician training and the impact that

has on maintenance planning repairs going as predicted and scheduled,” Cary said.

Training for technicians is not only paramount when it comes to the vehicle itself and all its systems, but also for the diagnostic tools used to troubleshoot and uncover problems.

“The impact [of] vehicle complexity is significantly reduced when a few key factors are thoroughly addressed, including proper training of technicians and the right tools and diagnostics,” said Chuck Brodie, field service team leader, commercial vehicle, ZF. “Highly trained expert technicians are critical to service, maintenance, and repair of complex vehicles. They not only need to know how to address various issues that may occur throughout the life of the vehicle, but they need the right tools to understand fault codes, et cetera.”

Training technicians is not a simple one-and-done occurrence; it must be an ongoing process in order to keep up with the latest technologies and newest vehicle systems. One way many fleets keep their technicians up to date is by partnering with OEs and component suppliers for training on the specific vehicles and systems the fleet operates.

This has become somewhat more complicated during COVID-19; the number of online training resources available has increased substantially, but with so many virtual training sessions now being offered, technicians can potentially become inundated. They do not have time to attend every training course and deciding which ones should take highest priority can be a challenge.

“There [are] a lot of training resources available online, and I think COVID has probably only accelerated that,” Bauer said. “Understanding what’s in the fleet in terms of ‘What are you running? How many [vehicles] are you running?’ and building a schedule or a training regimen to ensure that the technicians understand all the new technology is probably the first and foremost [priority]. There [are] so many offerings from a variety of companies, it gets difficult to understand what to attend, how to attend.”

Whether it is remote classes or self-learning, fleet managers and maintenance managers are encouraged to reach out to their suppliers to understand what tools are available to educate technicians remotely, Bauer added. He also advised fleets should make sure they have the training logs and the training setup for any new technicians that are hired in the future.

Telematics and predictive maintenance

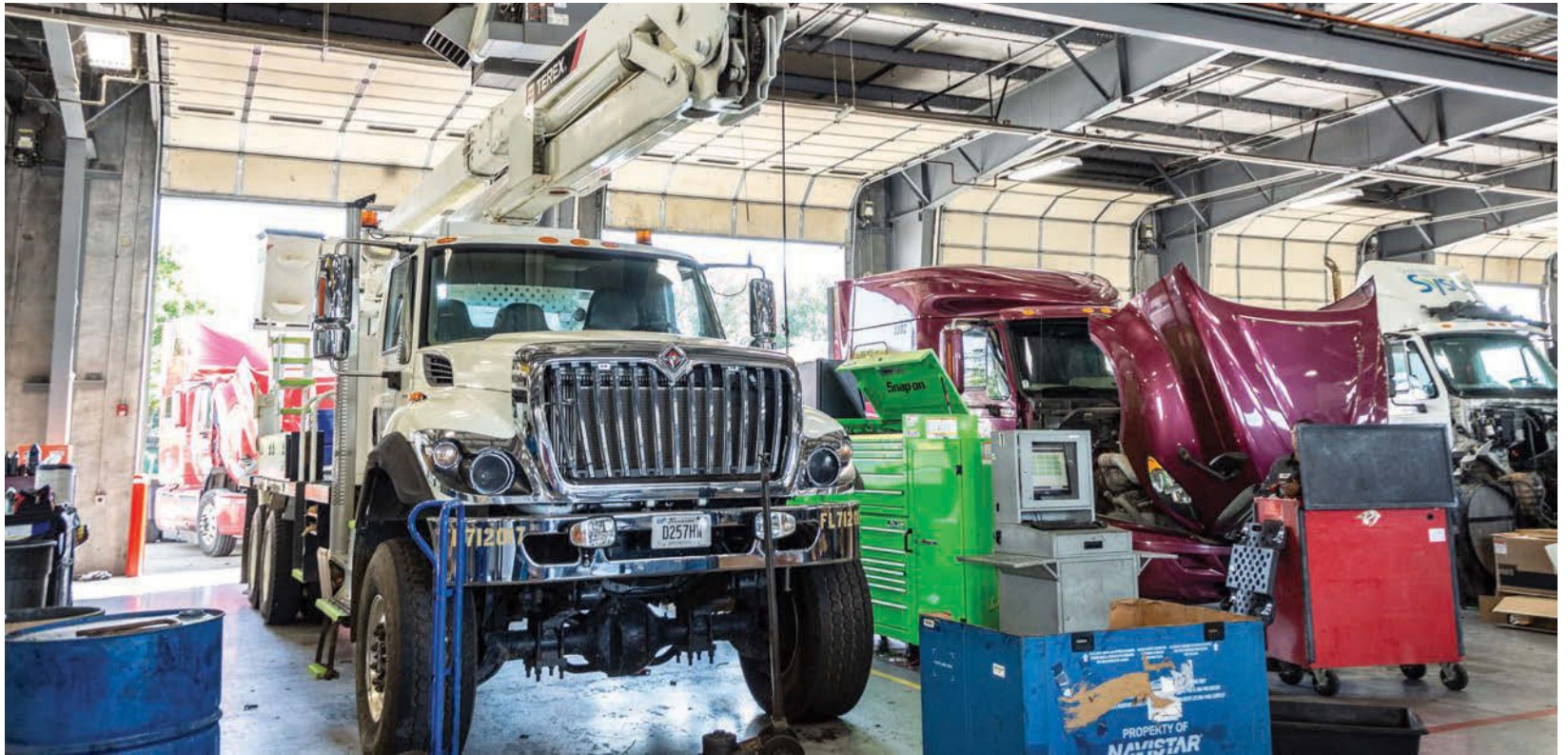
Another important piece to the complex vehicle uptime puzzle is utilizing all available technologies to keep the vehicle in operating condition.

Telematics systems, for example, contribute to vehicle complexity, but they can also help when it comes to knowing when a vehicle requires scheduled or unscheduled service.

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“The easiest way to streamline maintenance in fleets with complex vehicles is to follow the OE’s recommended guidelines for maintaining the vehicle in the fleet’s application,” Navistar’s Crichton and Krey said. “Understanding the data that comes from the telematics devices is also crucial. Leveraging vehicle data allows fleets to identify trends to modify maintenance or inspection time frames and develop a preventive maintenance program based on OE recommendations and specific to their application.”

Utilizing the data provided by a truck’s telematic system can help service technicians stay

more informed, Daimler’s Major said, which can improve the vehicle’s uptime.

“Maintenance is now less about nuts and bolts and more about telematics and analytics,” Cary added. “Vehicle complexity has accelerated over the past few decades, but it’s also facilitating tools that are driving greater customer satisfaction and maximizing optimal vehicle performance.”

Another benefit to vehicle telecommunication tools is the ability to update vehicle software remotely. Software updates help keep today’s complex vehicles on the road by providing bug fixes and other patches that might otherwise require the truck to be hooked up to a computer or scan tool in the shop.

“We cannot overlook the importance of properly maintaining vehicles to help prevent unplanned service events,” Cary noted. “Most often this will involve software updates, much like what we do with our personal electronic devices.” Cary added that these updates can be initiated by the driver or the technician.

Tracking telematics and other vehicle data can also help fleets get ahead of vehicle issues using predictive maintenance. Knowing when a certain component will likely wear out allows the fleet to replace it before there is a failure, avoiding unscheduled downtime.

“With the growing complexity of vehicles comes greater insight into how they’re operating and their needs, so the acceptance and adoption of predictive maintenance tools and practices will greatly

» As difficult as today’s vehicles can be to service, there are actions fleets can take to ensure maintenance and repair are handled properly and efficiently in order to maximize uptime.

Photo courtesy of Navistar



» Maintenance and repair technologies have evolved along with the vehicles to provide technicians with products such as advanced diagnostic scan tools.

Photo courtesy of Navistar

enhance a fleet’s ability to keep its equipment operating at peak performance,” Cary said.

Telematics and other vehicle data sources make today’s commercial vehicles more complex, but when applied correctly, that data’s benefits can far outweigh the added intricacy. Knowing of an imminent component failure, for example, or being able to remotely update a vehicle’s software, can help a fleet significantly reduce the vehicle’s downtime.

Future vehicle complexity

As time marches on, regulations for commercial vehicles will only get more stringent. That means trucks will need to provide greater fuel efficiency, with fewer (or zero) tailpipe emissions, and more advanced ADAS and safety features. Add to that the driver shortage as well as the fact that last-mile delivery and other freight demands are higher than ever, and it is clear that vehicles are only going to become more complex in the future.



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"I think we're going to see the complexity of vehicles continue to accelerate, probably like no time we've seen in the past," said Eaton's Bauer. "I don't see it slowing down where we're headed, which is to make the vehicles more fuel efficient, safer to operate, and certainly easier to drive. Driver shortage is a real thing, so manual transmissions aren't going to happen; automated transmissions are going to stay."

He noted his prediction that the industry will continue to see vehicle electrification and other complexities, with more systems coming onboard the truck adding more computers to service.

Mack's Cary offered a similar prediction, noting that vehicle potential and vehicle complexity tend to increase side-by-side.

"Electromobility has quickly gone from an 'on-the-horizon' to a 'here-and-now' technology, and like many of the other advancements we've seen in recent years, there are benefits and payoffs in other areas that can eventually outweigh the initial concerns with something new," Cary said. "Whether it is electromobility or higher levels of vehicle automation, the complexity of our industry is accelerating, and these advanced technologies are now part of our industry and will continue going through further development and refinement, bringing new challenges and opportunities along the way."

Navistar's Crichton and Krey added that as computers take a more prominent role in the operation of the truck, the overall stability of vehicle software will become increasingly important, making remote updates a necessity.

In addition to meeting efficiency, safety, and driver comfort demands, trucks of the future must also contend with new and different operating cycles.

"Freight demand in a COVID world is at levels never experienced before, trucks must be safer and more efficient to meet those demands," said ZF's Brodie. "Technicians with a strong electronics background, proper training, the right tools, and strong supplier engagement will find these future vehicles and systems exciting to work on."

As vehicle complexity continues to accelerate, it may

become increasingly difficult for independent repair shops and fleets to keep up with the advancing technologies. Technician training and retention will become more important than ever, so fleets should be prepared to meet those needs.

"It's going to create an interesting marketplace as you think of service," Bauer said. "Dealers will be up to speed on their technologies, [but] how that

plays in across manufacturers and how it plays into independent service and fleets doing their own service is yet to be determined, because there will be a lot of training and investment required to keep up with the technology." ■

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Why fleets should bypass the urge to bypass aftertreatment systems

Aftertreatment systems have come a long way in 14 years. With the right training, tools, and understanding of diagnostic procedures, fleets can relieve many of their common pain points without running the risk of illegal tampering.

By Gregg Wartgow

[EMISSIONS & EFFICIENCY]

» Some OEs have taken steps to guard against active aftertreatment tampering.

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Let's be honest, there are plenty of reasons why many fleets have developed such an unfavorable view of aftertreatment systems. Most tie back to three things: inconvenience, downtime, and cost.

"The need for forced regens and more frequent maintenance often frustrates drivers, inciting fleets to just disable the DPF (diesel particulate filter) regen function," said Alex Parker, chief marketing officer and executive vice president of Redline Detection, a manufacturer of diagnostic leak detection equipment. "But disabling DPF regen often leads to a clogged filter, and that often leads to a costly derating of the truck."

Technicians can also grow frustrated with aftertreatment systems. "Many fleet maintenance executives report a nine-times to 10-times increase in technician hours required to repair and maintain emissions systems since aftertreatment systems first came about in 2007," Parker said.

Much of the aftertreatment system stigma ties back to those early years. According to Johan Agebrand, director of product marketing for Volvo Trucks North America, DPFs had a lot of metal stresses and potential cracking due to the extreme thermal expansions and contractions created from temperature differences. Additionally, for selective catalytic reduction (SCR) and urea dosing systems, there were problems with crystallization and an inability to build up heat in all duty cycles.

"I often remind myself that the diesel engine has had 140 years to mature," added Len Copeland, product marketing manager for Detroit Products, a manufacturer of diesel engines, e-powertrains, transmissions, axles, safety systems, and connected vehicle services. "Aftertreatment systems have only been around a tenth of the time and have already evolved rapidly. That said, the very first aftertreatment systems were not without some learning opportunities."

In early systems, Copeland says the top three issues for many fleets were diesel exhaust fluid (DEF) dosing systems, DPF cleaning processes, and thermal management.

"Early aftertreatment systems often dosed DEF pneumatically," Copeland said. "That provided excellent atomization, but a dirty air system could lead to major issues. As such, most manufacturers appear to have gone to an electromechanical system that is able to achieve almost the same atomization with significantly reduced issues."

For thermal management, Copeland points to physical improvements such as exhaust insulation between the turbo outlet and aftertreatment systems inlet. There have also been software improvements such as Detroit's Auto-Elevate and Asymmetric Injection which help maintain aftertreatment system temperatures for more successful passive regens.

The most recent version of Detroit's aftertreatment system was released this year to meet greenhouse gas (GHG) Phase 2 regulations. "With this update, we are able to extend DPF replacement intervals up to 640,000 miles

or more while further improving the SCR to increase efficiency at lower temperatures," Copeland said. "The DOC (diesel oxidation catalyst) has also been improved to allow for lower minimum temperatures during dosing. These improvements help the system clean exhaust better at lower RPM."

Volvo's Agebrand points to other recent aftertreatment system improvements. "Some major changes include the fact that the SCR catalyst actually does a catalytic conversion in an increased temperature range. Thus, more variety in load and temperature from the engine will still result in a catalytic reduction of NOx emissions," Agebrand explained.

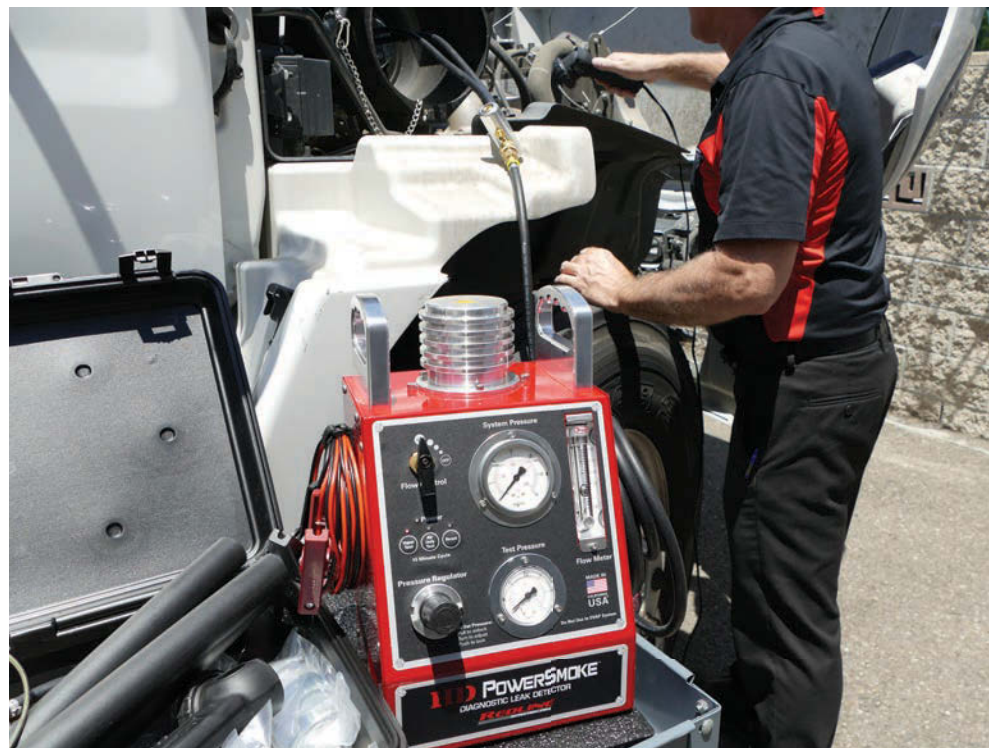
Dosing systems have also improved in both algorithms and hardware. "This enables the

“Aftertreatment systems have only been around a tenth of the time [as diesel engines] and have already evolved rapidly.”

Len Copeland, product marketing manager for Detroit Products

» The HD PowerSmoke from Redline Detection allows diesel technicians to perform an innovative leak detection procedure outlined in RP 375.

Photo courtesy of Redline Detection



systems to operate in a variety of conditions and with higher efficiency," Agebrand said. "Material production design has also facilitated more compact systems that are easier to service without reducing efficiency."

The need for specialized training and tools

Despite 14 years of aftertreatment system improvements, some fleets still have a bad taste in their mouths.

"When 2007 emissions standards were released, there was little to no training for the fleet technicians on how to diagnose, service, and maintain the aftertreatment systems," said Randy Griffith, director of technical sales at Emission & Cooling Solutions (E+CS), a family-owned company with nine shops nationwide. According to Griffith, this general lack of OE training is still the case in 2021. That is why E+CS specializes in helping technicians understand basic functions and diagnostic procedures for aftertreatment systems.

"We have also found that many parts are replaced when there is no need to replace based on age or hours," Griffith added. For example, a DOC should last many years, but a technician is often told to simply change it rather than find the root cause. "Customers get frustrated and decide to delete," Griffith said.

Even for those fleets that have attained the proper training, more hurdles exist. One is the need for specialized equipment.

"The cost of tools and equipment needed to diagnose and service these systems is a newer problem for fleets," Griffith said. "Smaller fleets are particularly affected because they previously could get by without having modern scan tools and equipment."

Another challenge is simply the cost of exhaust items. While exhaust used to be a

» An example of face-plugging due to an aftertreatment system that hadn't been working properly. Face-plugging refers to a heavy buildup of carbon on the inlet side of a DOC (diesel oxidation catalyst). Randy Griffith, director of sales at Emission & Cooling Solutions (E+CS), said face-plugging like this would likely be traced to an upstream issue such as a leaking turbo or EGR, or something as simple as a lack of regular maintenance.

Photo courtesy of E+CS

minimal expense for a fleet, Griffith says it has risen to the top of the list behind fuel, oil, and tires.

