

**HAVE YOU LOCKED DOWN YOUR LOCKOUT PROGRAM?**

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**FLEET**

# Maintenance

All Maintenance, All Management, All Vehicle Classes, All the Time

[ SHOP MANAGEMENT ]

## Steps to improve shop efficiency

REVIEWING AND IMPROVING OPERATIONAL PROCESSES CONTRIBUTES TO VEHICLE UPTIME.

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## First-Link™

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The First-Link app is available on the App Store or Google Play.



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It begins with reviewing, then improving, current operational processes.

- » Where analysis can aid in uptime
- » How operations management can aid in shop efficiency
- » What is VMRS?
- » Importance of safe vehicle lift operation

→ **On the cover:** Photo courtesy of Transervice

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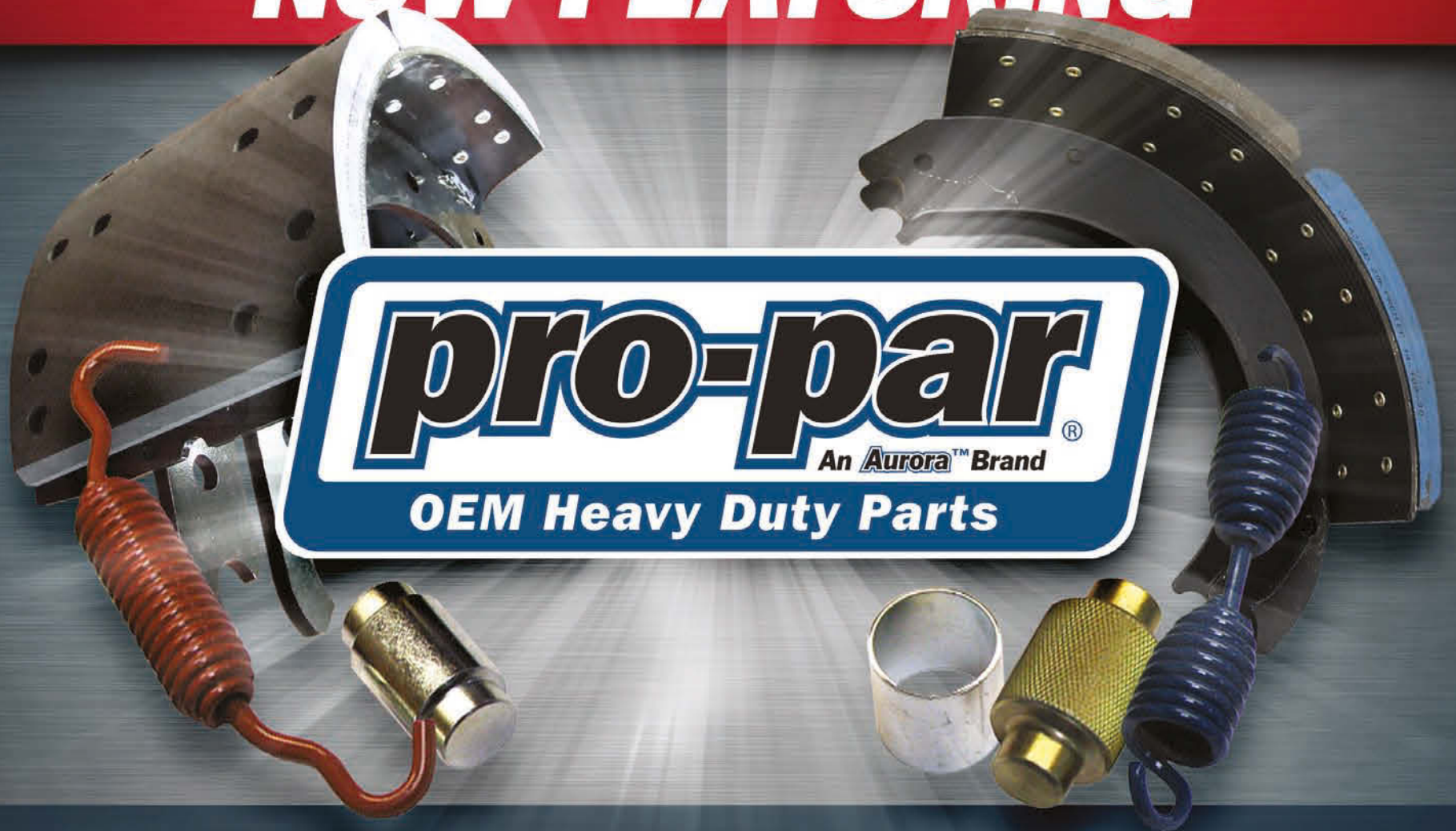
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The Mobile Air Conditioning Society training event and trade show took place in Orlando, Florida, in February.

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### VIDEO



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#### FLEET MAINTENANCE

Larry M. Greenberger Group Publisher  
LGreenburger@SouthComm.com  
Michael R. Uliss Publisher  
MULiss@SouthComm.com  
Erica Schueller Editor-in-chief  
ESchueller@SouthComm.com  
David Brierley Managing Editor  
DBrierley@SouthComm.com  
Vesna Brajkovic Assistant Editor  
VBrajkovic@SouthComm.com  
Stefanie Von Rueden Assistant Editor  
SVonrueden@SouthComm.com

#### PRODUCTION

Erin Brown Art Director  
Wes Gray Production Manager  
wes@SouthComm.com

#### ADVERTISING REPRESENTATIVE

Mike Eager Multimedia Account Executive  
262-473-9212

#### TOOL AND EQUIPMENT ACCOUNT MANAGERS

Cortni Jones Multimedia Account Executive - East  
920-568-8391  
Kylie Hirko Multimedia Account Executive - West  
920-563-1666  
Diane Braden Multimedia Account Executive - Midwest  
920-568-8364  
Mattie Gorman Multimedia Account Executive  
920-563-1636

#### CLASSIFIED ADVERTISING

Kaylee Kidd 920-563-1619

#### LIST RENTAL

Elizabeth Jackson Account Executive, Merit Direct LLC  
ejackson@meritdirect.com  
847-492-1350 ext. 18

#### ADMINISTRATION

Sarah Steed Administrative Assistant

#### CIRCULATION

Debbie Dumke Audience Development Manager

#### SOUTHCOMM, INC.

Blair Johnson CEO  
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#### SUBSCRIPTION CUSTOMER SERVICE

877-382-9187; 847-559-7598  
Circ.fleetmag@omeda.com  
PO Box 3257 • Northbrook IL 60065-3257

#### ARTICLE REPRINTS

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877-652-5295, ext. 118 or bpetillo@wrightsmedia.com.



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# How do you analyze the cost savings of accident avoidance?

New vehicle technologies are providing payback, but it's more complex to measure the cost savings.



By Erica Schueller  
Editor-in-chief

**How do you validate a return on investment (ROI) from accident mitigation?** When you avoid an accident you don't know how much revenue may have been lost because of unforeseen downtime, and how much you didn't spend on repairs or hospital bills.

This topic was one of the talking points at a recent panel discussion during Heavy Duty Aftermarket Dialogue this past January.

The conversation circled around the increased spec'ing of air disc brakes in heavy duty fleets, and validated why this adoption continues.

The reasons for spec'ing air disc brakes over drums haven't changed — reduced stopping distance, almost no fading or pulling, longer service intervals, less time to perform basic maintenance, to name a few — as more scrutiny continues to be placed on keeping operations lean and reducing costs. Not to mention the added pressure of adhering to Compliance, Safety and Accountability (CSA). Since air disc brake adjustment is done internally, it results in fewer CSA violations by eliminating out-of-adjustment situations.

A recent reader study on braking systems, conducted by *Fleet Maintenance*, also confirms continued air disc brake adoption, with 26 percent of respondents indicating they spec air disc brakes for their fleet.

While air disc brakes have been available on heavy duty vehicles for some time, when the cost and weight of the product come down and the decrease in accidents and vehicle downtime can be validated, adoption will continue to rise.

## Validating changes

While air disc brakes were a focus for this discussion, ROI on safety technologies in general can be more challenging to confirm. This is one of the reasons we have seen such an advancement in the adoption of data analytics when it comes to vehicle and shop operations.

Data has significantly improved many aspects of fleet maintenance: not only can it help confirm the return on safety technologies, it can also make processes like preventative maintenance (PM) and technician schedules more efficient.

In this month's cover story (page 10), we look at the process of how to evaluate and implement different strategies that help increase overall shop efficiency, focusing on the use of data analytics to improve operational processes.

## New safety products and procedures

If you haven't quite reached the point of spec'ing the latest vehicle safety technologies in your fleet but you



» Reviewing incremental changes can help fleets adjust different aspects of their operation, such as improved scheduling or more efficient maintenance cycles.

Photo courtesy of Transervice

want to know more, our editorial team spoke with a number of different suppliers focused on providing technology that promotes and enhances safety while on the road. We talk about the different safety systems currently available, and the (somewhat unsurprisingly) minimal maintenance that goes into many of these systems. Check out page 20 for more.

Speaking of safety, are you familiar with lockout and tagout procedures? Depending on your operation, you likely follow many Occupational Safety and Health Administration (OSHA) guidelines that are regularly reviewed and enforced to ensure the safety of your employees. This month we cover another accident mitigation technique — creating a formalized lockout/tagout procedure when working on vehicles (page 26).

Many accidents are avoidable with the right processes, tools and knowledge. But, it's inevitable that accidents will happen. When they do, it's important to learn from those mistakes. Our regular Management columnist Joel Levitt shares his input on the "problem" paradox — and why you should take steps to learn from what happened to help avoid the issue in the future (page 34).

I hope in this issue you'll find valuable information to help you run a more efficient maintenance operation, taking into consideration aspects of your business you may not have thought about previously. As always, I welcome your thoughts and comments. ▀



## 2018 FLEET MAINTENANCE BRAKE STUDY

Interested in learning more about current trends in braking systems? Check out a free downloadable PDF of the 2018 *Fleet Maintenance Brake Study*. To access, visit [VehicleServicePros.com/20993716](http://VehicleServicePros.com/20993716).



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The collage displays several key pages from the Vehicle Service Pros website:

- Home Page:** Features a navigation bar with links like 'PTEN e-REQUEST', 'PG e-REQUEST', 'IN PRINT', 'ADVERTISE', and 'CONTACT US'. A main banner for 'FIRESTONE IS SENDING TWO LUCKY DRIVERS TO CMA FEST' includes an 'ENTER TO WIN' button.
- Product Guide:** A detailed page for 'Vehicle Lift Guide' with a 'DOWNLOAD HERE' button. It includes a search bar and a 'PARTS, TOOLS & EQUIPMENT SOURCE' sidebar.
- Whitepapers:** A page titled '2017 Fleet Maintenance Oil Study' and 'Trends in truckload recruiting and retention', featuring a 'Driver IQ' logo.
- Product Listings:** A grid of featured products such as 'Master Fuel Pressure Test Set, No. FPT5000', '58 Oz Dead Blow Hammer, No. CDBH58', 'Curved Capped 3/4" Pry Bar 58", No. PB58CR', 'Deluxe 2-1/2" GID Quick Fill Tire Gauge, No. 52-52009', 'Cyclone Blow Gun, No. BG4', and 'TPMS4 Diagnostic Tool'.
- Cab & Body:** A section titled '2018 Medium Duty Truck Update' with a '2018 Medium Duty Truck Update' sub-header and a '2018 Medium Duty Truck Update' sub-header.
- Products:** A section for 'COLLISION REPAIR Supplement' featuring an image of a truck.

[ SHOP MANAGEMENT ]

**Steps to  
improve**

# shop efficiency

It begins with reviewing, then improving, current operational processes.

By Erica Schueller, Editor-in-chief

**W**hile determining how to make a shop more efficient can be a daunting task, creating a roadmap can aid in setting clear goals throughout the process.

When it comes to addressing operations in your shop for improved efficiency, there is a simple checklist to consider:

- Complete an analysis
- Review the data
- Create a plan
- Implement the plan

Beginning this process requires dedicated staff and, typically, an outside service provider to aid in providing evaluation, feedback and suggested changes.

There may be some obvious inefficiencies of the business, while others may be revealed only after a more thorough analysis.

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» Caption  
Creditline

» Allowing technicians access to the CMMS on the shop floor provides real-time information about the vehicle's service history, planned maintenance, parts ordering and more.

Photo courtesy of TMW Systems

## Analyzing current operations

The first step to improving shop processes and procedures begins with a thorough evaluation of current operations, says Taki Darakos, Vice President of Maintenance, Transervice.

Transervice (transervice.com) offers full-service leasing, contract maintenance, driver and logistics support, warranty recovery and material handling maintenance.

Oftentimes, fleets may opt to hire a consulting company, like Transervice, for example, to provide an outside perspective to evaluate existing shop layout and processes.

“Having an outside set of eyes look and offer some suggestions can help,” Darakos says. “We typically do this as part of our initial sales consultation, but also have metrics that we measure on an ongoing basis.”

Some questions to consider during an evaluation include:

- What does the fleet look like? (Types of vehicles serviced, size of fleet, etc.)
- What kind of downtime are shops experiencing?
- What kind of staffing is in place?
- Can improvements on shop layout or the cost of parts they buy or carry be made?
- Are there opportunities to make customer routing more efficient?
- Are they having a hard time finding or retaining drivers?

The comparative analysis can be particularly helpful for smaller fleets. One example looks at the decision to partner with a national parts program or tire program when it comes to parts usage.

“Many times smaller fleets do not have this level of data or the relationships [to easily obtain this data],” Darakos explains. “We have found many that still use paper and spreadsheets to track maintenance expenses. We can give them visibility. We can also do comparisons to see how their current cost per mile compares to enterprise-wide data. Is it higher or lower? Where are the differences?”

While an initial analysis is a first step, it’s important to continue analyzing operations going forward to help improve the operator, technician and overall operating costs, Darakos says.

One example includes equipment spec’ing, since a fleet’s asset portfolio is ever-evolving. Darakos suggests reviewing operations on an annual basis to confirm if changes in tools and equipment, staff training or shop layout need to be addressed. Shop layout in particular can have a critical impact on efficiency.



» A CMMS can provide both real-time information as well as repair and service history for both the individual vehicle and trends for the entire fleet.

Photo courtesy of TMW Systems

Having data to back up the proposed plan can reaffirm the decision to make a change.

“We have had existing shops that had been in place for years,” Darakos says. “By moving around the parts area, shop computers, toolbox storage, etc. we are able to become more efficient. No one really thought of this because it had always been that way.”

### Review the data

Evaluating an operation’s efficiency starts by figuring out which questions to ask. The next step is to figure out how to answer those questions. To do this, reviewing data offers an overview of current and prospective processes.

Fleets can work with a contracted service provider, or use a computerized maintenance manage-



» Reviewing incremental changes can help fleets adjust different aspects of their operation, such as improved scheduling or more efficient maintenance cycles.

Photo courtesy of Transervice

ment system (CMMS) to access and review this data. A CMMS can provide both real-time information as well as repair and service history for both the individual vehicle and trends for the entire fleet.

Overall, the most common CMMS features utilized by fleets are:

- Preventative maintenance (PM) management. Optimizing maintenance schedules.
- Inventory tracking. Better management of inventory can improve the buying process.
- Labor tracking. Figure out standard labor times, and how long, on average, it takes to complete specific tasks.
- Financial system integration. Further improvements on purchasing data.

## How operations management can aid in shop efficiency

Operations management is controlling the systems and processes used to manufacture products or, in the case of a maintenance and repair facility, provide services.

Dr. Ray R. Venkataraman, a professor of project and supply chain management at Penn State Behrend, provides insights on how improving operations management can aid in run-

ning a more efficient shop.

“The techniques of operations management and “lean” can be applied to design efficient layouts and efficient scheduling to optimize a fleet maintenance repair facility,” Venkataraman says.

Shops can review a number of any and all areas of their operation in order to become more efficient. Some examples include:

- Establish/create vehicle maintenance and repair standards
- Hire properly certified technicians and provide ongoing training
- Redesign shop layout for improving efficiency (use lean principles eliminate waste)
- Automate the process where possible and leverage data
- Buy necessary equipment such as vehicle lifts, etc.

Venkataraman notes it is important to address common pitfalls when adopting new processes. To do this, shops must address and eliminate any concerns about the change, utilize data and technology available to evaluate and implement more effective processes and be sure to acquire the needed resources to implement change successfully.

From a vehicle perspective, a CMMS provides an overview of what has already been repaired or serviced on the vehicle previously, including which parts were replaced, the technician responsible for the last repair and how long it was in the shop.

As information is accrued for each vehicle, a collective set of data offers the ability to review operations across the fleet. In particular, exception reporting – or reports that highlight irregular conditions or discrepancies outside of the typical operation parameters set by a fleet – can provide measurable performance. For instance, Renaldo Adler explains, data history could determine a brake system problem with a specific type of truck, or it can highlight reoccurring repairs. Adler is the Principal of Asset Maintenance for TMW Systems, a developer of management software including logistics, freight and maintenance and repair (tmwsystems.com).

By having records of the service history of the fleet vehicles, a CMMS also allows fleets to more optimally maintain CSA compliance, Adler adds.

This large amount of data can be seamlessly analyzed by a CMMS to provide a quantitative measurement of different processes, allowing a fleet to set benchmarks and measure success. These data sets are known as key performance indicators, or KPIs.

Some common KPIs used by fleets, according to Transervice's Darakos, include: Cost Per Mile, On Time Service, PM Currency, Equipment Uptime, Utilization, Inventory Turnover, Parts Pricing, Equipment Acquisition Costs and Safety (DART Rate, Accident Rate), to name a few.

Reviewing incremental changes can help fleets adjust different aspects of their operation, such as improved scheduling or more efficient maintenance cycles.

