

# FleetMaintenance

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» *TMC SuperTech2019*

NEW PROSPECTS FOR  
**TECHNICAL  
ACHIEVEMENT**

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FOUNDATION FOR SUCCESS

**How do you  
find and keep  
technician talent?**

BEST PRACTICES FOR TECHNICIAN  
RECRUITMENT AND RETENTION

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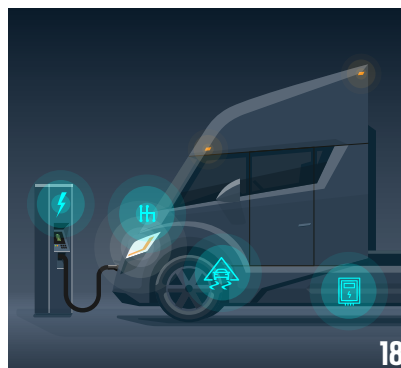
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→ **On the cover:** Photo courtesy of American Diesel Centers



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**Want to contribute?** Contact us at [editor@VehicleServicePros.com](mailto:editor@VehicleServicePros.com)



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# TECHNICAL ACHIEVEMENT

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**Step 1.1: Verify the component location.**

CY7, Variable Geometry Turbine VGT actuator (X15 CM2350)




**Step 1.2: Clean the area around the component.**

Dry with compressed air.

Detailed locations with real live images.

Step-by-Step guides for all components in the system.

**Step 4.6: Perform the initial installation procedure with the diagnostics tool.**

**1. INITIAL INSTALLATION**

**Step 4.7: Rotate the sector gear clockwise toward the turbocharger turbine housing.**

Make sure the edge of the sector gear is rotated all the way toward the hash mark on the bearing housing



**Step 4.8: Cover the teeth on the sector gear with the appropriate amount of grease.**

**Step 4.9: Make sure the O-rings are installed.**

**Step 4.10: Align the component to the bearing housing face with the lower capscrews.**

**Step 4.11: Slide the component into position.**

**Step 4.12: Install the remaining capscrews.**

**Step 4.13: Tighten the four capscrews in a crisscross pattern in two steps.**

If necessary, twist the actuator housing to align it with the mounting holes.

Variable Geometry Turbine VGT actuator

CY4, Injector, cylinder 4

CY5, Injector, cylinder 5

CY6, Injector, cylinder 6

**CY7, Variable Geometry Turbine VGT actuator**

CY8, Fuel supply pump actuator

CY9, Exhaust gases recirculation solenoid valve (EGR)

DOC, Diesel Oxidation Catalyst



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## UPTIME UPDATE

**Episode 27: Understanding the life cycle of DPFs**  
Redline Emission Products' National Sales Manager, Wayne Cochrane, provides guidance on how to tackle DPF cleaning and replacement.  
[VehicleServicePros.com/21084898](http://VehicleServicePros.com/21084898)

## GUEST BLOG



### NACV Show 2019 to highlight smart technology

The biennial North American Commercial Vehicle Show (NACV) promises to boost efficiency, operational intelligence, and productivity by addressing many maintenance and repair challenges that fleets face.  
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## ARTICLE

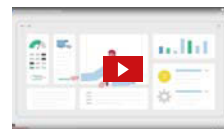
### PPG announces new paint system

The Delfleet One paint system contains a VOC level under 2.0, an average of 50 percent less than other paint systems.

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## VIDEO



The benefits of fleet management software.  
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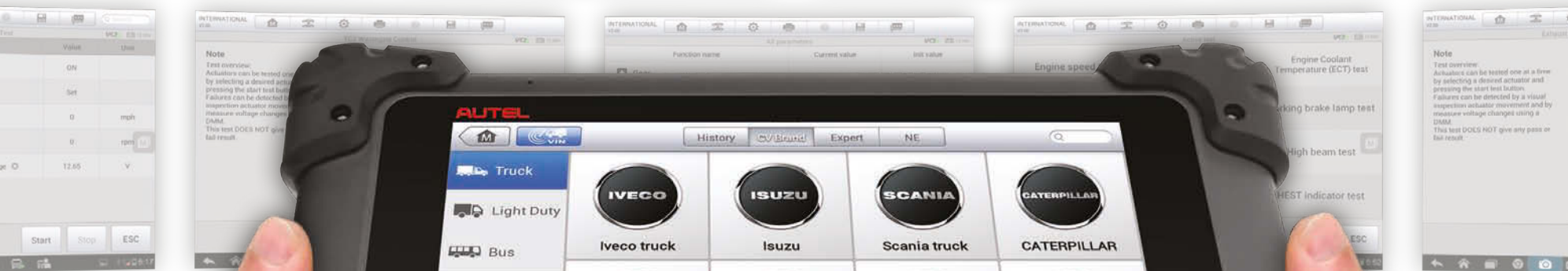
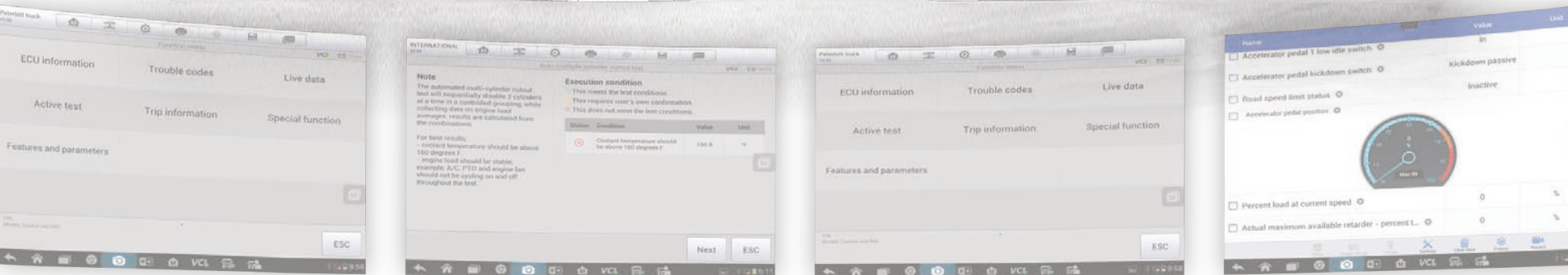
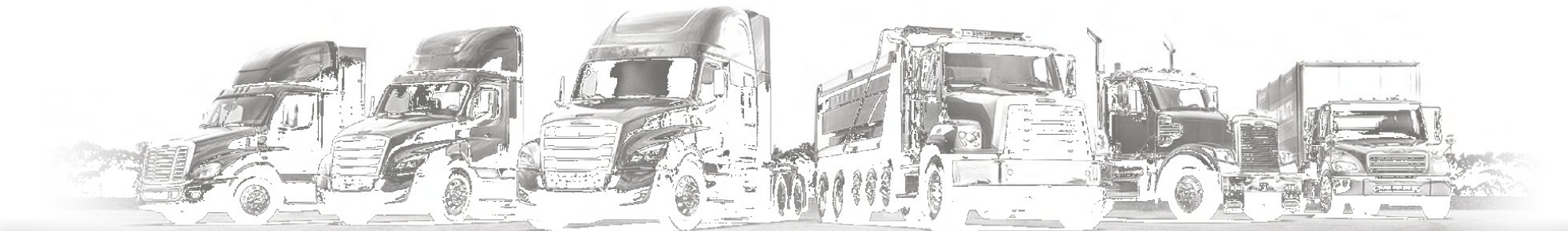
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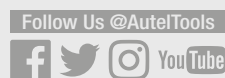
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# How you can make the most out of your shop's ROs

Standardization in the repair order process can make data collection more efficient and consistent



By Erica Schueller  
Editor-in-chief



@FM\_Editor



**Fleets today are faced with the challenge** of figuring out what to do with all the data they collect. It's certainly not the lack of data, but more so what to do with it.

Start the process by keeping it simple: look at the overall productivity picture of the shop.

A maintenance shop's productivity is measured in hours worked. Is your shop making the most out of these hours? An evaluation of your current repair processes can help assess current performance to set a benchmark and can help improve shop efficiency.

The Truckload Carriers Association (TCA) recently held a forum to provide fleet maintenance personnel insight into best practices for maintenance workflow through a seminar titled Maintenance Workflow Best Practices, which is part of the TCA Profitability Program (TPP). TPP events are designed to provide best practices for fleets in any number of departments within the fleet operation, such as maintenance, safety, finance, and more.

TCA Managing Director Jack Porter led this particular program for attendees, sharing insights from his time as a consultant for both dealers and independent fleets.

He suggested a review of the current repair order process and a method for creating and monitoring consistent standard repairs.

## Best practices for the repair order process

Productivity is measured by the number of hours paid, compared to the number of hours put into a job. To do this, compare shop hours versus repair order (RO) hours. Porter shared insights on how fleets can improve and optimize the RO order process in the shop.



### Start at the front desk

The RO should be started on the system at the front desk, Porter says. He also stressed the importance of capturing a signature at the time the RO is created – either digitally or manually. If something happens to that truck and you don't have a signature, you could face a lawsuit, Porter advises.

### VMRS Use standard coding

The only way to review historical data and benchmark your operations is through standardization. Be sure that jobs are coded to standard repair times (SRTs)

and with the vehicle maintenance recording standards (VMRS) established by the American Trucking Associations' (ATA) Technology & Maintenance Council (TMC).

Nearly all attendees at the seminar recorded VMRS codes in some form, though it was up for debate how detailed each operation went. Recording only the three-digit code will provide a more high-level view. This represents the vehicle system. Many shops will record the six-digit code, which includes both the vehicle system and the component. The most detailed fleets record the full nine-digit code, which includes the vehicle system, component, and area of the component. It is important to note that you can always get less detailed, but if you're not recording the data in the first place, you cannot get more granular.



### Include PM details

When recording information on the RO, be sure to also include preventive maintenance (PM) inspection details. This process can be expedited with electronic recording systems, versus pen and paper. One reason is, job codes can also be pre-loaded with the parts necessary for that job depending on your maintenance software system.



### Appoint a service coordinator

Another important aspect to consider is communication between the driver and the maintenance department, to gather additional information about the truck's performance and potential issues. For consistency, have one point-person – such as a service coordinator – code every job.

Another suggestion that came from this discussion was issuing internal service bulletins on chronic repairs, especially when there are similar issues showing up in the same trucks. Alert your entire team about these issues, providing a workflow and parts necessary to fix the issue. This can also help your fleet watch for trends, and what parts are needed, helping to prepare for an influx of issues with similar truck models.

## Figure out the top standard repairs

As it relates to standardization, consider build-

With any change, always consider employee buy-in.

ing your standard repair times (SRTs) internally. Porter detailed that dealers often have a number of SRTs in place to quickly record the length of time a repair will take.

Creating SRTs benefit shops in two primary ways:

- SRTs give technicians an estimated amount of time for how long a job will take. Keep in mind, newer technicians will take longer. Seasoned technicians may be more efficient and take less time. Some shops also incentivize technicians for having a completed labor time under the SRTs they've completed.
- SRTs let operations know how long you'll need that vehicle to be out of service to complete the work.

To establish a list of SRTs, start with the top jobs completed by your technicians on a regular basis. Porter suggested the top 30 repairs to start. You can create a baseline by asking technicians how long they believe it takes to complete certain jobs. Examples include the time it takes to complete PMs, wheel seal installs, brake jobs, etc.

Expanding on the SRTs, consider building out a standardized repair that not only includes the estimated time it should take a technician to complete the service, but also a parts list for that repair. This can help the technician no longer search for each part and plan ahead before getting into the service.

Communication and transparency with technicians are important. Be sure to get their feedback to ensure the SRTs make sense. If you change the SRTs, be sure to communicate changes with the technicians.

With any change, always consider employee buy-in. Change must come from the top down in order for the implementation of new processes to be successful. ▀

*Does your shop track top standard repairs? What tips can you offer others when it comes to improving the RO process? I welcome your insights. Feel free to share your thoughts at erica@vehicleservicepros.com.*



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# FOUNDATION

## *How do you find and keep technician talent?*

Best practices for entry-level technician recruitment and retention.

By Erica Schueller

### [ EMPLOYEES & HIRING ]

**A** recent study conducted by the ASE Education Foundation found that just under half of the graduates surveyed for the 2018-2019 ASE Career Survey left the industry within two years of completing the program.

“That is not sustainable,” says Kyle Holt, President at SP/2, an online training, career services, and apprenticeship provider resource for the vehicle service industry. “We graduate a large number of technicians

➔ Continued Page 12

# FOR SUCCESS



» As an organization looking to hire top talent, fleets must be prepared to provide potential hires a list of benefits as to why the technician should work for them.

Photo courtesy of Duncan Polytech

every year from high school and post-secondary programs... in what universe will we possibly be able to take a bite out of the technician shortage? We've got to do a better job of keeping them in the industry when they get there."

This issue becomes more critical when reviewing the number of technicians required to fill current job openings compared to the number of graduates entering the industry currently.

"U.S. schools are producing about 5,000 techs a year," says Tim Spurlock, president and co-founder of American Diesel Training Centers, which offers an accelerated training program for entry-level diesel technicians. "The industry needs about 30,000 to 45,000 [technicians] this year, and that number is growing." He estimates 12 percent industry growth, which will continue to compound the situation.

The challenge is two-fold: individual shops need to figure out how to hire and retain qualified technicians, and – for long-term sustainability and viability – the industry needs to work together to recruit and retain this talent.

These concerns can be addressed by evaluating current operations' hiring practices, improving upon assessing qualified candidates, establishing a thorough training program for new hires, and understanding the perspective and drive of the next generation of technicians entering the workforce.

### Create a sustainable pipeline

George Arrants, a training consultant specializing in ASE and NATEF accreditation, believes the industry must work together in order to advocate for the proper training of incoming technicians. This starts by forming lasting partnerships between local businesses and educators in order to establish industry needs.

"We first need to make sure the schools that are teaching students for our industry are teaching the skills that are important to our industry and not what educators believe we need," he says.

To begin this process, consider a partnership with a local educational facility that offers a vehicle service training curriculum. Work with local educational facilities and community members to establish a relationship.

"The best successes I have seen have come when businesses engage with local schools to 'grow their own' technicians," says Greg Settle, director – national initiatives for TechForce Foundation.

TechForce Foundation is a nonprofit 501(c)(3) organization with the mission to assist students through their technical education and into careers as professional technicians.

He says the approach for this is two-fold: establish and maintain a relationship with local educational facilities, and create internship programs.

Relationships can start through an introduction between the shop staff and the instructors, followed by a company representative participating on the school's diesel or automotive service advisory board, Settle says. To foster that relationship, consider ways to give back to the school through



» Students at Duncan Polytechnical High School in Fresno, California, choose their technical training path in ninth grade, says Heavy Truck Instructor Eric Rubio.

Photo courtesy of Duncan Polytech

To retain talent, it is critical to establish a clear and detailed onboarding process and training program for new hires.

donating time, parts, tools, or other training opportunities for students. Participation in career fairs or inviting students to tour a fleet's facility can also connect educators to local businesses.

As that relationship evolves between the business and school, fleets can establish paid internship or apprenticeship programs, where students receive hands-on training at a service facility.

"By doing this, they engage the students while they are still in school and start building a relationship with them and get to know them," Settle explains. "The students also get to know the organization and gain a sense of belonging."

Local engagement is key to being a resource for educators and for appealing to graduating students who are looking for entry-level positions within the industry.

"If you are working with a school, and the instructor[s] there know you and have a relationship with you, and the students know you, then your organization will have an upper hand in attracting those students upon graduation," Settle says.

One example of this can be found in Fresno, California, where a number of vehicle service businesses and suppliers worked together with a group of educators from the Fresno Unified School District to create a curriculum focused on the needs of the industry.

"The goal of our Heavy Truck Program is to create viable entry-level technicians to support the local trucking industry and also give the students trade skills that translate to a livable wage, therefore putting a stop to the cycle of poverty their families might be encountering," explains Eric Rubio, heavy truck instructor for Duncan Polytechnical High School. Located in

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Fresno, California, Duncan Polytech is a magnet school offering technical education to provide career pathways for students.

Students at Duncan Polytechnical High School choose their path in ninth grade, Rubio says. Students who select the Heavy Truck Program will receive continual instruction throughout their four years at the school. The program includes hands-on training, technical and safety certification, and first-hand jobsite training and apprenticeship programs with local trucking service businesses. Students who graduate have already been successfully hired at local truck dealerships, and have decided to continue education through community college, Rubio confirms.

When it comes to attracting entry-level technicians into vehicle service and repair, Holt advises the heavy duty truck industry has fared better than the automotive or collision repair segments. He says there are two primary reasons for this: diesel technicians tend to be compensated a higher hourly rate (about \$18 to \$22 per hour, compared to about \$10 to \$12 per hour for automotive or collision technicians), and many fleet service facilities will provide more of the tools and equipment necessary for working on the vehicles in the shop.

While diesel technicians may have an advantage over other vehicle service technicians – such as aviation and energy companies – still look to recruit from the vehicle service technician pool, according to SP/2's Holt. This adds to the continued decline of available new-hire candidates entering the vehicle service industry.

Spurlock's American Diesel Training Centers take an accelerated approach when it comes to training technicians. He says this helps to alleviate two major barriers of entering the industry: time and money.

A traditional technical program to become a diesel technician takes two years of full-time training, in addition to paying several thousand dollars for tuition. American Diesel Centers offers 300-hour, 12-week programs that can provide students a base knowledge of vehicle service and repair, with the expectation that companies who hire these employees will continue to focus on developing skills and setting a path for success.

Spurlock stresses that employers must become fully invested in the development and progress of their employees to address the challenges of employees jumping from shop to shop for incremental raises.

"That all funnels back to the challenges with student loan debt," Spurlock explains. "Because these folks come out of a [traditional technical] program with a student loan debt, it immediately becomes that company's problem ... because on day one, your typical starting salary – and it doesn't matter if you [attended] UTI, Lincoln Tec, or our program – is probably going to be between \$17 and \$20 an hour. If you're trying to service a loan, make a car payment, make an apartment payment, buy groceries, take care of a kid, do all that kind of stuff, you can't blame them. They need to make as much money as they can, which is why the whole phenomenon of stealing techs from each other for an extra dollar an hour is out there, and it just doesn't work."

Spurlock adds that this approach of poaching

## Tips for interview success

### Prepare for talking with potential new hires.

#### Finding qualified candidates to fill a technician position is just the first step.

Conducting phone and in-person interviews can provide details and additional insight into the candidate's attitude and experience. There are some guidelines employers should consider when preparing and conducting these question-and-answer sessions.

#### DON'T CROSS A LINE

Before starting the interview process, know the questions you can and cannot ask. Asking personal questions can put the employer at risk of litigation if the candidate can prove they were discriminated against during the hiring process.

"Do not ask inappropriate, illegal questions in an interview," says Kyle Holt, president, SP/2. SP/2 provides training courses for both potential employees and employers on proper interviewing techniques and best practices.

"We don't necessarily say, 'Oh, here's some very creative questions to ask,' we're far more concerned with making sure that companies are doing things the right way and not putting themselves

technician talent from different shops will ultimately be detrimental to the industry as a whole. Instead, the industry must focus on creating a sustainable "pipeline" of qualified, entry-level candidates, he says.

### Recruitment through resume reviews

Aside from working with local educational facilities, fleets can access online hubs with access to resumes for qualified service technicians seeking employment. These organizations – such as Find A Wrench and SP/2 – offer employers a means to search for candidates based on search criteria including keywords and geographic location.

"What we've done is we have systematized [resume design] so every single resume is laid out exactly the same to make it as easy as possible for businesses to go through and look at those resumes," says SP/2's Holt.

in a situation where they can be sued for discrimination," Holt explains.

Questions employers should NOT ask include any personal information, such as location of residence, marital status, number of children, religion, or age.

#### GIVE AND TAKE

Greg Settle, director – national initiatives for TechForce Foundation says it is important to actively listen to an interviewee's responses and try not to interrupt.

"Remember that the goal in an interview is to learn as much about the candidate as you can," Settle says. "Therefore, resist the temptation to do most or all of the talking. While you are talking, you can't be listening and therefore learning about the candidate."

As part of listening, be sure to engage with the candidate by asking follow-up questions if necessary. "Don't be afraid to probe deeper into a specific issue," Settle says. "You may learn more in 'going deep' with a couple of questions than staying at the surface level with five or six questions."

Settle also suggests asking for further details, or an example, if an interviewer finds a response to a question too general or vague.