"Aftertreatment components are expensive," Griffith said. "Without knowledge of the system and the proper diagnostic equipment, a fleet can easily spend tens of thousands of dollars to fix one system. Furthermore, fleets will typically deal with an ongoing occurrence until the root cause is repaired correctly."

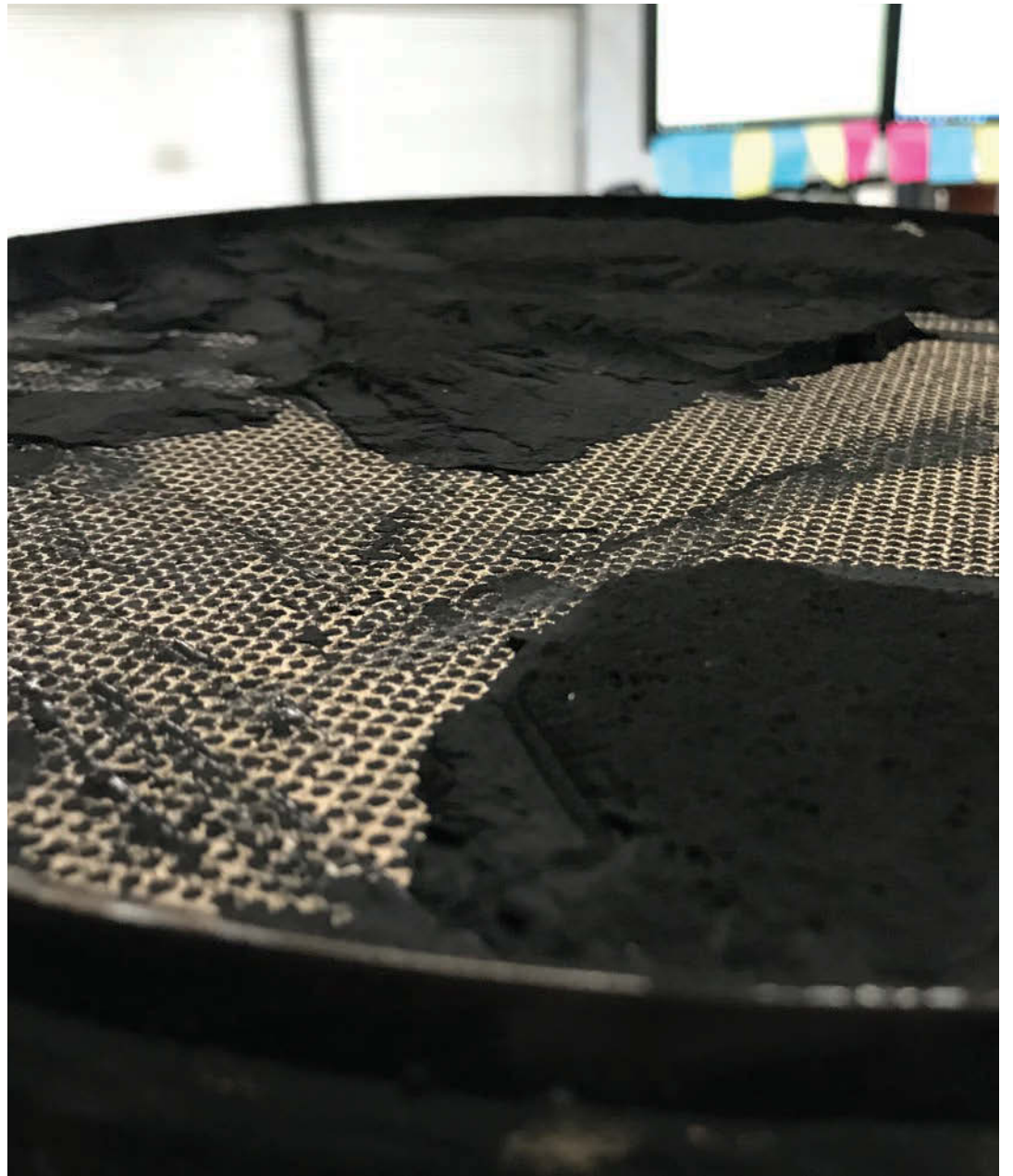
How some fleets illegally bypass aftertreatment systems

Given all of these hurdles, some smaller fleets have gone the way of removing entire systems from a truck. This creates both environmental and legal issues. Additionally, E+CS' Griffith says there can also be some drivability issues that cannot be repaired through the typical OE dealer channel.

"From my understanding, an OE dealership will not touch a truck in which the aftertreatment systems have been tampered with," he pointed out. "This leaves fleets with very little support if there is a major issue down the road."

Nonetheless, some fleets make the ill-advised decision to tamper.

Griffith stresses the fact that E+CS has never engaged in the removal or bypassing of an aftertreatment system. "We are in the business of



cleaning and repairing aftertreatment systems as well as providing aftermarket products to keep systems intact as they were intended to be," Griffith emphasized. That said, his many years in the industry have exposed Griffith to a story or two. Plus, his knowledge of engines and aftertreatment systems allows him to see where tampering could take place.

"I was in a shop in early April where a customer brought in a truck with a head gasket issue," Griffith related. "When the technician went to clean the filters, he found that the DPF had been drilled out due to contamination. According to the owner-operator of the truck, he had no idea the truck had been deleted when he'd recently purchased it."

Drilling out the DPF is a common way people delete their aftertreatment systems. This is generally done with a hole saw to make large passages through the filter media so it can bypass the filtration. Generally, this will cause aftertreatment codes which will then need to be either left in the system or programmed out of the system.

Another bypass method Griffith has heard about is the installation of block-off plates in place of the exhaust gas circulation (EGR) cooler. That keeps the system from recirculating the exhaust back into the engine. "This is common on early aftertreatment systems," Griffith added.

"When it comes to a person or company actually tampering with a vehicle, there are many consequences including voiding of the warranty, hefty fines from the EPA (Environmental Protection Agency) or CARB (California Air Resources Board), and possible imprisonment."

Johan Agebrand, director of product marketing for Volvo Trucks North America

Improving aftertreatment systems in vocational applications

Len Copeland, product marketing manager for Detroit Products, said a few key updates have been made to Detroit engines to improve the aftertreatment system performance of heavy duty trucks in vocational applications.

- An "auto elevate" feature eliminates hydrocarbon buildup in the aftertreatment system. Exhaust temperatures are temporarily increased during a slow ramp-up of RPMs while idling for a short period of time. Copeland also pointed out that this functionality will not interfere with PTO operation.
- For select applications, passive regens are possible during PTO operation, allowing uninterrupted use.
- With Detroit's DD15 Gen 5 engine update, ThermoCoasting and Asymmetric Injection at idle help to further maintain exhaust temperatures in low-load situations.

Tampering is illegal and costly

Just like E+CS, Volvo does not condone any activities that seek to bypass or delete an aftertreatment system. "It is considered active tampering with an emissions system and is against the law," Agebrand stated.

As Agebrand pointed out, the environmental consequences of tampering are also quite clear. "NOx emissions and particulates would not be controlled from the vehicle, and the air we breathe would not be as clean," Agebrand said. "When it comes to a person or company actually tampering with a vehicle, there are many consequences including voiding of the warranty, hefty fines from the EPA (Environmental Protection Agency) or CARB (California Air Resources Board), and possible imprisonment."

Some OEs have taken steps to guard against active tampering. For instance, Agebrand says Volvo has developed several functions and algorithms in combination with hardware sensors to detect any such tampering or systems that are not working. "If any customer tries to bypass the system, for example, the truck's 'check engine' light will activate, and the vehicle will go into a 'limp home' state with low speed, ultimately stopping if this is not addressed by a service technician," Agebrand explained.

Detroit Products' Copeland said it's important to ask why someone would want to bypass or remove an aftertreatment system in the first place. Typical answers are a perceived reduction in performance or the desire to reduce maintenance costs and downtime. However, perception is not reality.

"The aftertreatment device acts as an excellent muffler, especially when paired with a quieter downsped engine," Copeland explained. "That often leads to the perception of low power, even though power is tested by the EPA since most emissions regulations are measured in g-hp/hr. This means a DD15 engine with 505 horsepower is truly producing 505 horsepower, for example."

With respect to maintenance costs and downtime, Copeland said parked regens and unexpected repair costs

should be minimal when proper use and maintenance of a newer aftertreatment system are adhered to.

"Those costs are also likely to be offset by the extended service intervals of modern equipment," Copeland added. "Some engine oil changes are 75,000 miles and DPF intervals extend past 600,000 miles."

The bottom line is that the cost of deleting an aftertreatment system is often much more than the cost of proper preventive maintenance for the life of the truck.

"A standard PM is under \$1,000, but a new ECM (electronic control module) to work with a deleted truck can be \$4,000," E+CS's Griffith explained.

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**Innovative solutions improve
aftertreatment maintenance**

Even with adequate training, service tools, and preventive maintenance measures, most fleets could still benefit from additional aftertreatment system assistance. Fortunately, there are many aftermarket solutions that can help.

“Here at E+CS, we have a process known as the DPFRENU process,” Griffith said. “This process is used to service the DPF filters themselves and can increase the longevity of an aftertreatment service. DPFRENU can also reduce strain on the engine by decreasing backpressure and creating more soot-loading capacity.”

As Griffith explained, good DPF cleaning programs that focus on flow rate and capacity can help dramatically decrease the cost and downtime associated with aftertreatment issues. Since there are many different processes and types of equipment available, Griffith said it is important for a fleet to partner with a good service provider. That company can proactively maintain the fleet’s aftertreatment systems, as opposed to reactively deleting or removing systems that are not functioning properly.

Detroit’s Copeland said fleets should simply refer to Detroit’s guidelines on sourcing a remanufactured filter rather than having it cleaned by a third party.

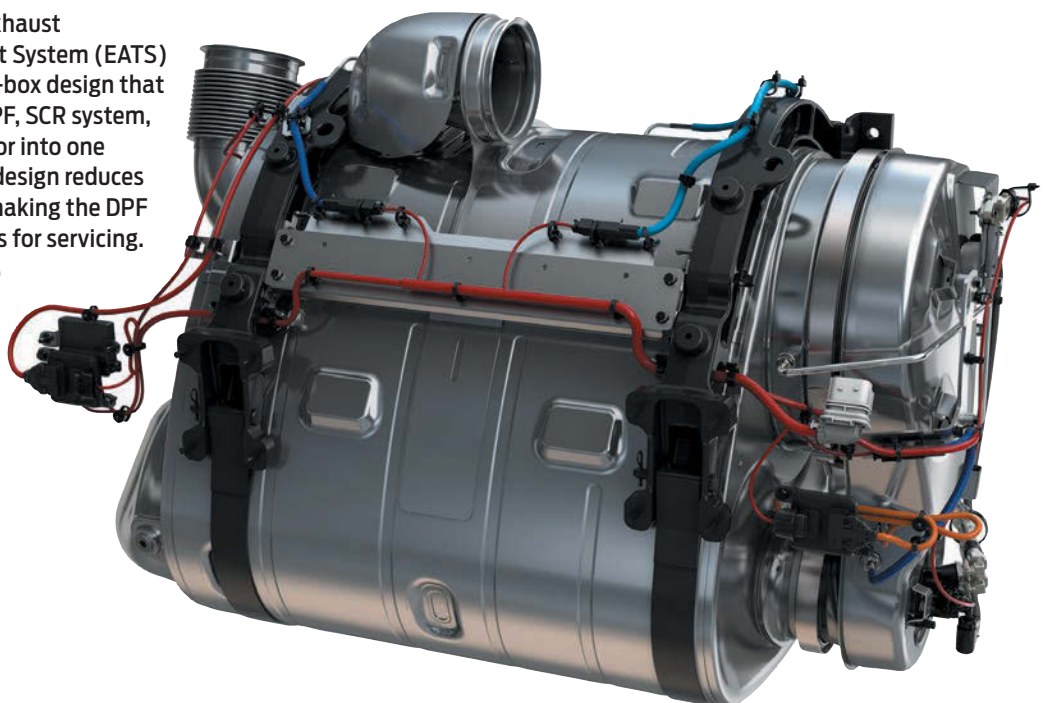
“Our remanufacturing process features an extensive, proprietary, environmentally friendly washing service for DPFs,” Copeland explained. “This cleaning process removes more than 95 percent of the ash residue from the DPF. Incorrectly removing the harmful ash residue in the filter can create hot spots. That can lead to a cracked DPF, downtime, and additional maintenance costs. Our process is far more effective than using a ‘bake and blow’ method.”

**Getting to the root of
upstream air leaks**

Redline Detection’s Parker said certain product innovations can also help diesel technicians proactively seek out air leaks, which happen to be the root cause of many DPF-related issues.

» This Volvo Exhaust Aftertreatment System (EATS) features a one-box design that encases the DPF, SCR system, and DEF injector into one package. This design reduces weight while making the DPF easier to access for servicing.

Photo courtesy of Volvo



Research from Redline Detection suggests that an “upstream component fault” is the most common cause (89 percent) of DPF failure. This can be caused by small air leaks that are often undetectable. These upstream leaks create an inconsistent air/fuel ratio that can lead to downstream aftertreatment faults and, ultimately, DPF/SCR failure.

According to analysis from Redline Detection, the most problematic upstream component failures are:

- Leaking injectors
- Leaking exhaust pipes
- Manifold gaskets
- Coolant leaks
- EGR cooler leaks
- Doser valve (aka 7th injector)
- Turbo failure or housing failure
- Sensors and wiring harness failure

The challenge for fleets is identifying when and where these seemingly undetectable upstream air leaks exist before they result in a failed aftertreatment system. As Parker pointed out, the old-school method isn’t effective.

“Standard practice has always been to pressurize a system by starting the engine, slide under the running truck, spray soapy water, and look for bubbles,” Parker said. “That method is not only dangerous, but also makes it nearly impossible to reach many of the key

**“Incorrectly removing
the harmful ash residue
in the filter can create
hot spots. That can
lead to a cracked DPF,
downtime, and additional
maintenance costs.”**

Len Copeland, product marketing manager for Detroit Products

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components in a modern truck. Another problem with the soapy-water method is that many modern trucks' computer systems will not allow the engine to produce boost while sitting in a bay."

An alternative to the soapy-water method is to use an ultrasonic listening device. But in a noisy shop, that can prove to be impractical, as well.

So, what is a heavy duty technician to do?

The Technology & Maintenance Council (TMC) has developed a Recommended Practice (RP 375) that utilizes high-pressure leak detection technology to address upstream leak detection in aftertreatment systems.

Redline Detection's HD PowerSmoke technology uses regular compressed air to maintain a variable pressure of 2 to 20 psi throughout the intake and exhaust system. Compressed air is injected into the system, followed by a visual vapor that replicates the boost load of a running engine. The vapor flows through the truck's hoses, tubes, and related components. If there is a leak, the vapor escapes at that precise point, allowing the technician to visually identify the location.

An added bonus to this procedure is the fact that the engine can remain safely off. As importantly, the procedure is quick and easy.

"It typically takes less than five minutes to test an entire aftertreatment system," said Mark Hawkins, head of technical products at Redline Detection. "The technician seals the largest orifices on the engine and the exhaust with our intake adapters. Then the visual vapor is introduced within those two points. It's designed so that when it inflates, it creates the perfect seal regardless of make or model."

Parker says Redline's unique leak detection technology can be used for triage diagnostics when a truck comes into the bay with an issue. Additionally, technicians can use this RP 375 procedure for preventive maintenance in an effort to locate faults before they trigger excessive forced regens or derate.

As a preventive measure, Hawkins says some fleets conduct a visual vapor leak inspection every 90 days. Regularly inspecting for leaks can help prevent costly system

failures. "A lot of leaks are found prior to an engine light coming on," Hawkins pointed out.

Fleets have plenty of solutions at their disposal to help get a better handle on aftertreatment system management. From training and tools to innovative services and procedures, it is up to fleets to take advantage. Yes, some investment is necessary. But when potential costs and other

downsides of poor aftertreatment system maintenance are factored in, the ROI picture becomes a lot clearer. Then, when you look at the potential costs and downsides of tampering with an aftertreatment system, the ROI really comes into focus. ■

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[SHOP MANAGEMENT]

What does your dream shop look like? That is a question asked by Fullbay, providers of a heavy duty repair shop management platform. Whatever it looks like, the company advised, fleets and service providers need to address a number of key practices to achieve that goal.

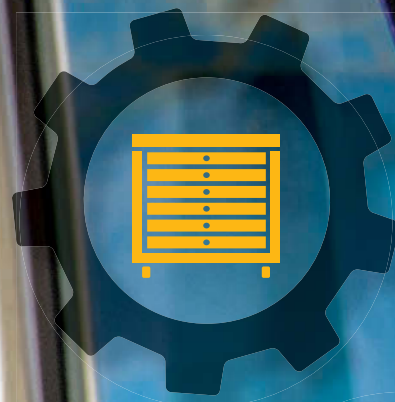
To start, you should not only have some idea of where you want things to be in your shop, but also how long it will take technicians to reach them. You do not want them hiking back and forth all day between places like bays and the parts room, so seeing how much time that will take and organizing the facility to cut it down as much as possible will pay off in productivity.

Second, invest in equipment storage. Large tools especially can get in the way when they are not in use, but technicians need them nearby so they do not waste time looking for items or trekking across the shop to retrieve them. Keeping equipment stored close to the service bays in a space that is organized but both out of the way and accessible, is a sure time saver.

CONSIDERATIONS FOR OPTIMAL SHOP EFFICIENCY

Employing **BEST PRACTICES** throughout the shop leads to **HIGH QUALITY WORK** that is done efficiently and productively.

By Seth Skydel



» For productivity, it is important for shops to equip their technicians with tools that facilitate quick and accurate diagnosis and repairs.