"Along with scheduling, you know you can plan for when this truck needs to come in, to forecast and manage your shop better – whether it's the people, the parts or the equipment coming in," Adler says.

Having data to back up the proposed plan can reaffirm the decision to make a change.

## Be predictive to be proactive

Implementing a maintenance management system allows fleets to take the data obtained through daily operations, along with collective shared data amassed from the software provider, to make more informed decisions on optimizing vehicle service and general operations.

"If you don't have a maintenance system, you're probably doing a lot of reactive maintenance," TMW's Adler says.

Previously, only larger fleet operations had access to extensive data in order to complete predictive analysis. With the advent of cloud services – where information is housed and accessible over the Internet, versus a local computer – many smaller fleets can now benefit from analyzing data to make incremental changes to their operations as well.

"With the new evolution of the cloud and everybody putting data out there, you can start getting that data and more people can have access to it," Adler says.

The cloud allows for a collection of data from fleets, the software companies and public data

➔ **Continued Page 15**

# What is VMRS?

**Vehicle Maintenance Reporting Standards, known as VMRS, is an alphanumeric coding system that allows individuals and organizations the ability to organize and categorize information into a standardized format.**

Licensed by the American Trucking Associations, VMRS was developed in 1969, long before the personal computer was a mainstay in the shop.

"It was developed by maintenance people for maintenance people," says Jack Poster, VMRS Service Manager at the Technology & Maintenance Council (TMC). "These were people that really knew trucks and equipment, and they came up with this. They were really forward-thinking. It just meshed right into the computer world, it was a perfect fit."

Anyone and everyone in the commercial vehicle realm may be using VMRS in some form or another, including fleets, vehicle manufacturers, suppliers and maintenance software providers.

"VMRS is unique because it is applied to so many different areas of maintenance and transportation," Poster says. "A fleet is going to use it to run their maintenance shop. The OEMs don't have a maintenance shop. They will use it for gathering information about warranty."

## HOW IT'S USED BY FLEETS

Poster says VMRS is used as a communication link for everyone in the shop.

"It links anybody in the shop – the maintenance personnel – it links them to their computer and, most important, it brings management into the whole system," he says.

If you already use a computerized maintenance management software (CMMS) platform in the shop, it likely utilizes VMRS. Many software companies license this coding and integrate it into their own software. In a fleet setting, Poster says VMRS is often used as a communications link for generating reports.

"It's part of the repair order. The shop manager or technician – whoever is completing the work order – VMRS will be included in a dropdown," Poster explains. "There are codes for 'Reason for repair' – why did that piece of equipment come into the shop. 'Failure codes' – why did that part fail. Instead of a technician writing out three paragraphs, he can just point and click.

"And that's where the efficiencies come in. You still might have to write some notes, but on everyday repairs or even more involved repairs, it saves time. It saves typing and misspelling."

In addition to work orders, VMRS can be found in the parts room. Poster says many fleets will organize their parts room by VMRS component codes. The coding convention

can also aid in inventory control by standardizing the inventory control process.

If you're looking to adopt/implement maintenance software, Poster encourages fleets to confirm software companies "have VMRS in the system, and they are updating their codes regularly."

## HOW INFORMATION IS ORGANIZED

The breadth of coverage for the different areas of fleet maintenance can be staggering.

At the highest level, VMRS is organized by primary categories known as code keys. There are now 65 active code keys to cover all aspects of the industry. The most common code keys used by fleets are component code keys (code 33), which organize parts, and manufacturer supplier brand code keys (code 34) to track product brands. Additional code key examples include assets, labor, reason for repair, failure codes, etc. A component code key is a standardized method for organizing vehicle parts.

"The component code is not a parts number replacement, it augments it," Poster adds.

The component code key consists of more than 32,000 codes to categorize different vehicle systems, assembly and exact component. Each component code key is made up of nine digits – three sets of three digits each.

"There are codes that cover the brake system, engine, transmission parts – to expendable items like work boots and safety glasses," Poster says. "The fleet can use that number to store their purchases on a repair order and keep track of what they're buying. They can also use that to compare reliability and durability between manufacturers."

For example, 013 designates any part of the braking vehicle system. The second set of digits refers to different aspects of the braking system assembly – 001 for front brakes, 002 for rear brakes, etc. The last three digits of the nine-digit code refer to the exact component. For instance, 023 within the braking vehicle system will always be a front brake drum. Combined, the component code for a front brake drum would be 013 001 023.

## THE OVERALL BENEFIT

"With VMRS, it's a single, concise method for managing fleets, their assets, their maintenance and their costs," Poster says. "It allows you to simplify, clarify and unify maintenance."

Poster provides the analogy of a symphony orchestra to describe how the standards work together. Each musician may speak a different language – or work in a different area of the industry – but the musical notes on the sheet music provide a standard way to play together.

"The notes are universal," Poster says. "If you can read music, that's it."

# Importance of safe vehicle lift operation

Reliable after-sales service aids in keeping your capital equipment operating more efficiently.

By Jamie Pedrick, SLEC, Inc.

**To keep your shop running most efficiently, the ultimate goal is to purchase lifts that will be safe, dependable and durable for your facility.** These important factors should play a role in your decision-making process.

## FACTORS TO CONSIDER

When choosing a lift for your fleet maintenance facility, what key factors are most important? Many may consider cost as one of the key factors when making a lift purchasing decision. It is important to consider cost beyond the initial purchase of the equipment. Some additional factors to consider include:

- Is the lift you're purchasing ALI certified?
- Does it come with a warranty?
- Is there a service plan available?
- Does the manufacturer offer tech support?
- Are parts readily available?
- How long will it take to complete service/repair work on your lift?

"There is nothing worse than spending money on a piece of equipment to make your maintenance shop run profitably and efficiently, and then having it break down with no after-sales support," says Allister Collings, President, SLEC, Inc.

Many lift manufacturers provide after-sale service options such as extensive product warranties, free technical phone support and customized service plans.



» A lift technician completing an annual inspection should check all key lift components for signs of wear or damage. Experts from SLEC note their technicians complete a comprehensive 15-point maintenance and safety inspection for this process.

Photo courtesy of SLEC, Inc.

Collings says SLEC provides service plans tailored to the shop's needs, from annual inspections to fixed-cost all-in plans which cover all parts and costs associated with non-scheduled breakdowns.

When making a decision on a lift purchase, also consider safety certification. Look for the Automotive Lift Institute's (ALI) Gold Label to verify third-party certification.

The governing standard of vehicle lifts, ALI provides an independent, third-party certification program that promotes the safe design, construction, installation, inspection and use of vehicle lift products. With seven different types of lifts commonly used in today's fleet maintenance facilities, it is important to check the ALI website to see if the lift you plan to purchase is ALI certified first.

## READ THE MANUAL

It is important for safe lifting practices to receive proper training on how to use your specific lift.

You should always follow the manufacturer's instructions and policies on how to correctly operate your lift. The manual should include important procedures regarding:

- Weight capacity
- Transportation and unloading
- Safety
- Installation
- Operation
- Troubleshooting
- Maintenance

Most importantly, the manual should include contact information for the manufacturer.

## ROUTINE SAFETY CHECKS

Making sure your staff goes home safely at the end of each work day should be a priority for your fleet maintenance facility. That's why it's important to complete daily safety checks on your lift before operating.

"Each lift manufacturer will have different safety checks for their lifts," Collings says. "The safety check is quick, but essential. Daily safety checks for SLEC mobile

column lifts include cables, plug, limit switch and the protection band. These items should be inspected daily for damage as they are components to the safe operation and longevity of the lift."

If there are any items on your daily safety checklist that are damaged, it is recommended that the item is replaced immediately to ensure your lift continues to run safely.

## ANNUAL INSPECTIONS

Current OSHA requirements and the latest ALI/ANSI standards state that all vehicle lifts should be inspected on an annual basis. Having your lift inspected annually ensures the essential components of your lifts are operating safely and correctly. Ultimately, this reduces possible downtime of your lift due to malfunctions, and supports the continued safety of your staff.

A lift technician completing an annual inspection should check all key lift components for signs of wear or damage. When the inspection is complete, you will receive an OEM Inspection Report confirming the safe operation and working conditions of your lift. If required, an outline of recommended corrective action can also be provided.



**JAMIE PEDRICK**  
MARKETING  
DIRECTOR, SLEC, INC.

SLEC, Inc. is a heavy duty mobile lift and lift accessories manufacturer headquartered in Baltimore. SLEC provides parts and

service for SLEC and SEFAC mobile lifts. Their mobile lifts are ALI-certified and Buy America compliant. Pedrick has been with SLEC, Inc. for the nine years, and is also currently pursuing her Marketing and Visual Productions degree at Cecil College.

## Where analysis can aid in uptime

**Real-world example with fleets who have faced issues that have been improved by a shop analysis to improve efficiency.**

Taki Darakos, Vice President of Maintenance, Transervice, uses equipment uptime as an example of how fleets have benefitted from a shop analysis to improve efficiency.

**Issue:** Continuous and numerous unplanned breakdowns of equipment  
**Resolution:** An analysis found a specification problem and a pos-

sible knowledge gap at the shop level.

**Issue:** Every "check engine" light due to latest emissions standards

sent to dealer for repair  
**Resolution:** "Dealers are extremely busy today. By having the right diagnostic software and training the techs on how to use it, there are opportunities to avoid this," says Darakos.

**Issue:** DPF issue – drivers bypassing regen  
**Resolution:** "In some instances we have used ELD data and diagnostic codes to change behavior," says Darakos. "Working

with their provider and our IT group we were able to create a weekly report that showed which drivers were bypassing the regen. It had a date and time stamp, driver name. After a few weeks the incidents stopped and the fleet benefitted from fewer over-the-road issues and less maintenance expense (derates, tows into a shop). It also helped improve their on-time percentage."

Darakos confirms once the issue was found, the company worked with the fleet to get information out to drivers educating them on the emission systems and importance of regens.

"By trying to understand and get ahead of problems it allows the shops to focus on campaigns and preventative maintenance to keep the fleet rolling," Darakos says.

– such as weather and geographic location conditions – which software companies then input into their proprietary algorithms to provide usable information to make sound business decisions.

“Better information reduces downtime,” Adler says. “If I can get that truck back on the road quicker, I save money.”

## Get everyone on board

Optimizing schedules doesn't just apply to vehicle maintenance; it can refer to staff schedules as well. Knowing what to expect – to a certain extent – also allows fleets to assign tasks to technicians or employees based on skillset, according to TMW's Adler.

Adler also advises the CMMS be available not only for management, but technicians and employees working in the shop.

“We actually have kiosks where the technician is working from, and he gets messages – ‘here's what you need to do,’ ‘here's what we did the last time we worked on this’ or ‘this part is under warranty,’” Adler says. “The technician is getting real-time information and he's able to do his job better. If you can push it down to the shop floor, you can pick up a lot of efficiencies.”

Adler says some management may argue they do not want technicians working on computers, instead spending time servicing vehicles. But, he counters, the computer and software can make the technician more efficient by serving as a resource to record issues and/or service on the vehicle immediately, as well as provide the means to look up the vehicle's history, look up and order parts, etc.

It's important to note that any implemented changes may affect the entire organization. Employees handling more routine day-to-day operations, like technicians, and those who manage larger projects and long-term company outlook, like management, need to be in sync.

Before making decisions be clear with all departments and staff – including technicians, managers and corporate – that a process or procedure change is happening.

It's important to fully communicate and engage with staff and management alike to ensure everyone understands the end goals and why changes are being made.

## Conclusion

Change will not occur overnight, and the full process must be implemented and followed through in order

to see results.

Continually reviewing processes and making changes when necessary also keeps shop operations efficient.

“You have to consistently be re-evaluating what you are doing and how,” Transervice's Darakos says. “Without this your costs gradually increase and you lose your competitive edge in the marketplace.” ▀



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» Ford's three lineups of 2018 van offerings include: Transit Connect (pictured), Transit and the E-Series cutaway van.

Photo courtesy of Ford

# 2018 vans update



» Ford offers the 2018 Ford E-Series E-350 Cutaway.

Photo courtesy of Ford

A compilation of the latest 2018 light and medium duty commercial van offerings.

By Vesna Brajkovic, Assistant Editor

## [ BODY & CAB ]

Fleets looking to make deliveries, haul cargo or provide transportation often rely on light and medium duty vans to meet their business' needs. For 2018, there are new and updated options across the market from various manufacturers.

"Demand for commercial vans continues to be strong," Julie Ellenberger, Ford's Transit brand manager, says. Ford Motor Co. ([ford.com](http://ford.com)) is a

U.S.-based automobile and commercial vehicle manufacturer.

Whether it be the ease of transportation in urban areas, or the ability to upfit and customize to accommodate very specific needs, fleets continue to seek out replacements for aging vehicles.

"Fleet managers should set aside their past perceptions of the commercial vehicles available to them," Dave Sowers, head of Ram Commercial marketing, says. "There are opportunities to downsize some vehicles and some surprising new alternatives from companies like Ram."

A division of FCA, Ram Trucks ([ramtrucks.com](http://ramtrucks.com)) is a U.S.-based brand of light and medium duty commercial vehicles.

This article provides a summary of Model Year 2018 commercial vans to help fleets determine which vehicle is best for their specific applications.



## Ford

Ford's three lineups of 2018 van offerings include: Transit Connect, compact commercial cargo and passenger vans; Ford Transit, full-size cargo, passenger and cutaway vans; and the E-Series cutaway van.

### CARGO

**The Transit Connect XL and XLT Series Cargo Van** comes in short and long van lengths. These vans feature options such as rearview camera, automatic headlamps and steel mesh window guards. Additional optional packages for CNG/propane gaseous fuel-prep and trailer towing with trailer sway control are also available.

- **GVWR:** Up to 5,270 lbs
- **Maximum payload:** 1,610 lbs
- **Engine:** 2.5L Duratec I-4 gas with 169 hp at 6,000 rpm and 171 lb-ft of torque at 4,500 rpm
- **Transmission:** 6-speed automatic
- **Brakes:** 4-wheel antilock disc

### The Transit 150, 250, 350 and 350 Heavy Duty Cargo Van

comes in three lengths – regular, long and long extended – and three cab heights – low, medium and high. A high-mount rearview camera is standard for all 2018 medium- and high-roof options.

- **GVWR:** Up to 10,360 lbs
- **Maximum payload:** 4,650 lbs
- **Engine:** 3.7L Ti-VCT V6 gas with 275 hp at 6,000 rpm and 260 lb-ft of torque at 4,000 rpm; 3.5L EcoBoost V6 gas with 310 hp at 5,500 rpm and 400 lb-ft of torque at 2,500; 3.2L Power Stroke I-5 Turbo Diesel with 185 hp at 3,000 rpm and 350 lb-ft at 1,500–2,500 rpm
- **Transmission:** 6-speed automatic
- **Brakes:** 4-wheel antilock disc

### CUTAWAY

#### The Transit 250, 350 and 350 Heavy Duty Cutaway, Chassis Cab

has several packages available, including ambulance prep, CNG/propane gaseous fuel-prep, interior and exterior upgrades, school activity bus and school bus prep, option to omit right-hand door and shuttle bus prep.

- **GVWR:** Up to 10,360 lbs
- **Maximum payload:** 6,020 lbs
- **Engine:** 3.7L Ti-VCT V6 gas with 275 hp at 6,000 rpm and 260 lb-ft of torque at 4,000 rpm; 3.2L Power Stroke I-5 Turbo Diesel with 185 hp at 3,000 rpm and 350 lb-ft at 1,500–2,500 rpm
- **Transmission:** 6-speed automatic
- **Brakes:** 4-wheel antilock disc

### PASSENGER

**The Transit Connect XL, XLT and Titanium Passenger Wagon** comes in passenger wagon and taxi configurations, with short and long wheelbase options.

- **Passenger seating:** 5; 7
- **GVWR:** Up to 5,280 lbs
- **Maximum payload:** 1,270 lbs
- **Engine:** 2.5L Duratec I-4 gas with 169 hp at 6,000 rpm and 171 lb-ft of torque at 4,500 rpm
- **Transmission:** 6-speed automatic
- **Brakes:** 4-wheel antilock disc

### The Transit 150, 350, and 350 Heavy-Duty Passenger Wagon

comes in three lengths — regular, long and long extended, and three roof heights — low, medium and high. A high-mount rearview camera is standard for all 2018 medium- and high-roof options.

- **Passenger seating:** 8; 10; 12; 15
- **GVWR:** Up to 10,360 lbs
- **Maximum payload:** 3,520 lbs
- **Engine:** 3.7L Ti-VCT V6 gas with 275 hp at 6,000 rpm and 260 lb-ft of torque at 4,000 rpm; 3.5L EcoBoost V6 gas with 310 hp at 5,500 rpm and 400 lb-ft of torque at 2,500; 3.2L Power Stroke I-5 Turbo Diesel with 185 hp at 3,000 rpm and 350 lb-ft at 1,500–2,500 rpm
- **Transmission:** 6-speed automatic
- **Brakes:** 4-wheel antilock disc
- **Wheelbase:** 130"; 148"

**The E-Series Cutaway, Stripped Chassis** includes the E-350 Super Duty Cutaway, E-350 Super Duty Stripped Chassis, E-450 Super Duty Cutaway and E-450 Super Duty Stripped Chassis.

The series is available with several packages, including ambulance prep, CNG/propane gaseous fuel prep, interior and exterior upgrades, activity bus and school bus prep, option to omit right-hand door, shuttle bus prep and more.

- **GVWR:** Up to 14,500 lbs
- **Maximum payload:** 9,090 lbs
- **Engine:** 6.8L EFI V10 gas with 305 hp at 4,250 rpm and 420 lb-ft of torque at 3,250 rpm; 6.2L SFI V8 FFV with 331 hp at 5,500 356 lb-ft at 4,000 rpm
- **Transmission:** 6-speed automatic
- **Brakes:** 4-wheel antilock disc

## GM Fleet

GM Fleet (gmfleet.com) offers several Chevrolet and GMC options for the 2018 van market, including cargo, cutaway and passenger vehicles.