"If someone is giving you a general statement in response to a

question, say 'Can you give me an example of that?'" he suggests. "If they cannot provide any real-world examples from their own experience, then I would not give much credence to what they are telling you."

In addition, get more details on gaps in employment and an explanation for leaving previous employers, especially if they have switched jobs often.

"It will help you get a feeling for whether there were valid reasons for them to move on, or if you may be dealing with someone who is never happy at a job and is always looking for 'greener grass,'" Settle says.

#### SHARE COMPANY DETAILS

In addition to determining the qualifications of a potential employee, at some point during the interview process, be sure to share details about the organization. Settle suggests sharing information about company culture in a second interview.

"A second interview is a good time to focus more on how the candidate fits into your organization, once you have determined in the first interview that you would like to consider hiring that person," he says. "That is the time to delve into your culture, talk about what the expectations are for employees, and what the key drivers are for your organization."

"We don't let just any technician build their resumes and post that to careers, only students who are enrolled in a career tech program can create their resumes," he adds.

Holt suggests that formatting, spelling, and grammar errors should not necessarily disqualify a potential candidate. More important than the layout is the information on the page and gauging the candidate's interest in the industry.

"You're going to have misspellings, you're going to have poor grammar, you're going to have typos, you're going to have lack of capitalization," Holt says. "That doesn't mean that they're not a good technician. What it really comes down to is, does it seem like they are clearly communicating to you an interest in the industry?"

"Rather than making a complete judgment on a resume alone, I'd encourage management to sit down and have a conversation with the individual," says Find A Wrench CEO Jay Goninen. Find A Wrench maintains an extensive job board for shops and technicians, and offers fleets options for



» American Diesel Training Centers offers 300-hour, 12-week technician training programs that can provide students a base knowledge of vehicle service and repair.

Photo courtesy of American Diesel Training Centers

various technician recruitment programs.

“Get to know what drives them, get a feel for what kind of attitude they have and dive into the technical side,” Goninen says. “Lots of times, good technicians feel most comfortable talking about how they fix things. Having them tell you stories about what they’ve repaired in the past can be a really effective tool. If you’re listening, you’ll be able to pick out pieces of their story that can help you understand their level of expertise.”

“But I think we, in general, would say we look for those intangibles,” adds American Diesel Training Centers’ Spurlock. “[Look at] the attitude and the aptitude over what they have on a resume.”

## Get on the same page

First and foremost, make it easy to apply for the job. Include a “careers” section on the company website, accurate details on the job requirements, location, and benefits, and provide a clear direction on how to submit an application. A cumbersome online application can quickly deter a potential employee from completing the necessary forms.

Oftentimes, the human resources department that is vetting potential hires may overlook a number of qualified candidates. This can happen due to a misrepresentation of the job posting created by the corporate office or human resources department, compared to the actual needs of the service department. It is critical that fleets establish consistency and common goals between all departments within the organization for the resume review, interview, and hiring process.

“Job descriptions, experience level, credentials, and other things that are configured in the electronic application and what is actually needed by the shop/service manager may be two different people,” says Arrants.

Also consider the consistency between expect-

tations established by management and by technicians. Find A Wrench’s Goninen says that the industry has come a long way with creating a professional image of the service technician, but there is still some work to be done in order to help improve this image.

“We can preach professionalism all day long, but it won’t matter until we get total buy-in from techs,” says Goninen. “There are a really high number of what I would consider professional techs that take a great deal of pride in what they do. I also think there are still a good percentage of technicians who are wary of management, and I’m not sure they trust that the shop owner/manager has their best interests in mind.”

Communication between the manager and technicians to establish wants, needs, and expectations is key to addressing this issue and to help build trust between both sides.

“Many of the organizations that we struggle recruiting quality technicians for have a different perception of their reputation than what the outside world is seeing,” says Goninen. This may require management to complete a detailed assessment of the benefits, working conditions, and company culture.

“We really want you to put your ear to the ground and hear what people are really saying and thinking about you,” he adds. “It could be drastically different than you think,” he adds.

## Focus on the soft skills

So, what does an ideal new hire look like? The answer is across the board, dependent on the needs of the organization. Technical know-how can be trained on the job, whereas the interpersonal, or “soft skills,” of a candidate are more often inherent.

Examples of soft skills include being dependable, punctual, respectful, and presentable, and representing themselves and the company professionally.

“Don’t call in sick or with excuses frequently, stay off your cell phone, be well-groomed, have a little humility as you are learning, and be respect-

ful of others,” says TechForce Foundation’s Settle. “In this day and age, many businesses would be very happy to just get a new employee who meets those requirements.”

“According to my personal advisory board for my program, soft skills are valued more than technical expertise in the majority of situations when it comes to entry-level technicians,” adds Duncan Polytech’s Rubio. “Traits like timeliness, integrity, [and] having a good attitude along with a great aptitude are invaluable to prospective employers. I have been told numerous times that employers would rather employ a technician with a growth mindset, a great attitude, and the willingness to learn over a technician that may have experience but poor work ethic.”

When it comes to assessing technical abilities, Settle advises that basic technical skills are really all that’s needed. The rest can be trained on the job based on the responsibilities of that employee.

## Conduct the interviews

There are two primary areas employers should keep in mind when conducting interviews: determine cultural fit and assess technical abilities as it relates to the position. In other words, does the potential employee have the right attitude and personality, and will they know how to complete the assigned tasks?

“If companies did more benchmarking of their current technicians and used that as a guide for all potential candidates, that may assist in finding those who could fit that shop environment,” Arrants says.

Arrants suggests that other employees who will be directly supervising or working with the potential hires be part of the interview process. This may help to determine if the candidates would be a qualified fit for the job requirements and the culture.

“The interviews should be conducted by other technicians and/or people they are going to need to work with, instead of an individual or group that asks the same questions [for every interview] and may never have direct contact with that hire after the interview,” he says.

Find A Wrench’s Goninen proposes shops continue recruitment efforts even at full capacity. This can help to ensure a pool of qualified candidates in the event an employee leaves, and it can help keep interviewing skills sharp. He suggests setting a goal of at least one interview per month.

“As competitive as the market for technicians is, I feel like you’re always just a day or two away from being ‘a tech short,’” Goninen says. “If you can change your mindset to truly focus on continuous recruitment, you will automatically have a leg up [compared to most other shops]. Do the recruiting when your shop is full, and I can guarantee you will make less hiring mistakes.”

American Diesel Training Centers’ Spurlock suggests adding an additional component to the interview process, by having prospective employees audition for the job. Allow them to spend a few days in the shop to showcase their skills to determine their knowledge and abilities.

“Some of the best shops that we work for they’ll say, ‘Look, you’re hired today. I like you. You have some experience, but you’re essentially going to audition for the job. I want you to come in, and I



» Participation in career fairs can connect educators to local businesses.

Photo courtesy of TechForce Foundation

## Best practices for onboarding new employees

### Steps for the first day, and first month, of a new hire's training.

The failure to integrate a proper onboarding process is one of the most common mistakes that employers make, as well as being one of the most detrimental to retention. The onboarding process sets the stage for success for a new employee, giving them confidence in what is always a stressful situation. Onboarding should always begin immediately with a "Day One" orientation.

Some best practices in orientation are:

- Arrange for the employee to meet the owner or general manager. This ensures the owner meets each new employee when they first start and gives the new employee the feeling they are valued as a member of the organization.
- Introduce the new hire to a contact in human resources so they know who to go to with questions on payroll, vacation, and other related issues.
- Assign them a "buddy" or mentor whom they can go to for answers to questions that may arise. Do a personal "walk around" the workplace, introducing them to their co-workers.
- Ensure that they have a written job description and sit down and review that job description with them.
- Your organization should already have an Employee Handbook in place. If not, this is a good reminder that you should have one. Speak to your HR department about developing one if you don't already have it. They are very useful in answering frequently asked questions and ensuring company policies are fully understood.

Having a comprehensive day-one orientation starts a new employee off on the right foot and helps set them up for success, but you also need a 30-day check-in to ensure things are on-track for them. Some best practices for that check-in are:

- Speak with their assigned "buddy" or mentor and see what they have to say. Find out how your new employee has been adjusting, what questions they have been asking. See if there are any questions or concerns that have arisen that you should step in and answer.
- Be sure to set up the 30-day discussion with your employee at least a day or two ahead of time. That gives the employee time to prepare for the discussion and think about what they may want to bring up.
- Give them feedback on how they are doing – if there are any developing habits that are of concern, you are much better off to address them right away. End the conversation by asking what you can do personally as their manager to help them be successful in their role.

*Information provided by Greg Settle, TechForce Foundation*

want you to work for a couple of days. I'll see what you're made of," Spurlock says.

### Skip the trial by fire

Gone are the days of letting a new hire fend for themselves, to try and figure out the lay of the land. To retain talent, it is critical to establish a clear and detailed onboarding process and training program for new hires.

"The failure to integrate a proper onboarding process is one of the most common mistakes that employers make, as well as being one of the most detrimental to retention," says TechForce Foundation's Settle. "The onboarding process sets the stage for success for a new employee, giving them confidence in what is always a stressful situation."

While there should be a standard training process in place, it is important to assess the abilities of each new hire individually to tailor the amount of training needed.

"There is no magic number for how much training a new employee will need to get them fully up to speed," Settle adds. "A very straightforward approach is to inventory the training and skills your new employee already has, match that against what work you are planning to assign them, and do a gap analysis. Then for the resulting gap you find, put together a training plan along with a timeline that is realistic."

When a new hire comes onboard, Settle suggests having a plan for both the first day and continued through the first month to help establish a good foundation for success. The first day should include meeting key contacts within the organization, such as the direct supervisor and other employees within the department, the general manager or company owner, and the human resources department.

Continually checking in with the employee throughout his or her first month allows for the employee to establish a line of communication and follow up on questions about the organization and procedures. They can also receive feedback regarding their performance.

Establishing a partner or mentor to help guide the trainee through the first several weeks can also help.

Duncan Polytech's Rubio suggests a way of utilizing current shop resources to establish a company mentorship program: tap retiring technicians to fill a training role within the organization.

"These in-house apprenticeship programs, when run correctly, are invaluable to shop retention rates and technician proficiency," he says. "I see too many shops that have a few 'lead technicians' that diagnose the problems, and the rest are parts changers. This creates an unsustainable culture in the shop where new skill sets are not being gained or honed and there are zero wage increases to be had for the parts changers."

"Any on-boarding should include a mentoring component," Arrants adds. "Proper selection, training, and compensation of a mentor is key to the success of on-boarding any new employees to your organization and the specific facility culture."

Mentorship can play a big role in not only helping to train new technicians but also to provide insight and a different point of view for veteran techni-

cians. For instance, an entry-level technician may be more tech-savvy and intuitively understand how to use a diagnostic scan tool, while a veteran technician may be more inclined to diagnose based on sight and sound. With the proper encouragement to support one another, a partnership or mentorship program can help both entry-level and veteran technicians share knowledge with one another.

"To some degree, the experienced techs will still have an advantage because they've seen so many different things that have happened," says SP/2's Holt. "Entry level techs are going to have their own set of advantages though because they are so technologically entwined. It shouldn't be an 'us-against-them' mentality between technicians." Working together can help create a united front when it comes to understanding new vehicle technologies, he adds.

### Commit to development

SP/2's Holt says that hiring entry-level technicians requires more upfront planning and further nurturing of qualified candidates, but the additional attention provided to these new hires can pay off in the long run.

"[Employers] have to be ready to mentor a candidate, show the young technician a career path," he says. Examples of this include providing an outline of certifications, benchmarks, and goals to set for the new hire, so they can assess their progress and advance in the position.

"That's the kind of employer that I want to work with because they're the ones that are going to keep young, entry-level technicians, they're going to help grow them into experienced techs and help keep them in this industry," Holt adds.

When it comes to setting a path for employees, American Diesel Training Centers' Spurlock agrees. His organization focuses on a "grow your own" approach when it comes to employee development.

"The days of hiring someone and kind of throwing them into the fire and just letting things happen are completely over, you just can't do it," says Spurlock. "Companies have to assume more responsibility for bringing someone in with a lot of aptitude, a high ceiling, and then setting that progression path so that they get from a C-level technician to an A-level technician."

Spurlock suggests the industry is overtraining students looking to enter the profession.

"I don't care what school you went to or even what certifications you have, nobody is going to trust the 20-year-old kid to rebuild a Cummins engine," Spurlock says. "They're either going to send that engine back to the factory or there's going to be an individual [at the shop] who's gone through five years of certification who is going to touch that engine. What companies want is – and I'm talking dealers to fleets – they want people who can hit the ground running and can do the basics."

He suggests starting out entry-level technicians on areas such as brakes, fluid changes, light engine work, [and] minimal electronics and diagnostics. Train them to be proficient with the basics before they continue with additional certifications and training, designed specifically for the organization.



## Appeal to the next generation

"I think the main challenge of recruiting technicians into the industry is the perception of what association a trade job entails to some people," says Duncan Polytech's Rubio. "Unfortunately, the trades have been relegated to last resort occupations when in reality the salaries and wages associated with these occupations prove quite the contrary."

"The main issues are the poor, outdated, and inaccurate images of a technician, and what that career is like, and the lack of knowledge about what the opportunities really are within this industry, including high demand, job security, good pay, and opportunity for advancement in a multitude of directions," adds TechForce Foundation's Settle.

While service technicians today must not be afraid to understand and complete mechanical repairs, the continued advancements in vehicle technology will require a deeper understanding of vehicle systems and how to use diagnostic tools.

"There will be a whole host of additional technologies that are going to be coming out ... with adaptive cruise [control] and lane [keep] assist, internet-enabled [vehicles], and the ability to see remotely back from headquarters as to the status of a vehicle," says SP/2's Holt. "I think that the amount of technology that's coming out is going to come out rapidly, and there's going to be so much continued education that's going to be required."

But, stresses Find A Wrench's Goninen, it is

important to not sell short the need to roll up sleeves to turn wrenches.

"We continue to try and push the narrative that there has been a shift to the technology side," he says. "While that's true, there is still a great deal of this work that is physically demanding and dirty. I don't know that this will change anytime soon. Some techs love that part while others don't."

As an organization looking to hire top talent, fleets must be prepared to provide potential hires the benefits as to why the technician should work for them.

"You need to be prepared to speak to your organization's assets and what it has to offer," Settle says.

Be transparent, but also provide specifics on what makes your shop unique. What's the shop culture? Does the shop get involved with the community? What compensation, benefits, and tools and equipment does the shop offer?

Overall, it is important to establish a clear and detailed process for employee development.

"There has to be a complete organizational buy-in to new employee development, on-the-job training, and career progression," says American Diesel Training Centers' Spurlock. "And, there needs to be pay and financial milestones along with this."

Goninen suggests it is important to provide a future road map for the career options available to entry-level applicants coming into the industry. Those involved should highlight the different avenues someone interested in the industry could pursue.

"It's not as much about trying to sell potential techs on the profession as much as it is trying to educate them on the opportunities that open up as a result of building a base of technical knowledge," Goninen says. "There is so much opportunity in this business and it's up to industry leaders to paint that picture."

## Future outlook

Whether it's creating a "grow your own" structure of recruiting technicians from trade schools, or through an extensive recruitment process through job boards and advertising efforts, finding a qualified candidate to fill a service technician position is half the battle. Once they arrive to work, it is critical to have a clear plan for career progression in order to retain those employees.

This will take a concerted effort among those within a business operation, as well as the industry as a whole.

"The number of experienced technicians is going to continue to decrease, and we do not have enough entering the trades to overcome that shortage," says SP/2's Holt. "But, those companies that are the best at both recruiting experienced techs, and recruiting and growing their own entry-level techs to become experienced techs, those that retain the best, those companies have the biggest strategic competitive advantage of anybody out there in the industry for the next five to 10 years at least." ■



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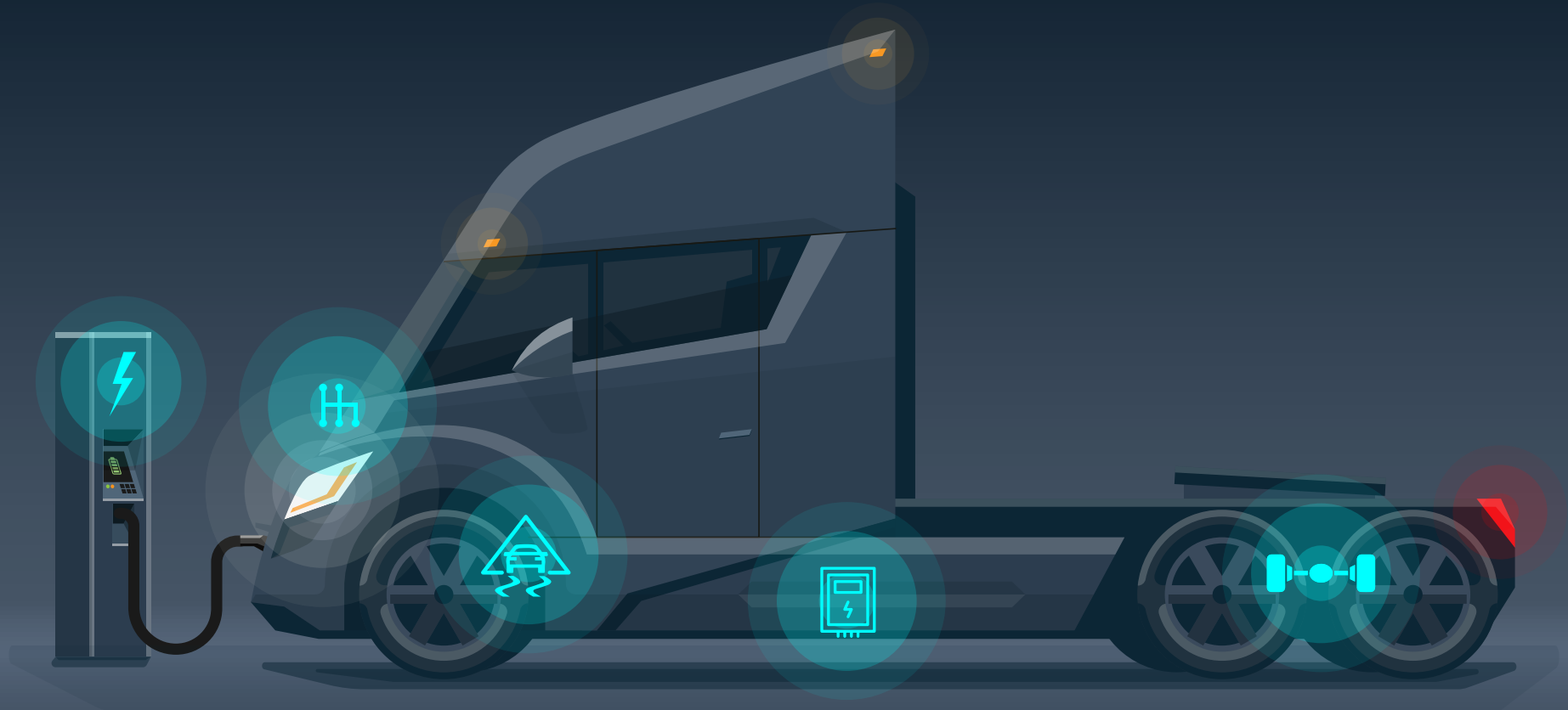


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» Fleets are joining the electrification trend because of the cuts in maintenance cost, data production, and performance advantages.

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# Examining the e-systems available for today's fleets

Electrification will change vehicle operation and maintenance.