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ASH**



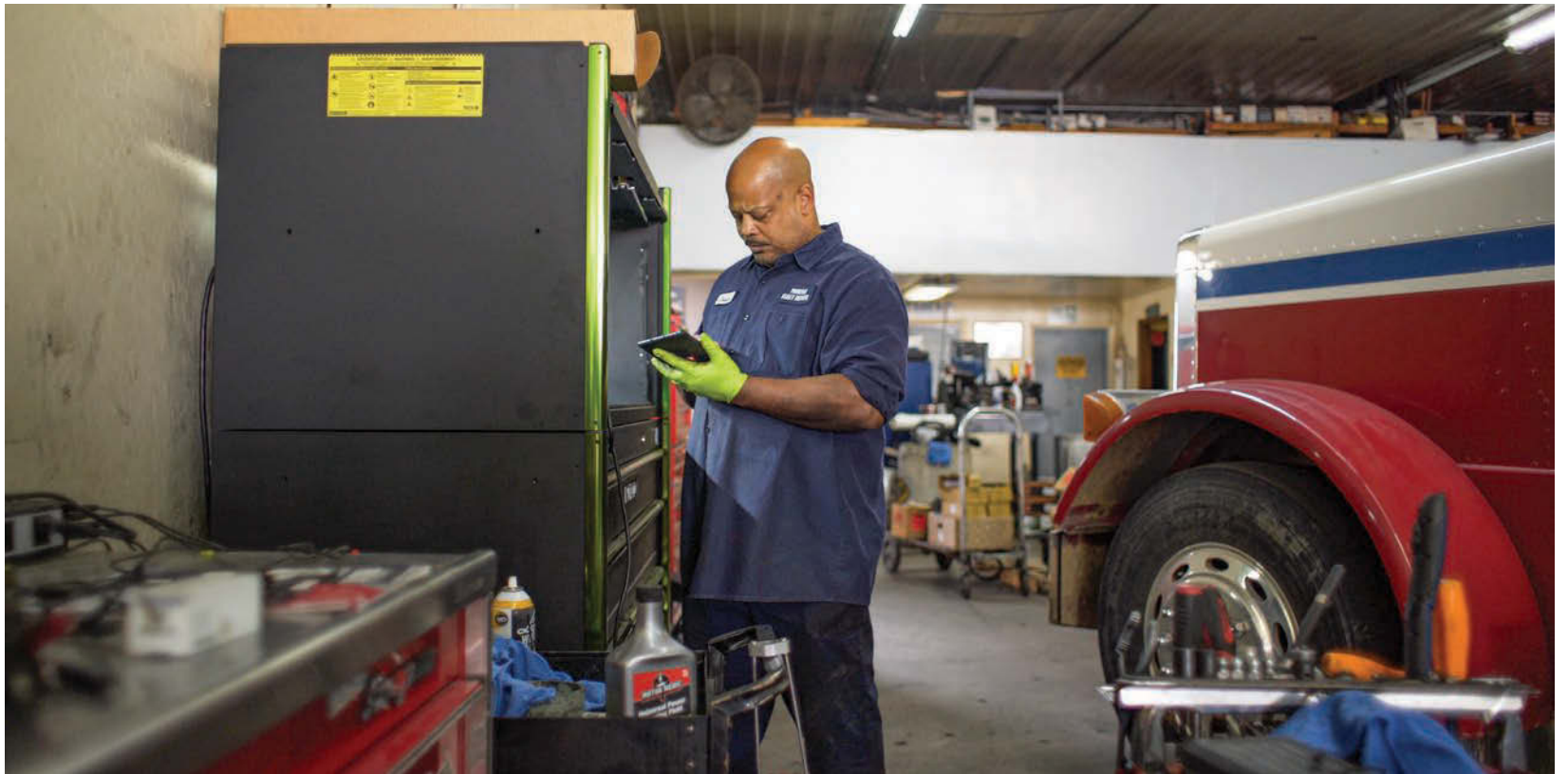
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» Fleets should not only have some idea of where they want things to be in the shop, but also how long it will take technicians to reach them. Cutting down on time it takes to retrieve a tool will pay off in productivity.

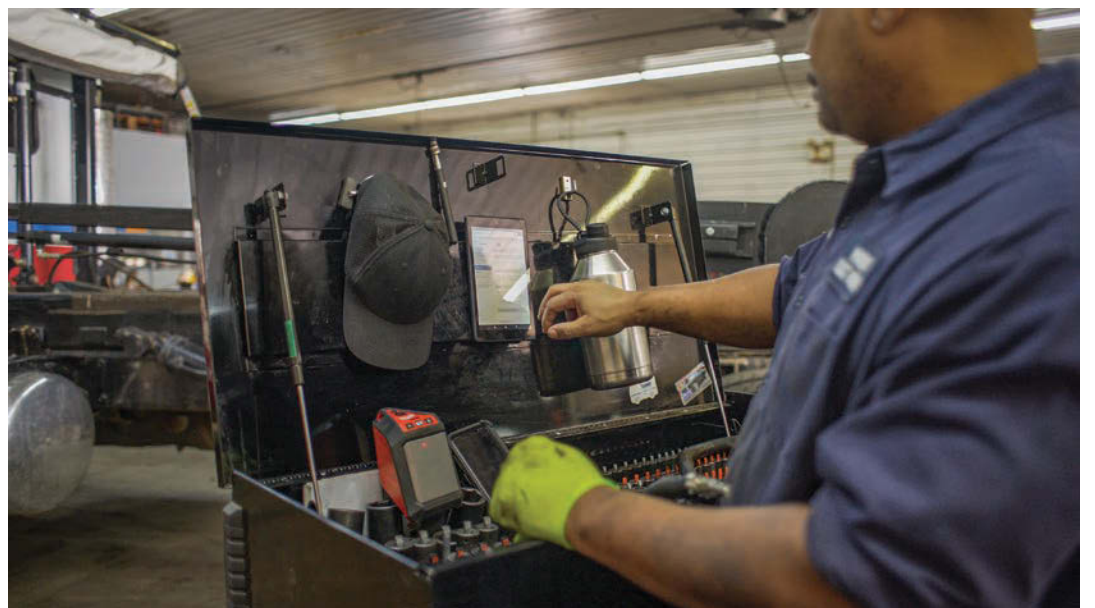
Photos courtesy of Fullbay

“Fleets want to minimize the distance a technician has to travel to perform routine tasks,” said Dave Shedlock, BendPak’s director of national accounts, North America. “Take wheel service, for example. By putting wheel balancers, tire changers, and inflation cages near each other and close to a bay where that work is done, technicians don’t have to move heavy wheels and tires all over the shop.”

How technicians move heavy vehicle components is another important consideration, Shedlock pointed out. Service carts, vehicle dollies, and other equipment can take the strain of lifting and moving vehicle parts off the technician, reducing risk of injury and improving efficiency, he noted. In some cases, labor-saving shop equipment can even let a single technician perform tasks that would otherwise require two people.

“Service and parts departments should be considered profit centers, and storage solutions should be looked at as a means of increasing efficiency and productivity,” said Ricky Johnson, vice president of sales at Borroughs LLC. “It’s important to work with a manufacturer to address efficiency and ergonomics. The supplier should be able to survey current and future workspace needs and use design software to provide a suggested storage layout.

“Parts inventory is the backbone of a shop’s support for technicians,” Johnson continued. “A proper layout for the parts department creates a ‘Fast Zone’ that places the fastest moving parts close to the counter. When a technician stands and waits for a part, a dealership can lose an average of a \$1.50 a minute in revenue. Creating a fast zone will resolve this issue.”



“Service and parts departments should be considered profit centers, and storage solutions should be looked at as a means of increasing efficiency and productivity.”

Ricky Johnson, vice president of sales at Borroughs LLC

Tool storage and equipment organization can help keep shops running efficiently, Johnson also noted. Features of well-designed workstations can include drawers that extend far enough so technicians can find tools in the back easily, and they should have the ability to open upper cabinets with one hand.

Shop size and layout can dictate equipment choices, noted BendPak’s Shedlock.

“Fleets with facilities that have less square footage will want to look at more compact equipment,” he said. “And don’t forget about the HVAC system’s role in technician safety and productivity. When temperatures get high, technicians can overheat, lose focus, and even become ill.

“Proper lift selection leads to greater shop efficiency and productivity as well, but the process must take into account many factors,” Shedlock also related. “Understand the types and weights of vehicles to be lifted, clearances above and around the lift, and access to vehicle lifting points. Before choosing a lift, get accurate bay measurements, including ceiling height, and check to make sure

the service bay can accommodate the fully raised height of the lift when it's loaded with the vehicles you'll be working on."

When it comes to two-post lifts, Shedlock pointed out, overhead cross bars can sometimes limit how high a vehicle can be raised, so make sure to account for that in your calculations. Turning radius is also a factor in lift selection. The vehicles a fleet is planning to service need to be driven into the bay without a lot of time spent maneuvering.

For ultimate flexibility, Shedlock added, consider a portable lift. For heavy duty vehicles, mobile column lifts can be stored out of the way until they are needed, and then conveniently moved from bay to bay as jobs require their use. A single set of mobile columns can be used to lift multiple vehicles throughout the day and lower them onto support stands. The lift columns can then be moved to the bay where they are needed next.

Fleets relate best practices

With more than 44,000 units of trailering capacity and over 4,000 power units in its asset-based fleet requiring routine service and repairs, Gerry Mead, executive vice president, maintenance & equipment, noted Hub Group's five shops have to operate as efficiently as possible.

"If you look at how a well-run dealership's shop is organized - with things like express lanes that improve throughput - you realize they do that to generate revenue," Mead said. "The same concept applies to fleets. Moving equipment efficiently through shops reduces costs and downtime so assets can cover more revenue-producing miles.

"The simplest approach to an efficient shop layout is to make sure everything is placed so technicians aren't wasting time," Mead continued. "COVID has forced everyone to focus more closely on non-essential movement, but a layout that limits the need for our 60 technicians to walk across shops eliminates wasted time under any circumstances. Simple things like making sure that PM tools are by the PM bay, or tire tools are

readily available, turn unnecessary travel time into asset uptime."

To further limit the need for technicians to leave their work bays, Mead is focused on the time that is associated with getting parts. As a result, Hub Group shops are organized by job type. For example, bays used for preventive maintenance (PM) and faster repairs are closer to the

parts room. In addition, the shops use carts to deliver parts to bays rather than requiring technicians to pick them up.

"The carts help with social distancing because technicians are not crossing back and forth across facilities, but just as importantly, the time that saves adds up," Mead stated. "We're seeing that improvement in efficiency in direct labor



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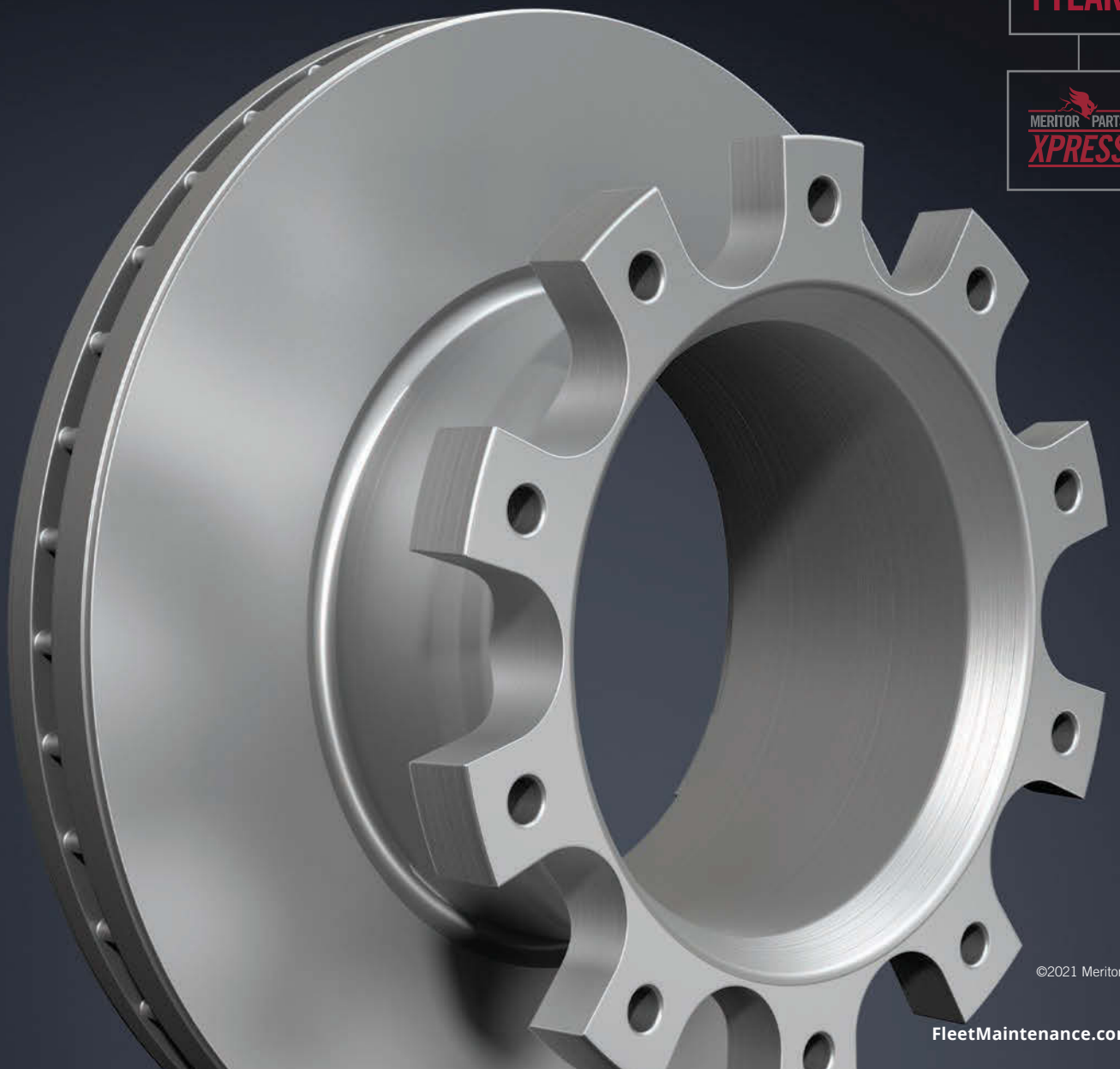
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» Large tools can get in the way when they are not in use, but technicians need them nearby so they do not waste time looking for them.

Photo courtesy of ComEd

costs and quicker turn times for repairs. It was an opportunity that was always there but until recently we didn't look at it closely.

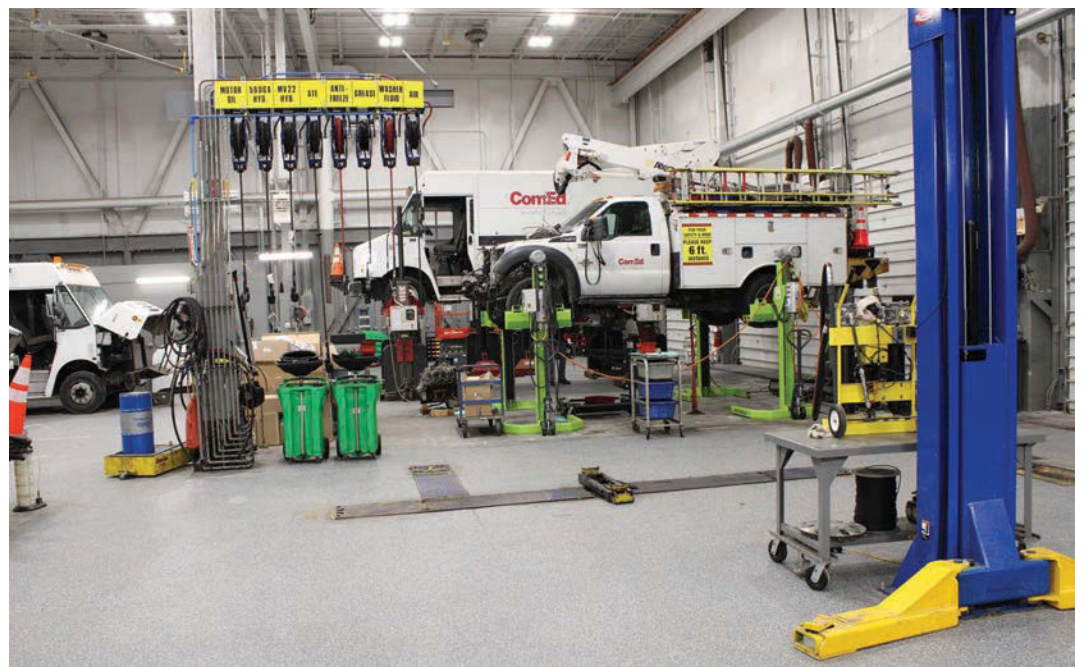
"Another thing we're doing to improve shop efficiency is organizing parts rooms by VMRS code," Mead added. "It saves a lot of time when things are sorted correctly. Otherwise, you will lose time you can never recover."

"Incorporating best practices for shop efficiency starts by looking outside your office door to see the workload for each day," said Jeff Harris, vice president, maintenance at USA Truck. "We've established staging areas for tractors and trailers that immediately identify where they are in the service process. That better way to organize vehicles eliminates wasted time and energy searching for or moving units to be able to bring one into the shop. And a quick three-second look makes it easier to tell our dispatch and operations staff which vehicles are ready for service."

Tool storage and equipment organization has also been addressed in USA Truck shops to eliminate wasted footsteps and time.