### CARGO

**The Chevrolet Express Cargo and GMC Savana Cargo vans** offer regular and extended wheelbase options and four different engine offerings.

- **GVWR:** 8,600 lbs
- **Maximum payload:** 3,269 lbs
- **Engine:** 4.3L V6 with 276 hp at 5,200 rpm and 298 lb-ft of torque at 3,900 rpm; 2.8L Duramax Turbo-Diesel 14 with 181 hp at 3,400 rpm and 369 lb-ft of torque at 2,000 rpm; Vortec 6.0L FlexFuel V8 with 341 hp at 5,400 rpm and 373 lb-ft of torque at 4,400 rpm; Vortec 6.0L V8 SFI Gaseous CNG/LPG capable (with fuel system installation by aftermarket upfitter).
- **Transmission:** 6-speed automatic
- **Brakes:** 4-wheel antilock disc

### CUTAWAY

**The Chevrolet Express 3500 Cutaway and GMC Savana 3500 Cutaway** (regular, long and extended length options) are designed for upfitting, with ambulance, school bus and shuttle bus configuration packages available.

- **GVWR:** Up to 12,300 lbs
- **Maximum payload:** 7,271 lbs
- **Engine:** Vortec 6.0L V8 SFI with 341 hp at 5,400 rpm and 373 lb-ft of torque at 4,400 rpm; 4.3L V6 (not available on 177 wheelbase option); Vortec 6.0L FlexFuel V8 with 341 hp at 5,400 rpm and 373 lb-ft of torque at 4,400 rpm; Vortex 6.0L V8 SFI Gaseous CNG/LPG capable (with fuel system installation by aftermarket upfitter).
- **Transmission:** 6-speed automatic
- **Brakes:** 4-wheel antilock disc
- **Wheelbase:** 139"; 159"; 177" (Chevrolet)

**The Chevrolet Express 4500 Cutaway and GMC Savana 4500 Cutaway** (regular, long, extended length options) are designed for a variety of upfits ranging from utility and service to ambulance and rescue.

- **GVWR:** Up to 14,200 lbs
- **Maximum payload:** 9,169 lbs
- **Engine:** Vortec 6.0L V8 with 341 hp at 5,400 rpm and 373 lb-ft of torque at 4,400 rpm; Vortec 6.0L FlexFuel V8 with 341 hp at 5,400 rpm and 373 lb-ft of torque at 4,400 rpm; Vortex 6.0L V8 SFI Gaseous CNG/LPG capable (with fuel system installation by aftermarket upfitter).
- **Transmission:** 6-speed automatic
- **Wheelbase:** 159"; 177" (Chevrolet)
- **Brakes:** 4-wheel antilock disc

### PASSENGER

**The Chevrolet 2500 and 3500 Express Passenger Vans** come in regular and extended wheelbase options.

- **Passenger seating:** 12; 15
- **GVWR:** Up to 9,600 lbs
- **Maximum payload:** 9,400 lbs
- **Engine:** Vortec 6.0L FlexFuel V8 with 341 hp at 5,400 rpm and 373 lb-ft of torque at 4,400 rpm; 4.3L V6 with 276 hp at 5,200 rpm and 298 lb-ft of torque at 3,900 rpm; 2.8L Duramax Turbo-Diesel 14 with 181 hp at 3,400 rpm and 369 lb-ft of torque at 2,000 rpm; Vortex 6.0L V8 SFI Gaseous CNG/LPG capable (with fuel system installation by aftermarket upfitter).
- **Transmission:** 8-speed automatic
- **Brakes:** 4-wheel antilock disc

**The GMC 2500 and 3500 Savana Passenger Van** comes in regular and extended wheelbase options.

- **Passenger seating:** 12; 15
- **GVWR:** Up to 9,900 lbs
- **Maximum payload:** 9,400 lbs
- **Engine:** Vortec 6.0L FlexFuel V8 with 341 hp at 5,400 rpm and 373 lb-ft of torque at 4,400 rpm; 4.3L V6 with 276 hp at 5,200 rpm and 298 lb-ft of torque at 3,900 rpm; 2.8L Duramax Turbo-
- **Transmission:** 8-speed automatic
- **Brakes:** 4-wheel antilock disc



» GM Fleet offers several options for the 2018 van market, including the Chevrolet Express Cargo (top) and the GMC Savana Cutaway Van (bottom).

Photo courtesy of GM





## Mercedes-Benz Vans

Mercedes-Benz Vans recently released their latest generation Sprinter van model, for model year 2019, which will begin U.S. production in the second half of 2018 after the completion of a new assembly plant in North Charleston, South Carolina. The new edition will be the company's first fully connected system, featuring electric drive and individual hardware solutions for cargo space.

Mercedes-Benz Vans ([mbvans.com](http://mbvans.com)), a division of Daimler AG, manufactures the Sprinter and Metris work vans.

The current-generation 2018 Sprinter full-sized and Metris mid-sized vans now include a rearview camera standard. The Sprinter has an additional GVWR available for both cargo and cab chassis configurations, and the Metris offers a new 135" wheelbase.

» Mercedes-Benz Vans recently released their latest generation Sprinter van model, for model year 2019, which will begin U.S. production in the second half of 2018.

Photo from Mercedes-Benz

### CARGO

There are a number of options available for the Sprinter and Metris Cargo van configurations.

**The Sprinter Worker Cargo Van** has standard and high-roof options.

- **GVWR:** Up to 8,550 lbs
- **Maximum payload:** 3,501 lbs
- **Engine:** 3L 6-cyl diesel with 188 hp at 3,800 rpm and 325 lb-ft torque at 1,400 to 2,400 rpm
- **Transmission:** 5-speed automatic
- **Brakes:** 4-wheel disc
- **Wheelbase:** 144"; 170"

**The Sprinter 2500, 3500 Cargo Van** has standard and high-roof options, and well as an extended wheelbase option.

- **GVWR:** Up to 8,550 lbs
- **Maximum payload:** 3,512 lbs
- **Engine:** 3L 6-cyl diesel with 188 hp at 3,800 rpm and 325 lb-ft torque at 1,400 to 2,400 rpm
- **Transmission:** 5-speed automatic
- **Brakes:** 4-wheel disc
- **Wheelbase:** 144"; 170"

**The Sprinter 2500 Crew Van** has standard and high-roof options.

- **GVWR:** Up to 8,550 lbs
- **Maximum payload:** 3,237 lbs
- **Engine:** 3L 6-cyl diesel with 188 hp at 3,800 rpm and 325 lb-ft torque at 1,400 to 2,400 rpm
- **Transmission:** 5-speed automatic
- **Brakes:** 4-wheel disc
- **Wheelbase:** 144"; 170"

### Sprinter 3500 Cab Chassis

- **GVWR:** Up to 11,030 lbs
- **Maximum payload:** 6,389 lbs
- **Engine:** 3L 6-cylinder diesel with 188 hp at 3,800 rpm and 325 lb-ft torque at 1,400 to 2,400 rpm
- **Transmission:** 5-speed transmission
- **Wheelbase:** 144"; 170"
- **Brakes:** 4-wheel disc brake system

### Metris Worker Cargo Van

- **GVWR:** Up to 6,724 lbs
- **Maximum payload:** 2,502 lbs
- **Engine:** 2L 4-cyl gas with 208 hp at 5,500 rpm and 258 lb-ft of torque at 1,250-4,000 rpm
- **Transmission:** 5-speed transmission
- **Brakes:** 4-wheel disc

### Metris Cargo Van

- **GVWR:** Up to 6,724 lbs
- **Maximum payload:** 2,502 lbs
- **Engine:** 2L 4-cyl gas with 208 hp at 5,500 rpm and 258 lb-ft of torque at 1,250 – 4,000 rpm
- **Transmission:** 5-speed transmission
- **Brakes:** 4-wheel disc
- **Wheelbase:** 126"; 135"



» The current-generation 2018 Sprinter full-sized and Metris mid-sized vans now include a rearview camera standard.

Photo from Mercedes-Benz

### PASSENGER

Mercedes-Benz offers a number of passenger van configurations for Sprinter and Metris models.

**The Sprinter 2500 Passenger Van** has standard and high-roof options, as well as a 4x4 option.

- **GVWR:** Up to 8,550 lbs
- **Passenger seating:** Up to 12
- **Maximum payload:** 3,501 lbs
- **Engine:** 3L 6-cyl diesel with 188 hp at 3,800 rpm and 325 lb-ft torque at 1,400 to 2,400 rpm
- **Transmission:** 5-speed transmission
- **Brakes:** 4-wheel disc
- **Wheelbase:** 144"; 170"

### Metris Passenger Van

- **GVWR:** Up to 6,724 lbs
- **Passenger seating:** 5, 7, 8
- **Maximum payload:** 1,874 lbs
- **Engine:** 2L 4-cyl gas with 208 hp at 5,500 rpm and 258 lb-ft of torque at 1,250-4,000 rpm
- **Transmission:** 5-speed transmission
- **Brakes:** 4-wheel disc
- **Wheelbase:** 126"; 135"

### Metris Worker Passenger Van

- **GVWR:** Up to 6,724 lbs
- **Passenger seating:** 5, 7, 8
- **Maximum payload:** 1,874 lbs
- **Engine:** 2L 4-cyl gas with 208 hp at 5,500 rpm and 258 lb-ft of torque at 1,250 – 4,000 rpm
- **Transmission:** 5-speed transmission
- **Brakes:** 4-wheel disc
- **Wheelbase:** 126"; 135"

## Nissan

For the 2018 model year vans, including the heavy duty cargo, passenger and compact cargo vans, Nissan announced rearview monitoring will come standard.

Nissan ([nissanusa.com](http://nissanusa.com)) is Japanese manufacturer of cars, trucks and commercial vans.



» For the 2018 model year vans, including the heavy duty cargo, passenger and compact cargo vans, Nissan announced rearview monitoring will come standard.

Photo from Nissan

**The NV1500, 2500 HD and 3500 HD Cargo vans** come in standard or high-roof options.

- **GVWR:** Up to 9,901 lbs
- **Maximum payload:** 3,700 lbs
- **Engine:** 4.0L DOHC 24-valve V6 with 261 hp at 5,600 rpm and 281 lb-ft at 4,000 rpm; Endurance 5.6L DOHC 32-valve V8 with 375 hp at 5,800 rpm and 387 lb-ft of torque at 4,000 rpm
- **Transmission:** 5-speed automatic; 7-speed automatic
- **Brakes:** 14.2" front vented disc, 14.4" rear vented disc

**The NV 3500HD (S, SV and SL) Passenger vans** come in standard or high-roof options.

- **Passenger seating:** 12
- **GVWR:** Up to 9,520 lbs
- **Maximum payload:** 2,490 lbs
- **Engine:** 4.0L DOHC 24-valve V6 with 261 hp at 5,600 rpm and 281 lb-ft at 4,000 rpm; Endurance 5.6L DOHC 32-valve V8 with 375 hp at 5,800 rpm and 387 lb-ft of torque at 4,000 rpm
- **Transmission:** 5-speed automatic; 7-speed automatic
- **Brakes:** 14.2" front vented disc and 14.4" rear vented disc

**The NV200 Compact Cargo and NV200 Taxi vans** come in standard or high-roof options.

- **Passenger seating:** 12
- **GVWR:** Up to 4,772 lbs
- **Maximum payload:** 1,480 lbs
- **Engine:** 2.0L DOHC 16-valve 4-cylinder with 131 hp at 5,200 rpm and 139 torque lb-ft at 4,800 rpm
- **Transmission:** 5-speed automatic; 7-speed automatic
- **Brakes:** 11.1" front vented disc and 9" rear drum



» The ProMaster is Ram's entry vehicle into the Class 2 full-size van segment.

Photo courtesy of Ram

## Ram

**The Ram ProMaster** is Ram's entry vehicle into the Class 2 full-size van segment. Ram's full-size van has a front-wheel-drive system, reducing weight and complexity by locating all components beneath the cab. This keeps the cargo load floor height and step-in height low, which aids in vehicle stability on low-traction surfaces, like snow. Coupled with gas and EcoDiesel powertrain options, the van is customizable for commercial customers and upfitters. A rear backup camera is now standard on all models.

- **GVWR:** Up to 9,350 lbs
- **Maximum payload:** 9,400 lbs
- **Engine:** 3.6L Pentastar V6 with 280 hp at 6,400 rpm and 260 lb-ft of torque at 4,400 rpm; 3L EcoDiesel I-4 with 174 hp at 3,500 rpm and 295 lb-ft of torque at 1,400 rpm
- **Transmission:** 6-speed automatic; Dual Active Drive 6-speed automated manual
- **Brakes:** 4-wheel disc
- **Wheelbase:** 118"; 136"; 159"

The model lineup includes: **ProMaster 1500, 2500, 3500 Cargo Van** (with low-roof, high-roof and extended body options); **Promaster 3500 Chassis Cab** (with extended body options); **Promaster 3500 Chassis Cab Cutaway** (with extended frame options).

**The Ram ProMaster City** is a Class 1 compact van offering designed for the hauling or delivery of cargo. It is available in two configurations (in two different trims): the two-seat Tradesman Cargo or five-seat Passenger Wagon. The ProMaster City offers a cargo area width of 60.4", height of 51.8" and a step-in height of 21.5". A backup camera is standard on all 2018 models.

- **GVWR:** Up to 5,395 lbs
- **Maximum payload:** 1,883 lbs
- **Engine options:** 2.4L Tigershark MultiAir I-4 with 178 hp at 6,400 rpm and 174 lb-ft of torque at 3,800 rpm
- **Transmission:** 9-speed automatic
- **Brakes:** 4-wheel anti-lock front ventilated disc and rear drum

» The Ram ProMaster City is a Class 1 compact van offering designed for the hauling or delivery of cargo.

Photo courtesy of Ram



A summary of available Model Year 2018 vans to help fleets determine which vehicle is best for their specific applications.

## Conclusion

As van manufacturers continue to introduce new models, driver safety will remain a top priority, with several making rearview monitoring standard on the 2018 model year.

"At Ford, we continue to develop new driver assist technology for our vans to help our customers maximize efficiency on the job and minimize downtime," Ellenberger says. ▀



» Forward view cameras and radar sensors are two technologies used in today's vehicle safety systems.

Photo courtesy of Volvo Trucks North America

# Technology to keep your fleet safe

A look at the latest commercial vehicle safety systems.

By David Brierley, Managing Editor

[ VEHICLE TECHNOLOGY ]

The role of any vehicle safety system is to help mitigate the chance of encountering unforeseen issues while the vehicle is in operation. While vehicle safety technologies are not yet 100 percent effective, some are able to reduce collisions by up to 90 percent within fleets, according to Fred Andersky, director of customer solutions for the controls group at Bendix.

Bendix Commercial Vehicle Systems ([bendix.com](http://bendix.com)) develops and supplies active safety technologies for medium duty and heavy duty vehicles throughout North America.

"One fleet told us that one year they had 10 rear-end collisions," Andersky says. "[They] added the collision mitigation technology, and the next year they had one [collision]."

Each accident adds considerable financial burden to a fleet when costs due to injuries, deductibles, downtime and potential loss of freight are taken into consideration.

"The cost of accidents is extremely high, and trends of increased driver distraction and growing congestion on highways are only increasing the risk of an accident," says Ash Makki, product marketing manager for heavy truck and engine manufacturer Volvo Trucks North America ([volvotrucks.us](http://volvotrucks.us)). "Companies see the value of safety systems that can help professional drivers prevent an accident."

Thanks to a proven track record in accident mitigation, more fleets are considering implementing vehicle safety systems on their vehicles. In a recent *Fleet Maintenance* reader poll on braking systems, 19 percent of respondents reported that they are already using some form of collision avoidance system on vehicles, and another 9 percent are considering the adoption of these safety systems in their fleet.

## Passive and active safety systems

There are a variety of vehicle safety systems that work independently or in conjunction with one another. While most people are familiar with more common systems such as seat belts, air bags, traction control and anti-lock brakes (ABS), new technologies have emerged in the past two decades that provide more real-time information and can even take a more effective role in keeping drivers, and others around them, safe.

These safety systems must be able to detect changes in order to react and provide the driver with information. To do this, vehicle safety systems incorporate a number of sensors and cameras to monitor the vehicle. (For more details on different types of sensors, see "There's a sensor for that" sidebar on page 24.)

Vehicle safety systems fall into one of two categories: passive and active.

Most passive safety systems use visual or audible warnings to alert the driver of an impending event such as a collision, an object in the vehicle's

blind spot, low tire pressure or departure from the current lane of travel. Some use cameras mounted on the exterior of the vehicle to afford the driver a view of the front, rear or 360 degrees around the vehicle when making low-speed maneuvers, such as parking or backing up. Others, such as Lytx's DriveCam, use cameras mounted inside the cab to provide both a forward view of the road as well as a view of the driver.

Active safety systems perform largely the same role as passive safety systems, but they are also able to automatically initiate actions such as braking or steering if the driver does not respond to warnings in time. These systems can help reduce the impact of collisions or even avoid them entirely.