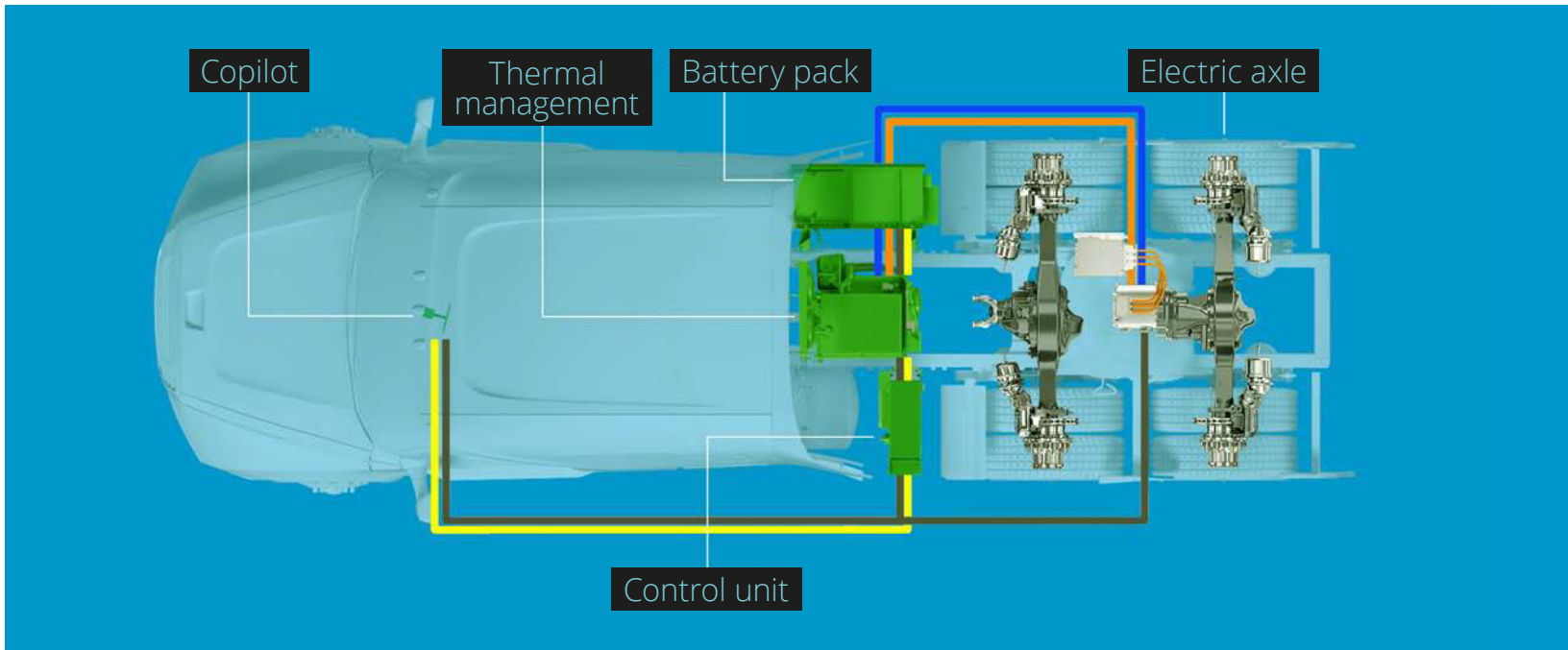
By Tyler Fussner

## [ ELECTRICAL SYSTEMS ]

**T**he implementation of electrified systems and components is nothing new for commercial fleets. However, the industry seems to be at a tipping point. Regulations and mandates are affecting OEM production and their utilization of electrification. Technology is making specified options available for today's vehicles. Electric vehicles (EVs) are at a limit in terms of the operational demands of many fleets regarding range and the supporting infrastructure, yet the technology for autonomous EVs seems to be closer on the horizon than anticipated.

This leaves fleets with a difficult decision: how to adapt to the electrification trend.

Industry manufacturers are offering many different electrified systems and components *now* to be utilized with today's fleets. Electronic stability control, e-Axles, electrified transmissions, power distribution units (PDUs), electrified auxiliary power units (APUs), motor and inverter systems, and more are being specified on commercial vehicles driven today in order to enter the electrification trend and, most importantly, start reaping the rewards of doing so. Cuts in mainte-



» Dana provides a diagram displaying the layout and connectivity of e-axes and other components integrated throughout a vehicle.

Image courtesy of Dana Incorporated

nance costs, data production, and performance advantages are major reasons fleets are adapting to the evolving technology. This article will examine some electrified components that can be implemented into a fleet today, their benefits and challenges, and the ways in which a fleet's electrification will affect operations.

## Electronic stability control

The Federal Motor Vehicle Safety Standards (FMVSS) mandated electronic stability control systems on heavy duty vehicles via FMVSS Title 49, part 571, Subpart B, Standard No. 136. By August of this year, all Class 7 and 8 vehicles manufactured in the U.S. must comply with this standard.

Bendix Commercial Vehicle Systems, a supplier of active safety technologies, energy management solutions, air brake charging, and control systems and components, has developed the Bendix Electronic Stability Program (ESP) system, anti-lock braking (ABS), and traction control technology, in order to add support for drivers and fleets to mitigate rollovers and loss of control situations. The Bendix ESP system is built on top of an advanced braking system in order to assist drivers with ABS through its brake controller.

"The brake controller is the brains of the operation," says TJ Thomas, director of marketing and customer solutions – controls, Bendix Commercial Vehicle Systems. "It takes into account all sensor readings and makes the decisions to apply

brakes to which individual wheel ends."

The ESP is built on the brake system. In addition to the brake system's sensors, modulators, and wheel speed sensors, two components essential to the ESP's functionality are the wheel steering sensor and the yaw lateral sensors. The wheel steering sensor measures wheel angle and determines the driver's intended steering direction. It possesses an ability to assist driver action with steering in order to maintain stability. The yaw lateral sensors measure lateral, side-to-side motion. In tandem, these two sensor systems translate driver intent and vehicle performance. If the sensor measurements are out of range for set parameters, the system will automatically take action to mitigate instability.

Fred Andersky, director of the Bendix Demo Team, explains the two-fold benefits of the Bendix ESP as they pertain to the driver.

"Out in the field, [the system] helps a driver mitigate rollover and loss of control situations," he says. "Secondly, the system helps the driver learn. When the driver gets an intervention, whether the throttle is cut or brakes are applied, they get the idea that, 'Hey, maybe I took that turn too fast,' or, 'I need to slow down.' It provides mitigation and training."

To maintain the ESP, it is crucial to continue proper maintenance procedures for the ABS system. The ABS, and therefore the ESP, can only be as effective as how well the wheel ends are maintained. Proper care should be taken to keep wheel ends and the braking system in good shape. For instance, brake pad changes, rotor changes, ensuring clean air is in the system through filter maintenance, proper tire inflation, and measuring tread depths help the entire system perform.

Wheel speed sensors, being a metallic sensor placed near the tire, are subject to rain, salt, snow, sand, and dirt exposure. They can shift and must be properly adjusted. Wiring is also susceptible

to elemental exposure and should be inspected through regular PMs.

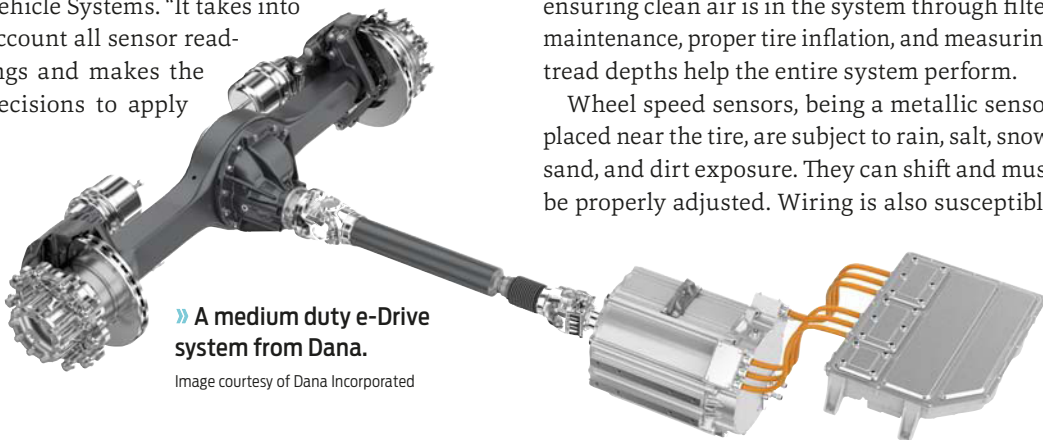
"Generally speaking, there is not much routine maintenance [for the ESP], other than the [maintenance of the] brake system that is specifically required," says Kevin Romanchok, director of eMobility and new business development at Bendix. For diagnosing ESP system issues, Bendix offers ACom diagnostic software. "It is important that the technicians understand how to use that to see active or inactive codes, perform component testing, and address the problems," says Romanchok.

Andersky also mentions it is important to recalibrate the sensors, such as the steer angle sensor, when certain maintenance procedures are performed on the vehicle, including front-end alignments. These recalibrations can be completed through Bendix's ACom diagnostic software.

A PC-based diagnostic system, ACom connects to the vehicle truck-side, connecting to the ECUs of subsystems, allowing technicians to examine error codes and recommended procedures for repair. A technical support team is available to answer questions and assist with diagnostic procedures. Bendix also conducts system demonstrations, which both drivers and technicians are welcome to attend in order to gain an understanding of what the system does and why it is being implemented into a vehicle. Bendix's service engineering staff also offers on-site training for fleets.

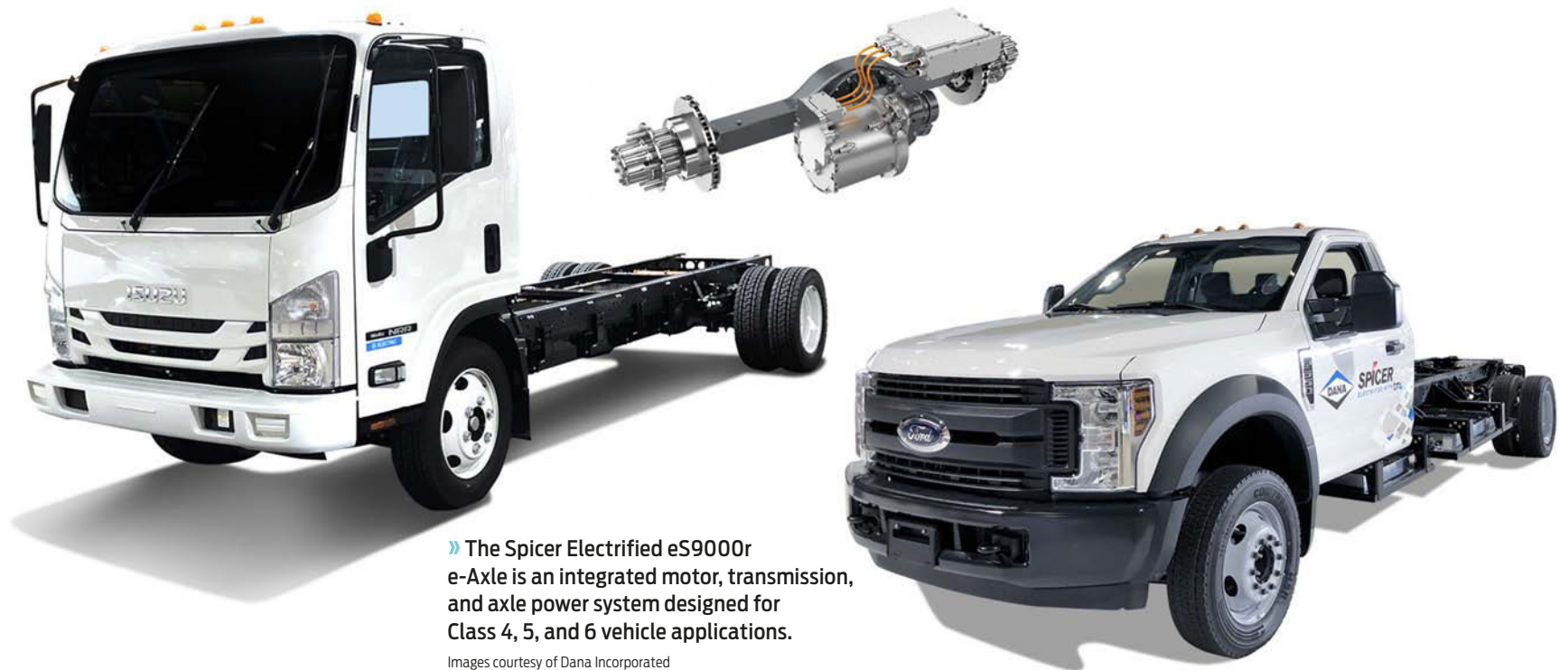
Bendix offers a myriad of information and training specifically focused on the ESP. Avenues include documentation, training, diagnostics, support teams, and demonstrations. Thomas suggests the first line of learning should be through the service data sheets. The service data sheets are published on Bendix.com and they explain proper system operation, system components, and how to troubleshoot the system. The detailed sheets cover all aspects of the system and should be the first resource technicians reference in order to familiarize themselves with system operations.

Aside from the service data sheets, there are also operational manuals and technical bulletins. Another source of information is the



» A medium duty e-Drive system from Dana.

Image courtesy of Dana Incorporated



» The Spicer Electrified e9000r e-Axle is an integrated motor, transmission, and axle power system designed for Class 4, 5, and 6 vehicle applications.

Images courtesy of Dana Incorporated

educational services of brake-school.com and the on-site Air Brake Training and Advanced Technology Training courses. These courses are held across the U.S. at Bendix office locations. Technicians attend these events, which are several days long, to understand the troubleshooting and diagnostic procedures of the entire brake system. Brake-school.com is a source of targeted information for all Bendix systems, from brakes to wheel ends, ABS, and ESP. Technicians can register for free to utilize the site, fleets can follow technician training progress, and users can complete quizzes to test their knowledge. The site contains videos focused on specific aspects of maintenance intended for technicians to obtain

the desired information and return to the vehicle quickly, decreasing downtime.

### Electronic axles and transmissions

A major step on the electrification path is the implementation of e-Axles or electrified transmissions into a fleet.

Drivetrain and propulsion systems provider Dana has acquired or partnered with numerous companies such as TM4, SME Group, Ashwoods, and Hyliion in order to address the industry movement toward electrification. This has allowed

Dana to integrate high and low voltage motor mechanics into their vehicle systems and to develop their line of e-Axles for the commercial market.

“The e-Axle is a game changer in the overall propulsion system,” says Harry Trost, senior manager of commercial vehicle product planning at Dana. “The e-Axle puts the entire powertrain system into one compact package that fits in place with the current axle on there today.”

The e-Axle enables many performance benefits for the EV, such as the elimination of diesel, a lighter weight, improvement in powertrain efficiency, and opening space in the vehicle’s chassis for batteries. The space created through an e-Axle allows for the packaging of the right amount of

batteries to reach the desired range for the vehicle. The regenerative braking offered through an e-Axle also helps to combat the range anxiety that fleets may have with EVs, as it is able to recapture energy and return it to the battery.

Another aspect of the e-Axle is its tuning ability. From an engineering perspective, the e-Axle can be tuned in how the torque ramps up in the e-Motor, allowing for high, instant torque capability. Parameters can be set to customer preferences, says Trost. With some limitations, these parameters can even be modified with over-the-air updates to change the software in near real-time to alter behavioral characteristics of the vehicle. An example would be with how aggressively or mildly the regenerative braking system is responding. Dana offers recommendations on how the vehicle should be tuned, accounting for multiple factors of operation and vehicle components.

“Talking with customers on this journey of electrification, they are seeing a two-thirds maintenance [cost] reduction with an electrified powertrain,” Trost says. “This offers significant savings, from a maintenance stand-

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point, and [fleets] have that uptime they are looking for.”

As e-Propulsion systems allow for regenerative braking, installation of such systems can lead to a benefit in decreased intervals of braking system maintenance and extended brake life, as well as a reduction in time, cost, and effort associated with servicing the brakes.

Dana provides two avenues of support regarding service parts for their e-Axles, as customers can go through OEM dealers or utilize [danaaftermarket.com](http://danaaftermarket.com) to obtain the service parts needed.

Servicing the e-Axle itself has not caused many changes to the PM procedure for technicians. The most notable difference would be that technicians are now dealing with high-voltage cabling and batteries. PMs associated with high-voltage cabling require safety precautions to be taken by service professionals. Wearing personal protective equipment, properly disconnecting the battery, and lock-out/tag-out procedures all must be integrated into a fleet’s PMs.

Dana’s Driveline Forensics training videos and the Aftermarket Training Academy provide training and educational information for technicians that are servicing the e-Axles. These resources develop alongside product development, ensuring technicians understand how to maintain the vehicle’s components.

Allison Transmission, manufacturer of commercial-duty automatic transmissions and electric hybrid propulsion systems, offers the ABE Series e-Axle for the bus market and the AXE Series e-Axle for medium and heavy duty trucks. The ABE Series e-Axle is a compact and fully integrated bolt-in system that replaces

the entire traditional powertrain within the existing frame. Its installation allows space for battery packs and other electrical components to be installed. The AXE Series e-Axle is a fully integrated powertrain system that fits inside a standard frame along the axle of commercial trucks. This system includes power electronics for a complete powertrain solution.

The ABE and AXE Series e-Axles provide good torque without the noise associated with a combustion engine. Not only is there a noise reduction, but there is an emissions reduction as well.

“Electric vehicles can also reduce the emissions that contribute to climate change, thus decreasing environmental damage,” says Michael Foster, chief technology officer, Allison Transmission.

Adoption of e-Axles in EVs indirectly affects other vehicle systems, as there is no longer an engine, transmission, fuel system, or aftertreatment. Hybridization with combustion engines also elicits improvements on vehicle systems, particularly extending part life and extending service intervals, ultimately resulting in a reduction of maintenance costs. Vehicle accessories will need to be adapted in order to operate through electricity. Foster also speaks to the alteration of vehicle system sensors, as different sensors will be required while traditional sensors are eliminated. “Sensors are designed to continually monitor vehicle operation and capture data when vehicles’ components fail to operate correctly. With new electrified components, traditional sensors will be unable to connect,” says Foster.

The ABE and AXE Series e-Axles offer significant maintenance benefits, as there are no fluid changes and the systems contain considerably

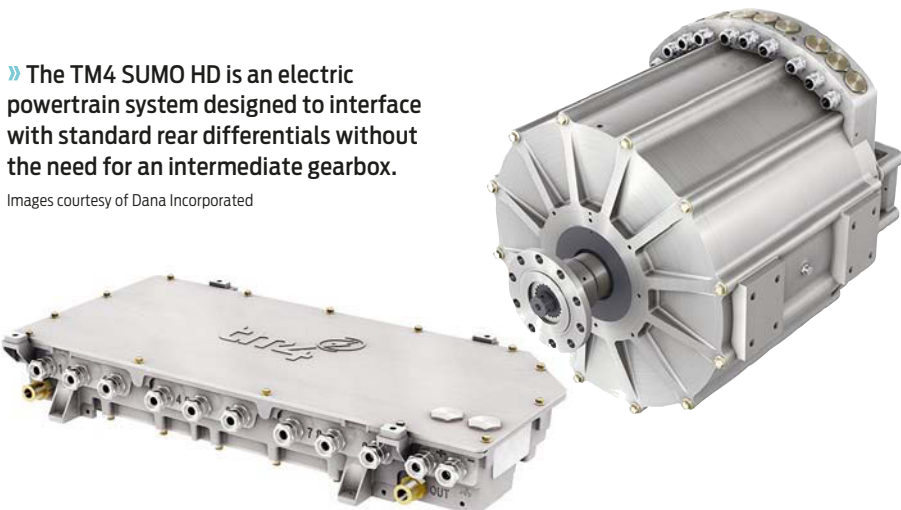
fewer parts for wear and tear. “Additionally, with the advancement of telematics, there will be more diagnostics ahead of time to ensure vehicles are maintained at the appropriate intervals and repairs made before any major issues arise,” says Foster.

The main challenge facing the adoption of electrified systems is the training that will be required of technicians servicing such systems.

With further federal and state regulation changes imminent, technologies available today and in the future are on the path of potentially drastic change.

» The TM4 SUMO HD is an electric powertrain system designed to interface with standard rear differentials without the need for an intermediate gearbox.

Images courtesy of Dana Incorporated



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Technicians will need to have a skill set suited to service these systems properly and safely. Allison Transmissions offers a maintenance and service network that Foster says the company plans to leverage alongside the electrification movement.

Eaton, a power management company and manufacturer of powertrain systems and components, established an eMobility business unit, which contains three distinct product categories: power electronics, power distribution and protection, and power systems. As part of their power systems, Eaton has developed electrified transmissions for commercial vehicles. Julie Marshaus, manager of new product introductions – systems at Eaton, explains that Eaton has been in the electrification market for some time, especially through their hybrid vehicle products. eMobility was not created from scratch, but rather drew from the company's experience and knowledge gained through the hybrid component developments they had enacted and its unit focused on full electrification.

Eaton's electrified transmissions deliver a motor torque profile significantly different than that of a diesel engine. In order to be able to meet performance demands, diesel engines may need 12-18 gears; vehicles with Eaton's electrified transmissions need only 3-4, or at most 5-6 gears, Marshaus says. The transmission has been simplified with Eaton's electrification process: a lower oil quantity, no high-low range box, fewer internal systems, no clutch, no clutch actuator, no range valves.