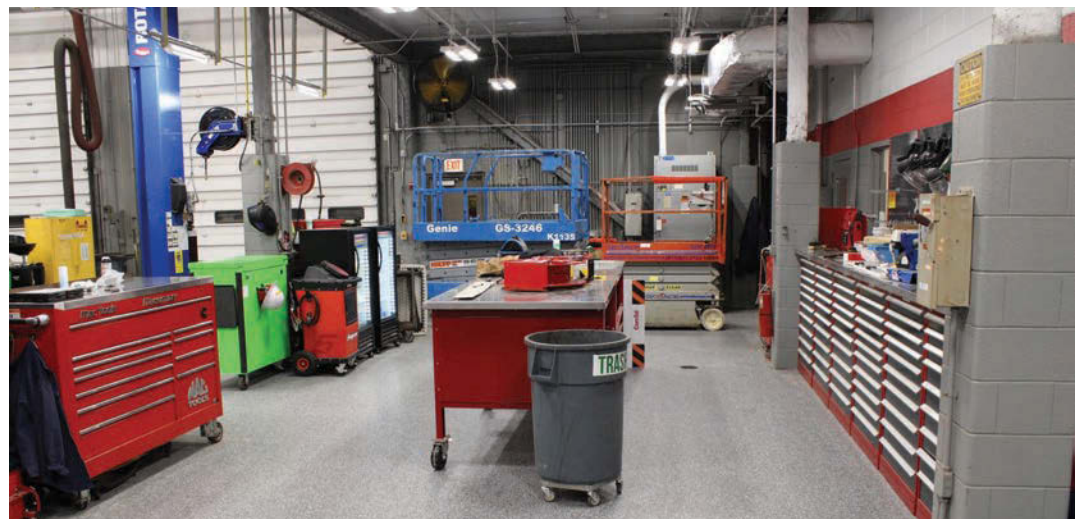
"We use rolling shadow boards with common and associated tools, which are staged at specific locations," Harris explained. "A board, for example, can have tire and wheel-end tools or other high-usage items. The boards are stored in painted blocks on the shop floor and are rolled to a bay as needed. That way they still have a home, but the tools are closer to the technician because they're not all in one central location."

Other organization practices at USA Truck shops, according to Harris, include painting boxes on shop floors for garbage cans and establishing locations for items like refrigerant recovery units.



» When a technician consistently has to leave the work area to retrieve a tool, the time loss adds up.

Photo courtesy of ComEd



» Keep equipment stored close to the service bays in a space that is organized and out of the way.

Photo courtesy of ComEd

“We’ve focused on parts storage as well, especially high usage items” he added. “For example, we keep a supply of mud flaps for quick replacement at our Maintenance Quick repair lanes, and we installed shelves for filters in our PM pits.”

Quantifying time savings has also yielded efficiency benefits at USA Truck shops. To evaluate the time spent on a routine PM, for example, the fleet outfitted a technician with a pedometer to count footsteps and created a diagram of the technician’s path around the truck. By analyzing the information, a change in procedure to reduce steps resulted in cutting a four-hour PM down to one hour and 45 minutes.

That kind of time savings can add up quickly for a fleet that has 115 technicians at seven shops, including four new facilities that were opened in the past three and half years. The maintenance staff at USA Truck services over 1,600 company tractors, 450 owner-operator vehicles, and 5,500 trailers.

“We see the benefit of all this activity in SRT (standard repair time) efficiency on the thousands of routine jobs we perform every year,” Harris stated. “By measuring efficiency, we know why things take certain amounts of time and whether we can improve on it with better organization.”

Technology contributes to shop efficiency

For productivity, related Jason Hedman, product manager at Noregon, it is important for shops to equip their technicians with tools that facilitate quick and accurate diagnosis and repairs.

“When a truck is held up in a bay because no one can figure out what’s wrong, fleets experience unnecessary downtime and service centers decrease their profit margins,” he said.

“The tools must both assist entry-level technicians with diagnostics, so they don’t have to pull away more experienced team members from their work, and at the same time offer advanced capabilities that experienced technicians need to complete more intensive jobs,” Hedman continued. “By equipping locations with tools that assist technicians of all skill levels, fleet shops will experience fewer comebacks and better bay-turn rates.”

Hedman also noted that benchmarking is essential for measuring improvements from upgrading shop tools.

“Keep records of average repair times, dwell time, average repair order values, or whatever other metrics you wish to improve,” he advised. “Fleets should also consider maintenance intervals, breakdown rates, or other measurable items that affect uptime. Then, once you implement a new tool and use it for a sufficient amount of time, return to these figures and take note of how they have changed.”

Management technology can streamline processes and make shops more efficient, noted Fullbay CEO Jacob Findlay.

“We’ve seen the results across different operations,” he stated. “Locations with shop management platforms that can transfer information in real time by using tablets or laptops at each bay so technicians and service managers can be in constant communication are steadily improving



» Place wheel and tire equipment close to a bay where that work is done so technicians don’t have to move heavy wheels and tires all over the shop.

Photo courtesy of BendPak



» Service carts, vehicle dollies, and other equipment can take the strain of lifting and moving vehicle parts off the technician.

Photo courtesy of ComEd

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Jason Hedman, product manager at Noregon

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Retreading done right

For many fleets, a successful retread program could offset initial new tire costs and boost a fleet's overall return on investment.

By Cristina Commendatore

For commercial truck fleets, failure to maintain proper tire pressure could lead to various safety risks and violations while vehicles are in service, costing them much more in the long term.

Improper tire inflation is the leading cause of tires not reaching their full life expectancy. Underinflation causes fleets to prematurely pull tires out of service, while overinflated tires are prone to irregular wear and compromised sidewall strength. Problems also arise when tread depths are mismatched and when fleets mistakenly use the wrong tire for the application, which leads to poor performance and potential hazards on the road.

Keeping tires properly inflated, while also maintaining minimum federal tread depth levels – 4/32nds for steer tires, and 2/32nds for drive and trailer tires – will not only help prevent roadside safety events and violations, it will also extend a tire's life to ensure the casing can be retreaded.

For many fleets, a successful retread program is a way to maximize the bottom line. By properly utilizing a retread program, fleets can offset initial new tire costs and spread that cost out over multiple tread lifecycles.

“Retreading is a vital part of any fleet operation,” explained Tom Clauer, senior manager of commercial product planning, Yokohama Tire. “There are a few exceptions where fleets may choose to use virgin tires exclusively. Even in these situations, retread programs are beneficial for fleets because by selling back the casing, they generate money from a retreading dealer. This can easily offset original tire purchase costs.”

Clauer added that premium new tires can be retreaded multiple times, thus expanding the usability of the casing.

Retread eligibility

It is important that fleets know when and if a casing can in fact be retreaded. According to the Tire Retread & Repair Information Bureau (TRIB), no medium truck, heavy radial truck, or bus tire casings should be accepted for retreading with the following “conditions or injuries.”

External

Ply separation beyond repairable limits; tread separations that cannot be removed during buffing; broken, damaged, kinked, or exposed bead wire; excessive oxidation (i.e., weather checking) extending to the body plies or deeper

than 2/32” (1.5mm); tires worn to exposed belt wires on more than 10 percent of the worn tire circumference, unless a protector belt is to be removed or damaged belts are to be replaced; circumferential cracking; tires with rust or corrosion beyond repairable limits; any signs of weakness or non-repairable injury (softness due to contamination from chemical/petroleum products, ripples, bulges, porosity, etc.); crunching or popping sounds when flexed; surface cuts that exceed the size of a repairable injury and penetrate the cord body; radial ply cracking; or improper labeling.

Internal

Injuries to the body plies in the non-repairable bead area; loose cords on the inside ply or evidence of having been run underinflated or overloaded; non-repairable damage to the inner liner or bead area on tires identified as tubeless; open inner liner splices which expose cord; flex breaks, X-breaks, or impact breaks; porous, contaminated from chemical degradation, or loose inner liners; previously installed repairs found to be defective and unreparable; or suspected of potential zipper damage, which include any signs of weakness or non-repairable injury (e.g., ripples, bulges, porosity, softness, etc.) in the sidewall, particularly the upper sidewall.

“Technicians and drivers need to know and understand that just ‘sticking’ and measuring tread depths is not enough,” Yokohama’s Clauer explained. “They need to do a complete 360-degree visual inspection. There could be irregular wear patterns in which lower tread depths could be found. The lowest tread depth – not the average tread depth – is the measurement that must be used. Road inspections have set measurements and will look for and use the lowest tread depth they can find.”

According to Dustin Lancy, product marketing manager for North America Commercial, Goodyear, most of the company’s larger commercial fleet customers are retreading as an integral part of their overall tire management program.

Goodyear offers a retread management system called GTRACS that helps track the casing lifecycle of a tire. It tracks the health of the casing, how many retreads it has had, and allows technicians to add repair notes into the system.

“When that product comes back from the fleet to be retreaded, we can do the proper inspections to make sure that casing is eligible to be retreaded again and to go back into the fleet for use once again after it’s been retreaded,” Lancy explained.

“A casing is like a \$100 bill to a fleet if it hasn’t been retreaded,” Lancy added. “You want to take

» Retreading is a process that must start with a high-quality tire and casing.

Photo courtesy of Cooper Tire



» Quality new tires can eventually be retreaded multiple times.

Photo courtesy of Cooper Tire

“...retread programs are beneficial for fleets because by selling back the casing, they generate money from a retreading dealer. This can easily offset original tire purchase costs.”

Tom Clauer, senior manager of commercial product planning, Yokohama Tire



care of that investment because that is what will help a fleet maximize its total cost per mile over time.”

That is exactly what Canada-based Len Dubois Trucking is doing. Derek Quinn, maintenance manager for Len Dubois Trucking, expects to see improvements in the fleet’s kilometers per tread using the Dana Rhombus TireAnalytics system. The fleet implemented Rhombus in February 2021 to track tire health on more than 30 trucks and 138 trailers.

Rhombus provides a guided inspection process via a cloud-based system of record that can help fleets maintain proper tire psi, identify issues to help prevent roadside and safety violations, allows technicians to capture, save, and share images of their tires, and tracks information like tread depth and condition to help prevent over-the-road failures.

Although Quinn and the fleet are relatively new to working with the system, in a short period of time Rhombus has helped the fleet identify a couple problem areas that required immediate attention. One was underinflated tires.

“We noticed when we started checking our units that we had an underinflated tire problem, so we quickly corrected that,” Quinn explained. “We had a staff meeting and talked to our technicians to make them aware of what’s going on. We’ve already reduced our underinflated tires by about 20 percent.”

Rhombus also helped the fleet determine that the maintenance department was pulling tires too soon in many cases, as technicians were not aware of proper tread wear patterns.

“We retread quite a bit,” Quinn explained. “That’s probably most of our tires, and it’s mostly on our trailers. We have an agreement with Michelin where they will warranty our casings up to three retreads. We basically have a written guarantee that the fleet can recap a tire up to three times in any configuration.”

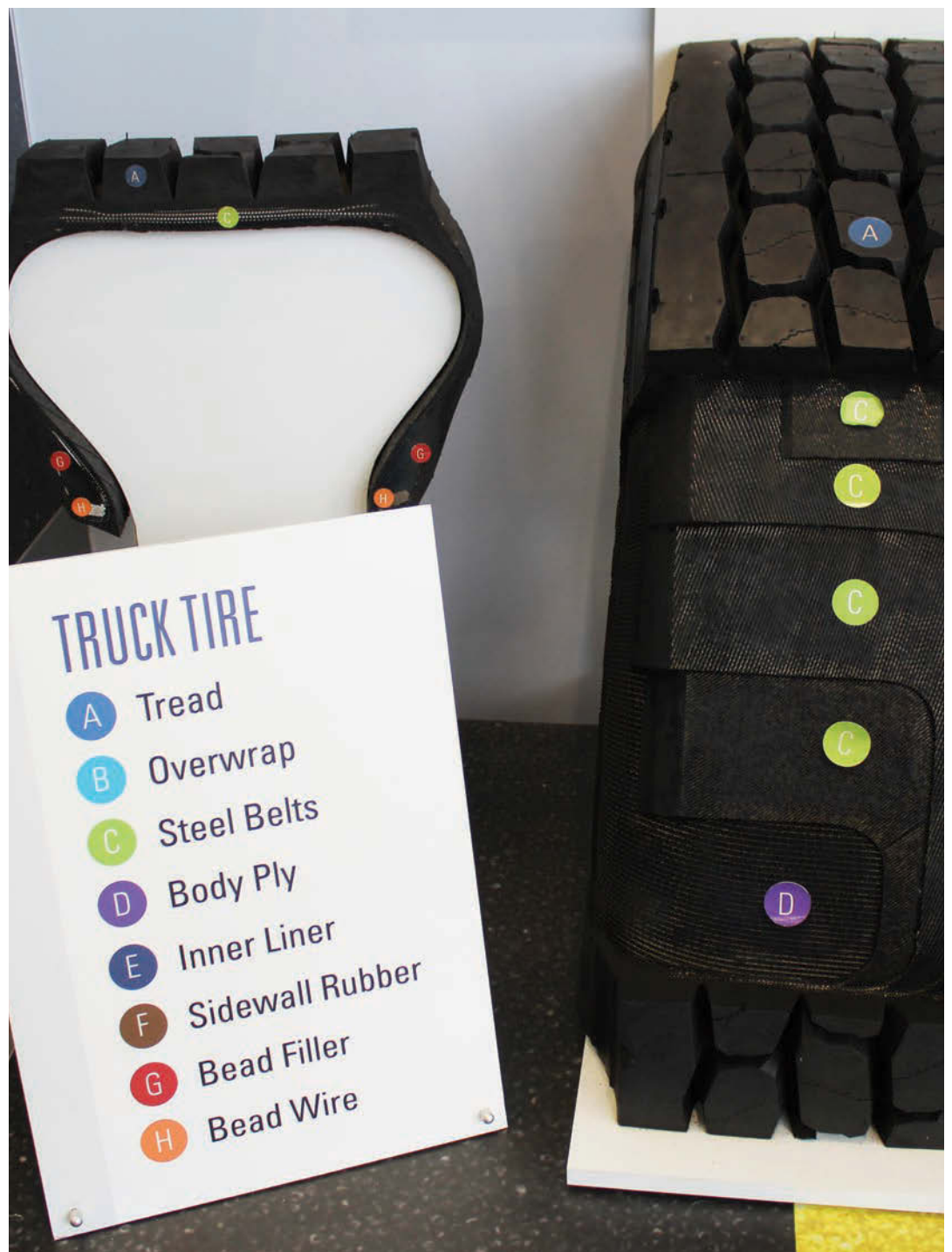
When Len Dubois Trucking buys a new truck, for instance, that asset will come with all-new virgin casings that will eventually run their life-cycle and will be cycled through the fleet’s retread plan, Quinn explained. Currently, a new drive tire will get one set of retreads, then it will get retreaded into a trailer tire. Ultimately, after the casing is retreaded multiple times, it will go onto a unit that is being returned to the dealer and cycled out of the company’s system.

Quinn expects that by retreading and using a digital tire management program, the fleet’s tire costs will drop 10 to 15 percent in the first year alone using Rhombus.

When is it best to retread?

When it comes to retreading, also referred to as recapping, there are a lot of factors to consider, noted Shaun Hartoog, digital solutions specialist at Dana. For instance, he explained that there are many data points in terms of the age of the tire casings and the number of repairs those tires have gone through.

“When it comes to forecasting, what we help and show customers is what they are getting for their average miles per 32nds [of an inch] of



» According to TRIB, casings can be denied for retreading if they have certain external and/or internal “conditions or injuries.”

Photo courtesy of Cooper Tire

tread,” Hartoog explained, adding that Rhombus can track tire lifecycles by make, model, and size. “We can show them the difference between new tires and recapped tread patterns. We can show customers the difference between performance ... and then we can provide them a forecasting based on previous measurements.”

Shane Feasel, senior brand manager for Bandag, Bridgestone Americas, explained that although retreads are a best practice in extending the useful life of a tire for many successful fleet operations, the process must start with a high-quality tire and casing.

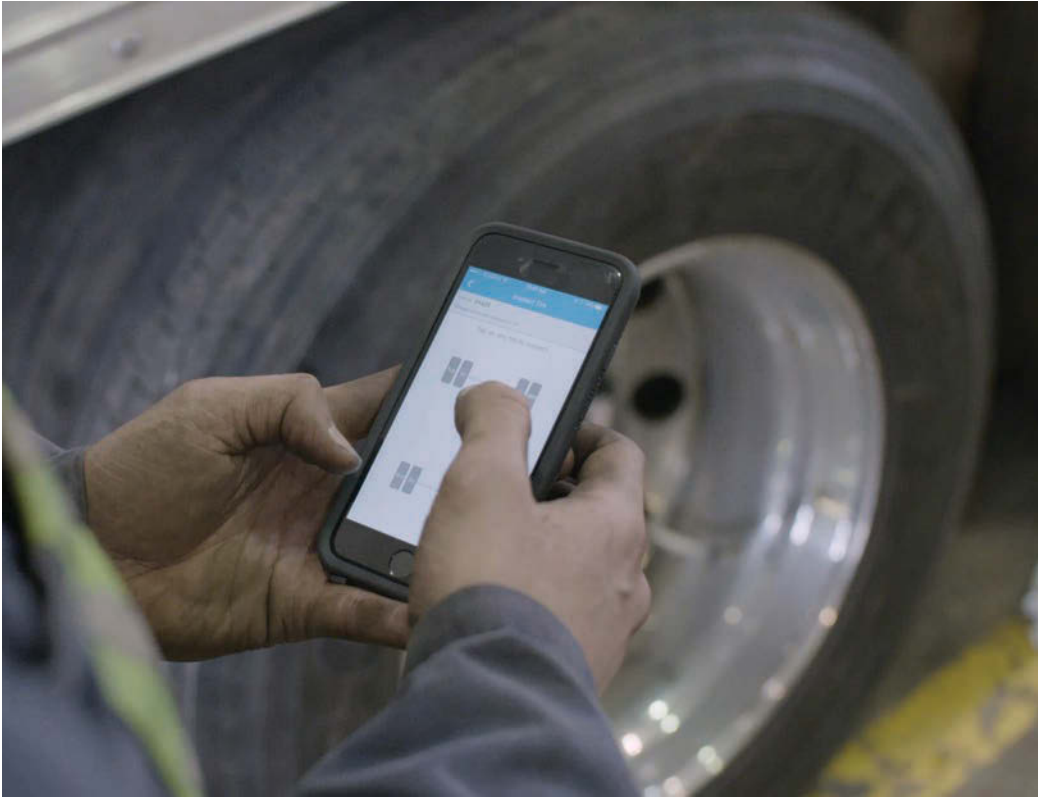
“As a means to ensure the longest useful life of the tire casing, proper tire inflation and proactive maintenance is critical, which is a great opportunity to leverage [Bridgestone’s] IntelliTire for TPMS monitoring,” Feasel said. “Once a tire reaches the

“Damage to the tread – if that perpetuates – that could potentially cause bigger issues down the road if those are not addressed early.”