The different types of vehicle safety systems available for vehicle today include:

### Passive safety systems

- **Blind spot monitoring** - Uses radar sensors or machine vision to detect a vehicle in the driver's blind spot. In most cases, provides a visual warning such as a light on or near the side-view mirrors.
- **Front and rear proximity detection** - Uses ultrasonic sensors to determine how close the vehicle is to objects in front of or behind it. These systems typically use a series of audible beeps that grow faster and louder the closer the vehicle gets to the object.
- **Cameras**
  - Backup camera - Mounted on the rear of the vehicle to provide views when in reverse.
  - Front camera - Similar to the backup camera, but mounted on the front of the vehicle to provide views in low-speed situations such as parking.
  - 360-degree view - Uses cameras mounted on the front, rear and sides of the vehicle to create a 360-degree view around the entire vehicle in low-speed situations.
- **Forward monitoring** - Machine vision camera mounted inside the windshield looking forward to monitor the vehicle's behavior. When sudden or erratic vehicle maneuvers or collisions are detected, it records a short video clip and uploads it to a database for review and potential driver feedback or training. Forward monitoring cameras are also used in lane departure warning and lane keep assist.
- **Driver monitoring** - Similar to forward monitoring, but monitoring driver behavior instead. When sudden or erratic vehicle maneuvers or collisions are detected, it records a short video clip of the driver and uploads it to a database for review and potential driver feedback or training.
- **Forward collision warning** - Uses forward facing radar, LiDAR, machine vision or a combination of these to detect an impending collision. Provides audible and visual warnings to the driver.
- **Lane departure warning** - Uses machine vision to detect the vehicle's position on the road in relation to clear lane markings. Provides an audible or



» A truck, shown on a demonstration track, with its electronic stability control system turned off (above) and on (below).

Photos courtesy of Bendix



visual warning when the vehicle veers too close to the edges of the lane.

### • Tire pressure monitoring system (TPMS)

Keeping fleets on the road with vehicle safety technology

- Indirect TPMS - Detects tire pressure based on wheel rotations. This type of sensor works based on the fact that an underinflated tire will have a smaller diameter than a properly inflated tire, so it will turn slightly faster. It cannot provide actual tire pressure information, but will provide a warning when low pressure is detected in any tire.
- Direct TPMS - Uses a pressure sensor on each wheel or inside each tire to measure actual tire pressure. In some vehicles, it can provide a readout inside the cab of the pressure of each tire, and a warning if any tire is underinflated.



» Forward monitoring and driver monitoring cameras (above and right) mounted inside the cab.

Photos courtesy of Lytx

### Active safety systems

- **Electronic stability control (ESC)** - Uses measurements from the vehicle such as steering input, vehicle direction and individual wheel speed to determine if the vehicle is traveling in the direction that the driver intends. In most equipped vehicles, if ESC determines that there is a loss of control, it can reduce engine power and apply braking to individual wheels to help steer the vehicle in the direction that the driver intended.
- **Roll stability control** - Also known as active rollover protection, works similarly to ESC to determine when a vehicle is likely to turn over on its side. If the system detects excessive lateral force, caused by unreasonable speed in a turn, for example, it reduces engine power and applies braking to the appropriate wheels to avoid a rollover situation.
- **Adaptive cruise control** - Also known as autonomous cruise control (ACC), this system is active only when the driver has set the cruise control. It uses forward-facing radar, LiDAR, machine vision or a combination of these to detect when the vehicle is approaching the vehicle in front of it too quickly. It then reduces engine power or, if necessary, applies the brakes to match the front vehicle's speed.
- **Autonomous braking** - Using the same sensors as ACC, applies the brakes in ACC situations or in emergency braking situations such as when there is a vehicle, pedestrian, animal or object in the vehicle's path. It should be noted that pedestrian and animal detection is one of the newer capabilities and is not available on all vehicles equipped with autonomous braking.
- **Forward collision mitigation** - Uses autonomous braking and, on some vehicles, autonomous steering, to avoid an impending collision.



Vehicle safety systems fall into two categories: passive and active.

- **Lane keep assist** - Uses machine vision to detect the vehicle's position on the road in relation to clear lane markings. If departure from the lane of travel (without the use of turn signals) is detected, the system can steer the vehicle back into the lane.
- **Lane centering** - A more advanced version of lane keep assist, it not only keeps the vehicle from veering out of the lane, but also keeps the

vehicle centered to avoid swerving back and forth within the lane.

### Aftermarket and OE options

Some safety system manufacturers work almost exclusively with OEs to provide standard coverage from the factory.

"Safety systems developed specifically for or by an OEM are tested to the highest degree," says Volvo's Makki. "It's possible that aftermarket systems may not go through the same level of testing with each truck OEM's products."

One example, Wabco, mainly work with OEs. "Wabco's ADAS (advanced driver assist systems) technologies are factory-installed on new vehicles," says Jon Morrison, president of Wabco Americas.

Wabco (Wabco-auto.com) is a global supplier of technologies and services that improve the

safety, efficiency and connectivity of commercial vehicles.

However, fleets with older vehicles also have options. Some of these safety systems can be added on as an aftermarket addition.

Bendix, known for providing factory-installed safety systems for OEs such as Peterbilt, Kenworth, Volvo, Mack and Navistar, is working to provide more aftermarket solutions to customers whose vehicles don't have the latest technologies.

Cameras are one of the more common aftermarket safety systems, but blind spot detection, trailer roll stability, lane departure warning and tire pressure monitoring systems can be added on to the vehicle in an "aftermarket approach," says Bendix's Andersky.

Companies such as Lytx work mainly in the aftermarket, but Del Lisk, vice president of safety services at Lytx, confirms there are instances where the company also works with vehicle manufacturers for OE installation.

Lytx (lytx.com) captures and analyzes driver and vehicle data and uses patented technology to help fleets become safer and more efficient.

"We do work with several OEMs to have [vehicles] pre-wired so the installation is a very quick and easy process," Lisk says.

He goes on to say that some bus and ambulance OEs have Lytx systems already installed in vehicles when they are delivered to the customer.

Another vehicle safety system manufacturer, Rear View Safety, a manufacturer of backup camera system technologies (rearviewsafety.com), also works with OEs as well as the aftermarket.

## Maintenance and repair

Since the majority of vehicle safety systems consist of solid state electronics (requiring no moving parts), the systems themselves have relatively low maintenance requirements. They are typically built to withstand elements that any vehicle might encounter.

For example, Rear View Safety's systems "come with aircraft-grade cable connections," says James Grossbaum, director of marketing at Rear View Safety. "Almost the entire system can be run outside."

"We always say the systems kind of outlive the vehicle they're placed on, and that is usually what happens," Grossbaum continues. "Usually you install it and you're good to go."

That being said, it may not be a bad idea to give a little attention to the wiring harnesses and connections as part of the vehicle's routine maintenance process. Exposed wiring or connections could lead to corrosion. Similarly, if a wiring

harness is installed near a sharp edge, the wires can fray, leading to a poor connection.

"If there's not a good electrical connection, that's going to create a fault," says Bendix's Andersky.

General maintenance and upkeep of the vehicle will also help to keep safety systems in working order. Keeping up with brake and tire maintenance is important on any vehicle, and safety systems can only do so much to

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## There's a sensor for that

One thing that all safety systems have in common is that they rely on sensors to provide them with the raw data needed to calculate risks and alert the driver of an impending event. Here are some of those sensors and how they work.

- **Ultrasonic sensors** - Send out audio waves at a specific frequency and wait for the waves to bounce back to determine how far the vehicle is away from another object. These are most commonly used in forward and reverse proximity sensors.
- **Radar sensors** - Send out electromagnetic waves (rather than the audio waves used by ultrasonic sensors) to determine how far an object is away and how quickly it is approaching. Radar sensors are used in some blind spot detection and forward collision detection and mitigation applications.
- **LiDAR (Light Detection and Ranging)** - A more advanced form of radar, LiDAR scans the environment using a non-harmful invisible laser beam to provide a three-dimensional view of the surrounding area. When combined with camera data, LiDAR can be used to detect what type of object the vehicle is approaching (vehicle, pedestrian, etc.).
- **Cameras** - Used in some forward collision detection and mitigation applications. Also used for maneuverability at low speeds (forward, rear and 360-degree cameras), to monitor driver awareness and to record unexpected incidents.
  - » **Infrared** - Creates an image using infrared radiation instead of light like a typical camera. Used to help some vehicles "see" in the dark.
  - » **Machine vision** - Analyzes and interprets images from camera sensors to determine risks. Used in some lane keep assist, blind spot monitoring and collision detection and mitigation systems.
- **GPS** - Pinpoints the vehicle's location and speed by determining distance from global satellites.
- **Accelerometer** - Measures acceleration and deceleration in a vehicle. Used to determine sudden unexpected maneuvers or collisions.
- **Connection to vehicle CANbus** - Allows certain systems to access vehicle information such as steering, accelerator and brake input, vehicle speed, etc. Can be used to determine driver inputs during an unexpected maneuver or an accident and later used to determine the cause of the event.



» Drivers are given visual and audible warnings when the system detects an impending collision.

Photo courtesy of Volvo Trucks North America

overcome maintenance neglect in these key areas.

"If your tires are bald and your brakes are worn, the [safety] system is going to utilize these as best it can, but it's not going to work optimally," Andersky says.

He adds that it's important to keep in mind many safety systems interact with and build on each other.

"If the ABS system has a fault in it, that's going to take out the stability system," he says. "And if the stability system is not functional, the collision mitigation technology is likely not to be functional either. Keeping your ABS system, your brakes and your tires in good shape takes care of everything else."

It is also a good idea to keep cameras and radar sensors clean and free from bugs, snow, ice, mud or any other type of buildup that might interfere with normal operation.

Some systems, such as Lytx's in-cab camera systems, are self-sustaining to the point that they even keep themselves up-to-date with the latest available software.

"Upkeep largely comes from over-the-air software updates and bug fixes," says Lytx's Lisk. "They're connected by cellular. Every day they're connecting back to our servers and getting software updates, bug fixes, sending data to us, all back and forth."

He goes on to say that in the event of

a unit failure, replacement is a simple plug-and-play process.

"We'll send [the fleet] a replacement and, essentially, they just plug that in. It's just a straight swap-out," Lisk says.

While most safety systems are relatively durable, they are not completely impervious to damage from accidents. Even an event as minor as a driver pulling forward too far and hitting a parking pylon with the radar can cause the sensor to malfunction or stop working. Fortunately, in situations such as these, technicians should be able to make the repairs without special training.

But Andersky warns not to assume a sensor is faulty unless physical damage is evident.

"Don't run off and replace the radar," he says. "Check the wiring going back through the harness to see if there's a spot that's worn through or something."

In the event of a more severe collision where additional components need to be replaced, more complicated repairs such as system calibration may be required.

"If you do front end work on a vehicle equipped with a stability system, like a front end alignment, you do have to go

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back in and recalibrate the steer angle sensor," Andersky says.

Many system manufacturers, such as Bendix, offer free access to their diagnostic software and online video tutorials to help technicians complete these types of repairs.

## Looking to the future

While some of these systems may seem futuristic, technological advances are being made quickly. These systems are only the beginning of what is to come. The industry is ramping up to meet the eventual goal of fully autonomous vehicles.

However, until full autonomy transitions from a goal to a reality, drivers will continue to play a role — whether they are in complete control or simply manning a semi-autonomous vehicle. For that reason, while manufacturers work to develop systems that will enable fully autonomous driving, they are also working to enhance vehicle safety while human drivers are still in the seat.

"The technology advances we expect to see will be the building blocks to autonomous vehicles of the future," says Wabco's Morrison. "But along the way, the technologies we're developing and bringing to market are helping improve safety and fuel economy."

One advancement we may see in the not-so-distant future could be integration between truck and trailer stability control systems, according to Bendix's Andersky. In current operation, trucks send air to the trailer brakes in bursts to mimic ABS, since the truck doesn't "know" whether or not the trailer is equipped with ABS or stability control.

"The more we can connect with the trailer ... the more braking power we're going to be able to control by being able to more effectively and efficiently utilize the trailer braking system," Andersky says. "At some point we'll have a direct connection with the trailer braking system, which means we may be able to do a number of things — controlling the brakes similarly to how we control the brakes on a tractor in a stability event."

## Conclusion

Like many new technologies, vehicle safety systems are somewhat controversial. Some say these new driver aids will create "lazy" drivers who are more dangerous by allowing them to rely on automation too much. However most, if not all, of these systems are designed to increase safety and improve drivers' awareness and capabilities.

The fact remains, until technology has advanced enough to create fully autonomous vehicles, drivers will be fully or partially in control. Vehicle safety systems add a layer of protection to keep vehicles, as well as those around them, safely on the road.

With a relatively low initial cost and little required maintenance, vehicle safety systems can be a smart investment for fleets to improve safety for everyone. ■

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# Have you locked down your lockout program?

Lockout/tagout continues to represent one of the most common OSHA workplace safety violations. Here's what fleets can do to prevent their organization from becoming the next statistic.

By Gregg Wartgow, Contributing Editor

## [ SAFETY & HEALTH ]

**T**he practice of lockout/tagout (LOTO) has been around since the 1980s. The good news is that the number of injuries caused by a lack of sound LOTO procedures has dropped in recent years. The bad news is that LOTO is still No. 5 on OSHA's list of top workplace safety violations. It is critical to point out many people do not realize LOTO also applies to vehicles.

LOTO refers to the procedure of disabling machinery that is undergoing repairs or maintenance. LOTO helps prevent that machinery from accidentally starting or moving, which could seriously injure the technician performing the service. Injuries can range from lacerations and burns to electrocution and crushing. These accidents can also result in death.

The formal OSHA standard is known as The Control of Hazardous Energy (Lockout/Tagout), Title 29 Code of Federal Regulations (CFR) Part 1910.147. Hazardous energy is "stored" energy that could unexpectedly release and start up. Energy sources include electrical, mechanical, hydraulic, pneumatic, chemical and thermal.

LOTO procedures help to control hazardous energy. A designated individual must first turn off and disconnect the machinery from its energy source. Then the individual must either lock or tag the machinery to prevent any accidental startup.

Locking, if the machinery allows, provides the best level of protection. If locking isn't practical, tagging is the next best thing. A tagout device serves as a visible warning to others to not start the machinery.

### How LOTO applies to vehicle repair

OSHA first applied the concept of lockout/tagout to the auto repair industry in 2008. Directive CPL 02-00-147 added a section on vehicle hazardous energy control to the OSHA standard. The direc-

## Steps to implement a lockout/tagout program for your fleet operation

tive points out that any vehicle has the potential to contain various types of hazardous energy:

- ➔ Mechanical hazards associated with unexpected start-up
- ➔ Mechanical motions due to moving power transmission components
- ➔ Mechanical hazards with disc brake springs and tire components
- ➔ Hydraulic hazards associated with fluid pressure and loss
- ➔ Gravitational energy from elevated vehicles and lifts
- ➔ Gravitational energy from elevated truck-mounted equipment such as dump beds
- ➔ Air bag explosions
- ➔ Electric battery shock, arc or burns
- ➔ Fuel and fluid system fire or explosion
- ➔ Hot or cryogenic fluid and surface hazards
- ➔ Chemical energy (i.e. battery acid, coolants, lubricants, etc.)

Prior to servicing a vehicle, an obvious initial step is to remove the ignition key from the ignition switch. The technician should maintain sole possession of that key, perhaps placing it in his or her pocket. Doors to the vehicle could also be locked.

However, those two steps are often not enough to prevent an engine from being accidentally

started. For instance, an engine could be started if the technician shorts out the ignition circuit. Thus, disconnecting battery cables may also be necessary. Disconnecting batteries is also important when working on or around cooling fans, which can automatically start up after the ignition key has been removed.

It's a good idea to allow an engine to cool down sufficiently. Doing so will allow heat and subsequent pressure to dissipate, helping to control those forms of hazardous energy.

Depending on the type of vehicle being worked on and service being performed, technicians may need to either lower or block-up components that are held up by hydraulic pressure, such as dump beds and aerial lifts. It may also be necessary to chock or block wheels to prevent a vehicle from rolling.

Dump beds can be especially perplexing. Manufacturer-provided props often don't provide the clearance necessary to perform many under-bed repairs. This incites some technicians to create their own support braces, many of which do not provide adequate protection. OSHA says equipment managers should contact the equipment manufacturer to discuss an alternative body prop or other suitable method to perform the work.

Keep in mind that it's often necessary to re-energize a vehicle or component as part of a testing or troubleshooting process. A procedure should be developed that defines the sequence of actions necessary to accomplish the task safely.

OSHA points out that it is imperative to check with the specific vehicle manufacturer on its service guidelines. Those service guidelines can double as guidelines to help fleets develop energy control procedures in the shop.

Finally, thorough LOTO procedures must be developed for shop equipment including lifts, jacks, tire changers, wheel balancers and pneumatic (compressed air) systems. Again, procedures should be aligned with the equipment manufacturers' service guidelines.

### Tips on implementing a LOTO program

Lockout/tagout is the concern of everyone in a vehicle repair facility—especially the technicians who could be in harm's way. However, it is the employer's responsibility to develop, document, implement and enforce energy control procedures.

An employer does have the flexibility to tailor the program to his or her unique workplace. That

➔ **Continued Page 28**



» Lockout/tagout refers to the procedure of disabling machinery that is undergoing repairs or maintenance.

Photo courtesy of J.J. Keller & Associates



## Products to help implement a sound LOTO program

» Lockout Station: Lockout stations provide a convenient way to store lockout/tagout devices in one location.

Photo courtesy of Ryder Fleet Products

OSHA says approved lockout/tagout devices must satisfy certain requirements.

**Durable.** Devices must be capable of withstanding workplace conditions, maintaining functionality and legibility.



**Standardized.** Devices must be standardized according to size, shape and color, as well as format and print. Furthermore, devices must be easy for employees to understand.

» Lockout Hasp: Hasps help keep machinery inoperative during repairs by facilitating lockout.

Photo courtesy of Ryder Fleet Products

**Substantial.** Protective materials and hardware must be easily recognized and large enough to minimize the likelihood of early or accidental removal.



» Lockout Tags: Good lockout tags, made for use with padlocks, allow for writing with pens, pencils and markers. Unlike tagout devices, they do not have to meet OSHA's 50-lb unlocking-strength requirement.