Adding an electrified transmission to an EV, rather than having a direct drive electric motor, "delivers greater start-ability, better grade-ability, and energy efficiency," Marshaus says. Another major benefit: environmental footprint. "We hope that the EVs will help with greenhouse gas emissions and make the world a cleaner, better place," Marshaus says.

With the removal of many systems and components in a traditional transmission, electrified transmission maintenance becomes less complex. There are still gears to maintain and oil change intervals, but there are no real new PM procedures to implement. Drivers will have to adjust to the noise reduction while operating, and technicians will need to be aware of the protocols associated with high-voltage servicing.

Eaton publishes troubleshooting guides and maintenance documents on how to service electrified transmissions, which also come with a control module that is updated through Eaton's service tool. The implementation of the transmission does not require additional sensors to be specified on a vehicle to accommodate for such a system, but changes in vehicle architecture may result in changes to existing monitoring sensors.

## Power management

With the electrification of a vehicle, changes in power management become necessary. In many cases, the management and distribution of the high- and low-voltage power



» The Dana Driveline Forensics training series, hosted by Jessi Combs, features episodes detailing e-vehicle maintenance.

Image courtesy of Dana Incorporated

Industry manufacturers are offering many different electrified systems and components *now* to be utilized with today's fleets.

must be reinvented to account for changes in the operation of the electrified components and systems. The ability to properly and precisely route the power to the various systems becomes explicitly crucial.

A challenge with EV inter-system operation is the differentiation in voltage required for system operation. Eaton offers a variety of power distribution units (PDUs). PDUs take high-voltage current and distribute the necessary voltage to accessory systems. PDUs also help the OEM and the fleet itself understand how the power is being used in the vehicle. It can even determine predictive maintenance with imminent system maintenance requirements or possible system failures.

"Some smart PDUs are capable of recording or broadcasting power consumption of accessories," explains Eaton's Marshaus. "[Smart PDUs] can track power draw and give an idea if a component is close to failure."

Dana provides flexibility in electrification adoption through their motor and inverter systems. These systems convert DC power to AC power for the motor, allowing the drive to adjust the frequency and voltage being supplied to the motor. With different models for separate circumstances, these systems allow for a central direct drive approach or can be implemented with e-Axles and full EVs.

"[The central mount direct drive approach has] minimal impact to vehicle architecture," says Dana's Trost. "It can be implemented quickly, it is in production today, validated, and can be sold with a warranty."

This approach allows customers to maintain conventional drivetrain components, such as the driveshaft or axle. Implementation of EVs and e-Axles offers increases in efficiency and range, as well as more space for battery packaging.

Thermo King, manufacturer of transport temperature control systems, developed the TRIPAC Envidia APU to assist in a vehicle's adoption of electrification through its ability to control the power and voltage necessary to operate select vehicle systems with battery power. The electric APU provides enough auxiliary power to run the vehicle's HVAC system for up to 10 hours, according to Steve Hubbard, engineering leader, electrification center of excellence at Thermo King.

A unique aspect of the Envidia is its battery management system. "Using AGM batteries for an APU, the management system protects the entire battery bank if one battery were to go bad," Hubbard says. "The system isolates a failed battery [so that a fleet] only needs to deal with the cost of one failed battery versus an entire bank."

Electric APUs offer a zero-emission alternative to traditional APUs which utilize diesel fuel. The only anticipated maintenance with an electric APU would be battery replacement, normal with any battery replacement cycle. PM procedures should accommodate battery monitoring, and including the APU will add efficiency to the vehicle's battery system altogether. There are no modifications necessary to the vehicle's ECU if it already has the ability to monitor battery voltage.

With the Envidia, customers can have the user interface installed in the cab rest area. There are independent sensors to monitor the temperature and operation of the APU itself, as well as the cab. A simple user interface device contains a temperature sensor and controls to adjust cab temperature. It also includes a display for state of charge on the battery, shown through a set of LEDs. The interface is as small as a person's hand and can be installed on the wall or console.

## What next?

For now, there is flexibility in the pace and extent to which fleets adopt electrified systems.

Federal mandates such as the Clean Air Act, or state regulations such as California's resource board (CARB) emissions standards, have been, are currently, and will continue to develop and further impact fleets' operations and makeup. The technology to ensure compliance with such regulations will become more prevalent, alongside the acquisition of more and more data on the environmental and logistical impacts such technologies offer.

With further federal and state regulation changes imminent, technologies available today and in the future are on the path of potentially drastic change. Fleets must

evaluate their current and future operational requirements to decide for themselves if, how, and when they adopt electrification.

Can the fleet's demands be met with full EVs? Will electrifying one vehicle pose a data and research opportunity to extrapolate viability for the electrification of the entire fleet? Does a fleet hold out on electrifying their vehicles today

in hopes of full EVs capable of meeting their demands tomorrow? There is much to consider when looking at the electrification of fleet vehicles – and the ability to successfully execute such a drastic upheaval in the status quo of operations will make all the difference. ▀

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# Do techs understand the fundamentals of electrical system diagnosis?

Evaluate and train technicians to improve efficiency and accuracy when diagnosing vehicle wiring issues.

By Stefanie Von Rueden

## [ ELECTRICAL SYSTEMS ]

Imagine this scenario: you have a truck that is in the shop for a hard-cranking issue. The technician replaces the battery, replaces the starter, and replaces the alternator, but the truck keeps coming back to the shop with the same problem. Finally, the technician realizes that it was a bad cable, and all of those extra parts were replaced when they didn't need to be.

What went wrong in the above scenario? The technician didn't fully understand the strategy behind electrical system diagnostics, and fell into the trap of what John Renno, manager, Center of Excellence, Isuzu Commercial Truck of America, calls "swapnostics."

"One of the struggles in this industry is that many technicians haven't been taught very well how to apply a best practice or a theory. What they've been taught is, 'when you see this symptom, replace this part,'" Renno explains.

When electrical systems are misdiagnosed, the repair doesn't work and the initial problem will recur, leading to increased vehicle downtime. If a technician replaces a part that hasn't failed, it can cause problems for the fleet. For example, if they try to turn the item in for warranty and the part is tested, the warranty claim will be rejected, says

➔ **Continued Page 26**

» Three measurements of electricity – voltage, amps, and resistance – are a key part of understanding electrical system diagnosis.

Photo courtesy of Power Probe Tek









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Bruce Purkey, founder and chief creative engineer for Purkeys, and a consultant for Auto Meter Products. Purkeys develops solutions for charging and protecting vehicle batteries.

“Roadside breakdowns and unnecessary repair expenses can result from misdiagnosis,” Purkey stresses.

In addition, when technicians replace parts that don’t need to be replaced in an attempt to further their diagnosis, it can make it more complicated to isolate the root cause of the issue, adds Keith Littleton, trainer and owner of K&D Technical Innovations. Littleton has worked in the industry as a trainer and technician for over 30 years.

“Going down the wrong path of misdiagnosis starts this kind of evolving situation that makes it really difficult to diagnose the root problem because you never really know where the issue started from,” says Littleton. “A lot of times, technicians are missing really small things. Probably 65 to 70 percent of the time, it’s very basic problems that get overlooked, and many parts get replaced that aren’t necessary.”

Ensuring that technicians have the correct tools to diagnose a vehicle, the know-how to use their tools correctly, and have training to effectively diagnose an electrical problem can help minimize misdiagnosis issues and maximize vehicle uptime.

**The basics of electrical systems**

Gerald Tabas, ASE Master Technician for Power Probe Tek, compares a vehicle electrical system to the human body’s circulatory system.

“The battery is the heart of the vehicle,” he explains, and “wiring runs like veins, allowing voltage to travel to various parts of the vehicle, such as switches or motors.”

Like blood flowing from the heart to the rest of the body, electrical current flows under pressure to the various components being powered—this pressure is measured in volts. The total strength of the electric current is measured in amperes, often shortened to amps. As electricity flows, it encounters resistance, which is measured in ohms.

These three measurements of electricity – voltage, amps, and resistance – are a key part of understanding electrical system diagnosis, explains Isuzu’s Renno.

“If you can understand those three components together, you can do very well at diagnostics. If you can figure out two of those measurements, you can understand all three. If you know the voltage and amperage, you can figure out the resistance, or if you know the voltage and the resistance, you can figure out what the amperage is doing.”

**Nine essential aspects of vehicle electrical system diagnosis**

- The time for diagnostics and repair in the mechanical and electrical worlds are flipped. A mechanical diagnosis is fast, but the repair can take hours; an electrical diagnosis can take hours, while the eventual repair is usually quick – sometimes only minutes. It’s important for the shop supervisor and the tech to understand this so that the process can be managed properly.
- There’s no such thing as an electrical “repair.” Once the actual fault is discovered, the electrical process ends, and the mechanical begins. Even if the fault is a shorted or broken wire, the repair is fully mechanical. When the diagnostic tools are put down and the repair tools are picked up, the process is mechanical. The only “electrical” process is the diagnosis.
- Nearly all electrical faults are simple, and 80 percent of all faults occur within the circuit. Often, a vehicle can be shut down and disabled by a fault that is entirely invisible to the naked eye. Small amounts of corrosion in any circuit can cause total failure. Oxidation only 0.001” thick on a single pin of one connector will fully destroy system operation, and in the wrong system, this fault will cause a 400-ton truck to stop dead in its tracks.
- Voltage drop is an effective diagnostic measurement. Voltage drop requires the circuit to be functioning, or complete, but if done properly, the test cannot fail. OEMs frequently specify a resistance or ohm reading, but these tests can be time-consuming, complicated, and inconclusive.
- The ohmmeter is prone to failure. The standard ohmmeter function in a digital multimeter is only designed to work within a small region of a very small system. Larger vehicles have extensive wiring harnesses, and the small amount of voltage used by an ohmmeter might not have enough energy to complete a definitive test.
- Many electrical tools are not fully effective for many circumstances. A test light is an age-old tool that most technicians either have seen or still have – even though there are more effective options. If the tool has electronic, solid state components, test lights are likely to miss a blatant fault because they aren’t sensitive enough. An older incandescent bulb tool can also damage sensitive electronic systems on vehicles.
- Schematics are often hard to acquire, and more often read incorrectly. A schematic is an illustration of circuits, and circuits comprise systems. When reading a schematic, it must be read for understanding then redrawn as a straight line. Additionally, it should be read from negative (-) to positive (+).
- All circuits are the same. Every circuit contains four essential parts – a voltage supply (+), a ground return path (-), a SINGLE load component, and switches. Even if this isn’t plainly illustrated by the OEM in the schematic, this is what is there, and this is what the tech should look for when reading. If you know this one principle, you understand every circuit.
- All “advanced” electrical systems are based upon, and work according to, old and well-understood concepts. No “modern” electrical system is truly new – electrical sensors, electrical vehicles, and all computers work according to basic principles. This suggests that all training should begin with the core components of electrical theory, and advanced training should always include these principles. “Ohm’s Law” governs nearly all circuits and systems in a vehicle. Ignoring these lessons doesn’t speed up training and diagnostics – it slows it down.

*Information provided by Electronic Specialties*

**Evaluating and training technicians**

“One of the most important starting points for technician training is to go back to the basics, and for electrical diagnostics, part of that is simply training technicians how to use a multimeter,” says Larry Rambeaux, sales manager for Purkeys.

He notes many managers that contact him for training believe their technicians are ready for an advanced course in electrical work and are above average. He cites one example where a fleet was adamant that its technicians were too advanced for what Rambeaux calls

“Multimeter 101.” But, when given a pre-test to gauge the technicians’ actual skill level, the fleet was shocked by how low the scores were.

This is a common issue, Rambeaux says. Last year at the TMC SuperTech technician skills competition, of the top 116 technicians that competed, the average score was only 66 percent. “There is plenty of room for improvement,” he emphasizes.

An alternative to subjectively judging technician skill level based on limited observation is to have technicians take standardized tests. There are a variety of standardized tests available – the

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ASE certification tests are one example. TMC is currently working on a technician test as well.

“Test your technicians and determine what skill level they have. That’s what you’ve got to base your training on,” Rambeaux says. “Then you’ve got to keep it updated and make sure you’re retesting your technicians to make sure they are learning and identify problem areas. It can even be part of the pre-hiring criteria, so you know what you’ve got when starting new employees.”

Once a fleet has determined the current skill level of its technicians, the next step is to find training resources to help their technicians more effectively handle electrical diagnostic work.

“Most people are in such dire need of a good technician that they’re looking for a magic silver bullet or a couple-day class where we can get technicians up to speed, but electrical diagnostics is not something you can take a couple-day class and get really good at it,” Isuzu’s Renno adds. “It’s something that takes years of practice. Fleets have to assess where the technicians are at, and then come up with a plan to grow them beyond that. It’s not a quick process.”

There are a variety of training sources available to fleets looking to help their technicians improve, and the best source will depend on what areas the technicians in a fleet are struggling with. Tool and equipment manufacturers offer electrical training that focuses mainly on how to effectively use their tools and equipment for electrical diagnosis. This type of training can be helpful in improving diagnostic efficiency, but only if the technician already understands the basics behind electrical diagnostics.

Another resource to consider is the vehicle manufacturer. Some, like Isuzu, offer electrical training as well. Renno cautions, however, that this training does not always help technicians who don’t already understand basic electrical diagnostics. “As a general rule, manufacturer training assumes that technicians already have a grasp of basic electrical diagnostics,” Renno says. “It focuses mainly on the specific information that is unique about their brand.”

“What I have found over the last few years is that the basic foundations that we were

assuming the technicians had, weren’t there,” he adds. “So [Isuzu] developed a basic electrical class that we have to teach before the technician can take a diesel diagnostics class, because we were struggling to teach advanced diagnostics because they didn’t have a firm grip on the basis of electrical work.”

There are also a variety of online courses, videos, and computer classes available. However,

K&D Technical Innovations’ Littleton cautions that while these courses can be helpful for introducing the theories and basic concepts behind electrical diagnostics, many technicians don’t benefit as much from the computer training as they do from hands-on training.

“Online courses can help, but I’d call those pre-course work,” he says. “You can do those before you get to class, but a lot of technicians need to put

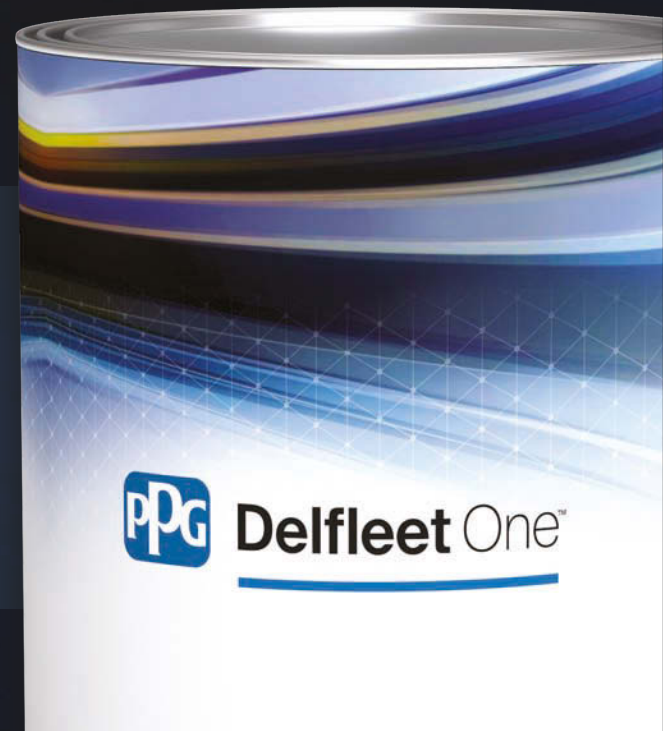


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their hands on it to fully understand the training.”

Littleton adds that OEM training can be helpful for diagnosing one specific vehicle type, but for technicians that work on various vehicle types, a third-party trainer will typically focus more on general technician improvement type training.

“That means it’s not specific to one product line – it’s generic across all product lines, and teaches them how to diagnose everything, not just one specific way of doing it,” he says.

“Train and evaluate technicians via real-time Wi-Fi reporting to ensure all technicians are following company repair procedures,” Purkey suggests. “Simply buying a tester is not enough. Are your technicians using the tester? Are they making the repairs as expected?”

He adds that even the best-trained technicians will struggle with electrical diagnostics if they do not have access to information on the systems and diagnostic procedures on the equipment the fleet is currently using. Every OEM and system is different, and it is hard for technicians to diagnose a system if they don’t have the information on how it is supposed to operate. Fleets should make sure that technicians have access to accurate OEM information and wiring diagrams, and that they have the tools and equipment they need to effectively diagnose vehicles.

“Electrical diagnostics is the toughest task a technician will ever face,” says Steve White, president of Electronic Specialties. “There are so many different OEMs with different schematics, and that makes it particularly difficult to stay abreast of all the nuances and changes that happen almost daily. It’s essential for techs to take time to research the problem and the technical information provided.”

## Common errors for misdiagnosis

Aside from a general lack of training or understanding of electrical systems, there are a few common areas of confusion that can lead to misdiagnosis.

- **Voltage drop.** One of the most commonly misunderstood diagnostic concepts in electrical diag-



» **Fleets should make sure technicians have access to the tools and equipment they need to effectively diagnose electrical system issues on vehicles.**

Photo courtesy of Purkeys

nosis is voltage drop, says Purkeys’ Rambeaux. “You can have a wire that’s damaged or corroded, and if you put a voltmeter at the end with nothing connected, you can see perfectly good voltage. But as soon as you have a load on it, that voltage may drop.” When checking a wire or circuit, Rambeaux stresses that technicians should be testing under the same load that the wire is expected to handle in normal operation. “If that wire in normal operation has to handle 5 amps, or 40 amps, or 100 amps, we need to put a load on it somewhat similar to that. So, circuits always need to be tested under load, but you also have to make sure you understand what that circuit should be loaded at.”

- **Relying too heavily on one measurement.** A problem that Isuzu’s Renno has noticed with inexperienced technicians is that they don’t understand how voltage, amps, and resistance work together and only focus on one measurement – oftentimes voltage. If a technician only focuses on one measurement, they are only seeing one-third of the picture. If they use that limited information to make diagnostic decisions, they are more likely to misdiagnose the issue, because they don’t fully understand what is happening in the electrical system.

- **Not using the wiring diagram to inform the diagnostic process.** A wiring diagram is the tech-

nician’s roadmap to figuring out electrical issues, Renno says. “The biggest mistake I see technicians make is they don’t read a wiring diagram first. They need to identify the circuit on the wiring diagram, identify the points they need to check, [and] decide what voltage, amperage, or resistance they are checking there. Then when they go to the truck, it’s a yes or no answer.” He adds that a lot of technicians make the mistake of going to the truck first, taking an arbitrary measurement, and then going back to the wiring diagram to try to find out whether the measurement was good or bad. If they go to the wiring diagram first, they can use strategy-based diagnostics to isolate the issue.

- **Using static measurements instead of dynamic ones.** Using test equipment in static situations can allow technicians to misdiagnose circuitry because it gives them a false sense that components are okay, says K&D Technical Innovations’ Littleton. When you take a dynamic measurement while the circuit is operating, you get a true idea of what is happening in that system. “One thing that some technicians miss the boat on is they avoid checking things dynamically, because in electrical systems, everything is connected, and they believe that to attach themselves in a circuit in a way that sometimes could cause damage to the circuit. A lot of technicians don’t understand that you can do things inductively with an amp probe where you can go around the outside of a wire with an amp probe without being intrusive in the circuit,” Littleton explains.

- **Relying too much on OEM software and scan tools.** “Some technicians tend to rely on the OEM software and the scan tools to figure out root causes of problems,” Littleton says. “A lot of times, root causes are found by testing dynamically, not by looking at a scan tool or looking at software. You can’t just plug in the scan tool into the truck and expect it to say, ‘Go to connector number three, there’s a high resistance there.’”

- **Assuming the wiring harness is okay.** “Most diagnostic procedures assume that the wiring harness is okay,” Renno says. “That’s where technicians can get tripped up and go through the service procedure and replace a lot of parts, and

## Tips and tricks for reading wiring diagrams

Industry experts offer their tips for getting the most out of wiring diagrams.