Dustin Lancy, product marketing manager for North America commercial, Goodyear

end of its initial tread life, dealers can utilize a tool called BASys to brand and track the tire casing as it is sent in for retreading.”

Understanding when to retread and monitoring the integrity of casings can also help fleets unlock



» Rhombus TireAnalytics provides a guided inspection process via a cloud-based system of record.

Photo courtesy of Dana



» It is important to measure tread depth and visually inspect for wear and condition.

Photo courtesy of Cooper Tire



» Analyzing tire data can help a fleet determine accurate pull points for their tires, by position.

Photo courtesy of Yokohama

the full potential of a tire's performance and profitability, Feasel added.

"Determining when to retread can depend on a fleet's application, but many will start with new tires in the steer position before retreading the casing and moving it to the drive position, followed by the trailer positions," he explained. "This helps to maximize the fleet's investment. In some high-scrub industries, it might be more productive to use retreads on the steer axle from the start."

When taking proper tread depth readings, Feasel emphasized the importance of utilizing the correct type of gauge and tracking solution.

"Be sure the technician is using a gauge designed for commercial tires and one that is large enough to take accurate measurements," he pointed out.

"To properly assess tread depth, be sure to take three separate tread measurements, [left, right, and middle,] on each tire to ensure accuracy. An average of the three measurements can be recorded. In most states, 2/32nds remaining tread depth is legal, but many fleets set their own tread depth standards for steer, drive, and trailer positions to preserve casing life for retreading."

While measuring the remaining tread on any tire, it is important to visually inspect the tire for obvious wear and operational conditions that may be present such as cuts, snags, holes, and debris lodged in the tread.

According to Brandon Gray, operational marketing manager, B2B Services, Michelin North America, a good example of analyzing tire usage data to improve retread performance is via

Michelin's retread analytics tool, SMART (Strategic Michelin Analytical Retread Tool).

SMART analyzes the conditions and causes of why tires are pulled out of service and can recommend changes in maintenance practices and casing asset management specifications. For example, upon completing an analysis of thousands of casings submitted annually for retreading, Gray said that a large national fleet customer noted a particularly high casing rejection rate due to sidewall impacts originating from one of their maintenance locations. Upon further investigation, the fleet's maintenance vice president discovered that the air pressure recommendation at that location was 10 to 15 psi higher than the company standard.

The higher tire pressure correlates with a higher-than-average casing rejection rate due to sidewall impact damage. According to Gray, that maintenance manager changed the outlier air pressure recommendation to be within the company standard, and this damage condition ended up falling back within the fleet's norms. That move resulted in several hundred tires being accepted for retreading that would have previously been rejected, Gray noted.

"It's typically time to retread a tire when the original life tread meets the fleet specifications to pull points," Goodyear's Lancy pointed out. "That's something that is known ahead of time before the tire can be retreaded. But these pull points can also vary by position, so all fleets are required to pull steer tires when they reach 4/32nds remaining of tread depth and drive and trailer tires at 2/32nds."

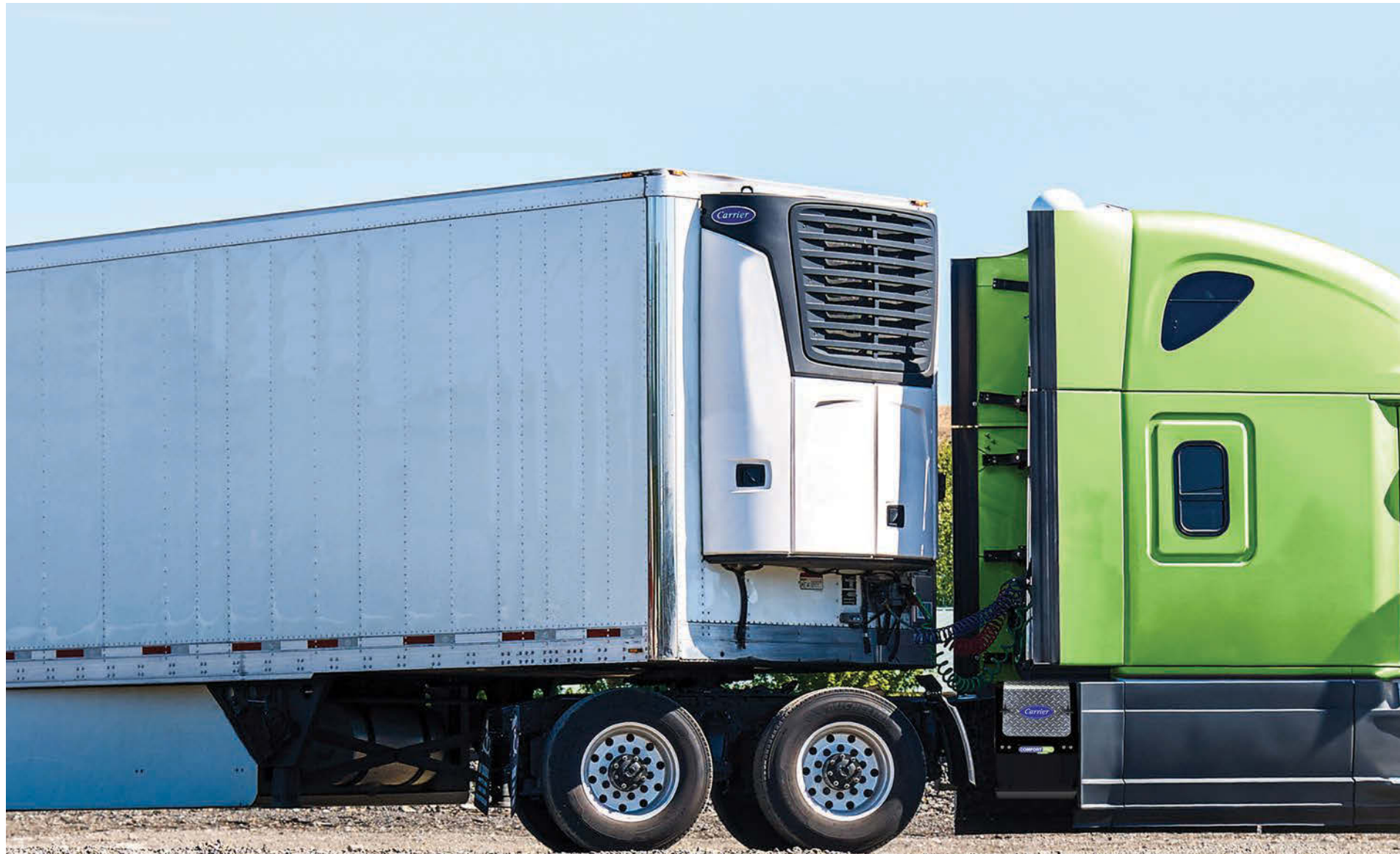
In addition to analyzing the exact pull points on when they remove tires, Lancy advised that fleets also do a thorough visual inspection. Goodyear's TireOptix program can help technicians look not just at the inner and outer sidewall, but also around the whole tread of the tire to make sure there is no damage.

"Damage to the tread – if that perpetuates – that could potentially cause bigger issues down the road if those are not addressed early," Lancy emphasized. "Number one would be to check tread depths and make sure that you're meeting the fleet specifications and, minimally, meeting DOT specifications. Then, do a visual check to make sure those tires are removed at the proper time so they don't cause any roadside service issues down the road."

When technicians are checking for tread depth, they should also make sure that a tire is wearing evenly, Lancy added. Ensuring even wear across the tread, especially for a steer tire, can help a fleet identify issues where the truck might need to be aligned or tires should be moved into different positions, he explained.

Lancy further emphasized the importance of technicians keeping an eye out for mismatched duals in the drive and trailer positions.

When it comes to implementing a successful retreading program, it is important for fleets to remember that quality new tires could eventually be retreaded multiple times. It is also critical that fleets know the manufacturer they are working with and that they continue tracking tires from the original new tire installation to that casing's final tread cycle. ■



Latest developments in electric APUs

Battery-powered auxiliary power units can help reduce emissions, fuel costs, and engine wear.

By Tyler Fussner



Examining the goals of a fleet's operations will most likely yield a litany of objectives surrounding efficiency and cost savings. This is true of any department, though such objectives reign supreme for the maintenance team.

Whether finding cost savings in vehicle operation or in maintenance practices, solutions that serve both avenues are always enticing and should be examined to enhance the way a fleet operates. One such solution comes in the form of auxiliary power units (APUs). Particularly, it serves fleets to look beyond diesel-powered APUs as the only available solution and consider alternatively powered solutions, specifically electric, battery-powered APUs.

What is an electric APU?

An electric APU is a battery-based power system that can operate specific vehicle systems without the need to have the vehicle's engine running. The basic electric APU may consist of a battery, or bank of batteries, a compressor, and possibly an inverter, along with hardware and software integrations to connect to specific vehicle systems, such as the in-cab heating and cooling, the vehicle computer system, and others.

"Today's electric APUs are battery-powered," said Ryan Rubly, product manager, alternative power for Carrier Transicold, Truck/Trailer/Rail Americas. "The standard ComfortPro electric APU [offered by Carrier Transicold] uses four Group 31 AGM batteries that are charged by the truck's alternator."

Though, AGM batteries are not exclusively the power-source standard for electric APUs, as Xantrex offers the Freedom e-GEN Lithium Ion System, which utilizes lithium iron phosphate batteries.

What does an electric APU do?

Electric APUs can serve a range of purposes and functions for vehicle system operation, primary of those being to provide air conditioning and heating to the cabin. "The primary function of the APU, such as those in Carrier Transicold's ComfortPro APU family, is to provide climate control for the truck cab so the driver doesn't idle the truck to maintain comfort during rest breaks," Rubly said.

» Electric APU specification offers benefits across multiple channels in a fleet operation.

Photo courtesy of Carrier Transicold

Mission Critical Electronics recently announced a technical partnership with ZeroRPM, which has furthered the capabilities of the Xantrex Freedom e-GEN Lithium Ion System to include additional air conditioning operations.

"The e-GEN core system is intended for hotel operations," said Don Wilson, applications engineer at Xantrex, a Mission Critical Electronics brand. "So, we are just doing the hotel electrification, including [systems such as] the Bergstrom air conditioner. It is a DC air conditioner meant to cool the sleeper. Our e-GEN [system] does that very well."

"The integration with ZeroRPM allows us to actually run the dash air too," Wilson continued. "You could power just the Bergstrom [vehicle climate control system] or just the sleeper air conditioner; you could do just the dash; or a combination of both."

Wilson relayed that the integration of the ZeroRPM System into the e-GEN core allows flexibility and extended options in climate control, particularly beneficial for vehicles operating in hot climates.

Beyond air conditioning, electric APUs can power hotel loads as well, though additional specifications are typically required.

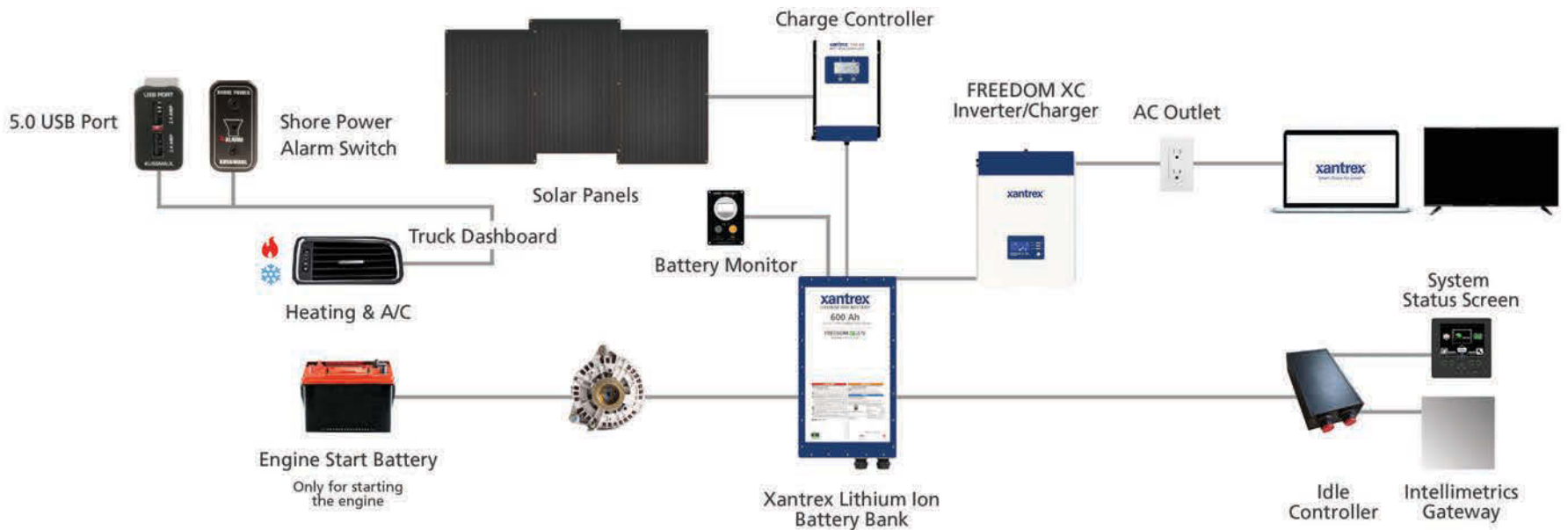
"Some APUs can also serve as a power source for hotel loads and offer features that support the truck power plant, such as engine warming," Rubly explained. "In the Carrier Transicold ComfortPro platform, most of our diesel systems are fully featured, meaning that in addition to climate control they also provide engine warming, battery charging, and power for hotel loads. The standard ComfortPro electric APU is primarily a cab air conditioning system. However, other capabilities can be added by specifying different options, such as a fuel-fired heater, an inverter for hotel loads, and a heater for truck engine preheating."

Xantrex's Wilson spoke to the e-GEN system and the utilization of the ZeroRPM integration that allows for cabin heating.

"Instead of running electric heaters, that diesel engine stores a lot of heat when you shut it off," Wilson said. "We can still circulate the coolant into the heater core and get that heat out of there. But eventually that engine is going to cool down ... One of the features that can be added on is the ability to start the truck. So, when the battery gets low, what it would do is it would start the engine, build up that heat again, shut off the engine, and then use that to run heat."

“Over time, the use of the APU can help extend truck service intervals, helping to control operating costs, which adds to return on investment.”

Ryan Rubly, product manager, alternative power for Carrier Transicold, Truck/Trailer/Rail Americas



» Mission Critical Electronics recently announced a technical partnership with ZeroRPM, which has furthered the capabilities of the Xantrex Freedom eGEN Lithium Ion System.

Image courtesy of Xantrex

Wilson reiterated that air conditioning is operated electrically off a battery, though emphasized that were the battery to get to a point where it is too low to run the compressor, the engine could be started and charge the battery.

Furthermore, Wilson said that the ZeroRPM System components of the electric APU can operate more than just the dash air conditioning, including the radio and “anything that you would normally run with the engine on that you don’t get with the engine off.”

The ZeroRPM System also captures all the data associated with the engine-off technology – utilizing the company’s Intellimetrics software to give users detailed insight into how the system performs. A secure portal provides customized reports and graphs of fuel savings, emissions reduction, and vehicle usage. “It pulls in runtime, downtime, hours, and stores it all,” Wilson said.

Electric APU considerations and challenges

Understanding the operational capacity of an electric APU is one thing; understanding how its performance impacts the vehicle’s operation, the fleet’s business operation, and the maintenance implications can help determine whether electric APUs will work for a fleet.

Essentially, operating an electric APU versus idling a vehicle’s engine will provide a windfall of benefits stemming from the reduction of the vehicle’s engine runtime.

“Since it is an engineless system, an electric APU provides air conditioning comfort without fuel consumption, idling noise, and related emissions,” Rubly said. “This saves fuel and related emissions, providing regulatory compliance in cities, regions, and states where anti-idling laws exist. Reducing the amount of time a truck idles also cuts wear and tear on the truck engine, which can provide long-term maintenance benefits.

“...when you look at safe energy storage, lithium can be scary, but if you are looking at the right chemistry, it is really not.”

Don Wilson, applications engineer at Xantrex, a Mission Critical Electronics brand



» The standard ComfortPro electric APU is primarily a cab air conditioning system. Other capabilities can be added by specifying options such as a fuel-fired heater, an inverter for hotel loads, and a heater for truck engine preheating.

Photo courtesy of Carrier Transcold

“While initial cost is a factor in an APU purchase, the most important consideration is lifecycle cost and payback period,” Rubly continued. “Whether diesel or electric, payback from fuel savings starts the moment the truck engine is shut off and the APU is engaged ... Over time, the use of the APU can help extend truck service intervals, helping to control operating costs, which adds to return on investment.”

Beyond vehicle operations, insight from Xantrex’s Freedom e-Gen System with ZeroRPM System integration can provide data from its use of Intellimetrics to create the opportunity for operational efficiencies from a management perspective.

“When we’re talking about engines, a lot of people look at miles, but it is really hours,” Wilson suggested. “We can help not only identify the hours that we have used if we needed to start the engine, but also compare it to an existing vehicle and see how many hours you have saved.”

“You can see information by vehicle,” said Mitul Chandrani, director of marketing, Xantrex Business, Mission Critical Electronics, speaking to the capabilities of the data management portal from their offering of the ZeroRPM System integration. “If a fleet has 25 vehicles, you can see information by vehicle, and then you can also see a consolidated dashboard of all savings in fuel, how much CO2 has been prevented from atmosphere from these vehicles, [et cetera].”

Wilson further spoke to the sort of data captured and how it can serve to better the practices by users.

“One of the things about the auto-start feature is if the system doesn’t work for whatever reason, the driver can override that and manually start his engine,” he said. “Well, that kind of information is logged. There are stories told of the truck ‘tattle-taling’ on the driver for misbehaving and using engine power when he should be using the system.”

Though providing multiple benefits, electric APU integration and operation doesn’t come without potential challenges.

“Traditionally, diesel APUs provide a greater range of capabilities, including higher capacity, continuous air conditioning and heating in climate extremes, as well as ample continuous power for hotel loads,” Rubly explained. “This can be especially important to long-haul operators,

who are subject to the 34-hour restart rule that may result in an extended break 'at home' in the truck cab while on the road. In contrast, electric APUs tend to be chosen by regional carriers where the driver may need air conditioning for a single overnight trip."