Photo courtesy of Ryder Fleet Products

Several types of LOTO devices have applicability in a vehicle repair environment. Quality products are available from suppliers including J.J. Keller, Ryder Fleet Products and Grainger, to name a few. LOTO devices include padlocks, key locks, locking boxes, hasps and tags. Some products, like steering wheel covers, are specifically designed for automotive LOTO. There are also specialty lockout products designed for pneumatic systems, for example.

said, there are certain OSHA requirements that must be followed.

Use lockout devices whenever possible to hold an energy-isolating device in a safe position. An energy-isolating device is a mechanical device that prevents the release of energy. Examples include circuit breakers, disconnect switches, line valves and safety blocks. Lockout can be used when the energy-isolating device has a locking mechanism built into it, or has a hasp or other part to which a lock can be attached.

Only use tagout devices when lockout is improbable. That said, an employer could choose to implement a tagout procedure provided that full employee protection will be provided. This includes attaching a tag at the same location a lock would be attached. Furthermore, one additional safety measure must be used. Examples include fuse removal, closure of a second in-line valve, and locking or blocking a control switch.

Lockout is not only considered the best measure, but it is perhaps the easiest and most sensible to execute if given the choice.

Other OSHA requirements for energy control procedures include:

- Only use LOTO devices that are authorized for the particular machinery
- Only use LOTO devices that are durable and standardized
- Make sure LOTO devices identify the individual users
- Establish a policy that permits only the employee who applied the LOTO device to remove it
- Inspect energy control procedures at least annually
- Provide thorough training to all necessary employees.

“The essential components of a lockout/tagout program are written procedures, employee train-



» When developing a LOTO program, use lockout devices whenever possible to hold an energy-isolating device in a safe position.

Photo from iStock

ing and annual inspection of your procedures,” says Judie Smithers, J.J. Keller’s workplace safety editor. “It’s very important to make sure your training documentation remains up-to-date. OSHA wants a simple certification document that includes the names of the employee and trainer.”

Procedural deficiencies are normally identified during annual inspections.

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J.J. Keller & Associates (jjkeller.com) is a source for workplace safety, transportation, construction and human resources products and services.

It is essential that the training program help to ensure that employees understand all applicable energy sources, methods of isolating and/or controlling those energy sources and methods to verify effective energy control.

“Employee retraining may be necessary from time to time,” Smithers points out.

Examples are when a fleet identifies deficiencies in existing procedures and makes a change, or when technicians take on new tasks or begin working on new machinery, as would be the case if a new vehicle type were added to a fleet or brought in to be serviced.

Procedural deficiencies are normally identified during annual inspection.

“You have to visually observe an employee performing the lockout/tagout procedures,” Smithers explains. “Then you discuss the findings with all employees who would be following that procedure.”

### Get it in writing

As is the case with most rules and regulations, there are provisions with respect to OSHA’s hazardous energy control standard. Other things fleets may need to consider are shift/personnel changes and the use of outside contractors. A workplace is a unique environment, so an energy control program will be unique to each company’s operations.

It is important for a company’s procedures to be in writing. It is also important to note there should be several procedures documented. Individual procedures should be developed for each type of “job” a technician might do. This could result in several written LOTO procedures for a single vehicle or piece of equipment.

Minimum elements of a written energy control procedure include:

- A specific statement of the intended use of the procedures
- Specific steps for shutting down, isolating, blocking and securing vehicles and equipment

- Specific steps for the placement, removal and transfer of LOTO devices

- Specific requirements for testing a vehicle or piece of equipment to verify the effectiveness of LOTO devices and other control measures.

OSHA says a written procedure doesn’t need to be overly complicated. It just needs to be specific and thorough. OSHA offers various publications and tools to help managers develop a sound LOTO

program for their organization, including free on-site consultations.

On that note, an insurance company may also be willing to send a representative out to assess hazards in your shop. Additionally, organizations such as J.J. Keller provide consultative services.

In other words, fleets have help if needed. When it comes to something as important as LOTO, do not be afraid to ask. ■

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# The case for digital tire monitoring

Tire pressure and temperature tracking through digital tire monitoring can help reduce tire costs and increase uptime.

Tires are one of the largest expenses for commercial fleets, and many sources consider them the top maintenance cost. Like many other areas of the transportation industry, tires are benefiting from new, advanced technology that can help companies reduce downtime and save money.

One major advancement in recent years is the development of digital tire monitoring technology, which effectively eliminates the need for manual tire pressure checks.

## Why monitor tire pressure and temperature?

On average, 34 percent of fleet tires are underinflated, according to data collected by Continental. Tires typically lose up to 2 percent of their air pressure every month. Worn valve stems and temperature changes can increase the amount of pressure loss, as can nail holes and other tire damage from demanding applications such as waste hauling. According to Continental's Research and Development team, fleets should check their tire pressure at least once a week to help extend the life of their tires – but daily would be even better.

A tire that is underinflated by as little as 2 percent can exhibit irregular wear and other tire issues. A properly inflated tire experiences a 1 percent increase in fuel efficiency, 15 percent longer tread life and 20 percent longer casing life, versus a tire that is just 10 percent underinflated. According to the Technology & Maintenance Council of the American Trucking Association (ATA), improper tire inflation increases total tire-related costs by approximately \$600 to \$800 annually per tractor-trailer combination.

» The tire-mounted sensors on Continental's digital tire monitoring solutions deliver tire pressure and temperature data wirelessly to either an onboard control unit in the ContiPressureCheck system, or a reader station mounted in the fleet terminal with ContiConnect. The data can also be viewed in a third-party telematics system such as Zonar or PeopleNet.

Image courtesy of Continental



» A tire-mounted sensor is adhered to the inner liner of a tire, and delivers tire pressure and temperature data wirelessly to the vehicle or fleet terminal.

Photo courtesy of Continental

Underinflated tires are also a leading cause of tire failure on the road. When a tire is underinflated, the sidewall flexes significantly during rotation, causing it to build up heat and weaken the tire. Monitoring the tire temperature is a key metric to help warn of an impending tire blowout, which could lead to immediate costs from roadside service, time lost and late deliveries, as well as danger to the vehicle driver and others on the road.

In short, if you want to increase safety and save money on your tire program in both the short term and the long term, the key is monitoring inflation and temperature.

## Types of monitoring systems available

Why is tire inflation so hard to monitor? Well, manual pressure checks are time-consuming. Reaching the air valve of the inside dual tire can sometimes be nearly impossible. Drivers may not get paid for the time spent performing pre-trip inspections, increasing pressure to finish quickly.

Improper tire inflation increases total tire-related costs by approximately \$600 to \$800 annually per tractor-trailer combination.



### By Michelle Reinhart

HEAD OF BUSINESS DEVELOPMENT, DIGITAL SOLUTIONS, COMMERCIAL VEHICLE TIRES THE AMERICAS, CONTINENTAL

Continental Commercial Vehicle Tires ([continental-truck.com](http://continental-truck.com)) is one of the largest manufacturers of truck, bus and commercial specialty tires worldwide, developing pioneering technologies to make fleets safer, more efficient and more connected. With innovative tire technology and digital fleet solutions, Continental optimizes tire life cycle management to help companies achieve their lowest overall driving cost. Reinhart is responsible for managing Digital Solutions, which includes the ContiPressureCheck tire pressure monitoring system (TPMS), ContiConnect digital tire monitoring for fleets, telematics partnerships and intelligent tire applications.

Fortunately, there are now several types of commercial tire pressure monitoring systems (TPMS) available on the market to automatically monitor tire pressure.

In addition to measuring tire pressure, many systems measure temperature, and may also integrate with third-party telematics companies to provide data in real-time while vehicles are on the road.

Valve-mounted options are inexpensive and easy to install, but fleets may find the sensors can be damaged by curbing. In some cases, valve-mounted options could also cause tire failure if the valve stem is torn during the event. It is important to note tire temperature, one of the key measures to avoid tire blowouts, is not measured by valve-mounted systems, but rather calculated via an algorithm, which in some cases can lead to inaccurate results.

Another type of TPMS is wheel- or rim-mounted. While protected from damage caused by curbing, this type of sensor may be damaged during the tire mounting or dismounting process. In addition, the metal band attaching the sensor to the rim receives heat as the wheel turns, causing expansion and contraction of the clamp. After a period of time, the clamp may loosen and allow the sensor to spin around the rim, causing damage. In terms of measuring temperature, the sensor can be influenced by heat from the vehicle's braking system, in which case it would not deliver accurate tire temperature data.

The third type of TPMS uses a tire-mounted sensor glued to the inner liner of the tire. This sensor requires dismounting the tire in order to install the sensor, but this protects the sensor from damage and theft. Tire-mounted sensors eliminate the need for a metal clamp and delivers the most accurate temperature data.

These sensors can deliver tire pressure and temperature data wirelessly to the vehicle or the fleet terminal, either by way of an onboard control unit, or a reader station mounted in the fleet terminal, respectively. There are oftentimes

options to integrate this data into a third-party telematics system as well.

### Summary

Regardless of what type of tire monitoring solution you choose for your fleet, it can provide benefits by increasing uptime, extending the

usable life of your tires and improving safety. With this technology, tire pressure can be monitored accurately for all tires on the vehicle simultaneously, eliminating the need for manual tire pressure checks.

If your goal is to reduce roadside breakdowns and save money on your tire program, then digital tire monitoring might be just the solution. ▀



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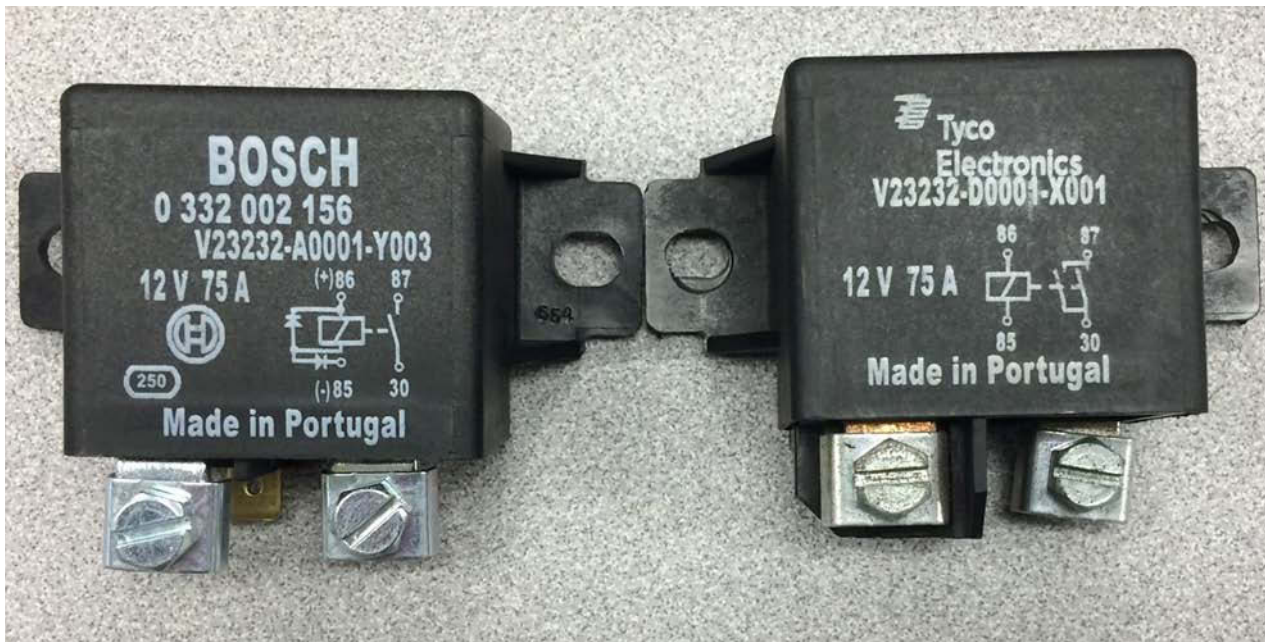
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» These relays appear to be the same, but they are not. Both will fit in both applications and will operate the circuit in the same way. The difference is one of the relays has a diode for voltage spike suppression and the other does not. It is very easy for a technician to install the incorrect relay during a repair or in troubleshooting.

Photo courtesy of K&D Technical Innovations

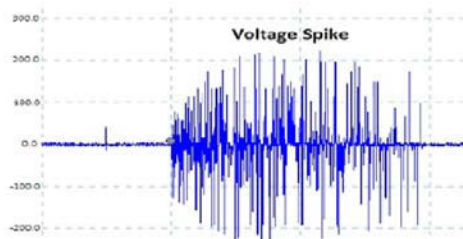
# It's not okay to "just swap relays"

Often seen as a quick fix, using the wrong relay for the application can cause inadvertent voltage spikes.

**How many times has someone just grabbed an old relay and swapped it to check to see if the one in the vehicle was bad?** Nearly all students are taught during an automotive or truck diagnostic competition to replace one with another to shorten the diagnostic time. Many technicians have a drawer full of relays in their toolbox and use them every day.

The problem is, not all relays are the same. Many relays, if installed for the wrong application, can and will cause a short (Internal Relay Circuit) and most likely cause functionality issues or even damage to the vehicle computer systems. Just because it has the same number/location of terminals, doesn't mean the relay works for that application.

Some relays, when used for the wrong application, can generate a voltage spike over 100V on a traditional 12V system.



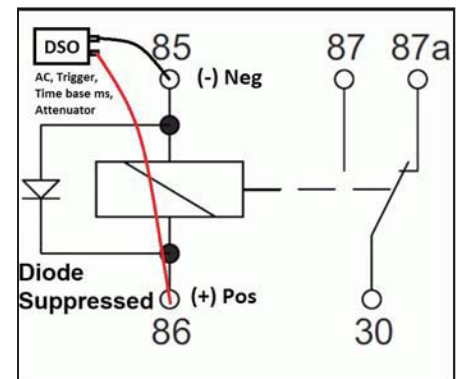
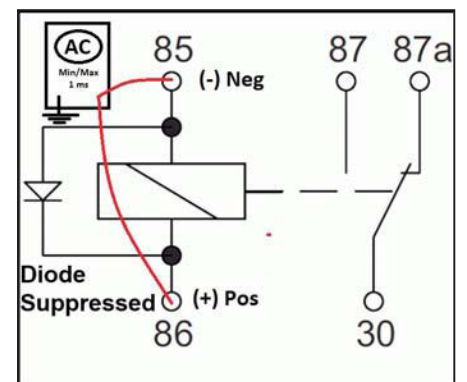
» This voltage spike was captured on an oscilloscope and, as you can see, it reached over 200V. A spike like this can damage or affect the operation of computer circuitry. If these voltage spikes are allowed to continue, computer circuitry can be damaged continually.

Image courtesy of K&D Technical Innovations

## Understand electrical circuits

Diagnosing electrical concerns can be challenging. But, with a good understanding of the electrical circuit operation and a solid troubleshooting plan, most faults can be fixed accurately the first time. Components do fail, but normally something helps or causes the failure. The challenge lies in knowing how to find these items that have a direct or indirect effect on failed parts.

In over 30 years of diagnosing, I have noticed that relays seem to be misdiagnosed, overlooked and misunderstood. Most techni-



» When setting up the DMM (top) or oscilloscope (bottom), test leads should be attached according to the diagrams shown above.

Image courtesy of K&D Technical Innovations

## Examples used to measure voltage spikes in a relay circuit

The following procedures are examples used to measure for voltage spikes in a relay circuit:

### DIGITAL MULTIMETER (DMM) (MIN/MAX)

- Set the DMM to "Min/Max" or "REC" function to capture a 1 ms recording speed on AC volts.
- Attach the test leads according to the figure below.
- Turn the relay circuit on and off while monitoring the DVOM.
- The voltages should be in the millivolts.

### OSCILLOSCOPE (ATTENUATION 10:1, 20:1, 600V PEAK)

- Set the scope to trigger function to capture a 1 ms recording on AC volts.
- Attach the test leads according to the figure below.
- Turn the relay circuit on and off while monitoring the scope.
- The voltages should be in the millivolts.



**By Keith Littleton**

OWNER, K&D TECHNICAL INNOVATIONS

K&D Technical Innovations ([kdtechnicalinnovations.com](http://kdtechnicalinnovations.com)) is a service provider offering training solutions for industry and education. Littleton specializes in CAN communication issues and lab scope diagnostics, and is the current Station Chair for TMC SuperTech's electrical test station. Littleton holds numerous ASE certifications, as well as nine Toyota certifications and 11 GM certifications.

cians have a drawer in their toolbox filled with "known good parts." Technicians will replace relays as an "easy" way to determine if a relay has failed.

The problem with "easy" is it can backfire on you. Just because a relay fits does not mean



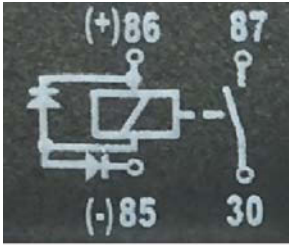


Fig. 1

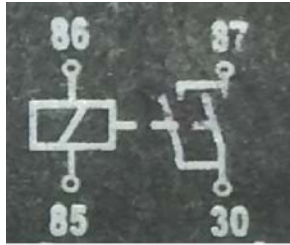


Fig. 2

» The two figures here show the internal differences of each relay. Fig. 1 has snuffing/clamping diodes for the dissipation of the voltage spike. Fig. 2 does not have diodes, so when the coil turns off (collapses), a voltage spike will occur.

Image courtesy of K&D Technical Innovations

it should be used as a known good part. I have diagnosed behind many technicians to find a trail of unintended damage to fasteners, circuitry, connector terminals and many high-dollar components.

### Determining different relays

There are notable concerns with this dangerous method of swapping relays to troubleshoot circuitry. It is important to know how to accurately test for a damaged or incorrect relay in a system. The two common types of suppressed relays (relays that have little or no voltage spike) are resistor and diode. Both types can fail and should not be interchanged.