When looking at a wiring diagram, don’t try to focus on the whole page all at once. It’s overwhelming. Put a blank sheet of paper next to the wiring diagram and just draw the simple circuit. Focus on the simple part and follow the current flow from power to ground or from ground to power. All complex wiring diagrams are just a series of simple diagrams, and it makes it hard to look at if you don’t narrow down to the circuit that you’re doing.

–John Renno, Manager, Center of Excellence, Isuzu Commercial Trucks

Print the wiring diagram off and use highlighters to trace the circuit. When you use your finger or follow the circuit with your eyes, it’s easy to mistrace the circuit. One trick that I use is to print the same wiring diagram off twice. On one, I’ll trace the current flow, how it operates, and that shows me what parts of the circuit I need to check. Then on the other one, I’ll start coloring the things that tested okay. When I get done, anything that’s not highlighted are suspect circuits that I need to identify.

–Keith Littleton, Trainer and Owner, K&D Technical Innovations

To properly read a wiring diagram, one has to know how the components in the system operate. For example, if a module is powered up and it sends out a signal of half the voltage and the technician does not know this, he would think he has a problem, as he would expect a 12V signal. Following diagrams is fairly simple, but using it within the scope of how the system operates is a different matter. My best advice is not only look at the diagram, but understand how the components operate when in use.

–Bruce Purkey, Founder of Purkeys and consultant for Auto Meter Products

Read wiring diagrams from negative to positive and redraw the circuit as a straight line. All circuits are the same – voltage, ground, single component, and switches.

–Steve White, President, Electronic Specialties

Before reading a schematic, get familiar and understand all the symbols. Read the schematic like a roadmap. I print the schematic and highlight the circuit I’m diagnosing to make sure I’m staying on the right path.

–Gerald Tabas, ASE Master Technician, Power Probe Tek

then they get to the end and realize that the wiring was what was wrong in the first place.” With rust and corrosion, wires can deteriorate over time, so technicians should be sure to test that the wires are working correctly before replacing larger parts.

## Utilize technician talent effectively

While fleets can improve their overall technician education level, not every technician has an aptitude for electrical diagnostics, cautions Electronic Specialties’ White.

Isuzu’s Renno adds that fleets need to assess the skills and talents of every technician in the shop and use that information to keep things running smoothly. “Different technicians have skills in different areas, and fleets need to figure out how to take advantage of each technician’s skills and minimize their weaknesses. So that means that some technicians may just be changing parts, while others focus on diagnostics. It’s not necessarily bad if everybody in the shop can’t do diagnostics.”

Renno describes a strategy that he has seen effectively employed in some large shops that he calls “triage.” Whenever a vehicle comes in to be worked on, the shop has a highly skilled technician who is good at diagnostics assessing the vehicles. Once the vehicle has been diagnosed, the faulty part can then be replaced by a less experienced technician.

Renno says that this strategy works well because it ensures that vehicles are being diagnosed correctly and the root cause of the issue is being addressed, instead of just replacing parts and hoping something works. He adds that in order to become adept at electrical diagnostic work, a technician must routinely diagnose vehicles. “Electrical diagnostics is a little bit different than other repairs. It’s not like tearing a component apart, where once a technician understands how to do it, they usually won’t forget even if they don’t use the skill for six months,” he explains. “Electrical work is philosophical. There’s theory involved. It is a learned skill, and it has to be exercised.”

## Conclusion

When technicians misdiagnose electrical problems in vehicles, it can be costly for the fleet. If technicians are experiencing a lot of comebacks, taking an extensive amount of time to diagnose electrical circuits, or are replacing components to help diagnose circuitry, they may need extra training to diagnose electrical systems more effectively.

Technicians can benefit from training that covers

diagnostic theory and tool usage, and OEM-specific and advanced training. Having an accurate measure of technician skill level, investing in training, and effectively utilizing the pool of technician talent the fleet has available can help improve electrical diagnostics and maximize uptime. ▀

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# How to assess replacement parts

Insights and guidelines to help fleets choose the right type of part for the right situation, keeping both uptime and the bottom line in mind.

By Gregg Wartgow

[ PARTS ]

**T**here are three general categories of replacement parts: genuine OE, aftermarket, and remanufactured. Achieving two of a fleet's most critical goals – vehicle uptime and expense control – requires an understanding of all three categories, along with what makes one a better option in certain circumstances.



» With more than 270 branch locations across the country, FleetPride shelves are stocked with the best-known parts brands in the industry, plus an assortment of private brands like OTR. The company says its approach to private label is to continue raising the bar for quality, innovation, and durability by partnering with world-class manufacturers.

Photo courtesy of FleetPride

Eaton's aftermarket offering includes clutch and transmission products to support the Eaton Fuller product portfolio.

Meritor, a supplier of axle, brake, and suspension solutions, formally structures its aftermarket products portfolio the same way:

- **Best** – Meritor Genuine, ideal for newer trucks and fleets looking to maintain overall condition and like-new performance
- **Better** – Meritor and Euclid-branded all-makes aftermarket components, ideal for second and third truck owners
- **Better** – Meritor remanufactured products
- **Good** – Mach-branded all-makes components focused on value, ideal for trucks in later life-cycle stages

Eaton's Bauer says that while original equipment (also known as genuine) parts make a lot of sense for newer vehicles, they can also be a good choice for older vehicles. "Many manufacturers have products that are an older design or have been de-featured to provide a balance between performance and price," Bauer points out.

Sometimes a fleet simply wants to stick with genuine parts. There are several common reasons why.

"One is total cost of ownership, including what the vehicle is worth at trade-in," says Mike Eppes, managing vice president of parts for Rush Enterprises, which operates roughly 130 commercial vehicle dealerships (Rush Truck Centers) across the U.S. "Overall risk can also be a factor. Some fleets don't want to take on the liability of using an aftermarket part in case something ever went wrong and they ended up in court."

Fleets should recognize that genuine replacement parts are components of a system specifically designed and engineered to work together, maintaining the same level of quality originally offered as first fit parts.

"Design tolerances and mechanical properties separate an original part from a will-fit," says Michael Keller, D.M. director of sales (aftermarket, regional fleet, and dealer) for SAF-Holland. "Altering a system with a will-fit replacement part may result in jeopardizing performance and safety." The SAF-Holland product offering includes air disc and drum brake axles, spring and air ride suspensions, fifth wheels, landing gear, tire pres-

➤ **Continued Page 32**

Tim Bauer, vice president of Eaton's North America aftermarket vehicle group, likes to separate replacement parts into a good-better-best scenario based on features, benefits, performance, and price. This helps fleets maximize return on investment (ROI) by matching the right type of part at the right stage in a vehicle's lifecycle.



» Eaton's Advantage Clutch (pictured) meets and exceeds OE specifications and has a recommended lubrication interval of 50,000 miles — double the recommended interval of Eaton's lower price point option. Fleets should keep preventive maintenance needs in mind when choosing a replacement part.

Photo courtesy of Eaton

sure management systems, and coupling products, along with a full line of genuine and premium aftermarket parts to support all of those products.

When considering replacement part options, Eric Coffman, senior product manager at Meritor, says it's important to recognize that "same as" is not always "equal to." For example, "Meritor Genuine RSD friction [brake pads] are carefully engineered and selected for their application," Coffman points out. "Meritor RSD frictions deliver performance that is capable of exceeding the 250-foot regulation by 25 feet, representing nearly two car lengths."

On the other hand, if a fleet is exploring the value of all-makes parts options, Coffman says the offerings of proven industry leaders can provide some peace of mind. The aftermarket all-makes offerings of OE component suppliers provides opportunity from shared engineering, testing facilities, and technical support. For example, "Meritor's PlatinumShield III offers premium protection against rust-jacking, and is available in both OE and aftermarket [parts]," Coffman says.

### The case for aftermarket parts

SAF-Holland's Keller agrees that premium aftermarket parts should only be considered if designed



» The SAF-Holland product offering includes genuine replacement parts and Gold Line Quality Parts, an offering of premium aftermarket parts that are designed and manufactured to the quality standards expected for extended performance.

Photo courtesy of SAF-Holland



» Wabco's packaging makes it easy to identify a genuine Wabco part. Pictured are Wabco air dryer cartridges.

Photo courtesy of Wabco

and produced by a trusted manufacturer that understands the importance of safety and uptime.

"The decision to use premium aftermarket parts should be based on more variables than just price, although price plays an important role," Keller says. "Our Gold Line Quality Parts, for example, are designed and manufactured to the quality standards expected for extended performance."

Parts vendors can help fleets make wise purchasing decisions. "Our job is to provide as much choice as possible for any make of truck, including OE, a national branded part, or a high-quality aftermarket part," says Larry Gruendike, director of category management for Rush Enterprises.

In addition to Rush Truck Centers, Rush Enterprises also operates Rig Tough Parts, a premium line of aftermarket parts for all makes and models of heavy duty trucks. Robb Nixon, vice president of aftermarket sales for Rush Enterprises, says Rig Tough Parts are backed by a warranty that is as good or better than other parts sold by Rush Enterprises.

While some fleets will only go back to genuine parts, others have a different philosophy that more strongly emphasizes operating cost. Parts-related decisions often hinge on vehicle age, as well as the type of component.

"A cosmetic part is typically less of a concern to a fleet," Rush Enterprises' Eppes says. "If a high-quality aftermarket part is available, they'll often use it over OE. On the other hand is something like an internal engine or transmission part. Should that part fail, the cost of downtime far outweighs the cost savings of going with an aftermarket part."

Abe Aon, regional aftermarket sales leader for Wabco North America, says his team likes to approach fleets with an ownership lifecycle support perspective. Wabco is a manufac-



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Good parts suppliers provide a good selection, insightful advice, and a shopping experience that makes it as easy and fast as possible to find the right part.



turer of braking systems, steering systems, air compressors, air dryers, and more. The company offers the complete trifecta of replacement parts: genuine OE, remanufactured, and all-makes aftermarket. The company's all-makes parts offering is available through its ProVia brand, launched in 2016. ProVia parts are designed to bridge the gap between genuine and low-end budget parts.

"A fleet with an older vehicle might not need a part that will last another 15 years," Aon says. "The fleet might be looking for something that's a little bit lower-cost and not necessarily to that original OEM spec. At the end of the day, the fleet is going to dictate that to us. Then we give them the best options that will provide the best value for their dollar."

## The case for remanufactured parts

Sometimes a remanufactured part provides the best value.

In addition to Rig Tough aftermarket parts, Rush Enterprises operates its own line of remanufactured parts called Premium Power. Eppes says the company is primarily focused on engine components at this time since the engine is one area where reman can make good financial sense for a fleet.

"Products that include a large amount of cost and energy, such as products with large cast pieces, are good for remanufacturing," Wabco's Aon says. Along with engines, examples include air compressors, air dryers, steering gears, and transmissions. "These things make a lot of sense because there is still a lot of life left on the high-dollar components that go into them," Aon adds.

Founded in 2010, Wabco Reman Solutions remanufactures a variety of electronics, mechatronic components, and conventional mechanical products for both Wabco and other OEMs. Wabco remanufactures back to the original OEM spec. In fact, they'll also upgrade to the latest features within that product line. "Wabco OEM and Wabco Remanufactured are functionally and durably equivalent," Aon says. "This

gives us an opportunity to bring a better value to market while still maintaining the consistency and specification fleets require."

While remanufactured parts present a lower-cost option, Eaton's Bauer says fleets shouldn't view that as a reflection of inferior product quality. "Remanufactured products can be as good or better than new parts if the remanufacturer has good techniques to qualify reclaimed [salvaged]

parts in the operation," Bauer says.

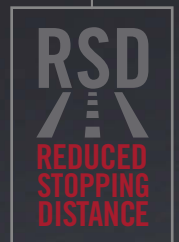
The manufacturing process itself is also important. John Chalifoux, president and chief operating officer of MERA, the Motor & Equipment Manufacturers Association's sustainable manufacturing division, says it's important to recognize that remanufacturing has the word manufacturing in it. "If you ever toured the plants of many of our members by starting at the end



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of the assembly line, you'd think you were in a new manufacturing facility," Chalifoux relates.

One such MERA member is Reviva, a remanufacturer of diesel engines and components. "If a truck is new enough, there is still the potential of replacing an engine with a new engine," says Josh Stahl, president of Reviva. "But in many instances, an engine lasts a very long time. By the time it needs to be replaced, it is either no longer produced by the manufacturer or has been greatly modified. In those instances, replacing with a brand new engine isn't a feasible option for a fleet."

So what are the options?

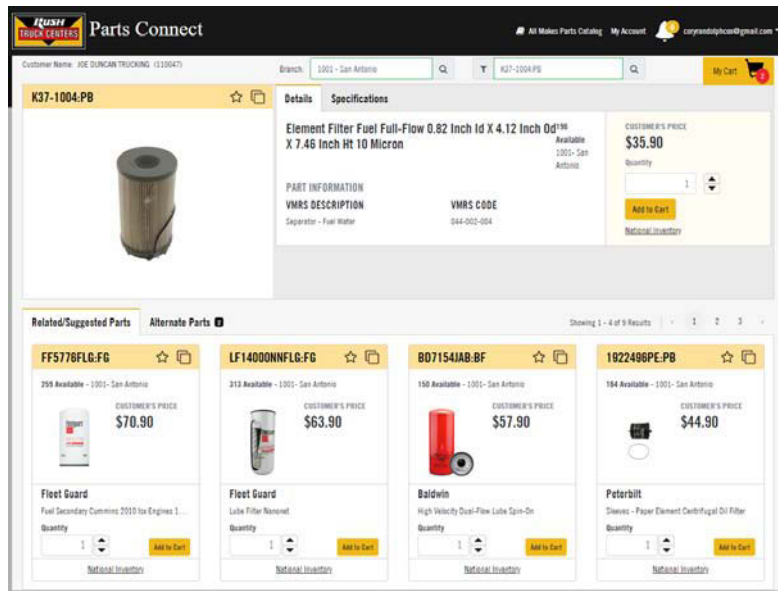
- Perform an in-frame overhaul of the existing engine
- Replace with a used engine
- Replace with a remanufactured engine

"The problem with a used engine is that you never know what you're going to get," Stahl says. "And with today's electronically controlled engines, you need to find one that is almost an exact fit."

An in-frame overhaul can be a good option, but according to Stahl, many fleets do not have either the technician or bay availability to tackle intensive projects like this. "Fleets are often better off flopping a complete engine in a day or two," Stahl says.

This is where reman fits in. Stahl says Reviva does sell some long blocks, but most of the company's sales are complete drop-ins. According to Stahl, fleets can have confidence in what they are getting.

"Remanufactured means the engine is completely disassembled in a factory setting," Stahl explains. "We thoroughly clean and inspect the engine to make sure all parts are qualified. Anything out of spec is discarded. We always use 100-percent new pistons, rings, bearings, and gaskets. All parts must be OE or equivalent. In many cases, it is an OE part. In others, we use reputable names. For example, we might use a



» RushCare Parts Connect allows fleets to look up OE and all-makes part numbers online. Each search also displays up to three equivalent part alternatives complete with pricing.

Photo courtesy of Rush Enterprises

Bauer, that criteria will likely include:

- Vehicle's lifecycle stage
- The component itself
- Cost of potential downtime

According to SAF-Holland's Keller, other factors can also come into play:

- Product warranty
- Strength of company's presence in the industry
- Manufacturing capabilities
- Distribution footprint
- Knowledge and support provided by vendor's sales team
- Customer service

Preventive maintenance is another consideration. As an example, Bauer compares Eaton's Advantage self-adjusting clutch, which is to OE specification, to Eaton's EverTough genuine after-market part:

- Advantage – meets and exceeds OE specifications, recommended lubrication interval of 50,000 miles
- EverTough – high-value option at a lower price point, recommended lubrication interval of 25,000 miles

A fleet should evaluate price point, maintenance needs, and uptime in unison to make the

Federal Mogul piston that maybe wasn't specifically made for a certain application but is a proven part and a good fit. We then put the engine on a dynamometer and test it."

In 2017, MERA launched the Manufactured Again Certification. Manufacturing and remanufacturing are held to the same international quality standards based on ISO 9001 and IATF 16949. Through this effort, a manufacturing process is certified, as opposed to specific products. That said, fleets purchasing remanufactured parts from a certified manufacturer can have an extra degree of confidence in the finished product.

## The finer details of parts selection

A fleet should develop its own set of criteria for evaluating replacement parts. According to Eaton's

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right decision as to which type of part makes the most sense.

It's also important for a fleet to know who is actually manufacturing the part. According to Bauer, there are some key things to understand:

- How are the parts approved for sale and use?
- Does the supplier support an ISO/TS process when developing, releasing, and manufacturing products?
- Does the supplier have an OEM position or not?
- What support network is in place to address questions or product issues?

"There is an expectation that all parts sold in the market are proven, tested, and approved with a standard criteria – however, that is not the case," Bauer says. "When fleets are making a purchasing decision, they should do their research and ask their parts suppliers for products by brand or manufacturer name to ensure they are getting the quality they expect, as well as what they are expecting in terms of performance and support."

Good parts suppliers provide a good selection, insightful advice, and a shopping experience that makes it as easy and fast as possible to find the right part.

"When you walk into a FleetPride branch, you'll see shelves stocked with the best-known brands in the industry, plus an assortment of our private brands like OTR," says Mike Harris, senior vice president of sales and branch operations for FleetPride, a provider of services and parts for heavy duty trucks and trailers with more than 270 locations across the country. "We're focused on having what the customer needs for their particular application with the quality attributes, warranty, and price points that make the most sense for the job at hand."

Parts availability is also a key consideration when it comes to selecting parts.

Rush Enterprises has made significant investments to simplify and expedite parts shopping for fleets. RushCare Parts Connect, launched earlier this year, is an online ordering system that allows fleets to shop parts for all makes and models of medium and heavy duty trucks.

"Parts Connect gives the

fleet e-commerce capability, as well as the ability to view all of our parts inventory across the country," Nixon says. Parts Connect is also set up to provide not only the OE part number but also up to three alternative aftermarket part numbers. Pricing is also displayed to help the fleet make a faster, more informed decision.

Faster, yet more informed replacement part

decisions should be the goal of any fleet. By understanding the types of parts available, along with when and where each type makes the most economic sense, fleets will be well on their way toward achieving that goal. ▀

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# Reasons fleets should consider reman

Remanufactured parts and components are sustainable, quality products designed to help reduce operational cost and inventory.

**Remanufacturing – the process of turning a non-functioning used part, known as a core, into a high-quality finished product – is gaining momentum throughout the commercial vehicle industry. Proponents readily tout reman’s environmental attributes. The business case for fleets, manufacturers, and end users is just as compelling.**

## Overview of benefits

Remanufacturers have the advantage of knowing a product’s performance, allowing them to see design weaknesses that the original manufacturers could not predict. This knowledge allows remanufacturers to implement design and process improvements to solve specific issues and provide a product that is equal to or better than the original in quality, performance, and cost.

Examples are as simple as chrome plating parts that are prone to rust, using larger bearings to prevent a weak link in an assembly, or adding sensors for service alerts. To back this up, remanufacturers offer the same warranty on a remanufactured part as they do on a new original equipment (OE) genuine part. This process allows remanufacturers to offer products no longer in current production, and fleets enjoy a substantial discount to the new original – typically up to 40 percent.

» AxleTech recently launched an air disc brake (ADB) caliper remanufacturing product line.

Photo courtesy of AxleTech

Given the rapidly accelerating evolution of electronics and mechatronics in light duty and heavy duty vehicles, suppliers, original equipment manufacturers (OEMs), dealers, and distributors will encounter an increasing need to address product end-of-production inventory and service level requirements. Many business owners struggle with the risk of inflating their inventory with discontinued SKUs to satisfy possible future demand. Remanufacturing offers an alternative to minimize these last time buys, thereby reducing stagnant inventory levels, decreasing cash outlays, and improving long-term product lifecycle service levels.

Given the lower cost of remanufacturing compared to standard manufacturing processes, OEMs can significantly lower warranty costs by adopting a comprehensive remanufacturing strategy.

Going forward, OEMs and suppliers alike will need to adopt an integrated lifecycle management approach to their new product

Reman products offer a solution that is equal to or better than new at a substantial cost savings.



### By Raji El-Kassouf

DIRECTOR OF BUSINESS DEVELOPMENT, REMANUFACTURING, AXLETECH

For the last 40 years, AxleTech has remanufactured its axles and transfer cases for the off-highway and defense markets, and recently launched an air disc brake (ADB) caliper remanufacturing product line, as well as electronics and mechatronics remanufacturing capabilities based on the expected exponential growth of electronics content in vehicles in the next five years. El-Kassouf is responsible for leading the global business development effort for the remanufacturing business segment. He is a 27-year veteran in the commercial vehicle industry.



introductions that includes a design for remanufacturing discipline. This allows fleets to operate their vehicles longer and more efficiently while keeping employees focused and trained on the core business of servicing customers.