Specific to the use of lithium batteries, Wilson advised of system-specification challenges.

"The only drawback when we're dealing with lithium batteries [is that] lithium batteries can't be left out in the cold; they can't be left out in the heat," Wilson said. "They have to be in the cab, which means you have to add a battery in the sleeper."

He added that while lithium batteries must avoid extreme temperatures, the size of the battery pack is about half that of the traditional lead battery setup. Wilson explained that compared to a system utilizing Group 27 batteries – typically a set of four – to get the electrical equivalent in a lithium battery powered system requires the space of less than two Group 27 batteries, in terms of volume.

Maintenance, charging, and battery management

Aside from fuel, noise, and emission reductions, arguably the greatest benefit offered by electric APUs is the reduction in maintenance requirements.

"Electric APUs are also selected for their low-maintenance aspects," Rubly stated. "With a simpler design than [diesel] APU systems and only a few moving parts, there is far less to service with an electric APU, and there is no engine-related maintenance such as oil changes and various filter replacements."

The closed-system nature of electric APUs creates an environment to be seemingly simple in terms of maintaining its operation and performance capabilities.

"That's the beauty of it – because everything is electronic other than the compressor itself and the Freon lines, there are no different maintenance [requirements] than you would have on the truck anyway," Wilson advised. "The compressor itself is fully enclosed; you never really need to touch it."

"If you ended up with a Freon leak, you would handle that the same way you would handle it if it was just in the truck," he added.

From a maintenance perspective, electric APUs inherently require proper battery management.

"Electric APUs are generally charged via the truck engine alternator," Rubly explained. "Carrier Transicold's ComfortPro electric and diesel APUs offer optional shore power kits that allow the driver to power the APU from any 115V outlet, providing climate control and battery charging while utilizing zero fuel." He added that the ComfortPro electric APU can provide 500 Btu/h of air conditioning for up to 11 hours under normal operating conditions.

Along with understanding the charging needs of the battery, a fleet should remain cognizant of battery lifecycle expectations and when to perform appropriate replacements.

"Battery changeouts are the main maintenance requirement of electric APUs," Rubly said. "With AGM batteries used in most systems, battery changes may be necessary in a 24- to 36-month

timeframe, depending on use and number of charge cycles."

However, fleets need be aware of the type of battery utilized in an electric APU system, as maintenance and replacement intervals can vary drastically.

"The lithium battery should have, in normal usage, at least a 10-year life span before it even needs to be touched," Wilson stated.

Battery technology and the future of electric APUs

Electric APUs are available on the market today. Though, as the horizon nears with impending regulations for emissions, idle hours, noise pollution, and the industry's goal of electrification, an understanding of the future of battery technology, and its applications to the electric APU space, is important.

"The emerging technology is going to be [focused on] how to store energy," Wilson said. "Before, it was lead batteries. Big, heavy, and they go bad after a couple of years because we really work them to death in this market." Wilson confirmed the industry more readily continues to adopt lithium battery technology as a replacement for AGM batteries.

"Lead [batteries] will always have their place in starting the engine; lithium batteries, they just can't do that kind of load in starting an engine. But for lightweight, long-term storage, lithium – right now – is a way to go."

Lithium-ion batteries may receive negative attention today as potentially dangerous, though Wilson heeded a generalization of the lithium category is inappropriate.

"Lithium scares a lot of people," he said. "It doesn't need to scare you as long as you understand it, but everybody just throws out lithium like it is all the same. There are six different chemistries of mainstream lithium batteries; some are safer than others, and some are more volatile."

For instance, there is a distinct difference in chemistry and application for lithium cobalt

batteries compared to lithium iron phosphate batteries. Wilson explained that while the lithium cobalt battery is used for lightweight, small-energy storage, for applications in the cellphone, airline, and car industries, it can be more volatile.

"When we are talking about energy storage in a vehicle – not to drive the vehicle like a Tesla – but storage in a vehicle for electrical loads, lithium iron phosphate batteries are way less volatile," Wilson advised. "You don't have the burning problems with lithium iron phosphate that you do with lithium cobalt. And so, when you look at safe energy storage, lithium can be scary, but if you are looking at the right chemistry, it is really not."

Xantrex utilizes lithium iron phosphate chemistry in their lithium-ion batteries. In creating such a battery composition, Wilson stated that to utilize such a chemistry, about a 10 percent addition in weight and about a 10 percent addition in size was necessary, which was a decisively acceptable trade-off for the safety offerings.

"They are UL Listed," Wilson said of Xantrex lithium iron phosphate batteries. Underwriter Laboratories (UL) is an independent safety science company that provides third-party certification and can approve UL Listing. UL Listing means that the company has tested representative samples of a product and determined that the product meets specific, defined requirements. These requirements are often based on UL's published and nationally recognized Standards for Safety. "I like the UL Listing because it means somebody else, who doesn't care how many batteries we sell, looked at it and made sure it was safe," he added.

Integration of such battery technologies into a fleet's operations today can help with plans for the future when regulations may move the industry toward expanded electrification adoption. Exploring electric APU specification today, even in limited capacity, can help a fleet understand which vehicles, applications, routes, etc. may be most positively impacted with such technology. Beyond that, testing electric APUs in a fleet today provides valuable feedback should extensive fleet-wide specification become necessary down the road with federal regulations requiring reduced greenhouse gas emissions and more efficient technologies. But aside from just planning for the future, electric APUs can be implemented today – and they offer benefits across multiple channels for a fleet's organization. ■

» Xantrex utilizes lithium iron phosphate chemistry in their lithium-ion batteries. "The lithium battery should have, in normal usage, at least a 10-year life span before it even needs to be touched," said Don Wilson, applications engineer at Xantrex, a Mission Critical Electronics brand.

Image courtesy of Xantrex





» By applying rigorous purchasing and negotiating techniques to lower costs, a fleet might be able to save money. This is an excellent application for the skills of the purchasing department.

Photo by David Brierley | Fleet Maintenance

For each part, multiply SKU units used per month by 12 to calculate annual usage. Multiply the resulting number by the unit cost, then add freight to calculate annual spend.

Sort this list in descending order and disregard the bottom 90 percent (if the report is 20 pages long, only keep two pages of it).

One study determined that the top 7.3 percent of the line items represented 76 percent of the yearly dollar volume spent on parts annually. Minimizing these parts' usage provides a double bonus of saving money from the part and saving on labor.

Most fleets likely already know the top items on their parts list and already spend time on them (tires, batteries, motor oil, etc.). The next tier after these items is where it is important to focus.

For example, if a brake part costs \$112.50 and a fleet uses 132 units annually, their annual purchasing cost for the part would be \$14,850.

The action is to investigate the where channel (where the fleet buys it from) to either save money or reduce the annual usage, which impacts ownership costs.

Look at these items closely for potential engineering changes that could reduce usage; use preventive maintenance (PM) to reduce usage; review specifications to get better parts at the same costs or equivalent parts at lower prices (this is the situation where some level of engineering can pay off in significant returns).

By applying rigorous purchasing and negotiating techniques to lower costs, a fleet might be able to save money. This is an excellent application for the skills of the purchasing department. These items will pay dividends with creative new vendors, purchasing modes, and approaches.

The business of parts

Steps to trim costs and improve ROI by better managing parts inventory.

Two facts about parts make them an exciting area to investigate. The first is that parts consume 40 to 70 percent of every maintenance dollar, so reducing parts cost can mean major savings.

The second is that parts can point to maintenance problems. A fleet can reduce their problems by looking at the parts used. Since most maintenance jobs require some parts, reducing parts usage will automatically reduce labor.

Example 1

Motor oil purchased in 1-gallon bottles costs \$10.00 per gallon, and motor oil purchased in bulk costs \$7.00 per gallon.

The cost to plumb the shop for motor oil and supply tankage is \$15,500.

The fleet's annual motor oil usage is 20,000 gallons, meaning 1-gallon bottles would cost \$200,000, but buying the same amount of oil in bulk would cost \$140,000.

In this case, the \$15,500 cost of installing bulk oil equipment in the shop is far outweighed by the \$60,000 saved annually by purchasing bulk oil instead of 1-gallon bottles. Other advantages including reduced labor, reduced contamination, higher yield, less clean-up, and less debris (bottles).

Choosing targets

In the maintenance storeroom, parts consumption is an important metric, but money consumption is even more so. We can use the following calculation to get a rough estimate of annual spending, by SKU, to find unnecessary waste.



By Joel Levitt

PRESIDENT, SPRINGFIELD RESOURCES

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

Example 2

A shipping company owned thousands of old shipping containers, and they repaired a large number each year in their shop. One of the most common repairs was the replacement of the corner posts.

They used 400 corner posts a year, and the OEM cost (as a spare part) was \$396 each, for a total of \$158,400 per year.

They hired a fabricating shop to reverse engineer the corner posts with particular attention to the grade of steel (muffler grade stainless) and the fit into the welding fixtures. The fabricating shop came up with a price of \$199 each or \$79,600 per year with a minimum purchase requirement of 100 pieces. Since there was no investment, the ROI is off the chart.

Big-ticket analysis

If a fleet needs to reduce the amount of maintenance, repair, and operation (MRO) inventory, the simplest way is to attack the big-ticket items. These are items with a value greater than \$500, \$1,000, or even \$5,000. In later iterations of this exercise, it is possible to lower the ticket amount.

List all the items in stock with a value greater than your target. These represent most of the dollars on the shelf. Start with the costliest spare you stock and make a list in a spreadsheet like the example in Figure 1.

Note the stocking policy for each part – whether it is a capital spare or a critical spare. If it is a critical spare, skip the analysis for now.

What action can be taken to reduce the inventory level (to zero, if possible)? Consider consignment, accepting the risk of an outage, sharing parts, etc.

What engineering action can be taken to reduce the need for the part (again, to zero if possible)?

Some ways to reduce inventory levels:

- ➔ Standardize equipment
- ➔ Standardize supplies and suppliers
- ➔ Develop a spare parts interchange list
- ➔ Consider what parts can be fabricated rather than purchased
- ➔ Reduce obsolete parts
- ➔ Use only one location per part (even with different numbers)
- ➔ Reduce spoilage and shrinkage
- ➔ Control the items subject to pilferage
- ➔ Require the vendor to stock the fleet's requirements
- ➔ Automate various functions
- ➔ Investigate stocking options
- ➔ Limit what is stored

Obsolete parts

It is not uncommon for parts to become obsolete for a fleet's requirements. The stock room has to face the fact that parts become outdated for a variety of reasons. Some of these reasons include:

- ➔ The asset is retired

Figure 1

| Part Number | Description | Value | Notes | Questions and potential actions |
|-------------|-------------------------------|----------|---|--|
| 01 | Mechanical seal | \$7,350 | Critical part: We keep a dozen of these seals to make sure we do not run out. | Do the math to see if 12 is too few, too many, or just right |
| 02 | Main controller circuit board | \$12,213 | These are not critical because we have adequate redundancy in this equipment | Should these be in stock at all? Can these boards be repaired to "like new" quality? |

“What engineering action can be taken to reduce the need for the part (again, to zero if possible)?”

Joel Levitt

- ➔ The maintenance strategy changes (i.e. the fleet hires a vendor for full service)
 - ➔ The asset is improved by engineering changes initiated by the fleet or the OEM
 - ➔ Field reengineering to solve a particular problem
 - ➔ The asset moves on to a different duty cycle, so the failures change
The process to deal with obsolete items:
 - ➔ Print out a list of items with no activity for the last two years
 - ➔ Cross off items that are for critical assets
 - ➔ Cross off items which do not belong on the list for another reason (document the reason)
 - ➔ Using the system's data, determine where every item on the “no activity” list was used
 - ➔ Highlight any parts where the asset has been retired (and there is no other asset that uses the part)
 - ➔ Send the list to operations and maintenance personnel
 - ➔ Have them identify items they would like to keep (document why)
 - ➔ Lay out the remaining parts on the list and do a walk-through to ensure none are still needed
 - ➔ The remaining parts are obsolete and can be removed
- In most storerooms, about 10 percent of the parts account for 80 percent of the value. Ensuring parts are being used, inventoried, and managed properly is crucial to the fleet's success. ▀

HEAVY DUTY INDUSTRIAL/HYDRAULIC SHOCKIT CROWS FOOT SETS

AIR HAMMER POWERED SHOCKIT CROWS FOOT SETS FOR EASY ACCESS

- **Must be used with Shockit Punches for maximum performance & warranty coverage**
- Uses the force and vibration of an air hammer
- Air hammer powered angled punch allows for use in tight places
- Indexed holes designed to keep Shockit Punches from slipping off crows foot
- Sets packaged in custom red display tray with clear cover
- 30% more steel, 30% stronger
- Built to precise ISO 1174-2 DIN tolerances
- Patent #7,677,143 and other patents pending
- Punches sold separately - see below

AIR HAMMER POWERED



8mm Shockit Punch tips fit precisely into indexed holes

LT1910-24 in use with LT1910PS

LT1900 shown

LT1900 10 Piece SAE Shockit Crows Foot Set

- **Must be used with Shockit Punches for maximum performance & warranty coverage**
- **AIR HAMMER POWERED**
- Loosens hydraulic fittings on tractors, forklifts & heavy equipment
- Fits into small spaces between hydraulic lines
- 3/4", 13/16", 7/8", 15/16", 1", 1-1/16", 1-1/8", 1-3/16", 1-1/4", 1-5/16"

LT1910 10 Piece Metric Shockit Crows Foot Set

- **Must be used with Shockit Punches for maximum performance & warranty coverage**
- **AIR HAMMER POWERED**
- Loosens hydraulic fittings on tractors, forklifts & heavy equipment
- Fits into small spaces between hydraulic lines
- 14mm, 15mm, 16mm, 17mm, 18mm, 19mm, 20mm, 21mm, 22mm, 24mm

LT1910PK Shockit Punch Kit

Kit includes:

- LT1910PS - 5.5" Short Punch
- LT1910P - 11" Standard Punch
- LT1910PL - 22" Long Punch



AIR HAMMER POWERED

- 8mm Shockit Punch tips are designed to fit precisely into indexed holes on all Shockit tools for maximum performance & warranty coverage
- Offset design for greater access
- Non-turning slots
- **Individual punches also sold separately**
- Patent pending



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» Brianna Luckman currently holds National Institute for Automotive Service Excellence certification in electrical/electronic systems, with the goal of earning ASE Master Technician status.

Photo courtesy of ASE

Bolstering your technicians

How opportunities in training, support, and recognition can help fleets drive technician retention.



» ASE has designated June as Automotive Service Professionals Month.

Image courtesy of ASE

As a heavy duty technician at the Walmart fleet maintenance shop in Bentonville, Arkansas, Brianna Luckman's typical day is anything but typical. Some days she works on trucks, performing preventive maintenance service and follow-up repairs, while other days she works on trailers, doing major repairs such as full front grid replacements.

Since joining Walmart through an internship program in 2017, Luckman has gained the skills and knowledge that it takes to maintain the equipment that is an essential part of the Walmart supply chain network.

However, Luckman did not grow up dreaming of one day becoming a heavy duty technician. At the suggestion of her father to pursue a career in the trades, she enrolled in the Medium and Heavy Truck Diesel Technology program at Northwest Technical Institute (NWTI) in Springdale, Arkansas.



By George Arrants

VICE PRESIDENT, ASE EDUCATION FOUNDATION

George Arrants is the vice president for ASE Education Foundation. Arrants works with instructors and administrators to develop partnerships with local businesses and industries through program advisory committees. He is the past chair of the Technology and Maintenance Council's TMC SuperTech, the National Technician Skills Competition, and TMC FutureTech, the National Student Technician Competition. His entire career has been in the automotive service and education industries.

Luckman credits her five years spent in the U.S. Navy as an aviation electrician technician with giving her the confidence to try something different.

"I strongly believe the military helped me when choosing my future career path – I learned I could take on different situations that I normally wouldn't have done in the past," Luckman said.

It was during her third semester of school that Luckman began her internship at Walmart. At the time, the program required 200 hours of on-the-job training, which she completed by working weekends and after school. She was paired with a senior technician to "watch and learn" the full scope of what a heavy duty technician may encounter in a repair shop, which includes everything from oil changes to diagnostics and repair.

After graduating from NWTI in 2017, Luckman accepted a position with Walmart as a preventive maintenance technician, where she now performs diagnostics and in-depth repairs on tractor-trailers, including Freightliner Cascadia P3s and P4s, Kenworth T680s, and Peterbilts. Luckman was also given the opportunity to take on more responsibility to work and cross train as a warranty clerk. This included repair order accuracy review, which she believes helped to make her an even better technician.

Luckman currently holds National Institute for Automotive Service Excellence (ASE) certification in electrical/electronic systems.

"My ASE certification has helped advance my career as it encourages me to 'revisit the books' in order to keep up my technological knowledge when I prepare to renew my certification," Luckman said.

As for the future, Luckman plans to take her ASE certifications to the next level.

"My goal is to earn my ASE Master Technician status," Luckman said. "I hope to one day become a Walmart area manager."

Technician support

Service Shop Operations Manager Charles Bishop is Luckman's supervisor.

"We are very proud of Brianna and we're lucky to have her on our team," Bishop said. "She started with us through her internship program, and we have watched her become a very capable technician.

"It's important to help young technicians as they are getting started in the field," Bishop added. "One of the things that Walmart does is it provides new technicians with all the shop tools that they need at no cost. We understand that the tools they need to do their jobs every day are a big investment, so instead of expecting them to purchase the tools, we take care of it and put that money back in their pockets. We're glad that we have the programs in place to recruit and retain technicians such as Brianna."

Walmart also supports their technicians by offering ASE certification premium pay, along

with benefits such as health insurance and eyecare. In addition, they offer a "dollar a day" degree program that promotes higher learning opportunities for trade and associate degrees. Employees commit to contributing one dollar per day and Walmart pays for the remainder of the tuition.