To clarify, swapping relays is not the only item that can cause voltage spikes, but it is a shortcut practice that can lead to avoidable damage. Some circuitry/components have suppression devices inside them and others are more sensitive to voltage spikes, but if a low-voltage circuit is continually exposed to high-voltage spikes, damage will most likely occur.

Technicians that are well-trained understand it is much easier to take the time to make a few measurements to reveal the root cause instead of being misled by swapping parts that may lead you down the wrong diagnostic path. When parts are replaced and they fail repeatedly because the root cause was never found, it can increase and extend vehicle downtime.

Make sure if you are replacing with a known good part that it is the correct one. If you suspect voltage spike damage, check for incorrect components or damaged suppression circuits. ▀

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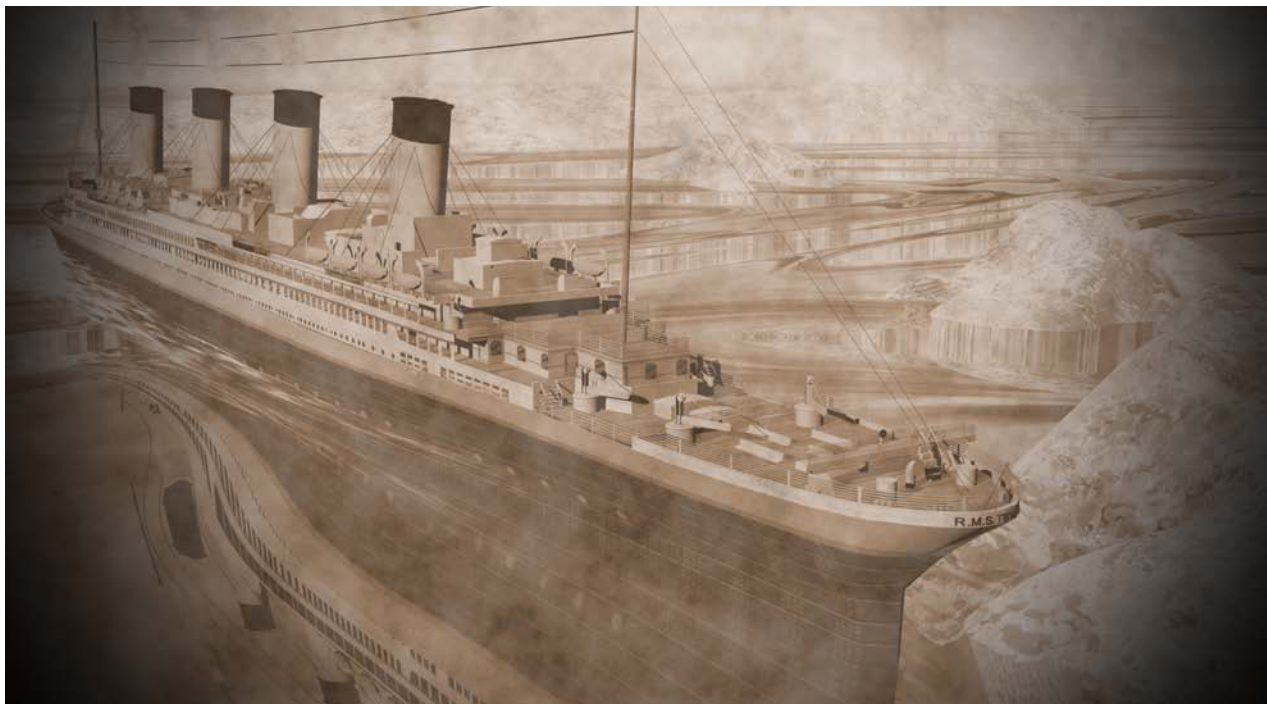


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# Addressing the “problem” paradox

Take a different approach to how you address system and process issues.

**We are trying every day to rid ourselves of problems.**

People’s imaginations always seem to be concerned with arriving at a place where our problems are solved (money, companionship, housing, health, etc.). We rarely appreciate our problems for having made us stronger. An appreciation of these problems can lead us to build more reliable systems and processes.

A problem, mistake or accident opens a door to a hidden world. That “problem” world is completely hidden when everything goes right.

## A real-world example

Let’s review a historic problem that has been extensively studied: the sinking of the RMS Titanic passenger liner, which hit an iceberg in 1912, on its maiden voyage to New York City from the U.K.

We can look at this example, even superfi-

cially, to see the hidden world. Here is a partial list of the reasons the ship sank:

- ➔ Collided with iceberg
- ➔ No bow watch, no binoculars for crow’s nest
- ➔ Rudder too small
- ➔ Improper maneuver
- ➔ Radio was run 9-5 as a concession (Western Union) and was off at the time and they didn’t hear about the icebergs. Ship’s business and safety were low priority
- ➔ Water tight compartments not water tight
- ➔ There was a bad batch of rivets

Every new investigation has uncovered more reasons why the ship sank. Just accepting this short list starts to reveal the hidden world.

First off, if there was no iceberg in the way the ship’s passengers would have happily sailed on to New York, and we would be unaware of these potential or latent defects.

The actual events tell a different story. Hundreds of other defects and potential accidents lurked on that ship.

The sinking threw a spotlight on the defects. People were enraged at the loss of life and property from a supposedly unsinkable ship. Investigations started as the facts were streaming in. Many of these issues were brought forward at inquiries on both sides of the Atlantic.

» Reviewing a problem opens up a hidden world. In the case of the infamous RMS Titanic sinking, investigations uncovered a number of reasons why the ship may have sank.

Photo from iStock

In fact, many major changes were made to the entire cruising industry that continue to this day. If you take even a short cruise nowadays, one of the first tasks to complete is a muster drill. This emergency drill, completed after passengers board the ship, provides details on emergency procedures and escape routes. This drill is completed for both the passengers and the crew. The ignorance of both groups accounted for (some of) the unnecessarily high loss of life during the sinking of the Titanic.

## Takeaways

What does this have to do with fleet maintenance? Just look at any incident, breakdown or accident. When you conduct a root cause analysis you’ll find all kinds of “causes” that had to be present for the incident to take place.

Consider an accident that happened at your facility years ago, when the world opened up. There were all kinds of factors that may have caused the issue — weather, road conditions, truck mechanical systems, maneuvering, visual acuity, reflex time, anticipation, etc. Now most of these are not easily changeable, but some, like requiring eye exams, drug testing, a CDL license and background checks, to name a few, are now standard practice. A generation of drivers are safer because of the hidden world opened up by reviewing these problems.

Apply this same analysis when confronted by unreliable equipment, low fuel efficiency, excessive time taken in the shop, fuel problems or spare parts problems.

A problem, mistake or accident opens a door to a hidden world.

## You are forced to look

Problems force you to look closely at the system, product or process. You may analyze and see a wide variety of causes. Some of these problems can be addressed at low cost. Taken together, fixing these causes can result in fewer problems in the future because the latent defects might have contributed in different ways to other problems.

The hidden world is revealed by the problem. We feel sad and upset about the loss. But when we exercise defect elimination we have an opportunity to fix these issues on all the ships currently in use and save countless lives over the next 100 years. That is the advantage of problems. ■



**By Joel Levitt**

**PRESIDENT, SPRINGFIELD RESOURCES**

Springfield Resources ([maintenancetraining.com](http://maintenancetraining.com)) is a management consulting firm that services a variety of clients on a wide range of maintenance issues. Levitt is the president of the company, and has trained more than 17,000 maintenance leaders from more than 3,000 organizations in 24 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.

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## » Offers time-release penetration

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is designed to penetrate existing rust and corrosion and also stay on metal surfaces longer than conventional greases to provide long-lasting lubrication and protection against rust and corrosion. This high-quality synthetic grease offers a time-release penetrating action and is designed for farm and

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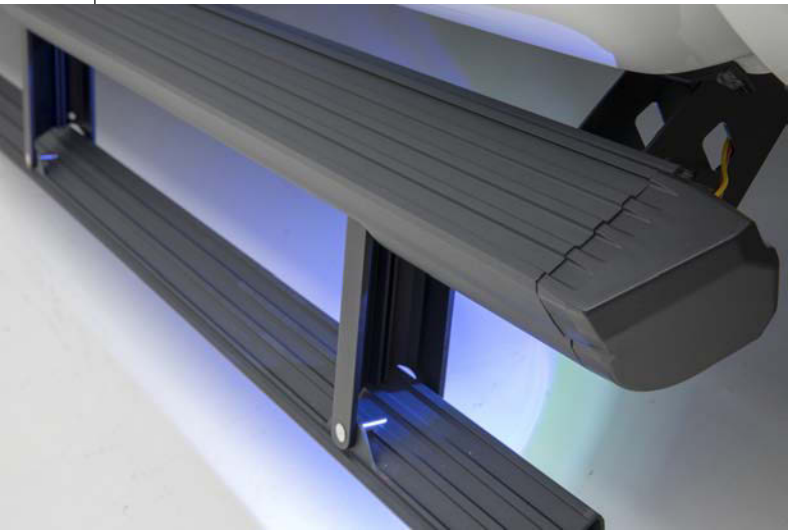


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» Step-within-a-step design



The **Aries ActionTrac Running Boards** feature an innovative step-within-a-step design for improved safety. These boards operate with integrated smart sensors that automatically deploy the power step 8" when the door opens—which is up to 15" below the doorsill,

according to the company. The ActionTrac running boards mount using pre-existing factory holes, eliminating the need for drilling and reducing installation time. These running boards are constructed from powdercoated aluminum.

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» Adheres to microscopic imperfections

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The **Steel Shield Technology Truck Shield** is designed to protect moving metal parts for trucks. Truck Shield uses Advanced Boundary Film (ABF) technology to protect moving metal parts from wear and damage, from frictional abrasion and extreme pressure. According to the company, this product can increase fuel savings and performance, and reduce maintenance costs and downtime by lowering operating temperatures to extend component life.

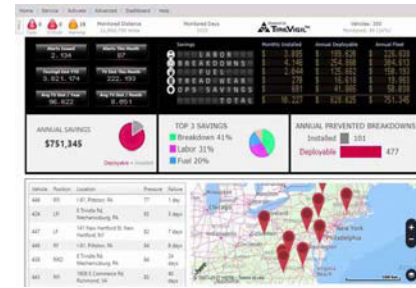


➔ For more information visit [VehicleServicePros.com/20985413](http://VehicleServicePros.com/20985413)

## » Provides a snapshot of key tire cost metrics

The **TireStamp Inc. TireVigil Savings Dashboard** provides commercial truck and bus fleets with the savings they achieve using the TireVigil Cloud tire monitoring and management solution, based on their tire performance data and costs. This dashboard complements the existing maintenance dashboard that visually summarizes a fleet's tire maintenance performance based on real-time metrics generated from data accumulated from each vehicle. The dashboard provides a snapshot of a fleet's key tire cost metrics, the annual and current month savings generated by vehicles equipped with the TireVigil Cloud solution and the projected savings attainable by deploying TireVigil throughout the entire fleet. Additional information provided includes areas where savings are being achieved, such as labor, breakdowns, fuel consumption and tread wear.

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## » Eliminates need for separate backup lamp

The **Optronics Fusion GloLight 6" Oval Multi-Function Surface-mount LED Lamps** offer a reflective safety bezel for commercial vehicles that need a higher level of conspicuity. These lamps are available with a chrome bezel, a paintable white bezel and a reflective safety bezel. The lamps come hardwired with standard female PL-3 plugs. The consolidation of lamp functions helps reduce SKUs and carrying costs, and eliminates the need for a separate backup lamp, the company says. The Fusion GloLight LED Combination lamps meet all FMVSS 108 and CMVSS 108 photometric requirements for visibility and safety. These lamps come with a one-diode lifetime warranty protection that will replace the lamp if even one diode fails.

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# TOOLS & EQUIPMENT

A roundup of the latest tool and equipment offerings.

## » Multi-directional magnetic swivel base



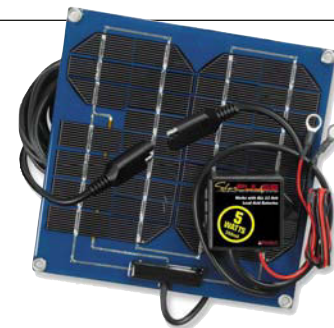
The **EZ Red XLM500 Series Extreme Magnetic Logo Worklight** emits 500 lm on high and 250 lm on low. This series of worklights includes three color choices: red, green and orange. The included multi-directional magnetic swivel base accessory adds the convenience of hands-free use. The adjustable handle helps make this light portable for any job. These worklights are micro-USB rechargeable and offer up to a six-hour run-time.

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## » Charges, maintains and desulfates

The **Pulsetech SP-5 SolarPulse Pro Charger** charges, maintains and desulfates any type of 12V lead-acid battery including AGM, flooded cell, gel cell and VRLA. It utilizes PulseTech's solar charging system combined with a patented optimized high-frequency pulsing circuit to ensure batteries start and release maximum power when needed. SP-5 provides a full 5 watts of power, features a low mounting profile and is designed to be virtually indestructible, impervious to weather and resistant to damage.

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## » Four interchangeable steel bands



The **Lumax 4-in-1 Oil Filter Wrench Set**, No. LX-1805, is a heavy duty, swivel handle oil filter wrench with four interchangeable 1" wide steel bands. The cushion grip handle is designed to provide greater comfort and better gripping force. This filter wrench set allows users to install and remove filters ranging from 2-3/8" to 4-3/8" (60mm to 110mm).

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The **Lisle 24mm Harmonic Balancer Socket**, No. 77070, is a heavy duty impact socket designed to have more than three times the standard socket mass to help direct more energy to removing bolts. This socket can be used on GM LS engines that use a 24mm hex pulley damper bolt or other 24mm applications such as Land Rover or Jaguar. The socket is heat-treated, constructed of impact-quality alloy steel and is designed to be used with a 1/2" drive.

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» Feature heavy textured surface

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[VehicleServicePros.com/10123733](http://VehicleServicePros.com/10123733)

» Features adjustable shelf rack



The **Extreme Tools RX Series Professional Hutch** are designed with built-in holes and slots in the adjustable shelf rack that allow users to organize screwdrivers, wrenches and more. The shelf edge was designed to hang accessories such as a power tool rack, media/electronics stand, socket holder and tool and can organizer. These hutches are available in 55" and 72" sizes, and include a powerstrip and USB ports.

➔ For more information visit [VehicleServicePros.com/20976578](http://VehicleServicePros.com/20976578)



» Designed to be strong and reliable

The **Channellock 171-pc Mechanic's Tool Set**, No. 39053, is designed to be a strong, reliable tool set for vehicle applications. The set includes 1/4", 3/8" and 1/2" 45 teeth ratchets; 20 1/4" sockets; 35 standard and deep 3/8" sockets; 12 1/2" sockets; two spark plug sockets; 3" extensions; a magnetic bit driver; 40 Phillips slotted torx, pozi, square and hex driver bits; 20 SAE and metric nut driver bits; 18 SAE and metric hex keys; 12 SAE and metric combo wrenches; and a magnetic parts tray. The entire set comes in a durable storage case.

➔ For more information visit [VehicleServicePros.com/20976581](http://VehicleServicePros.com/20976581)



» Helps prevent slips and falls

The **DayMark Safety Systems SafetyApplied Spill Cleanup Kit** is designed to make clean up of spills quick and easy, to help prevent slips and falls and to protect building users and cleanup workers from harmful norovirus and other diseases. This kit includes critical items and written instructions for removing spills and reducing the risk of contamination with bodily fluid incidents. The SafetyApplied Absorbent Spill Pad, which is included in the spill kit, is designed for cleaning common liquid spills in front- and back-of-house situations, and can also be purchased separately in boxes of 12.

➔ For more information visit [VehicleServicePros.com/20976824](http://VehicleServicePros.com/20976824)



» Removes R-1234yf refrigerant, even if contaminated

The **MAHLE Service Solutions ArcticPRO ROU250 recovery only unit** is designed to safely remove the mildly flammable R-1234yf refrigerant even if it is contaminated. It will also safely recover R-134a refrigerant. The ArcticPRO ROU250 features fully automatic servicing to ensure easy, time-saving and precise refrigerant recovery for vehicle air conditioning systems. It features a 1/2 hp compressor that does not require oil and comes with a limited one-year warranty.

➔ For more information visit [VehicleServicePros.com/20977225](http://VehicleServicePros.com/20977225)



» For commercial truck, bus and passenger vehicles

The **Rotary R544 Pro Truck 2D Wheel Balancer** is designed to quickly and accurately balance a wide array of commercial truck, bus and passenger vehicles. The R544 features a microprocessor with self-calibration and self-diagnostic features and specific balancing programs for static, dynamic and light alloy/aluminum wheels. The R544 can raise up to 441 lbs with the integrated wheel lift and features a pneumatic wheel lock. The digital caliper with optical scanner provides 2D automatic data input of distance and diameter up to 26".

➔ For more information visit [VehicleServicePros.com/20977722](http://VehicleServicePros.com/20977722)

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» Features 180-degree swivel handle

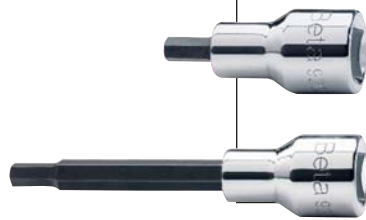
The **Clore Automotive Light-N-Carry 500 lm COB LED Worklight**, No. LNC1341, provides 300 lm output on high and 90 lm on low. The light also offers a 60 lm SMD focus beam function for pinpointing specific trouble spots. This light features multiple lighting functions, dust- and water-resistant housing and an easy-to-use micro-USB charging system. The LNC1341 offers a four-hour run-time on the high setting. The light has a 180-degree swivel handle with magnet mounting, and a hang hook to enable convenient placement in most applications. The LNC1341 includes a wall charger with a braided micro-USB charging cord, and a Repair Service Coupon. The coupon provides a low, one-time fixed fee repair after the warranty, regardless of the reason for failure.