**Benefits beyond the business**

Beyond product benefits, jobs, energy, and waste savings related to remanufacturing are substantial and measurable.

For example, one air disc brake (ADB) manufacturer recently announced over 40 million of their ADB calipers are on the road worldwide currently. The amount of energy used to create those potential ADB cores is equivalent to powering 1.5 million U.S. homes for one year. A fuel injector remanufacturer in Chicago advertises that its process on one product line saves enough energy to power 50,000 U.S. homes for one year.

Additionally, remanufacturing renews the life of a core several times before it ends up in a landfill or a recycling station. Likewise, fleets that prioritize remanufactured products can quantify their positive contribution to the environment and, as a result, private and public sectors globally are starting to see this link and are working on legislation to encourage the trend.

Technological advancements in 3D printing, additive and surface treatment technologies, and reverse engineering technologies will allow remanufacturers to reuse an increasing percentage of the core, giving remanufacturers a competitive edge when taking advantage of the new tools available. As fleets demand more remanufactured products, technology will evolve to add more value to an already valuable product.

Quality and reliability will always reign supreme. That's why remanufactured products must be, at minimum, on par in quality and performance with new products to offer the maximum benefits to fleets, the companies that produce them, and the environment.

According to the Remanufacturing Industries Council, remanufacturing can save

85 percent of energy, water, and material use compared to a newly manufactured product. And the trend has led John Chalifoux, president of MERA – the Association for Sustainable Manufacturing, to recently suggest an update to the three “Rs” of the environment to now say “Reduce. Reuse. Reman. Recycle.”

For a fleet, remanufactured products offer a

solution that is equal to or better than new at a substantial cost savings. Additionally, fleets save resources when buying a ready-assembled remanufactured product versus repairing in-house. Fleets can help support remanufacturing by demanding MERA-certified remanufactured products from reputable sources while also helping a smooth flow of cores back to their suppliers. ▀



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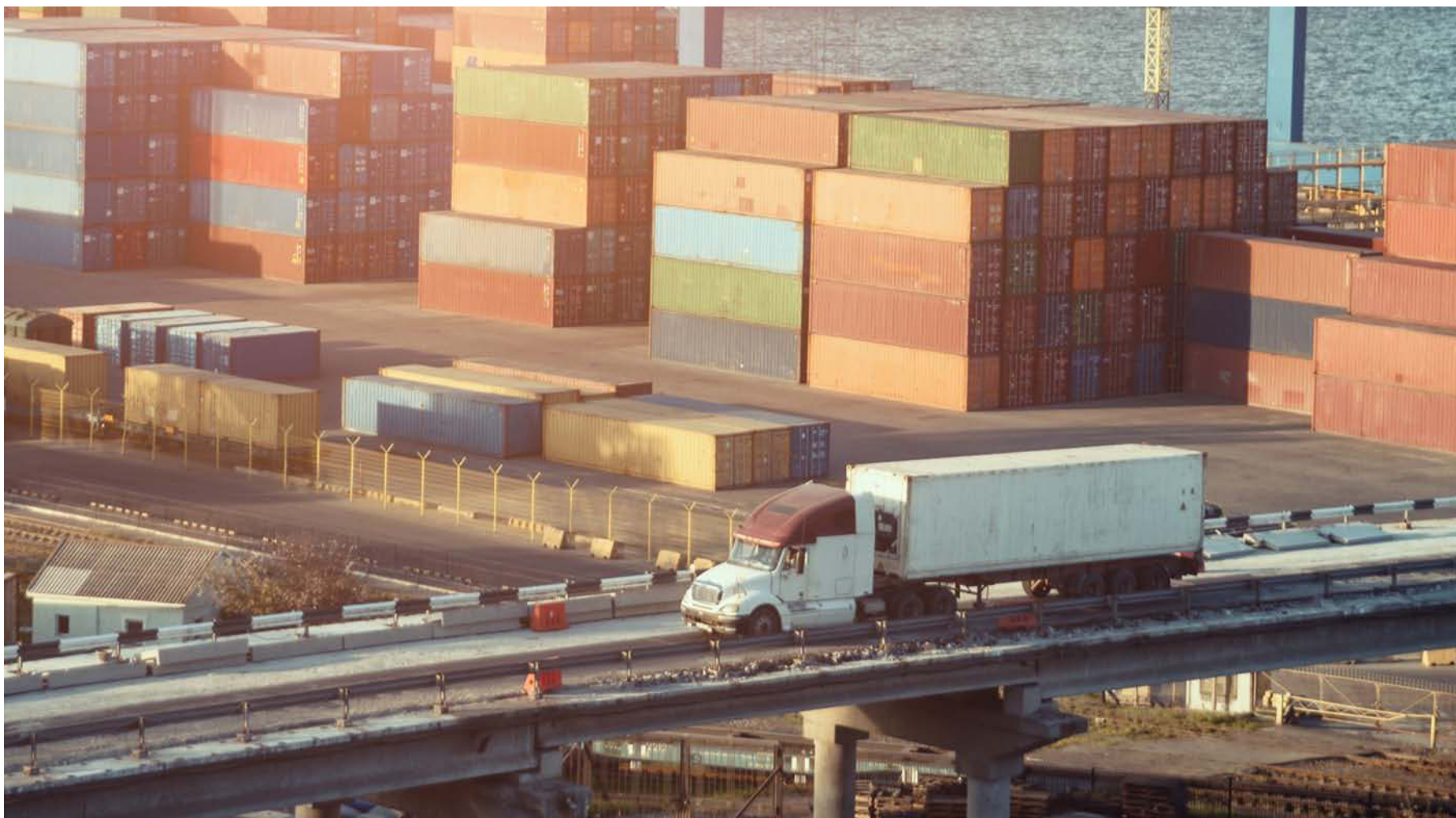
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# Uncertainties with today's global economy

Origins and progress of the current trade and tariff dispute.

**A very long time ago, when I was working** for a bank, I had occasion to deliver an interest rate forecast at a meeting held at one of the large hotels near O'Hare International Airport in Chicago. The message of the forecast was that the Federal Reserve was not going to raise interest rates in the immediate future.

As I left the meeting I walked by the newsstand (they had those then) in the lobby of the hotel where I saw the clerk stacking the evening edition of the newspaper (they had those then,

too). The headline read: Federal Reserve Raises Interest Rates.

Why am I telling you this? Because there is a chance that some of what you are going to read here will have been rendered obsolete by events that occur between the time this is written and when it appears before you. That

» The economy moves at such a speed that what you're reading now could be rendered obsolete by tomorrow.

iStock

said, I would like to offer a few observations about the origins and progress of the current trade and tariff dispute.

## Multiple fronts of the dispute

The first thing we need to recall is that the trade and tariff dispute has multiple fronts. While our differences with China receive most of the headlines, we should not forget that we also have pending issues with Canada, Mexico, and the European Union.

» The U.S. tariff dispute includes not only China, but Canada, Mexico, and the European Union as well.

iStock



**By Robert Dieli**

ECONOMIST, MACKAY & COMPANY AND PRESIDENT, RDLB, INC.

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





The second thing we need to recall is that each side of each of the disputes has its own set of economic and political factors to consider. The final resolution of the disputes will have to include outcomes that are politically and economically acceptable to both parties. Reaching such agreements is rarely done quickly.

The third thing we need to recall is that there is a supply chain involved with each and every good that is traded. Changes in the volume of trade affect how, when, and why goods are shipped. This aspect of the trade war is already affecting you and your customers, even if you don't use the goods being shipped yourself. A full 25 percent of truckable economic activity (TEA), which is the MacKay & Co. proprietary measure of the trucking economy, consists of imports and exports. The trade war affects both of those activities.

Changes in tariffs are like dropping a rock into a pond. There are many ripples and it will be some time before the waters are still again.

### Ripple effect

Over the past year we have seen the effects of the tariffs manifest themselves in several different ways. One of the first was the acceleration in exports immediately after China announced a tariff on U.S. soybeans in response to our tariff on Chinese steel. Purchases of soybeans that would normally have taken place in the third quarter of 2018, took place in the second quarter to beat the July 1 tariff deadline.

Similar effects have been noted on the import side, where purchases of consumer goods have been pulled into 2018 to beat an anticipated tariff increase in 2019. The question now is how, when, and at what levels these trade flows stabilize.

The last thing is that tariffs function in exactly the same way as a tax increase and a

new set of regulations. This fact is especially puzzling since the current administration opened its tenure with a tax cut and significant red-tape cutting.

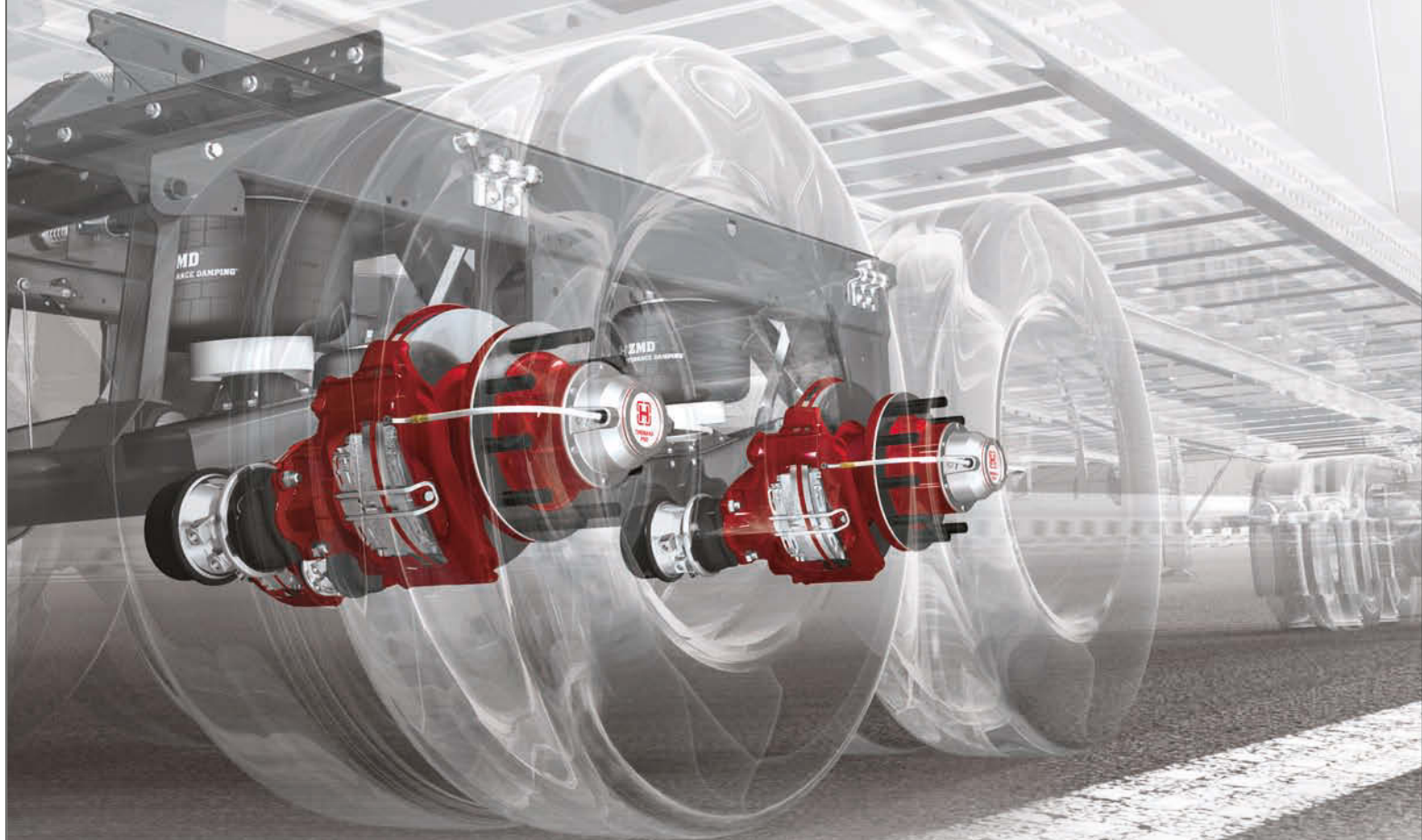
Changes in tariffs are like dropping a rock into a pond. There are many ripples, and it will be some time before the waters are still again. ▀

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# Factors to help determine the lifecycle of tires

Upfront cost, fuel efficiency, tread life, and casing value should be considered to assess the true cost of a tire.

When buying a truck, astute fleets will make the “which truck to buy” decision based in part on lifecycle costs. They know the upfront cost of the truck and can factor in service and PM costs, expected fuel economy, and residual value. It’s a blueprint for success.

With tires, the thought process should be the same. After all, tires are the second largest operating expense after fuel.

Considerations for assessing tire lifecycle include the initial cost, their effect on fuel consumption, the wear life of the tires, and the residual value. For instance, residual

value includes the retreadability of a tire if the fleet is using retreads or the market value of casings if a fleet chooses not to use retreads.

## Tire price

Tire price will be a clear-cut factor when considering different tire models. It’s the first factor when determining the cost of ownership over time, or miles.

Miles to removal is a straightforward measure of tire performance that has typically been used to calculate tire operating cost over time, or miles. Simply divide tire cost (minus casing value if a fleet plans to sell it) by the miles to removal to determine a tire cost per mile.



» Considerations for assessing tire lifecycle include: initial cost, effect on fuel consumption, wear life of the tires, and residual value.

Photo courtesy of Cooper Tire & Rubber

The U.S. EPA SmartWay website suggests that these tires should give a 3 percent improvement on fuel efficiency over non-verified tires. Depending on a fleet’s starting point and which SmartWay tires are selected, it could be significantly more.

To put fuel economy and tires into perspective, annual fuel costs for a truck running 100,000 miles per year, averaging 7 mpg with fuel prices at \$3 per gallon, would be about \$43,000 annually. In this example, every percentage point reduction in fuel consumption would translate to a \$430 savings.

Lower rolling resistance, which is designed to decrease the drag of a tire, can help improve fuel efficiency. SmartWay-verified tires are designed to have a lower rolling resistance. As a SmartWay-verified tire, about 30 to 40 percent of the fuel in the calculation above would be needed just to overcome the loaded tire rolling resistance. Presumably, fleets are already running tires that are at or below

the SmartWay limit for rolling resistance. Now if a fleet selects tires for all positions – tires that actually have rolling resistance 5 percent below their existing fleet tires, for example – then fuel consumption for the new set of tires would drop by up to 2 percent, providing a total savings of \$860 in this example.

If the consideration were only for the drive tires, then the 5 percent improvement in rolling resistance for those drive tires would translate to a little less than 1 percent of total fuel consumption, or about \$400 per year.

It is important to note that fleets will not see an immediate improvement in fuel efficiency the day they replace worn tires with new, more efficient, tires. The new tires will be at full tread depth while the tires they replaced were worn down. The comparison has to be new-to-new.



### By Phillip Mosier

MANAGER OF COMMERCIAL TIRE DEVELOPMENT, COOPER TIRE & RUBBER

Cooper Tire & Rubber Company specializes in the design, manufacture, marketing, and sales of replacement automobile and truck tires. Mosier is a 20-year tire professional, responsible for the design and development of commercial truck and bus tires for the North and South America regions. Mosier and his team have brought to market many successful commercial truck tires in the Cooper Commercial Series and Roadmaster brand tire lines.

## Impact on fuel economy

The effect of tires on fuel economy is far less apparent because there are so many factors that can impact fuel economy. But, it is very important to the total cost of ownership, especially in long haul or regional haul operations where the trucks are constantly rolling. A starting point to assessing good fuel economy is to run only SmartWay-verified tires on all positions.

## Maximizing tread wear

When it comes to fuel efficiency, it’s a hard balance for tire manufacturers to maximize tread wear while reducing rolling resistance. Some SmartWay tires have less tread depth than non-SmartWay tires because the shallower the tread depth, the more fuel-efficient the tire. This is especially the case with drive tires. The big difference between SmartWay and non-SmartWay tires is often in the tread compounding which impacts both rolling resistance and tread wear. The key is to find a SmartWay tire that gives fleets adequate tread depth and miles to removal.

Testing one model of tire against another for either tread wear or fuel efficiency requires careful planning and execution in order to generate data that is valid for decision-making. The Technology & Maintenance Council (TMC) provides recommended practices for both.

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Wear testing can be part of normal operations, which makes it relatively easy. It can be conducted to simultaneously test various steer, drive, and trailer tires against one another. The disadvantage of wear testing is that it takes a long time – at least six months to start – to generate useful data. With that comes the likely loss of some tires, so the initial quantity of tires and trucks needs to be large enough to still allow a valid test.

Fuel economy testing, compared to testing for tread wear, has the advantage of being relatively quick so that decisions can be made and implemented. However, it requires very high attention to detail outside of normal operating practices. Because it requires something beyond the normal day-to-day work, it costs more to conduct it.

Each test run can only evaluate one full set of steer, drive, and trailer tires against another set. This means that to evaluate several different models of drive tires, fleets would have to keep all other tires the same while running tests (and run replications of the tests), then repeat the exercise to evaluate steer or trailer tires.

**Assessing tire casings**

Finally, the integrity of the tire casing is an important factor. This is the “residual value” of the tire.

Look closely at the tire manufacturer’s warranty. It will tell fleets how much confidence the tire manufacturer has in its tire, including the retreadability of the casing. What the warranty offers projects the quality of the tire and gives fleets assurances that the tire will perform as advertised. A fleet’s retreader should be able to advise on rejection rates for various brands of casings and how well a given brand will hold up to multiple retreads.

**Putting it together**

Without including fuel economy differences, here is a quick calculation to analyze tire cost per mile: (Original price – casing value) / drive tire mileage = cost per mile.

Consider these two examples:

**Tire A**

Original price – \$400  
 Casing value – \$40  
 Drive tire mileage – 370,000 miles  
 Cost per mile – 0.0973 cents/mile

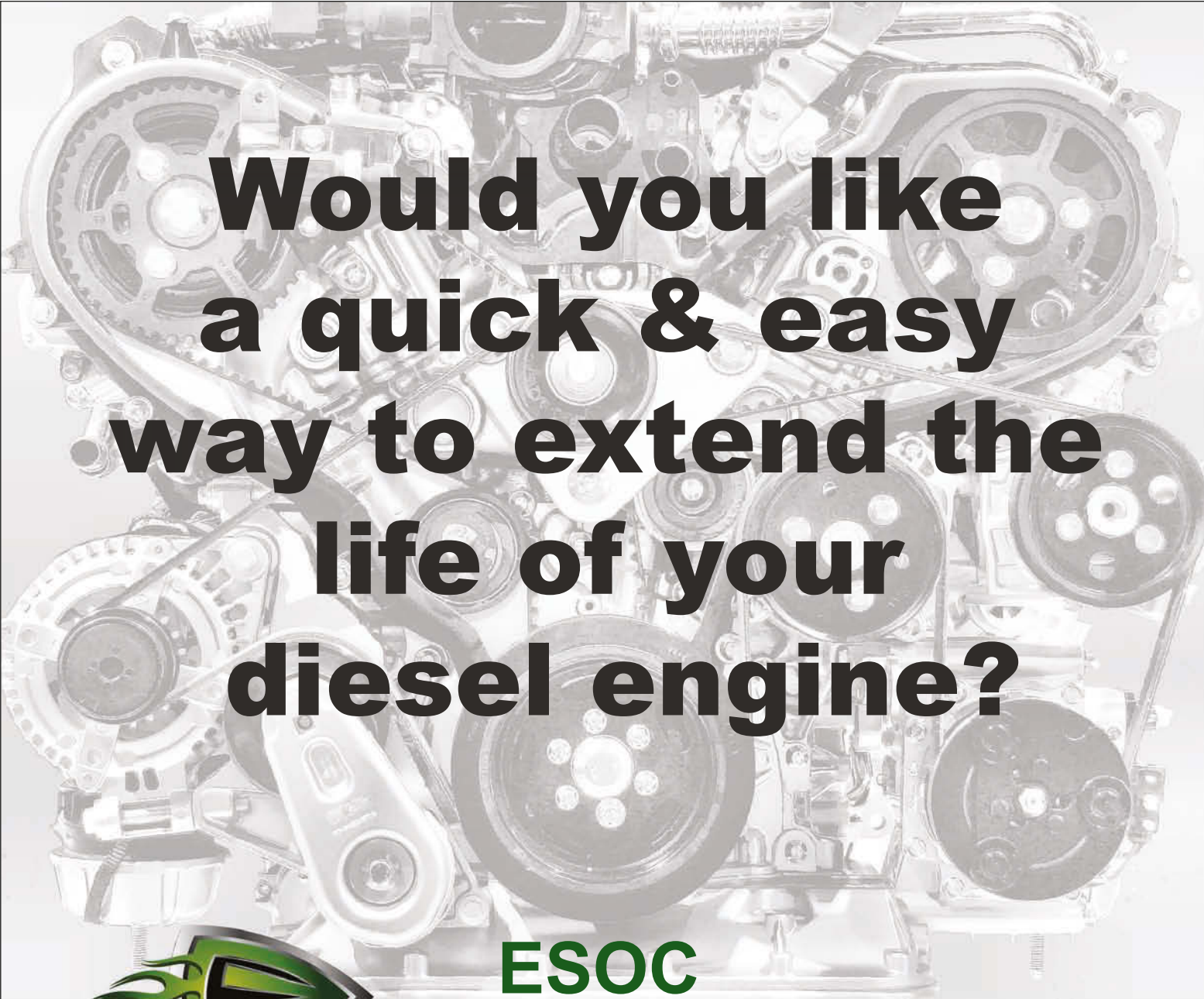
**Tire B**

Original price – \$500  
 Casing value – \$50  
 Drive tire mileage – 400,000 miles  
 Cost per mile – 0.1125 cents/mile  
 Even though Tire B had more miles to removal, it was more expensive to run and not the low cost of ownership winner.