"Walmart does a great job of retaining its technicians," Bishop said. "We provide opportunities for personal growth, such as additional training and increased responsibilities, to help build their careers within the company. We want our technicians to feel like it is *their* Walmart. For them, it's more than just earning a paycheck."



» Luckman joined Walmart fleet maintenance through an internship program in 2017.

Photo courtesy of ASE

Technician recognition

As a way to recognize vehicle service professionals who are proficient, credentialed, and committed to excellence, ASE has designated June as Automotive Service Professionals Month.

"Automotive Service Professionals Month is the perfect time to say, 'thank you,' to the men and women who service and maintain the vital and highly complex vehicles upon which our economy depends for day-to-day transportation," said Tim Zilke, president and CEO, ASE. "It's a chance for everyone to acknowledge their skills and dedication, and ASE is proud to spotlight individuals, such as Brianna Luckman, for their commitment to their craft."

Eric Bengé, senior manager fleet maintenance, Walmart, explained that the company encourages ASE and industry credentials.

"We appreciate the month-long opportunity to officially recognize our technicians and give them the visibility that they deserve for the contributions that they make to the supply chain," Bengé said. "Without a well maintained and efficient fleet, we couldn't fulfill our obligation to keeping our store shelves stocked with the products that our customers depend on."

According to Bengé, Walmart reimburses its technicians for their ASE registration and testing fees.

"We hope to incentivize them to continue to learn and develop their skills," Bengé concluded. "They have a real sense of pride when they are able to put that ASE patch on their uniform."

For more information about Automotive Service Professionals Month or recognizing excellence in your service bay, visit ase.com/aspm2021. ▀



FLEET PARTS & COMPONENTS

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



» Bushings require no lubrication

Hendrickson's **PRIMAAX EX** severe-duty vocational air suspension features advanced structural beams that include integrated end caps that form a solid connection with the square cross brace to form a rigid torsion system for improved stability and control. Large-volume air springs lift and support the load with less air pressure. Premium, heavy duty bushings require no lubrication for reduced maintenance. The QUIK-ALIGN system helps simplify axle alignment for reduced maintenance time and extended tire life.

For more information visit FleetMaintenance.com/21214472



» Engineered to match International 2004-02, 1998-81 models

The **Dorman Products Engine Oil Pan**, No. 264-5009, is precision-engineered to match the original equipment pan on specific vehicle years, makes, and models for a reliable replacement. The complete assembly includes a replacement pan and drain plugs to match original components. Its durable design features high-strength coating to prevent future corrosion.

For more information visit FleetMaintenance.com/21220115



» Helps prevent rollaway and runaway crashes

The **Bendix Intellipark Electronic Parking Brake** can be ordered factory-installed on two Thomas Built Buses Inc. models. Intellipark is available as an option on the Saf-T-Liner C2 equipped with a Cummins diesel or Detroit Diesel powertrain and an air brake package, and comes standard on the Saf-T-Liner C2 Jouley electric bus. Monitoring inputs in critical areas, such as the foot brake, the accelerator pedal, and wheel speed, along with a 30-second timeout, the Bendix Intellipark Electronic Parking Brake helps prevent rollaway and runaway crashes by automatically setting the brakes if the driver does not. The system utilizes a customizable J1939 network message to facilitate or inhibit unparking the vehicle to support when the driver intends to do so. The Intellipark system replaces the yellow push-pull dash valve with an electronic switch. The switch maintains the yellow symbols and text and includes built-in LED indicator lights that show the status of the brake. Fleets can use information from the data Intellipark provides through Bendix SafetyDirect to enhance their safety programs and driver training efforts.

For more information visit FleetMaintenance.com/21220121



» Available for any full-size pickup since 1965

The **DECKED Tool Box** is a safe and secure solution for organizing and storing gear and tools, while saving users from having to crawl in and out of a pickup for access. The Tool Box features an integrated telescoping ladder along with a sleek design and bombproof construction. Available for any full-size pickup since 1965, according to the company, it weighs 113.5 lbs with ladder, measures 76" long by 22" wide by 20.53" tall, and has a storage capacity of 9.82 cu feet/73.4 gallons. Made from injection molded, high-impact polymer resin, the Tool Box offers a seamless lid and tub as well as overbuilt moisture-repelling, watertight architecture which is sealed tightly when closed. Anti-corrosion treated steel and aluminum hardware make for long-lasting durability. Backed by a 3-year limited warranty.

For more information visit FleetMaintenance.com/21220128



» Installs into the HVAC system's evaporator compartment

Grote Industries developed the **UV-C Disinfecting Light**, a safe and effective disinfecting light for the HVAC systems on public transportation. The UV-C Disinfecting Light assembly installs quickly and easily into the HVAC system's evaporator compartment, functioning during normal bus operations to effectively destroy microorganisms as they pass through the evaporator. Assembled in North America utilizing the latest generation of highly efficient and reliable LEDs, Grote's UV-C technology is calibrated to deliver disinfecting UV-C light at the right wavelength. LED technology requires low DC voltage to operate, reaches full output with no warmup time, operates under a wide range of temperatures, and features a life span of more than 13,000 hours.

For more information visit FleetMaintenance.com/21220123



» Converts conventional vehicles into hybrid units

Mission Critical Electronics (MCE), in partnership with **ZeroRPM**, delivered the **ZeroRPM System** which converts conventional vehicles into hybrid units by eliminating idling while continuing to power all onboard equipment, including HVAC. The lithium-ion battery technology integrates with a vehicle's engine and existing electrical system, providing extended engine-off A/C and heating, plus full power to onboard electronics, including lights, radios, and computers. The ZeroRPM System offers hands-free control: Once a vehicle is in park, the system automatically shuts down the engine and provides all required power utilizing lithium-ion batteries with a five-year warranty. For extended times of stationary use of the vehicle, the ZeroRPM System manages the engine start/stop to recharge the batteries as needed. The system is available through MCE's Xantrex, Purkeys, and Kussmaul brands.

For more information visit FleetMaintenance.com/21220132

» Lithium-ion battery-based power system

The **Xantrex Freedom e-GEN** is a lithium-ion battery-based power system that can be requested as an OEM install with most truck brands or as an aftermarket solution through Xantrex authorized dealers. It features a dedicated battery bank with AC and DC power to run hotel loads and auxiliary HVAC units. The lithium-ion batteries are available from 125Ahr to 1,260Ahr. The Freedom XC Inverter/Charger converts DC electricity from the battery bank into AC power. Available with ratings of 1,000 to 3,000 watts, all models feature high surge capability and premium sine wave output. Regulated by the Xantrex Intelligent Battery Management System, Freedom e-GEN supports charging from both a second alternator and shore power.

For more information visit FleetMaintenance.com/21220135





TOOLS & EQUIPMENT

A roundup of the latest tool and equipment offerings.



» Offers pre-set rpm and ipm levels

The **Milwaukee Tool M18 FUEL 1/2" Compact Impact Wrench w/ Pin Detent**, No. 2855P-20, measures 4.9" and delivers 250 ft-lbs of nut-busting and fastening torque. The 2855P features the company's Powerstate brushless motor, Redlink Plus intelligence, and Redlithium battery pack. It also offers Drive Control for greater precision with a range of pre-set rpm and ipm levels, along with auto shut-off and bolt removal modes. For increased visibility in confined and low-light workspaces, the tool has tri-LEDs that deliver bright light with less shadows. The compact impact wrench is also available as a kit.

For more information visit [FleetMaintenance.com/21157243](https://www.fleetmaintenance.com/21157243)



» For Class 7 and 8 trucks

The **Lisle Corporation Large U-Joint Puller**, No. 42910, is designed to quickly and easily remove sealed U-joint caps without damage to driveshafts, yokes, or bearing caps. The unit works on Class 7 and 8 trucks with 1.5" to 2.2" bearing cps. It features heat-treated threads and casting for durability.

For more information visit [FleetMaintenance.com/21159335](https://www.fleetmaintenance.com/21159335)



» With two-stage power lock-off

The **Makita 4-1/2" / 5" Paddle Switch Angle Grinder with AC/DC Switch**, No. GA5052, offers a 11A motor and delivers 11,000 rpm to handle high demanding applications, all in a compact size. The large paddle switch design allows for easy power start in multiple grip positions. The grinder features a narrow barrel grip design and rubberized side handle for increased user comfort. The guard can be rotated with a tool-less adjustment for increased productivity. Additionally, there is no lock-on power switch, but there is a two-stage power lock-off. The AC/DC switch allows the grinder to be used with an alternative power source.

For more information visit [FleetMaintenance.com/21203516](https://www.fleetmaintenance.com/21203516)



» Offers quick magnetic charging

The **Ledlenser H7R Core Headlamp** emits up to 1,000 lm and offers a maximum run-time of 65 hours. It features the company's patented Advanced Focus System, allowing users to easily transition light from a broad flood beam to a sharply focused long-distance beam. The H7R Core has a 130-degree rotating lamp head, is rechargeable, and offers Flex Sealing Technology to provide protection against dust and water.

For more information visit [FleetMaintenance.com/21204649](https://www.fleetmaintenance.com/21204649)



» Has a viewing area of 3.82" by 2.44"

The **Cornwell Quality Tools Variable Shade Welding Helmet**, No. MMW67VG, is blue with a racing stripe and features 9-13 variable shade with grind function for use in a variety of applications including: stick, MIG, pulse MIG, TIG, pulse TIG, AC, and DC to 2A and grinding. With ANSI and CSA approval, the auto-darkening welding helmet is safe and functional for the above welding applications. It also has dial sensitivity and delay adjustment, along with a viewing area of 3.82" by 2.44". Additionally, the welding helmet offers quick 1/25,000 second switching time, UV/IR protection to shade 16, auto on/off, solar power supply, low amp TIG to 2A, 5-point adjustment articulating head gear, and a large removable/washable sweatband.

For more information visit [FleetMaintenance.com/21205456](https://www.fleetmaintenance.com/21205456)



» Provides focused blast for blowoff

The **Exair VariBlast Precision Safety Air Gun with Nano Nozzle** is a CE compliant lightweight air gun with an engineered variable flow trigger able to produce variable force upon a target simply by pulling the trigger. The air gun has a built-in full finger trigger, convenient hanger loop, and its body is made of high impact, glass reinforced nylon. It's available with a standard 12" or 20" extension which can also be outfitted with an impact resistant polycarbonate chip shield. The airflow that exits the nozzle can't be blocked, assuring safe operation and meeting required OSHA standards. Additionally, the air gun produces 75 dBA noise level which is well below the limits of the OSHA noise exposure standard.

For more information visit [FleetMaintenance.com/21212353](https://www.fleetmaintenance.com/21212353)

» Forms a coating around moving parts

The **Lube-It All White Grease** from **FedPro** is a high solid, non-staining white lithium grease. It clings to vertical surfaces, forms a complete coating around moving parts, and protects metal surfaces against rust and wear. Use it on chains, gears, drives, hinges, and other overhead surfaces. Safe on most plastics and painted surfaces. Made in the U.S.A.

For more information visit FleetMaintenance.com/21210831



» For 6.7L Cummins Diesel engines

The **CTA Cummins Service Kit**, No. 7250, includes the required specialty fluid service tools for 6.7L Cummins diesel engines. It services the 2013 and up variant of the Dodge RAM 6.7L Cummins diesel 2500/3500 HD trucks. The kit includes Cummins Oil Filter Plug, No. 4334; Cummins Fuel Filter Socket, No. 7888; and Cummins Water Sensor Wrench, No. 1021.

For more information visit FleetMaintenance.com/21205538



» Spindle lock feature for quick and easy accessory changes

The **AIRCAT 115 Degree Angle Die Grinder**, No. 6295, features a .6hp motor and the company's silencing technology. The rotational rear exhaust with internal silencing reduces noise level to 87 dBA. In addition, the tool has a conveniently located spindle lock to provide quick and easy accessory changes as well as a speed control switch at the top of the tool for added control. The 6295 offers 18,000 rpm and a standard 1/4" Erickson-style collet. It weighs 1.65 lbs and measures 7.8" in length. The tool is ideal for working in tight or challenging spaces.

For more information visit FleetMaintenance.com/21210262



» Able to handle low voltage conditions

The **Yellow Jacket SuperEvac PLUS II Vacuum Pump** is designed for use with A2L systems and features an integrated brushless DC (BLDC) motor, providing high efficiency, high torque, and a long life. The SuperEvac PLUS II is able to function in extreme low voltage conditions, including low temperatures, and is field rated to 15 microns. The easy-to-carry, lightweight design is available in 4, 6, 8, and 11 cfm models. It has a two-year warranty and is made in the U.S.A.

For more information visit FleetMaintenance.com/21211474



» Features a replaceable carbon brush motor

The **Matco Tools 12V Cordless Infinium 1/4" Impact Wrench Kit**, No. MCL1214IWK, provides up to 60 ft-lbs of maximum torque and includes an ergonomic variable speed trigger for precise control. The trigger activates the LEDs. The impact wrench features a replaceable carbon brush motor, making it easy for the user to extend the life of the tool, the company says. It also has a one hand forward/reverse knob to allow users to easily change direction in tight quarters. The compact tool is ideal for work under the hood or in the interior where larger tools have a tough time operating. It includes a motor screen to keep debris out.

For more information visit FleetMaintenance.com/21204810



» Features a compact, non-tilt design

The **Dannmar Swing-Arm Tire Changers**, Nos. DT-50 and DT-50A, feature a compact, non-tilt design to fit in most shops as well as a high-torque turntable with fast operating speeds and reverse-direction for easier tire swaps. The rigid spring-assist hexagonal vertical tool shaft and hardened steel horizontal outrigger support arm reduce flex and the chance of damaging expensive wheels, the company says. Both can efficiently handle 12" to 26" wheels including difficult low-profile and run-flat beads. For the stiffest sidewalls, the DT-50A adds a power-assist tower.

For more information visit FleetMaintenance.com/21214152



» Fully textured for an enhanced grip

The **MicroFlex Nitron One NO-123 Powdered Nitrile Glove** is designed to provide durable protection while offering superior grip. The disposable gloves are lightly powdered for easy donning and moisture control. They are fully textured, have a beaded cuff, and are thickest at the palm and finger for increased protection. The Nitron One NO-123 gloves are recommended for inspecting parts, equipment repair and maintenance, and general purpose automotive aftermarket. The gloves are packaged 100 per dispenser and are available in sizes XS to XL.

For more information visit FleetMaintenance.com/21213455



» LED layout eliminates tunnel vision

The **STKR FLEXIT Headlamp PRO** is designed to combine comfort and ergonomics with performance and usability. Its low profile design features side mounted C.O.B. flood LEDs that deliver 240 degree halo lighting. This illuminates the user's peripheral vision, while the adjustable center perch houses a CREE spotlight projecting 350 lm. The spotlight is flexible, allowing the user to aim the direction of the spotlight directly at their focal point. The LED layout eliminates the tunnel vision created by a single spot light headlamp. In addition, the headlamp weighs 5.8 oz., is USB rechargeable, and emits up to 55 hours of run-time.

For more information visit FleetMaintenance.com/21212369





» 360 degree rotation saddle for easy positioning

The **OEMTOOLS 2 Ton Scissor Jack**, No. 24799, is engineered for lifting vehicles for tire service. The package includes a universal ratchet wrench for quick and easy lifting. The jack has a maximum load capacity of 2 tons and has a 360 degree rotation saddle for easy positioning. Made of durable steel construction, it has a 4" minimum lifting height and 16.5" maximum lifting height.

For more information visit FleetMaintenance.com/21212837



» Offers handsfree mounting

The **Coast PS700 Flashlight** features polysteel strength and is built from rugged poly-nylon and stainless steel to handle tough working conditions. A magnet is built into the tail cap to enable handsfree mounting, and its Pure Beam optic emits light up to 800 lm with seamless focusing between ultra view flood beam and Bulls-Eye spot beam. A handle-mounted chip on board (C.O.B.) brings secondary, directional lighting capability. The company's Dual Power system enables the light to run on alkaline AA's or a rechargeable Coast Zithion-X Li-ion battery.

For more information visit FleetMaintenance.com/21213216

» Has a self-locking throttle trigger

The **Mighty Seven Air Die Grinder**, No. QA-211, offers a high-powered motor rated at 0.9hp that helps to reduce stalling and has an operating rpm speed of 20,000. Other notable features include a self-locking throttle trigger, OSHA safety rated 76dBA working sound pressure, and a rubber grip that reduces user fatigue from vibration. The kit includes 1/4" and 1/8" collets, and two wrenches for quick and easy bit change. The tool is backed by a three-year warranty.

For more information visit FleetMaintenance.com/21213218



» Runs on shop air

The **Proflex+ Pro S-2000HD Heavy Duty Smoke Machine** is engineered for the heavy duty truck market as well as agricultural, mining, industrial, engineering, and more. It features full testing capabilities from the airbox to the exhaust system and has cabin vent testing. Test pressure from 0 to 110 psi adjustable. It runs on shop air and is nitrogen compatible. The smoke machine is lightweight and easy to use. Accessories include two H.D. Bladder Blockers, LED flashlight, halo, 16.25" long detachable battery cable, and detachable air/smoke hoses. A 52" miser wand is also included inside the box.

For more information visit FleetMaintenance.com/21213221



» Can also be used as a personal work station

The **Launch Tech TWT-100 Tool Trolley** is durable and offers ideal storage tool for any shop. It can also be used as a personal work station with room for various tools including computers, scanners, and more. It features a user-friendly design with push-pull handles, universal wheels, and a hook rack for wire. It is equipped with a keyed locking system and is made of high-quality steel at least 2mm thickness.

For more information visit FleetMaintenance.com/21217233



» Interior organization tray for hand tools and accessories

The **Milwaukee Tool PACKOUT XL Tool Box**, No. 48-22-8429, features a 100-lb weight capacity and an extra-large depth to fit large power tools and equipment with ease. It offers modular connectivity with all PACKOUT components via integrated locking cleats and is the largest storage solution within the PACKOUT system to date. The toolbox is constructed with impact-resistant polymers and metal reinforced corners to withstand harsh jobsite conditions and an IP65 rated weather seal protects tools and accessories from rain and other jobsite debris. It includes an interior tray allowing users to keep hand tools and accessories organized to fit their needs.