» For more information visit [VehicleServicePros.com/20991151](http://VehicleServicePros.com/20991151)

» Bright chrome finish

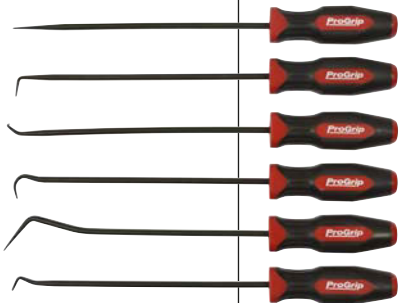
The **Beta Tools Hex Key Drivers**, No. 920PE, are 1/2" drive sockets with a bright chrome finish and working-end hex keys with a burnished finish. These are available in 3mm, 4mm, 5mm, 6mm, 7mm, 8mm, 9mm, 10mm, 12mm, 14mm, 17mm and 19mm hex key sizes. They also come in a 10-pc set (No. 920PE/C10) with a metal storage case.



» For more information visit [VehicleServicePros.com/20861113](http://VehicleServicePros.com/20861113)

» Updated non-slip handle design

The **Mayhew Tools ProGrip Hook and Pick product line** is comprised of over 30 hooks and picks and 11 sets all featuring Mayhew's non-slip ProGrip handle. The varying lengths, shapes and angle bends are designed for an array of applications. All of the tools in this line are made in the U.S.A. with an alloy steel shank and black oxide finish to deter rust. The ergonomic ProGrip handle, made of polypropylene with an over-molded thermoplastic elastomer soft grip, has two patented ribs around its neck designed for maximum transfer of torque from the hand to the tool, and a slip-free grip when pushing or prying. The rounded end rolls smoothly onto the heel of the palm, reducing friction and hand fatigue, the company says.



» For more information visit [VehicleServicePros.com/20865368](http://VehicleServicePros.com/20865368)

» Features 120V power strip

The **Cornwell Pro Series Neon Green Six-drawer Cart**, No. CTSPS600UNG, features four 4" drawers, one 6" drawer and one 8" drawer, with 120-lb ball bearing slides on each drawer, and double slides on the 6" and 8" drawers. A drawer liner kit is provided. This cart offers plastic corner bumpers on all four sides, a handle with over molded grip and a 120V power strip with USB charging capability mounted at a 45-degree angle. A cord wrap is supplied to mount on the rear of the unit for improved mobility. There are cutouts on sides for large tool storage. This tool cart is made in the U.S.A. with globally sourced components.



» For more information visit [VehicleServicePros.com/20976150](http://VehicleServicePros.com/20976150)

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» **Folds away for easy storage**

The **ATD Tools Heavy Duty Folding Aluminum Platform**, No. ATD-10325, is designed to provide users extra reach when working on trucks, vans, SUVs and RVs. This non-slip platform is 19-1/2" tall and holds up to 330 lbs. The platform is lightweight with an aluminum alloy construction and folds away for easy storage.

➔ For more information visit [VehicleServicePros.com/20977711](http://VehicleServicePros.com/20977711)



» **180 degree swing motion**

The **CRKT Daktyl Pocket Knife** is a non-traditional pocket knife with a unique 180-degree swing motion that is employed by a simple flick of a digit, according to the company. The Daktyl includes a slide-lock mechanism that allows user to slide a lever at the top the handle to reduce the chance of the knife opening unexpectedly. This blade is completely ambidextrous and rotates both to the right and the left. This knife offers a bead blasted modified wharcliffe style blade that fits snugly into the handle. The skeletal, ergonomic frame sits well in the hand, and a round hole at the base helps improve grip.

➔ For more information visit [VehicleServicePros.com/20977684](http://VehicleServicePros.com/20977684)



» **Offers three-position flexible head**

The **SP Air Reversible Flex Head Cut-Off Tool**, No. SP-7231R, offers a three-position flexible head designed to provide greater access in tight work places. The tool features a cushion grip handle, rear exhaust, safety throttle lever, built-in power regulator, graduated trigger, direct drive motor and metal guard. The tool cuts muffler clamps and hangers, sheet metal, radiator hose clamps, bumper bots and steel rods up to 3/4".

➔ For more information visit [VehicleServicePros.com/20977978](http://VehicleServicePros.com/20977978)



» **Chrome plated to resist rust**

The **GreatNeck 175-pc Mechanic's Set** from **OEMTOOLS** is a chrome vanadium set that features a selection of SAE and metric sockets, ratchets and accessories in 1/4", 3/8" and 1/2" drives. This set also includes hex keys, bit driver, assorted bits and 12 combination wrenches. The set is CR-V steel and chrome plated to resist rust. The entire set comes in a blow molded storage case.

➔ For more information visit [VehicleServicePros.com/20977577](http://VehicleServicePros.com/20977577)



» **For 2017 Ford Super Duty pick-up beds**

The **OTC External Torx PLUS Socket**, No. 5932-24, is specially designed with a reduced chamfer for immediate "lobe to bolt head" hook up. This socket is made of S2 steel and is designed to offer excellent durability. The socket can be used for the 2017 Ford Super Duty pick-up bed where a low-profile 24mm external Torx PLUS bolt head is used.

➔ For more information visit [VehicleServicePros.com/20977936](http://VehicleServicePros.com/20977936)



» **Dispenses in pints, quarts, gallons or liters**

The **Lincoln Lubrication LFC 612 Fluid Management System**, available from SKF, is designed for dispensing engine oil, transmission fluid, antifreeze and diesel exhaust fluid. The LFC 612 is easy to install and operate, with no special training required, according to the company. The system manages one fluid to 12 hose reels or two fluids to six hose reels each. Its touchscreen LCD shows the amount dispensed and has memory of the last three entries, plus quick-select quantities defined by the operator. The LFC 612 dispenses in pints, quarts, gallons or liters and operates effectively in temperatures ranging from 32 to 122 degrees F.

➔ For more information visit [VehicleServicePros.com/20977824](http://VehicleServicePros.com/20977824)

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» **Designed for all-day comfort**

The **Honeywell Uvex SVP Series Safety Eyewear** is designed to provide protection, all-day comfort and modern style at a great value. This series is available in the Uvex SVP 200, 300 and 400 line and delivers 9- or 10-base coverage and lightweight comfort. The 200 series features a low-profile frameless design; the 300 series offers a bold, full-frame look; and the 400 series offers a stylized frameless design.

➔ For more information visit [VehicleServicePros.com/20983127](http://VehicleServicePros.com/20983127)



### » Wi-Fi capabilities

The **EnviroMotive DPF Regeneration Oven** offers a newly designed baking compartment to help increase life expectancy and revised dimensions that maximize internal space. This DPF Regeneration Oven features easy-to-program controls, a fast cooling rate and Wi-Fi capabilities.

For more information visit [VehicleServicePros.com/20978111](http://VehicleServicePros.com/20978111)



### » Prevents slip-and-fall accidents

The **SpillTech Floor Grabber Absorbent Mat** is a safe-floor solution that sticks tight and flat to the floor and is designed to help facilities prevent slip-and-fall accidents. This mat features an absorbent top layer that absorbs leaks, drips and spills around machinery and captures dirt and moisture tracked in by employee and customer traffic. The adhesive back holds tightly to the floor, but can be easily pulled up for replacement or relocation, according to the company. Floor Grabber is available in rolls and pads, and can be cut to fit any space.

For more information visit [VehicleServicePros.com/20978937](http://VehicleServicePros.com/20978937)

### » Digital readouts for voltage and amperage

The **Associated Equipment Model 7136R Digital Carbon Pile Variable Load Tester** is designed to support heavy duty and fleet 6V, 8V and 12V batteries up to 2,000 CCA. The 7136R provides digital readouts for both voltage and amperage of the battery. The tester is designed with a fan-cooled high-resolution carbon pile assembly to help provide smooth operation and longer life.

For more information visit [VehicleServicePros.com/20978240](http://VehicleServicePros.com/20978240)



### » Removes particulates and soot

The **NEXIQ Technologies Aftertreatment Service Kit** is designed to remove particulates and soot from the filter in a heavy duty diesel's Diesel Oxidation Catalyst. The kit includes the following: 13" aftertreatment adapter, 6" aftertreatment adapter, retaining collar, retaining straps and blow gun assembly. The kit requires a source of compressed air, a shop vacuum with a 2.5' diameter hose and dust bag, which are not included.

For more information visit [VehicleServicePros.com/20983123](http://VehicleServicePros.com/20983123)



Flood High



Flood Low



### » Multi-fin heat sink design

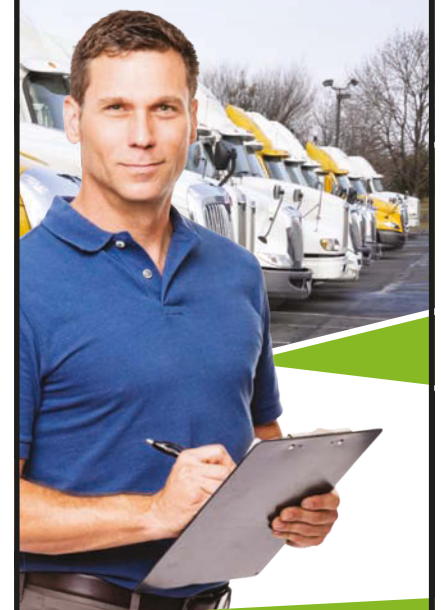
The **Bayco Nightstick Rechargeable LED Area Light Kit**, No. NSR-1514C, offers 1,000 lm of light on high and 500 lm on low with a single-sealed push-button switch. The housing is constructed from lightweight 6061-T6 aluminum, and the multi-fin heat sink design keeps the fixture cool to the touch. A heavy duty magnetic base allows the light to be attached to most surfaces, and the light is designed to swivel, allowing users to focus the beam wherever needed. This light kit includes an adjustable handle, a 6' tripod with camlock adjusters and AC and DC power supplies all placed inside a durable carrying case.

For more information visit [VehicleServicePros.com/20979334](http://VehicleServicePros.com/20979334)

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» Reinforced bottom for durability

The **Klein Tools Stand-Up Zipper Bags**, No. 55470, offer a reinforced bottom of 2520D ballistic material designed to prevent tools and parts from poking through. The stand-up bottom helps make finding tools easier, and the interior color helps tools and parts stand out. The two-pack includes a 6-1/2" tall orange bag and a 7-1/2" tall gray bag.

➔ For more information visit [VehicleServicePros.com/20982560](http://VehicleServicePros.com/20982560)



» Designed for extracting glow plug tips

The **Mueller-Kueps Glow Plugs Electrode Extraction Kit**, No. 600 300, is designed for the extraction of glow plug tips in the event of breakage or seizure inside the seat. This set includes all the tools needed to safely remove the terminal part of the glow plug electrode without damaging the cylinder head, according to the company. The tool is designed to make this a simple and quick task that saves users time by eliminating the need to disassemble the head.

➔ For more information visit [VehicleServicePros.com/20979946](http://VehicleServicePros.com/20979946)



» Anti-fog, anti-scratch lenses

The **Galeton Miter Safety Glasses** offer anti-scratch, anti-fog lenses with an ultra adjustable rubberized nose piece designed for a customized fit. The temple arms feature openings at the end for a lanyard to loop through. These glasses filter 99.9 percent of UV rays and meet ANSI Z87+. The Miter Safety Glasses are available with clear lens (No. 13202) or smoke anti-fog lens (13203).

➔ For more information visit [VehicleServicePros.com/20980557](http://VehicleServicePros.com/20980557)



» Offers flood light and spot beam

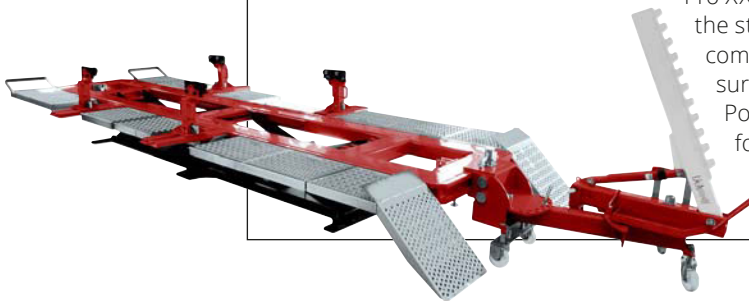
The **Coast Rechargeable HP10R LED Flashlight** offers 1,050 lm and a beam distance of up to 1,017'. The flashlight features Coast's Pure Beam Optic technology with ultra-wide flood and bulls-eye spot beams designed to produce a consistent, clear circle of light. The light includes a charging port, and the charging cable plugs into the micro-USB within the tail cap. The HP10R can run on the included lithium rechargeable battery or on standard alkaline batteries.

➔ For more information visit [VehicleServicePros.com/20982202](http://VehicleServicePros.com/20982202)

» Working heights up to 55"

The **Blackhawk Power-Pro XXL Frame Straightening Rack** is designed for lifting and straightening commercial, four-wheel drive and passenger vehicles. The Power-Pro XXL offers working heights up to 55" and the strength to lift up to 9,900 lbs. This rack is compatible with the Blackhawk Shark 3 measuring system, according to the company. The Power-Pro XXL has up to 10 tons of pulling force for all types of repairs.

➔ For more information visit [VehicleServicePros.com/20982578](http://VehicleServicePros.com/20982578)



» Require minimal maintenance

The **J.D. Neuhaus Profi TI Series Air Hoists** are designed for general purpose use. These units are easy to operate, offer low headroom, and are designed to be impervious to dust, vapor, humidity and working temperatures ranging from -20 to 70 degrees C. These hoists have fail-safe starting and overload protection. The hoists feature a low-maintenance vane motor, maintenance-free ball bearings for the chain sprocket and a patented motor-brake system designed to produce little wear. Six models are available for various carrying capacities.

➔ For more information visit [VehicleServicePros.com/20983967](http://VehicleServicePros.com/20983967)

» Universal, heavy duty puller

The **Matco Tools Heavy Duty Outer Tie Rod End Puller**, No. 7503HD, is a universal, heavy duty puller designed to remove a wide range of tie rods and ball joints from a variety of cars, trucks, SUVs and heavy duty vehicles. This puller works on FWD, RWD and 4WD import and domestic vehicles. 7503HD features a large 3/4" live center forcing screw with interchangeable tips included, cone, flat and cup for multiple applications. This tool offers a 10-ton load capacity.

➔ For more information visit [VehicleServicePros.com/20982821](http://VehicleServicePros.com/20982821)





### » Includes casters for added mobility

The **Vidmar E-Series Mobile Cabinet Line** features eight different cabinets from light and heavy duty carts to workstations designed for users who want a light duty, high-density storage option for small tools and parts. The E-Series cabinets are available in 3-, 6-, 7-, 10- and 15-drawer models, as well as open shelf cart and lift-top work surfaces. All E-Series cabinets include casters for added mobility and are available in gray or black.

For more information visit [VehicleServicePros.com/20984099](http://VehicleServicePros.com/20984099)

### » For contour cutting

The **Hazet Vibration-Damped Metal Sheers**, No. 9035N-5, is designed for contour cutting. This pneumatic tool cuts stainless steel up to 1.2mm and aluminum up to 1.6mm. The tool features speed regulation to support cutting a wide variety of materials. The Nibbler offers a 370W output, and users can regulate the speed via the rotary control on the back of the tool's handle.



For more information visit [VehicleServicePros.com/20983974](http://VehicleServicePros.com/20983974)



### » Detachable headlamps

The **Advanced Lighting Systems Headlamps** are designed to provide users a convenient light source in any work environment. The headlamps can be detached and used separately, and feature a magnetic back that can adhere to metal surfaces. The lamp's glow-in-the-dark reflector makes the lamp easy to locate in the dark. This headlamp is available in two models. The HDL121R features a wide beam angle design, and the HDL215R offers three light modes: flood, spot and arc.

For more information visit [VehicleServicePros.com/20983914](http://VehicleServicePros.com/20983914)



### » Fully adjustable wall and van bracket

The **Big Wipes Cage** offers a fully adjustable wall and van bracket that allows users to keep Big Wipes close at hand when working. The Big Wipes Cages holds any Big Wipes 80s tub and the 32-oz Big Wipes Power Spray firmly and securely, the company says. Users simply push the Big Wipes product into the adjustable bracket, tighten and the cage is ready to go.

For more information visit [VehicleServicePros.com/20987118](http://VehicleServicePros.com/20987118)

### » For heavy duty vehicles

The **Mastercool Heavy Duty Cooling System Pressure Test and Refill Kit**, No. 43306, is designed to remove the complications resulting from unreliable rubber plugs or bladders. This kit can help save set-up time and provides precise results. The kit uses shop air to uphold continual pressure to the cooling system during testing and refill. Four quick disconnect vacuum attachments provide quick refilling of the cooling system and eradicate airlocks. This kit is designed for use with Freightliner, International, Kenworth, Peterbilt, Mack, Volvo, GMC and Sterling cooling system. The kit includes heavy duty vehicle adapters, a pressure test regulator, vacuum refill attachment with tubing and a plastic case.

For more information visit [VehicleServicePros.com/20988005](http://VehicleServicePros.com/20988005)



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» **Pivoting bottom jaw for improved grip**

The **KNIPEX Tools Gripping Pliers Series** is designed to offer a heavy duty design and extensive gripping abilities. The series includes the following: 10" Universal Gripping Pliers, which feature a pivoting bottom jaw designed to automatically adjust to any workpiece; 8" Long-Nose Gripping Pliers, which feature narrow, long jaws that are 1/4" in width; and 11" Welding Gripping pliers that feature moveable jaws with clamps for sections with high ridges up to 1-1/2". All the pliers offer a heavy duty design with a release lever and one-handed operation for easy use. The pliers are made from high-strength rolled steel, and the gripping jaws are forged from chrome vanadium electric steel.