To carry this example further, if a fleet is

running 100,000 miles per year, then the annual cost difference is a little over \$15 per tire or \$120 for eight drive tires. That adds up quickly for a large fleet of trucks.

It is important for fleets to do their homework and take steps to analyze the tire program and factor in cost, miles to removal, fuel economy, and casing integrity. The study will be well worth it. ▀



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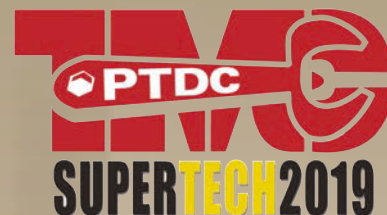
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# TMC SuperTech 2019

TURNING EXPERIENCE INTO PRACTICE



## New Prospects for **TECHNICAL ACHIEVEMENT**

Education • Leadership • Competition • Opportunities

### EVENT

Invitation

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### TMC FALL MEETING

Discover opportunities  
through new prospects

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### TMC MEMBERSHIP

A stepping-stone  
to the future

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Learn how to  
be a leader

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**TMC MEETINGS**

**RALEIGH, NC**  
 September 15-19, 2019  
 2019 Fall Meeting & National  
 Technician Skills Competition  
 Raleigh Convention Center

**ATLANTA, GA**  
 February 24-27, 2020  
 2020 Annual Meeting & Exhibit  
 Georgia World Congress Center

# TECHNOLOGY & MAINTENANCE COUNCIL

TURNING EXPERIENCE INTO PRACTICE

July 1, 2019

Dear Trucking Industry Professional:

As TMC Executive Director, I invite you to attend ATA's Technology & Maintenance Council's 2019 Fall Meeting, Sept. 15-19, at the Raleigh Convention Center in Raleigh, N.C. Once again, TMC's Fall Meeting features a strong slate of educational sessions for equipment professionals, as well as a host of activity geared for truck technicians.

The theme of TMC's 2019 Fall Meeting — **New Prospects for Technical Achievement** — centers around finding answers to the environmental, economic, cybersecurity and regulatory challenges that face our industry. Many of our educational sessions will address these topics, as explained in our fall meeting promotion.

In addition, TMC is holding North America's 15th annual **National Technician Skills Competitions** September 15-17. The event — **TMC SuperTech 2019** — will feature three separate competitions — our traditional (heavy-duty) track, trailer track, and light/medium vehicle track. The event showcases our industry's commercial vehicle technicians, who will compete for top honors and valuable prizes as they demonstrate their diagnostic abilities through a series of skills stations. Organized by TMC's Professional Technician Development Committee (PTDC), TMC SuperTech 2019 will this year start Sunday morning and conclude Monday evening. Awards will be given to the top three technicians and skills station winners during Tuesday evening's Awards Banquet. This year also features our sixth Student Technician Skills Competition, TMC FutureTech 2019, sponsored by the TechForce Foundation. All meeting attendees are welcome to observe the contests.

The Council is also offering the **PTDC Technician Training Fair**. The Fair is expanded for 2019, offering 1-1/2 days of hands-on training sessions starting Tuesday, Sept. 17 and concluding midday on Wednesday, Sept. 18. These sessions are being organized by TMC's Professional Technician Development Committee, and will feature expanded blocks of training on electrical and databus diagnostics, aftertreatment systems, and more. For details, please review the material provided in our meeting brochure, found on TMC's event website: <http://tmcfall.trucking.org>. For information, call (703) 838-1763.

On behalf of TMC's Board of Directors, I encourage you to take advantage of this opportunity and join us at TMC's 2019 Fall Meeting. We look forward to seeing you in Raleigh!

Sincerely,

Robert Braswell  
 TMC Executive Director



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» The theme of this year's TMC Fall Meeting is New Prospects for Technical Achievement.

Photo courtesy of TMC

# Discover opportunities through new prospects in technical achievement

Information about TMC's 2019 Fall Meeting education and study group sessions.

## TMC FALL MEETING

**Today's challenging world of increasing vehicle complexity and rapid technological change demands diligent attention to detail and careful consideration.** Shipper expectations, government regulations, engineering advances, and CSA compliance issues all require commercial vehicle fleets to be ever vigilant in order to stay safe, efficient, and profitable. Smart fleets scrutinize the investments they make for their operations and vehicle maintenance programs, and many turn to American Trucking Association's (ATA) Technology & Maintenance Council (TMC) to help them make smart business decisions on maintenance and specifying issues.

Technology is transforming the way fleets specify and operate equipment in both intentional and unintentional ways. Staying ahead of the learning curve is paramount to maintaining and securing fleet operations. That's why it is appropriate that

the theme of TMC's 2019 Fall Meeting is "New Prospects for Technical Achievement."

This year's meeting will take place September 15-19 at the Raleigh Convention Center in Raleigh, North Carolina

At TMC, equipment and technology professionals can also:

- Participate in TMC's Future Truck Initiative, where TMC and its member companies work together with OEM's to create the industry's standards for future truck technology and equipment that help ensure that the truck of the future is one that is the most efficient to operate and maintain.
- Gain and share information with hundreds of peers at TMC's Shop Talk, a free-form discussion on equipment issues.
- Resolve troublesome equipment issues at TMC's Town Meeting and Fleet Operators' Forum.
- Participate in voluntary standards-setting efforts through TMC's Study Groups and Task Forces, which are addressing important issues such as electronic logging devices, natural gas-powered vehicles, and emerging onboard technologies.

### Educational sessions

TMC's 2019 Fall Meeting offers a comprehensive collection of educational sessions designed to keep your maintenance personnel on the cutting edge of vehicle technology.

### » Technical sessions

#### How to Navigate Aftertreatment System Maintenance, Breakdowns, and Vendor Management Best Practices

##### Technical Session #1

Wednesday, September 18 | 8-9:30 AM

During this session, a panel of fleet, manufacturer, and service provider representatives will discuss best practices for leveraging vendor relationships to minimize costs and downtime when dealing with both local and over-the-road vendors. Topics to be covered include: outsourced maintenance management, purchase order process management, cost management strategies, route optimization and service provider relationships, third-party vendor communication practices, enforcing fleet standards when outsourcing maintenance tasks, how to work with independent shops or outside-of-dealer-network facilities for non-warranty repairs, and adjusting preventive maintenance programs to deal with aftertreatment realities.

Attend this session and learn how fleet practices and procedures — good or bad — directly impact a company's ability to successfully manage aftertreatment-related costs. If you run diesel-powered equipment, this session is a must.

#### New Approaches to Preventive Maintenance, Vehicle Triage, and Shop Design

##### Technical Session #2

Thursday, September 19 | 7:30-9 AM

Through timely, quality preventive maintenance inspections (PMIs), fleet operators should be able to detect, correct, and prevent the development of costly vehicle breakdowns. In addition, a quality PMI program should provide fleets with the maximum return on assets by attaining optimum component life of major vehicle systems before failure or replacement. A PMI program should also provide management with an instrument for predicting vehicle operating costs more accurately.

Attend this session and learn what the latest recommendations are for preventive maintenance. Panelists will also present how technology is changing their approaches to vehicle triage, repair strategies, and shop design. This session will provide attendees practical suggestions and insights they can put to work to reduce PMI costs and increase asset availability.

### » Study group sessions

#### **Rolling Into Greenhouse Gas (GHG) Phase 2 S.2 Tire & Wheel Study Group** Wednesday, September 18 | 3-4:30 PM

Federal "Phase 2" greenhouse gas emission (GHG) /fuel economy requirements aren't just for engine and vehicle manufacturers. Tire manufacturers have to meet tough new standards, too; how they meet these mandates will impact how fleets specify and maintain their rolling stock in the coming decade.

Attend this session and learn what to expect from the next generation of Class 7 and 8 commercial vehicle tires. Tire manufacturer representatives will address their strategies for meeting the new federal requirements and meeting fleet expectations for tire performance. Since fuel and tires represent most fleets' top-two equipment-related costs, this is a session you will not want to miss.

#### **Overcoming Capital Expenditure Restraints and Timing Economic Disposal** S.5 Fleet Maintenance Management Study Group

  
Wednesday, September 18 | 1:15-2:45 PM

During this session, panelists will present details of proven strategies for overcoming these situations and others. For example, cash flow problems might be addressed by turning to short-term equipment rentals or longer-term equipment leasing. If purchasing, longer-term financing or less expensive specifying options might do the trick. We'll also present ideas for building a more effective return on investment (ROI) strategy, such as finding ways to extend service life or achieve longer amortization.

Making do with less and maximizing the value of end-of-life assets are things all fleet managers must master. Attend this session and learn tried and true lessons from industry experts.

#### **A Fresh Look at Automated Manual Transmissions and Clutches** S.6 Chassis & Brake Systems Group

  
Thursday, September 19 | 9:15-10:45 AM

While it's true some veteran drivers will always prefer traditional manual transmissions, many are singing the praises of the

automated manual gearbox. Automated manual transmissions (AMTs) help drivers stay better focused on driving and be less fatigued while on duty. Fleets recognize AMTs help them recruit and retain drivers, as well as improve overall fleet fuel economy. In fact, AMTs are the primary spec in many fleets now because of these and other benefits.

Attend this session and learn what your fleet needs to know about specifying and maintaining the latest generation of AMT offerings. We will cover tooling and training requirements for technicians, as well as strategies for improving driver training and acceptance. We'll also provide insights into what the next generation of AMT technology will look like in the coming decade.

#### **How to Spec and Maintain Trailers for Your Operation's Lifecycle** S.7 Trailers, Bodies, and Material Handling Study Group

  
Wednesday, September 18 | 3-4:30 PM

Fleets that don't pay close attention to trailer specs will ultimately learn the hard way that the 12- to 20-year trailer they purchased is not going to experience the service life they expected. Disposing of units that don't meet the first owner's expectations will be much more challenging when it comes time to sell to a second owner. Doing all of this isn't easy as it is very vocation dependent. What works well in one operation can be a disaster in another.

Attend this session and learn from our panel of experts how to spec and maintain a trailer to your operation's expected duty cycle. We'll present recommendations based on fleet experience and existing TMC Recommended Practices covering trailer bodies, flooring, doors, chassis, and much more.

#### **Fleet Experiences in Achieving Fuel Efficiency Gains** S.11 Sustainability and Environmental Technologies Study Group

  
Thursday, September 19 | 9:15-10:45 AM

If there's one constant truth about fleet management it's that you don't have to convince fleet managers on the virtues of saving fuel. The trick is, of course, finding the right combination of specifying options, technology, and techniques to maximize one's efforts at achieving maximum fuel savings for a given application.

Attend this session as presenters will offer fleet experiences in achieving and verifying fuel efficiency gains. Representatives from fleets as well as fleet testing and research organizations will share data and case studies as to what works when it comes to maximizing fuel economy for a range of different industry applications.

#### **What's Next in Vehicle Databus Architecture and Diagnostics?** S.12 Onboard Vehicle Electronics Study Group

  
Wednesday, September 18 | 9:45-11:15 AM

Attend this session and learn what's coming as it relates to current and future databus technology to support the specialty and higher data throughput requirements of future electronic systems. We will cover "CAN with Flexible Data Rate (CAN-FD)," "Local Interconnect Network (LIN)," and "Automotive

Ethernet" and shed light as to when these will be appearing on your fleet's vehicles.

Truck manufacturers will be asked to present the databus types they will be using for 2020 vehicles — both at the diagnostic connector as well as behind the diagnostic connector. We'll also address the issue of using specialty cables instead of software scanning the channels on the diagnostic connector and what that means for vehicle maintenance operations and RP1210 compliance.

#### **The Evolution of a Professional Diesel Technician** S.16 Service Provider Study Group

  
Wednesday, September 18 | 9:45-11:15 AM

Great technicians and shop leaders aren't born — they're developed. Given our industry's technician shortage, it's critical that maintenance operations "get it right the first time" when it comes to onboarding, training, and developing their technical talent — especially at a time when the equipment technicians are expected to service is evolving as rapidly as the training environment itself.

Attend this session and learn from our panel of experts how to create opportunities for the greenest rookies all the way to the most seasoned veterans, and thereby ensuring continued success and improvement for your company's maintenance services operations. We'll focus on the process of transitioning technicians to supervision, management, and other maintenance departments or roles such as warranty and training.

#### **Corrosion of Suspension and Underride Components** S.17 Corrosion Control Study Group

  
Wednesday, September 18 | 4:45-6 PM

Anything in the "hot zone" of the vehicle is subject to the corrosive effects of salt and deicing chemicals, but the hidden underbelly of the truck is especially susceptible to this serious and costly problem. If not properly addressed through specification and maintenance, corrosion can quickly degrade critical components of frames, spring and air suspensions, and substructures such as rear impact guards on trailers.

Attend this session and learn what your fleet needs to know to protect itself from the perils of corrosion. We'll review the latest activity from the 7 Corrosion Control Study Group, including RP 1705, "Guidelines for Corrosion Protection During Chassis Modifications."

### » TMC New Technology Presentations

  
Wednesday, September 18 | 4:45-6 PM

TMC's New Technology Presentations inform council members of innovative features or applications of new technologies without engaging in blatant merchandising, advertising, or harmful competitive references. Products presented should be in production and available to the industry at the time the request is made. Products shown must be a component, tool, or service used in the commercial transportation industry that is conceptually unique in its design — from a manufacturer or service supplier company which is an active TMC member in good standing. Marginal improvements or 'upgrades' of existing products will not be considered for presentation. ■

## TMC Fall Meeting Schedule

### SUNDAY, SEPT. 15

**7 AM to 8:30 AM**  
TMC SuperTech 2019 Heavy Duty Track Orientation and Qualifying Written Exams

**9 AM to 4 PM**

TMC SuperTech 2019 Heavy Duty Track Qualifying Rounds

**7 PM to 8 PM**

TMC SuperTech 2019 Welcome Reception and Hands-on Skills Challenge Finalists Announcement

### MONDAY, SEPT. 16

**7:30 AM to 4 PM**

- TMC FutureTech 2019 National Student Technician Competition
- Trailer Track Competition
- Light/Medium Track Competition

**8 AM to 4 PM**

Traditional (Heavy Duty) Track Hands-on Skills Challenge finals

### TUESDAY, SEPT. 17

TMC's 2019 Fall Meeting officially opens Tuesday, which is also Task Force Day

**8 AM to 3 PM**

PTDC Technician Training Fair

**5:30 PM to 6:45 PM**

Town Meeting and Fleet Operators' Forum

**7:30 PM to 9:30 PM**

TMC SuperTech 2019 and TMC FutureTech 2019 Awards Banquet

### WEDNESDAY, SEPT. 18

Technical Sessions and Study Group Sessions take place throughout the day, as well as TMC's industry luncheon and evening social event and dinner.

**8 AM to 9:30 AM**

Technical Session No. 1: How to Navigate Aftertreatment System Maintenance, Breakdowns, and Vendor Management Best Practices

**9:45 AM to 11:15 AM**

Study Group Sessions:

- S.12 Onboard Vehicle Electronics
- S.16 Service Provider

**1:15 PM to 2:45 PM**

Study Group Sessions:

- S.5 Fleet Maintenance Management

**3 PM to 4:30 PM**

Study Group Sessions:

- S.2 Tire & Wheel
- S.7 Trailers, Bodies, and Material Handling

**4:45 PM to 6 PM**

Study Group and Technical Sessions:

- New Technology Presentations
- S.17 Corrosion Control

### THURSDAY, SEPT. 19

Technical Sessions, Study Group Sessions, and Shop Talk take place.

**7:30 AM to 9 AM**

Technical Session No. 2: New Approaches to Preventive Maintenance, Vehicle Triage, and Shop Design

**9:15 AM to 10:45 AM**

Study Group Sessions:

- S.6 Chassis and Brake Systems Study Group
- S.11 Sustainability and Environmental Technologies

**12:30 PM**

TMC's 2019 Fall Meeting concludes



» With technology transforming the way fleets specify and operate equipment, TMC's Fall Meeting educational sessions will help keep fleets ahead of the curve.

Photo courtesy of TMC

## How to register for TMC's 2019 Fall Meeting

### REGISTRATION, ACCOMMODATIONS, AND TRAVEL

To register for TMC's 2019 Fall Meeting, attendees can submit their application by mail, fax, or online before August 16. Registration fees increase after this date.

The fastest option for registration is to visit: [tmcfall.trucking.org](http://tmcfall.trucking.org). If you cannot register online, you may download a TMC registration form at [tmcfall.trucking.org](http://tmcfall.trucking.org) and register by mail or fax using the following contact information:

Mailing address: TMC Meeting Registrations PO Box 101360 Arlington, VA 22210-4360  
Fax: (703) 838-1701  
Email: [registrations@trucking.org](mailto:registrations@trucking.org)

*\*TMC will not process your meeting registration over the telephone. Payment or credit card information must accompany your registration.*

### REGISTRATION FEES

First-time fleet attendees are eligible for a \$200 discount if registered on or before August 16.

#### On or before August 16, 2019:

- TMC or ATA Member - \$575
- First-Time Fleet Member (TMC or ATA) - \$375
- Non-Member - \$675
- First-Time Non-Member - \$475
- Spouse Program (2-day event) - \$350

#### After August 16, 2019:

- TMC Member - \$675
- TMC Non-Member - \$775
- Spouse Program (2-day event) - \$400

#### TMC SuperTech and TMC FutureTech 2019 contestants, judges, and observers:

All contestants must complete a printed form and sign the disclosure prior to mailing or faxing. Download the registration form at [tmcfall.trucking.org](http://tmcfall.trucking.org). A unique email is required to receive competition study materials and rules prior to the event.

Registration for contestants is \$275 for TMC/ATA members; \$375 for non-members. Registration for judges and observers is \$275 for TMC/ATA members; \$375 for non-members.

# Job Well Done...THANKS TMC!

Join ATA's Technology & Maintenance Council



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# TMC

TURNING EXPERIENCE INTO PRACTICE

ATA BUSINESS SOLUTIONS



» TMC SuperTech is considered trucking's only industry-wide national technician skills competition.

Photo courtesy of TMC

# Finding the best of the best

## Six steps to participating in the TMC National Technician Skills Competitions

### COMPETITION FRAMEWORK

TMC SuperTech 2019 marks the 15th anniversary of the Technology & Maintenance Council (TMC) National Technician Skills Competitions, designed to determine the industry's top technician through a variety of troubleshooting tests and skills challenges.

Organized by TMC's Professional Technician Development Committee (PTDC), TMC SuperTech 2019 will showcase the high degree of skill and knowledge shown every day by trucking industry technicians. This competition is considered trucking's

only industry-wide competition dedicated both to honoring technician professionalism and acknowledging the "best of the best."