For more information visit FleetMaintenance.com/21213460

» Extends up to 18"

The **ATD Tools 3/8" Drive 3-in-1 Variable Length Ratchet**, No. PLT-99638, features one ratchet that can work in four different lengths. The handle extensions securely attach to a compact 4" fixed head ratchet and can extend 18" to help reach fasteners and to provide additional torque. Made from chrome vanadium steel, the ratchet can provide up to 300 ft-lbs of torque and requires only 5 degrees of movement. The 72-tooth ratchet meets or exceeds ANSI specifications and includes a tray with lid for easy storage. It has a limited lifetime warranty.

For more information visit FleetMaintenance.com/21213220



» Ideal for oil filter sizes of up to 7" diameter

The **Mueller-Kueps Universal Belt Wrench**, No. 551 005, allows users to tighten the strap to the size needed to loosen an oil filter without denting the filter in the process. The band is made of nylon, enabling users to also use it to hold pulleys or rolls without damaging them. The tool features a 1/2" drive and is ideal for larger trucks and equipment with a filter size of up to 7" diameter. It's recommended by Caterpillar for use on their equipment, the company says.

For more information visit FleetMaintenance.com/21215032





» Features 14-gauge oil resistant cord

The **Legacy Manufacturing Flexzilla 50' Retractable Extension Cord Reel**, No. FZ8140503, includes 50' of 14-gauge oil resistant cord, a lighted triple tap outlet, and grounded 5' lead-in cord. The reel also contains a circuit breaker with reset button, adjustable cord stopper, power indicator light, and a swivel mounting bracket. The reel locks the cord out in 1' increments and can be mounted to the wall or ceiling. The impact-resistant housing protects and stores the extension cord when not in use. The retractable reel is ideal for general, commercial, and industrial use in dry, indoor locations.

For more information visit [FleetMaintenance.com/21213965](https://www.fleetmaintenance.com/21213965)



» Straightens 3/16" and 1/4" tubing

The **S.U.R.&R. Handheld Tubing Straightener**, No. TS224, is designed to straighten 3/16" and 1/4" tubing. It can be used on aluminum, copper-nickel, and steel lines. It straightens tubing with the flip of a convenient thumb-size selector, then slide the tubing through the straightener to eliminate curves or bends. It's ideal for creating long and consistently straight lines from bulk tubing coils. The TS224 can be used in a vise or on the vehicle thanks to its compact design that makes the tool easy to grip and control. The TS224 also works well with S.U.R.&R. UltraBEND flexible brake line tubing and Max Flex Alloy tubing coils or bundles.

For more information visit [FleetMaintenance.com/21213977](https://www.fleetmaintenance.com/21213977)



» Able to soak up grease, coolants, diesel fuel, and more

The **Sellers Absorbent Materials EverSoak Light-Duty Absorbent Pads**, No. 22883, are designed to soak up both oil and water as well as grease, transmission fluid, coolants, diesel fuel, and many other fluids. They are made with 70 percent recycled cellulose fibers and are Class A fire retardant when pad is dry. With coverstock only on the top side of the sorbent pad, the pad instantly begins to soak up liquid, keeping the pad firmly in one place while still maintaining its durability. They are made in the U.S.A. and not intended for use with aggressive acids or caustics.

For more information visit [FleetMaintenance.com/21216697](https://www.fleetmaintenance.com/21216697)

» Designed to minimize heat build-up

The **Goodson Tools and Supplies CSS ULTRA Grinding Wheel** from **Radiac Abrasives** provides an alternative grinding wheel composition that minimizes heat build-up. The grit texture is composed of white and sintered aluminum-oxide with a high strength bond. The grinding wheel offers long life, cool grinding, and high productivity. The high strength bond system allows the grains to withstand greater loads during use without premature breakdown, the company says. The bond also allows for increased stock removal rates and reduced friction. It's available in 26" and 28" diameter with an 8" arbor hole. Face widths are available from 3/4" to 2-1/4".

For more information visit [FleetMaintenance.com/21213969](https://www.fleetmaintenance.com/21213969)



» For Dodge HEMI 5.7L and 6.1L V8 engines

The **ProMAXX Alan ProKit** is designed to provide accuracy, speed, and consistent reliability in the removal of broken exhaust manifold bolts in the Dodge HEMI 5.7L and 6.1L V8 engine. It has demonstrated repair times of less than 10 minutes per stud, the company says. The Alan ProKit includes ProMAXX's Bolt Blaster machine shop penetrating oil and now offers a smaller footprint, mount-anywhere precision bushings/fasteners, and two platinum vertical flute bits to punch through hard material. It's made in the U.S.A.

For more information visit [FleetMaintenance.com/21214276](https://www.fleetmaintenance.com/21214276)



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» Shares results wirelessly via app

The **Snap-on 1,000 PSI Wireless Diesel Pressure Tester Set**, No. EEDF700, is designed to diagnose engine performance issues. With a range of 0 to 1,000 psi and 0 to 30 inHG, it stores results for viewing on the tool or shares them wirelessly via a free app on Bluetooth-enabled Android or Apple devices. The tool measures in psi, kPa, Bar, mBar, inHG, inH2O, and cmH2O, and graphs and stores up to 12 readings, so writing the results isn't required. Lift tank fuel pump, engine return flow, and flow restriction testing adapters are included in the set.

For more information visit FleetMaintenance.com/21214933



» Sturdy, large base provides stability

The **Martins Industries Pneumatic TBR and OTR Tire Spreader**, No. MTRS-HD, is ideal for truck, bus, and commercial/public utility tires with its heavy duty, automatic tire-lifting platform and spreader hooks, tire rollers, and roll-on ramp. Swivel hooks on both sides sit on the bead without damaging it and adjust to tire width and sidewall height. When ready, use the first joystick to lift/lower tire and the other one to spread/release it. The tire spreader features a large tool tray as well as an air outlet on the base. It also has a wide-opening lamp mounted on the fully flexible arm to allow users to illuminate and inspect the inside of the tire.

For more information visit FleetMaintenance.com/21214475



» Handheld or can be mounted

The **Dent Fix Equipment MatchRight MatchGUN 5 Color LED Gun Lamp**, No. DF-MR007, is a super bright and rechargeable flood lamp that fits in the palm of a hand or mounts to the included tripod. The high CRI (96+) lamp produces ideal lighting conditions while paint color matching and detailing, while the UV mode is ideal for quick leak detection and light curing jobs. The LED screen has a battery indicator that lets the user know when it's time to charge and how much of a charge is left in the battery. The battery charges in three hours with included USB charger and wall mountable base.

For more information visit FleetMaintenance.com/21214929



» Ideal for loosening hoses and nozzles gently

The **KNIPEX Pipe and Connector Pliers Series with Plastic Inserts**, No. 81 11 250, feature dual component inserts designed for gently loosening hoses and nozzles. The materials include a soft blue outer layer and a firm red inner layer. The Pipe and Connector Pliers series offer 25 easy adjustments with a push of a button. They have a sturdy box-joint design and include a soft jaw to prevent corrosion by not allowing metal from being transferred onto the workpiece. Their rounded jaws also grab round pipes and connectors up to 3-5/32" in diameter, suitable for tightening and loosening screw connections, plastic pipe fittings, and round nuts.

For more information visit FleetMaintenance.com/21215020

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» Capable of OE-level analysis of 28 automotive systems

The **Topdon ArtiDiag800BT Diagnostic Tool** is capable of OE-level analysis of 28 automotive systems. It can pull ECM codes, transmission, ABS, airbag, SAS, DPF, EVAP, TPMS, BMS, EPB, and other onboard systems. The ArtiDiag800BT can diagnose wirelessly, up to 33', via Bluetooth and can provide diagnostics for oil, SAS, EPB and tire pressure reset, injector coding, SAS calibration, ABS bleeding, DPF regeneration, battery, throttle, headlight, EGR adaption, tooth learning, and sunroof initialization. It will automatically identify a vehicle's make, model, and year information and quickly match the right software at a single touch upon this scan tool. A full, clear, and accurate report is automatically generated for further analysis.

For more information visit FleetMaintenance.com/21215023

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» Provides a comprehensive evaluation of fluid

The **Vital Fluid Analysis** from **Fluid Rx Diagnostics** is a tool and process that educates users on the benefits of fluid preventative maintenance and shows them why and when these services are required based on fluid condition. The diagnostics charts differentiate between and performs separate testing for all four major variations of transmission fluids and all four major variations of power steering fluids, as well as brake fluid and gear lube. This includes separate testing for transfer case and front and rear differentials. The test provides a comprehensive evaluation of each fluid including a measure of the additive package, dispersant properties, and total sludge or debris content.

For more information visit FleetMaintenance.com/21216689



» Features a 360-degree rotating head

Wilton's Multi-Purpose Bench Vice is ideal for light tradesman, utility, MRO, and general-purpose use. The vise features a 360-degree rotating head to clamp material at any angle, 30-degree indexing increments for quick set up, replaceable pipe jaws, and a V-jaw to easily hold round objects vertically. The body and movable jaw are 30,000 psi gray cast iron and the base is 60,000 psi ductile iron, providing durability through a wide range of applications. The vise is available in 4-1/2" (No. 28844), 5-1/2" (No. 28824), and 6-1/2" (No. 28845) jaw widths.

For more information visit FleetMaintenance.com/21220131

» Adjusts from 48" to 64" in height

The **TraXion Topside Creeper NXT** enables technicians to work safely from the topside of the engine compartment. Mounted atop the ladder section is an adjustable padded deck for the technician to rest upon while reaching into the engine compartment. The tool assembles in about 12 minutes, folds flat for easy and compact storage, has locking casters for security and leverage, and offers more height adjustment points than its previous models. Additionally, its I-base design provides flexible positioning around the vehicle. It can adjust from 48" to 64" in height.

For more information visit FleetMaintenance.com/21220130



» Eliminates damage to the block and crank

The **OTC Crankshaft Rear Seal Remover**, No. 6740, is a three-jaw puller designed to grab the inner lip of the seal. The forcing screw attached to the center plate is used to react against the crankshaft end to pull the seal out, eliminating damage to the block and crank that prying the seal can cause. For use on 2001 and later 6.6L Duramax diesel engines found in GMT800, 2500HD, 3500, and GMT900, GMC Sierra HD and Chevrolet Silverado HD, as well as 2006 to 2016 Chevrolet Express and GMC Savana.

For more information visit FleetMaintenance.com/21217212



» Delivers a stable TIG arc down to 10A

The **ESAB Rogue ES 180i PRO** inverter for stick/TIG welding features next-level control technology that produces a smooth welding arc with all types of stick electrodes, including E70818 and E6010, the company says. The Lift TIG function provides positive arc starts without the use of high frequency. Rogue delivers a stable TIG arc down to 10A, giving welders the control needed to work on thin metal or delicate components. The unit weighs 18.2 lbs., delivers a maximum output of 180A at 25 percent duty cycle, and uses 115 - 230V primary power.

For more information visit FleetMaintenance.com/21217229



» Features an adjustable nose piece

The **Encon Safety Products Veratti Lite 2.0 Safety Spectacles** feature advanced fog resistance. The glasses also have adjustable temples and an adjustable nose piece to help ensure fit and wearer comfort, as well as brow guard protection. The lenses are made from high-impact polycarbonate and are available in clear or gray.

For more information visit FleetMaintenance.com/21219186



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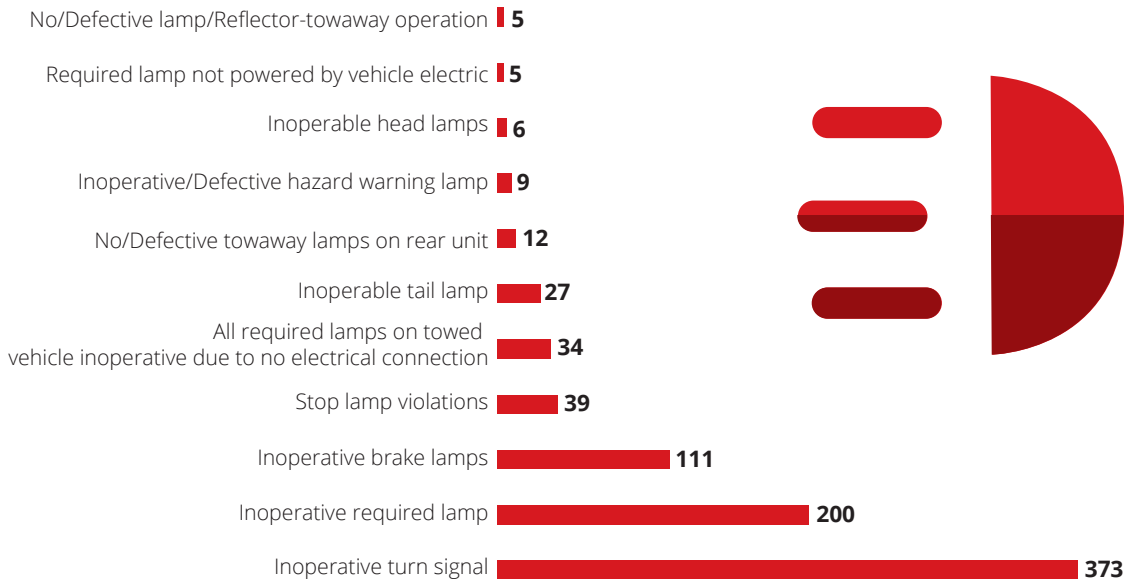


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» Out-of-service (OOS) lighting violations in the U.S. from the 2020 International Roadcheck event.

Statistics courtesy of the Commercial Vehicle Safety Alliance | Graphic by Erin Brown

Over the long haul

It is important for every fleet to establish and adhere to a well-documented PM schedule, including the thorough examination of a vehicle's entire electrical and lighting system beginning on day one.

If OEMs have positioned wiring and connectors in high-moisture areas, such as just above or behind tires, the fleet maintenance team may want to add ancillary protective coverings in the form of boots, plastic looms, moldings, or tubing.

These measures not only help reduce high-pressure moisture exposure, they also diminish the potential damage that can be inflicted by rocks, road debris, and ice accumulation that can place undue stress on wiring and connection points.

During the new vehicle inspection, maintenance professionals should make sure that all lighting is correctly installed and operational. They should look for wires and cables that are bent sharply and those that come into contact with metal edges, such as where wires pass through walls or into body cavities.

Dielectric grease can be added to grounding ring terminals that are improperly connected to a frame member and might otherwise produce a galvanic response caused by two dissimilar metals making contact.

To the extent possible, corrections should be made and the system augmented as needed. Any wiring that appears to be loosely hanging should be secured. If unused connectors are spotted, these should immediately be capped.

The cable and wiring augmentation described above will help guard against corrosion, but if problems arise, here is what to look for. Wiring and harness problems usually come in three identifiable categories:

- ⦿ Failure due to a grounded circuit
- ⦿ Failure due to an open circuit
- ⦿ Failure due to a short circuit

Once the vehicle is in service, maintenance personnel should focus on seals, connection points, and cable and wiring integrity.

Fleets should follow this five-point approach:

- ⦿ Start corrosion prevention on the day the fleet takes possession of the vehicle.
- ⦿ Train drivers to perform proper pre-trip inspections (make them a part of the maintenance protocol).
- ⦿ Train everyone on the team on how to spot corrosion and where to look for it.
- ⦿ Stick to a regimented PM schedule.
- ⦿ Replace incandescent lamps with LED lamps.

By taking some practical steps in the short term and some intelligent steps in the long term, a fleet can ensure their trucks are safe, well-lit, and prepared for whatever they meet on the road ahead. ■

Keeping the lights on

Practical, actionable, and common sense tips to help fleets keep vehicle lighting in working order.

There is not yet a technology or algorithm capable of tracking down and correcting electrical and lighting issues, and until there is, technicians will have to continue to troubleshoot and correct electrical and lighting problems the old-fashioned way – through the process of elimination. It is still a matter of power and ground.

If a maintenance department already has a well-documented preventive maintenance (PM) protocol in place, they are likely already periodically examining the electrical and lighting system on each vehicle.

A fleet's drivers are the last line of defense for detecting lighting issues, so it is important to remind drivers that they are required by law to inspect their truck and trailer before starting their shift and again every 24 hours on the road.

Make drivers part of the maintenance team

Before a driver starts a pre-trip inspection, they might be asking themselves a few questions.

Did my fleet take the required maintenance and service steps to support proper lighting operation on my vehicle? Did my fleet make educated decisions in selecting or specifying electrical and lighting technology? Did fleet management adequately train me to perform a driver vehicle inspection?

Drivers who know the answers to these questions are indicative of a well-run fleet, and well-trained drivers and maintenance crews work together. Without knowledge, understanding, cooperation, teamwork, and training, even a good maintenance program can be undermined by an uninformed, untrained driver in the field.

While there are not any legal guidelines governing how long a pre-trip inspection should take, a proper inspection will take somewhere between 30 and 50 minutes. Doing an inspection properly requires following a process, focus, and vigilance as the driver moves methodically around each area of the vehicle.

Some critical lighting features that can easily get overlooked are reflectors and conspicuity tape. These passive safeguards are there as a critical precaution and a key feature of safety and visibility. They can also save lives in situations where lighting and power have been lost on a vehicle.

Drivers can receive violations for having defective reflectors and conspicuity tape. Working together, maintenance crews and drivers need to make sure that reflectors are free of cracks and dirt. Be aware that over time, conspicuity tape can also deteriorate so that it is no longer sufficiently reflective, thus making it a candidate for an infraction or, worse yet, a collision.



By Kyle O'Dell

DIRECTOR OF ENGINEERING AND NEW PRODUCT DEVELOPMENT, OPTRONICS INTERNATIONAL | USA HARNESS INTERNATIONAL

Optronics International | USA Harness International is a leading manufacturer of vehicle harnesses, electronic control systems, and LED lighting for the global transportation industry. Kyle O'Dell is the company's director of engineering and new product development. O'Dell has over 22 years of experience designing and manufacturing consumer products. He has an extensive background in marine electronic systems, aircraft harnessing, and automotive and commercial vehicle lighting.

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