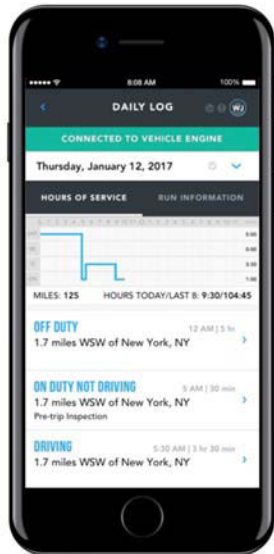
➔ For more information visit [VehicleServicePros.com/20984257](http://VehicleServicePros.com/20984257)



» **Designed to reduce smoke**

The **Bernard 300 amp Clean Air Fume Extraction MIG Gun** is designed to allow users to reduce smoke at the source with an industrial duty frame extraction gun comparable in size and weight to a regular welding gun. This gun features a black finish on all vacuum tubes and chambers. The vacuum chamber is designed to provide good joint access and visibility, and the 360 degree vacuum hose swivel helps improve flexibility and reduce operator wrist fatigue. This gun is intended for large weldment and confined space welding applications, the company says.

➔ For more information visit [VehicleServicePros.com/20984636](http://VehicleServicePros.com/20984636)



» **Meets ELD mandate**

The **Penske Driver app** is a fully integrated, custom app designed to provide truck drivers with easy Hours of Service functionality to meet the electronic logging device (ELD) mandate, and other productivity tools. The app allows drivers to locate truck stops, CNG stations, public scales and Penske service locations; access vehicle information, including a vehicle's recent service history; and digitally submit fuel receipts with a simple form and receipt photo. The Driver app is available for free download in the Apple App Store and on Google Play.

➔ For more information visit [VehicleServicePros.com/20984987](http://VehicleServicePros.com/20984987)



» **Riveted ball-bearing drawer slides**

The **Homak 30" GT Top Chest** offers high security tubular locks, heavy duty plastic embossed handles and full extension gas struts. This chest also features riveted ball-bearing drawer slides, stainless steel plated drawer pulls and a 3.2 mil Epoxy Polyester powdercoat finish. Drawer liners and a top mat are included.

➔ For more information visit [VehicleServicePros.com/20984385](http://VehicleServicePros.com/20984385)



» **Double latex dip for maximum protection**

The **212 AX360 Shield Glove**, No. AXSDG-05, are designed to keep users protected with a double layer latex dip that ensures liquids are kept away from the skin. The primary layer of texture latex helps improve grip integrity, and the secondary layer of smooth latex offers protection from liquids.

➔ For more information visit [VehicleServicePros.com/20984754](http://VehicleServicePros.com/20984754)

» **Improved touchscreen functionality**

The **Diesel Laptops DTC Solutions Update** is designed to provide customers with quick, easy-to-find repair information on diagnostic trouble codes (DTCs). The update features a new user interface, 100 new and updated modules, over 1,200 more images and an improved search engine. The update also improves touchscreen functionality, allowing users to navigate the program with common touch gestures including swipes and double-taps. This item is available as part of Diesel Laptop kits.

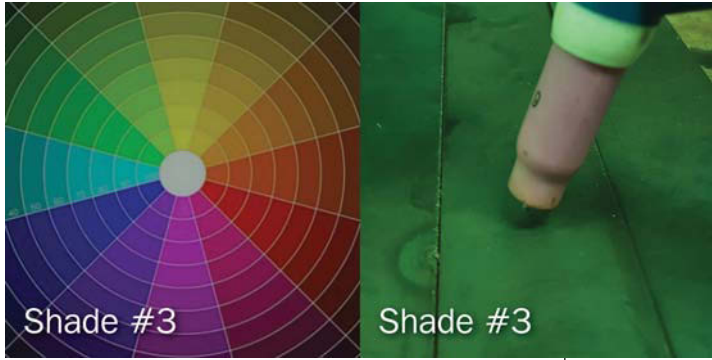
➔ For more information visit [VehicleServicePros.com/20984782](http://VehicleServicePros.com/20984782)



» **Delivers up to three ounces per minute**

The **K-Tool International 19.2V Cordless Grease Gun**, No. KT173970, delivers up to 3 oz per minute and can handle up to six grease cartridges on a single charge. This grease gun offers three loading options: bulk, 14-oz cartridge or suction fill. The tool includes two 1.5Ah lithium-ion 19.2V battery packs, a 110V AC one hour quick charger, a 30" high-pressure grease hose and quick lock coupler. The quick lock coupler is designed for one-handed operation and locks and unlocks over any conventional 1/8" NPT grease fitting so the user doesn't have to hold the coupler in place.

➔ For more information visit [VehicleServicePros.com/20986311](http://VehicleServicePros.com/20986311)



### »» Allows more colors through the lens

The **Miller Electric ClearLight Lens Technology** is designed to provide optimum clarity for welding operators to help them produce better welds with less rework. This technology was previously only available in the Miller T94 Series auto-darkening helmets, but is now available for all Miller digital helmets including Digital Infinity, Digital Elite and Digital Performance models. ClearLight is designed to enhance clarity by allowing more colors to come through the lens, providing truer colors during welding. In addition, the clarity rating of ClearLight lenses helps allow a brighter light state to help operators keep their hood down as much as possible.

➔ For more information visit [VehicleServicePros.com/20988031](http://VehicleServicePros.com/20988031)



### »» Latching drawers with PVC liners

The **Monster Seven-drawer Fully Assembled Cart** is designed with a 15.6" tall top storage compartment that provides extra space, gas struts for stability and a locking mechanism that helps keep tools secure. The drawers are latching and have PVC liners to keep tools in place. Each 5" heavy duty caster is designed for smooth mobility. The cart also features bumpers to give extra protection in case of contact with painted surfaces. This cart is available in three colors: green with black trim (No. MST3507XG), matte black (No. MST3507XMB) and textured gray (No. MST3507XTG).

➔ For more information visit [VehicleServicePros.com/20987635](http://VehicleServicePros.com/20987635)



### »» Helps remove dents in plastic and sheet metal

The **Polyvance 6450 Bumper Bag Plus** is designed to be soft and pliable to allow it to conform to the shape of the object it is pressed against. This tool absorbs the energy of the force applied to it, helping prevent further damage to the area. The Bumper Bag Plus is made from 70,000 lbs of webbing and is virtually indestructible, the company says. This bag can be used to take dents out of plastic bumpers and sheet metal, adjust the fit of adjoining sheet metal panels and to cushion a jack saddle to eliminate the risk of damage to the subframe.

➔ For more information visit [VehicleServicePros.com/20987137](http://VehicleServicePros.com/20987137)



### »» Runs on rechargeable or lithium batteries

The **Streamlight Polytac X Flashlight** offers 600 lm output and the versatility of a rechargeable battery option. This light can be powered by two 3V CR123 lithium batteries or one Streamlight rechargeable 18650 lithium ion battery. The Polytac X Flashlight offers high, medium, low and strobe power modes. When using CR123 batteries, the light offers a run-time of 2.75 to 34 hours; when using the 18650 battery, the light offers a run-time of 3.5 to 36 hours. This light features a durable case made of high-impact nylon polymer that helps provide a sure grip. The light weighs 4.34 oz, measures 5.46" and is IPX7 rated. The Polytac X Flashlight is available in black, yellow or coyote.

➔ For more information visit [VehicleServicePros.com/20988037](http://VehicleServicePros.com/20988037)



### »» Comfort and feel of a sneaker

The **Keen San Antonio Boot** offers the comfort and feel of a sneaker with the protection of a work boot. The boot features a crafted lightweight synthetic upper, Cleansport NXT lining for natural odor protection, dual-density compression molded EVA midsole and a removable custom PU footbed for additional comfort. The left and right asymmetrical aluminum toe caps are designed to provide a roomy fit, and the oil- and slip-resistant non-rubber outsole offers good surface area contact and meets ASTM F2412-11 and F2413-11 M I/75 C/75 EH safety standards. These boots are available in black/silver or gargoyle/blue opal colors.

➔ For more information visit [VehicleServicePros.com/20992908](http://VehicleServicePros.com/20992908)



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## » Bent for easy access



The **Lang Tools Prybars** feature strike-protected hard-capped handles designed for comfort, secure grip and durability. The prybars are manufactured from high carbon alloy forged steel that is heat-treated for strength and durability, and bent for ease of access. These prybars are available in 12", 17", 25", 31" and 36" sizes. Three- and five-piece kits are also available. These prybars exceed ASME standards, are made in the U.S.A. and come with a lifetime warranty.

➔ For more information visit [VehicleServicePros.com/20977467](http://VehicleServicePros.com/20977467)

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## » Removes front hubs on Dodge pickup trucks

The **Cal-Van Tools Dodge Wheel and Hub Removal Adapter**, No. 90300, is designed to remove the front hubs found on 3/4-ton (2500 series) and 1-ton (3500 series) Dodge pickup trucks. This tool helps users cut the flat rate for changing out U-joints, front differential service, ball joints and any front hub service. According to the company, on average it takes 3.4 hours to do both sides using a sledge hammer, torch or heavy duty slide hammer, and with this tool, it takes about one hour to do both sides.

➔ For more information visit [VehicleServicePros.com/20991968](http://VehicleServicePros.com/20991968)



## » Flash evaporation for quick cooling

The **Wilton Cold Front 3037 Atomized Cooling Fan** applies patented Flow Blurring technology, which uses low air pressure and water to produce micro-droplets that evaporate instantly and create cooler air covering 3,161 sq. ft. The Cold Front 3037 runs for more than 10 hours on a single fill-up of its 19-gal water tank. The single-speed cooling fan operates on standard 120V AC/60 Hz current and has independent fan and cooling controls. A dual onboard accessory outlet with GFCI protection is provided. The Cold Front 3037 measures only 4' 8" high, and is powered by a 0.5 hp, direct-drive motor that turns the 30" blade at 1,100 rpm. It generates air flow of 8,462 CFM and air velocity of 22.3 mph. Mounted on four 12" wheels with solid rubber tires, the mobile fan rolls through standard doorways and has a standard foot brake control. Made in the U.S.A.

➔ For more information visit [VehicleServicePros.com/20866843](http://VehicleServicePros.com/20866843)

## » Features floodlight and penlight

The **Maxxeon WorkStar 3000 LED Worklight**, No. MXN03000, offers a wide floodlight main beam and a narrow penlight beam on top. The flood-style beam provides a 6' beam diameter at a 4' distance from the light, and the penlight provides 150 lm and has a seven hour run-time. The light also features a rugged build, retractable hook, magnetic base, soft touch handle and battery charge status indicator. The head is adjustable 180 degrees and the LED bulb is designed to last up to 50,000 hours.

➔ For more information visit [VehicleServicePros.com/20991320](http://VehicleServicePros.com/20991320)



## » Cleans a variety of industrial fluids

The **Mahle FluidPRO CFF-1HD Multi-Fluid Filtration System** is designed to be a versatile, portable all-in-one machine that can clean a wide variety of industrial fluids in on- and off-highway applications. The CFF-1HD helps filter oil and water to minimize component wear and maximize the service life of hydraulic oil, engine oil, gear lube and transmission fluids. The closed loop filtration process helps eliminate spills and contamination while extending the life of vehicle fluids to help reduce a shop's operational costs.

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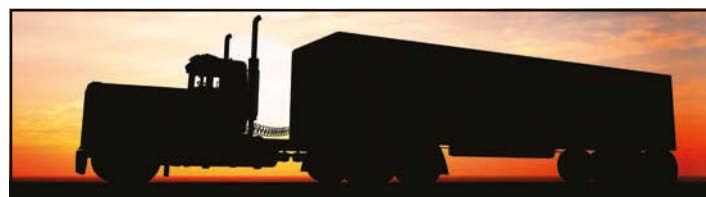
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Standard Repair Name: A PM Police Car			Current Standard Time: 1.90			
Mechanic	Number of ROs	Total Hours	Avg Hours Per RO	Percent Diff Actual vs SRT	Percent Diff vs Totals Average	
Wyatt Hiller	1	2.10	2.10	10.53%	6.60%	
Steve Magee	1	1.90	1.90	0.00%	3.55%	
Lane Holland	1	1.90	1.90	0.00%	3.55%	
<b>Totals</b>	<b>3</b>	<b>5.90</b>	<b>1.97</b>	<b>3.51%</b>		

Standard Repair Name: B-SERVICE			Current Standard Time: 2.50			
Mechanic	Number of ROs	Total Hours	Avg Hours Per RO	Percent Diff Actual vs SRT	Percent Diff vs Totals Average	
William Casselberry	2	3.25	1.63	35.00%	20.73%	
Ron Roles	8	16.92	2.11	15.42%	3.15%	
Chinh Sachs	1	2.40	2.40	4.00%	17.07%	
<b>Totals</b>	<b>11</b>	<b>22.57</b>	<b>2.05</b>	<b>17.94%</b>		

Dossier Fleet Asset Maintenance Solutions  
DSR3018.0002

» Use your CMMS to identify issues with procedures or data. Dossier's Standard Repair Times (SRT) reporting identifies technician times above/below SRT. Times well below SRT may mean tasks are being skipped.

Image courtesy of Dossier Systems

# Use your CMMS and know your costs

Don't let "what if?" become "what happened?"

Every fleet manager is looking for opportunities to improve efficiency and save money. We consider many "what-if" scenarios looking for the best return. Should we keep assets longer or replace with new? Do drivers and technicians need more training? Should we automate more, or change maintenance practices?

These, and many other such "what-ifs" require a sound approach to analyzing the best plan of action.

For example, if you're considering replacing trucks you believe are getting too expensive to maintain, have you compared their maintenance costs to new trucks? Newer units may have higher maintenance costs due to emissions equipment and other complexities. If some of the maintenance costs in your existing fleet are accident- or abuse-related, newer units won't make those costs go away.

## Poor or incomplete data leads to flawed analysis

No one wants to invest time and money in a strategy and then get a sub-standard, or even

negative, return. There's an old phrase that goes back to when businesses first started using computers: "garbage in, garbage out." In other words, the quality of reporting that you get from your system is directly related to the accuracy of the data that gets entered.

The bad data input problem is magnified if you are using two years of fleet cost data and projecting it forward; now the \$5,000 of cost captured in the wrong Vehicle Maintenance Reporting Standards (VMRS) code becomes \$10,000, and if you have 100 assets in that category, becomes \$1 million. Little mistakes can compound to create skewed results and seriously impact conclusions. So how can you apply best practices for capturing and categorizing costs on your existing assets, to make sure that the basis for your analysis is valid, as well as identifying some oft-forgotten hidden or soft costs in new scenarios?

If you have a good computerized maintenance management system (CMMS), you already have the tool that you need most. Good systems make the process of complete data capture part of normal workflow. If basic data capture is easy but being specific requires the technician to take extra time, you can be sure the extra data will seldom be there. A good example is if your system supports the full nine-digit VMRS coding for parts and labor, make sure that those functions are enabled.

## A real-world example

Your company starts servicing a new region and builds a new shop. Unfortunately, construction runs long, and startup is rushed.

**Scenario A:** Since there is very little time to get the parts room set up, parts are only coded with the top-level VMRS system code. In addition, the assistant fleet manager who was supposed to set up the Standard Repair Tasks/Times (SRTs) took another job and SRTs were never implemented. The situation you have now have is that your system captures the maintenance cost in terms of parts and labor, but only at a high level.

After running for a few years, your gut tells you that your brake repair costs and frequency seem high based on your experience, and when you run repair cost reports you see that brakes are indeed a problem. But now what? Your parts and labor data only reveals high brake costs. There are several possibilities:

- Driver abuse
- Poor quality repairs/PMs, which may be a technician training issue
- Aftermarket parts quality versus OE parts
- Incomplete/poor repair data capture

Unfortunately, trying to identify which of the above is the real issue will now require a potentially time-consuming manual review of driver, repair and parts data.

**Scenario B:** When you start up your new shop, you bite the bullet and pay the parts team to get parts coded to full nine-digit VMRS (system, assembly, component). Since you don't have the manpower to immediately define your SRTs, you set aside a few hours a week and knock them out one or two at a time, beginning with the most common repairs. It takes a while, but once finished, you have a much better benchmark in terms of repair labor by task and technician. Now when that higher-than-expected brake repair cost problem appears, you have the same possibilities; but the data you have been capturing allows you much faster identification and correction.

In the situation above, the issue turns out to be an otherwise good technician who was skipping the full caliper inspection as part of the brake service (and corroded caliper slides or pins were causing the premature pad wear). Your SRT reporting would have shown that this particular tech typically finished the job faster than others, and that would be a red flag. With bad or incomplete data, you may have incorrectly drawn a connection to a driver or drivers, and then chased the wrong solution while the real problem remained.

## Upfront investment delivers returns

Note that having this good data wouldn't create any additional data entry work for your techs, parts room or even clerks because all of the definitions had already been set up; that's the key.

The above issues could play out in hundreds of different ways in your fleet; between your assets, parts, techs, drivers, climate, etc., there are a lot of potential causes. Having solid and complete data allows you to really manage "what-ifs" with some confidence.

If you don't have a CMMS, you need one. If you do, make sure that you are using it to its fullest. ▀



### By Bob Hausler

VICE PRESIDENT, MARKETING & TECHNOLOGY,  
DOSSIER SYSTEMS

Dossier Systems ([dossier-systems.com](http://dossier-systems.com)) is an industry-leading provider of fleet maintenance software and solutions. Dossier software helps clients to increase efficiency and profitability, while also ensuring safe operation and regulatory compliance. Hausler is responsible for marketing and product development at the company, and has over 35 years of experience delivering software and services for fleet and industrial applications.

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