This year's competition schedule includes a written test, a series of qualifying rounds, and the final Hands-on Skills Challenge. For 2019, there will be three professional tracks — traditional (heavy duty), trailer, and light/medium vehicle. The traditional (heavy duty) track spans two days — Sunday and Monday. The trailer and light/medium tracks will take place on Monday.



### TMC FutureTech 2019

The National Student Technician Competition consists of a set of skill stations for technician students to be held on Monday, September 16. Winners will be announced at Tuesday's TMC SuperTech 2019 Awards Banquet, which is open to both contestants and meeting attendees. Student registration is limited to 80 individuals for 2019. The student competition registration fee is \$200. The registration cutoff is August 16.

"TMC's Professional Technician Development Committee organizes skills competitions to further our efforts to promote careers for professional commercial vehicle technicians in all segments of the trucking industry," said Robert Braswell, executive director of ATA's Technology & Maintenance Council. "For 2019, TMC is able to continue the National Student Technician Competition thanks to our official sponsor, the TechForce Foundation."



Sponsored by:

### How to get involved

#### Step 1 Register

Any technician employed in the trucking industry may register for TMC's National Technician Skills Competitions and must do so by the August 16 deadline.

The entry fee for TMC technician members is \$275. The entry fee for non-member technicians is \$375, which also includes TMC technician membership for the balance of 2019. The entry fee is waived for verified champions of 2019 state trucking association technician skills contests.

#### Step 2 Come to Raleigh

The competitions will be held at the Raleigh Convention Center, Sept. 15-16. Registration opens Saturday, September 14, where attendees will be given TMC SuperTech credentials. The orientation takes place Sunday, September 15 at 7 AM.

#### Step 3 Compete in the qualifying rounds

All traditional (heavy duty) track contestants will compete in qualifying rounds on Sunday, September 15, consisting of several hands-on skill pre-qualification tests. There are no qualifying rounds for the trailer or light/medium technician tracks.

#### Step 4 Attend the reception

After the qualifying rounds, at the TMC SuperTech 2019 Reception contestants who will compete in the traditional (heavy duty) track finals on Monday, September 16 will be announced. A maximum of 119 traditional track contestants will advance to compete in Monday's Hands-on Skills Challenge. Certified grand champions from State Trucking Association contests will automatically be included in the Hands-on Skills Challenge.

#### Step 5 Enjoy the finals

On Monday from 8 AM to 4 PM, qualifying contestants will compete in a

### TMC SuperTech 2019 Schedule

#### Sunday, September 15 7 to 8:30 AM

TMC SuperTech 2019 Heavy Duty Track Orientation and Qualifying Written Exams

#### 9 AM to 4 PM

TMC SuperTech 2019 Heavy Duty Track Qualifying Rounds

#### 7 to 8 PM

TMC SuperTech 2019 Welcome Reception and Hands-on Skills Challenge Finalists announcement

#### Monday, September 16 7:30 AM to 4 PM

- TMC FutureTech 2019 National Student Technician Competition
- Trailer Track Competition
- Light/Medium Track Competition

#### 8 AM to 4 PM

Traditional (Heavy Duty) Track Hands-on Skills Challenge finals

#### Tuesday, September 17 7 to 8 PM

TMC SuperTech 2019 and TMC FutureTech 2019 Awards Banquet

series of stations, covering a variety of diagnostic skills areas. Observers are welcome on the competition floor, too.

#### Step 6 Attend the awards banquet

The winners of the competition will be announced and presented trophies and prizes during TMC's Industry Awards Banquet. Awards will be given for first, second, and third best in the overall competition and separately for the trailer track. Winners will also be named for those receiving the best score at each skills station.

First Place: TMC SuperTech Grand Champion will receive an expense-paid trip to the 2019 Daytona 500, plus other prizes. The winner will also be presented with a special trophy and his or her name will appear on the TMC SuperTech Grand Champion Banner that is displayed at every TMC meeting. Second place and third place winners will also receive trophies and valuable prizes. Individuals who place "Best in Skills Category" will be recognized as well. ■



# Overview of competition tracks

Competition Skill Stations will consist of the following skill areas:

## SUNDAY: Qualifying Rounds

There will be a total of 13 skill stations in Sunday's qualifying round. Each station, featuring table-top equipment mock-ups, will be divided into 10 substations. Each station rotation will last 25 minutes. The 13 stations will be:

- HD1: Written Test (two rotations)
- HD2: RP Manual
- HD3: Wiring Diagrams
- HD4: Safety & Environmental
- HD5: Fuels & Lubricants
- HD6: Coolants & DEF
- HD7: Aftertreatment #1
- HD8: Electrical Circuits
- HD9: Fasteners
- HD10: Precision Measuring
- HD11: Service Information
- HD12: CSA Compliance
- HD13: Cybersecurity

## MONDAY: Hands-on Skills Challenge (Finals)

There will be a total of 13 skill stations in Monday's Hands-on Skills Challenge. Each station will be divided into seven substations. Each station will last 25 minutes including an opening two-minute instruction period. The 13 stations will be:

- HD14: Brakes (two rotations)
- HD15: Wheel End
- HD16: Fifth Wheel
- HD17: Liftgates
- HD18: Heating, Ventilation, & Air Conditioning (HVAC)
- HD19: Tire & Wheel
- HD20: Tractor Preventive Maintenance
- HD21: Starting & Charging
- HD22: Steering & Suspension
- HD23: Telematics
- HD24: Aftertreatment & Integrated Powertrains (two rotations)
- HD25: Holding Pen #1
- HD26: Holding Pen #2

*Twenty-five minutes will be allotted to each cycle. Orientation, instructions, and task completion will occur within this time allotment. At end of 25 minutes, with appropriate signal, contestants will be escorted to next station within rotation.*

## TRAILER TECHNICIAN TRACK

The Trailer Technician Track will consist of the following skill areas:

- T1: Written Test (two rotations)
- T2: 7-Pin Receptacle & Plug Repair
- T3: Hydraulics
- T4: Electrical Circuits
- T5: Trailer Wheel End
- T6: Precision Measuring
- T7: Trailer Fasteners
- T8: Trailer Preventive

Maintenance Inspection (PMI)

- T9: Trailer Alignment
- T10: Roll-up Doors
- T11: Trailer Lighting
- T12: Liftgates
- T13: Central Tire Inflation
- T14: Trailer Electrical Corrosion
- T15: Trailer Antilock Braking System (ABS)
- T16: Trailer Telematics

*Twenty-five minutes will be allotted to each cycle. Orientation, instructions, and task completion will occur within this time allotment. At end of 25 minutes, with appropriate signal, contestants will be escorted to next station within rotation.*

## LIGHT/MEDIUM TECHNICIAN TRACK

The Light/Medium Technician Track will consist of the following skill areas:

- LM1: Written Test
- LM2: Fasteners
- LM3: Wiring Diagrams
- LM4: RP Manuals
- LM5: Coolants & DEF
- LM6: Precision Measuring
- LM7: Electrical Circuits
- LM8: Hydraulics & Drivebelts
- LM9: Fuel & Lubricants
- LM10: Wheel End
- LM11: EVAP Systems
- LM12: LMV Preventive Maintenance
- LM13: Inspection (PMI)
- LM14: Service Information
- LM15: LMV Aftertreatment

*Twenty-five minutes will be allotted to each cycle. Orientation, instructions, and task completion will occur within this time allotment. At end of 25 minutes, with appropriate signal, contestants will be escorted to next station within rotation.*

## TMC FutureTech 2019 STATIONS

- FT1 ASE Written Test (two rotations)
- FT2: Fasteners
- FT3: RP Manuals
- FT4: Service Information
- FT5: Wiring Diagrams
- FT6: PMI
- FT7: Electrical Circuits
- FT8: Safety & Environmental
- FT9: Fuel & Lubricants
- FT10: Precision Measuring
- FT11: Coolants & DEF
- FT12: Trailer Lighting
- FT13: Trailer Wheel End
- FT14: Aftertreatment
- FT15: Hydraulics & Drivebelts

*Twenty-five minutes will be allotted to each cycle. Orientation, instructions, and task completion will occur within this time allotment. At end of 25 minutes, with appropriate signal, contestants will be escorted to next station within rotation.*

# TMC Recommended Practices Enter Appeal Period

The Technology & Maintenance Council (TMC) of American Trucking Associations is proposing adoption of the following Recommended Practices.

- Proposed RP 182(T), *Troubleshooting 12-Volt Cranking and Charging Systems Equipped With Three Terminal Ultracapacitors*. This Recommended Practice (RP) provides a sequential procedure for evaluating or troubleshooting the electrical charging and cranking systems of heavy-duty vehicles with three-terminal ultracapacitors (UCs) which utilize the added third "S+" terminal design during a pilot inspection, preventive maintenance (PM) inspection, or repair/diagnostic procedure.
- Proposed RP 184(T), *High-Voltage Cable For Heavy-Duty Truck Wiring Systems*. This RP defines the terminology and specifications for high-voltage primary or shielded cable that meets the performance requirements needed to design and service heavy-duty truck, tractor or trailer electrical systems.
- Proposed RP 203E(T), *Truck/Bus Tire regrooving*. This RP presents two federal regulations that must be followed when regrooving heavy-duty truck and bus tires, and covers the recommended steps that should be followed to avoid causing damage to the tire.
- Proposed RP 230C(T), *Tire Test Procedures For Tread Wear, Serviceability and Fuel Economy*. This RP provides guidelines on tire testing procedures.
- Proposed RP 231C(T), *Wheel System Maintenance Labeling Guidelines*. This RP establishes a standard format for wheel system maintenance labels that are installed by fleets and original equipment manufacturers on trucks, tractors, trailers, chassis, dollies and other vehicles.
- Proposed RP 232B(T), *Inspection Procedures To Identify Potential Sidewall "Zipper Rupture" In Truck and Bus Tires*. This RP provides inspection procedures for identifying potential circumferential ruptures, also known as "zipper ruptures" on truck and bus tires (Load Range "F" and higher) and light truck tires (Load Range "E" and lower) of steel cord radial construction.
- Proposed RP 239B(T), *Commercial Vehicle Tire Inflation and/or Monitoring Systems Guidelines*. This RP covers current capabilities and basic operation of tire inflation and pressure monitoring systems. It is designed to help fleets select tire inflation and monitoring systems for commercial truck tires.
- Proposed RP 240B(T), *Steel Wheel and Rim Refinishing Guidelines*. This RP provides guidelines and inspection criteria for steel wheel and rim refinishing and for evaluating refinishing suppliers.
- Proposed RP 264(T), *Guidelines For Tire Shop Tools and Equipment*. This RP provides guidelines for setting up or making improvements to tire shop work areas and service vehicles. These tool and equipment recommendations apply to the servicing of tire/wheel assemblies on Class 4-8 vehicles.
- Proposed RP 332C(T), *Guidelines For Hoses, Clamps, and Fittings For Cooling and Charge Air Cooler Systems*. This RP addresses the proper use of hose clamps used on all engine support systems. It describes the proper matching of hose clamp and hose application on cooling and charge air cooler engine support systems.
- Proposed RP 414C(T), *Truck Cab Air Conditioner Specification Guidelines*. This RP is designed to help industry professionals reduce heavy-duty truck air conditioner problems through better specifications when purchasing and designing new vehicles.
- Proposed RP 445(T), *Power Management Strategies For In-Cab Medical Devices (PAP)*. This Recommended Practice (RP) offers guidelines for specifying and implementing power management strategies for in-cab, air pressure medical devices, such as Type A,B and C positive airway pressure (PAP) devices used in the treatment of sleep apnea.
- Proposed RP 631C(T), *Recommendations For Wheel End Lubrication*. This RP offers equipment users recommendations and operational considerations for selecting, inspecting and using lubricants in wheel end applications for Class 3-8 trucks, buses, tractors, and trailers designed for on-highway applications.
- Proposed RP 746A(T), *Drawbar Length Considerations*. This RP offers a comprehensive source of information for fleets and manufacturers to use when specifying drawbar lengths on commercial vehicles with the exception of driveaway/towaway and stringer-steered applications.
- Proposed RP 1115A(T), *Guidelines For Qualifying Products Claiming a Fuel Economy Benefit*. This RP provides equipment users with guidelines on how to qualify, or critically review, product claims of improved fuel economy.
- Proposed RP 1616A(T), *Mobile Maintenance Safety*. This RP helps ensure that mobile maintenance technicians have as safe of a work environment as possible. This RP outlines safety protocols and procedures for running a mobile maintenance operation.

Any party may submit a written request of appeal of a proposed Recommended Practice (RP). However, the request must be received by the Technology & Maintenance Council within 90 days of publication of this notice. If no appeals are made at the end of the 90 days, the RP will be formally adopted by TMC. (The suffix "T" indicates an RP is proposed.)

With the printing of this issue of *Fleet Maintenance*, the following RPs are now open to the 90-day appeal process. Written appeals can be sent to TMC Technical Director Jack Legler, 950 N. Glebe Road, Arlington, VA 22203. Phone: (703) 838-7956; jlegler@trucking.org

# TMC Task Forces to Meet September 17, 2019 in Raleigh, N.C.

The following Task Forces of the Technology & Maintenance Council (TMC) will meet in open session on Tuesday, September 17, 2019 at the Raleigh Convention Center in Raleigh, N.C. Task Force meetings are scheduled for approximately one hour and will take place between 8 am and 4 pm. Parties wishing information on how to attend specific Task Forces should contact TMC headquarters at (703) 838-1763 or visit <http://tmc.trucking.org>.

- S.1 Electrical**
  - RP Updates (S.1)
  - Electrical Infrastructure Safety and Interoperability for High-Power Electrical Refrigeration
  - High-Voltage Cable for Heavy-Duty Truck-Tractor Wiring Systems
  - Non-Connector Based Wiring Repairs
  - Fifth Wheel Ground Strap Installation Guidelines
  - RP 110C Update (Low-Tension Cable For Heavy-Duty Truck-Tractor Wiring Systems)
- S.2 Tire & Wheel**
  - RP Updates (S.2)
  - Tire Asset Management (Cradle to Grave)
  - Specification of Tires for Heavy-Duty Electric Vehicles
  - Repolishing Aluminum Wheels
  - Driver Pocket Guide for Tires and Wheels
  - Kill the Mallet
  - Effects of Regenerative Braking on Tires
  - Proper Tire Inflation Procedures Outside the Safety Cage
- S.3 Engine**
  - RP Updates (S.3)
  - RP 364 Update (Fleet Purchasing Specification for Organic Acid Technology Extended Life Coolant)
  - Guidelines for Diesel Particulate Filter Cleaning
  - Smoke Detection Guidelines
  - RP 371 Update (LNG/CNG)
  - RP 338 Update (Extended Service Interval Coolants)
  - RP 326 Update (Recycled Engine Coolant)
  - LNG/CNG Thermal Events
  - RP 365 Update (Coolant Maintenance Guidelines)
- S.4 Cab & Controls**
  - RP Updates (S.4)
  - RP 430 Update (Guidelines for Collision Warning)
  - RP 443 Update (In-Cab Cleaning & Deodorizing Guidelines)
  - In-cab Gas Detectors
  - Conversion of Rear View Mirrors to Cameras
- S.5 Fleet Maintenance Management**
  - VMRS Codes Committee
  - RP Updates (S.5)
  - RP 512A Update (Technician Staffing)
  - Developing Key Performance Indicators
  - Cybersecurity Issues
  - Internet of Things
  - Right to Repair
- S.6 Chassis & Brake Systems**
  - RP Updates (Chassis-Related RPs)
  - RP Updates (Brake-Related RPs)
  - RP 602/626 Update (Towing Procedures)
  - RP 605 Update (Reconditioning Brake Shoes)
  - RP 614A Update (Air Brake Tubing & Fittings)
  - RP 608B Update (Brake Drums and Rotors)
  - RP 648 Update (Troubleshooting Ride Complaints)
  - Disc and Drum Brake Integration Issues
  - RP 638 Update (Heavy-Duty Clutch Maintenance)
  - RP 642B Update (Total Vehicle Alignment)
  - Rear Suspension Inspection Procedure
  - Proper Diagnosis of S-cam Out-of-Service Criteria
  - RP 652 (Air Disc Brake Service/Inspection)
  - Wheel End Thermal Events (Joint S.6/S.7)
- S.7 Trailers, Bodies & Material Handling**
  - RP Updates (S.7)
  - RP 708C Update (Trailer Axle Alignment)
  - Van Trailer Washing Procedures and Testing
  - Cryogenic Cooling Systems
- S.8 Heavy Haul Trailer Issues**
  - RP 755 Update (Alternative Liftgate and Material Handling Charging Methods)
- S.11 Sustainability & Environmental Technology**
  - RP 1112 Update (Lightweight Components and Fuel Economy)
  - RP 1105 Update (Idle Limiting Systems)
  - Future Energy Conservation (Joint with Future Truck)
  - SmartWay Activities
  - Alternative Energy Implementation Elements
  - Terminal Tractor Powertrain Options
  - RP 1118 Update (Cost Modeling for Aerodynamic Devices)
- S.12 On-Board Vehicle Electronics**
  - RP 1226 Messaging Standardization
  - RP 1208D Update (PC Selection Guidelines for Service Tool Applications)
  - RP 1210C Update (Windows API)
  - RP Updates (S.12)
  - Mobile Device Communication API
  - RP 1210 Compliance
  - RP 1210 OEM Application Validation Testing
  - Connected Vehicle
  - Electronic Logging Devices (ELDs)
  - Open Wireless Vehicle Data Adapter API
- S.14 Light- & Medium-Duty / Specialty Trucks**
  - RP 1514 Update (Hydraulic System Failure Analysis)
  - RP 1412 Update (Walk-in Van Electrical System Routing/Load Requirements)
  - Work Truck Platform Hybridization
  - RP 1411 Update (Light- & Medium-Duty Auto Transmission Fluid Guidelines)
  - Inspection of CMV Axle and Transmission Fluid Levels
- S.16 Service Provider**
  - Implementing TMC RPs in Fleet & Service Provider Operations
  - Safety Guidelines for Mobile Maintenance
  - Developing and Leveraging Next Generation Leaders
  - Refinishing to Maximize Adhesion
  - Heavy-Duty Collision Repair Roadmap
  - RP Updates (S.16)
  - Frame Correction
  - Proper Vehicle Lifting Procedures and Equipment
- S.17 Corrosion Control**
  - Corrosion of Non-Ferrous on Chassis and Suspension
  - Corrosion Manual Update
- S.18 Automated Vehicles**
  - Automated Vehicles
  - Platooning
  - Electrified Vehicle
- Educator Committee**
  - Curriculum Development
  - Educator Involvement
  - NATMI Curriculum Advisory
  - Credentials for Truck Program Instructors
  - Grant Writing for Medium/Heavy Truck Programs
- Professional Technician Development Committee**
  - No PTDC Task Forces meet at the fall meeting.
- Future Truck Committee**
  - Future Electrical/Electronic Systems
  - Future Tire Reliability/Durability
  - Future Alternate Propulsion Systems
  - Future Cab and Driver Interface
  - Sensor-Enhanced Maintenance
  - Future Chassis and Brake Systems
  - Augmented and Virtual Training
  - Future Trailer Productivity

# Maximize training opportunities at TMC

In-depth hands-on and classroom training available to all attendees

## PTDC TRAINING FAIR



» PTDC Training Fair sessions qualify for continuing education credit by the ASE Education Foundation.

E.Schueller

**All Technology & Maintenance Council (TMC)** attendees and TMCSuperTech2019 contestants may attend the Professional Technician Development Committee (PTDC) Training Fair, a series of hands-on training sessions designed for technicians, shop supervisors and fleet managers. This training qualifies for continuing education credit units accepted by the ASE Education Foundation. There will be a mix of in-depth hands-on and classroom-style sessions during the one-and-a-half-day Training Fair, so attendees can maximize the number of training opportunities.

### Details on sessions



#### Session 1 – Innovative Approaches to Electrical Diagnostics and Repair

Tuesday, September 17 — 8 AM-12 PM

During this session, we will cover basic and advanced electrical diagnostic and repair techniques to help you improve your ability to understand the concepts needed to work on today's vehicle electrical systems. This is an in-depth, four-hour training session to be held on the competition floor.



#### Session 2 – Vehicle Aftertreatment Systems: Maintenance, Diagnostics, and Repair

Tuesday, September 17 — 8 AM-12 PM

During this session, we will cover basic and advanced diagnostic and repair techniques you need to effectively service and maintain today's vehicle emissions aftertreatment systems. This is an in-depth, four-hour training session to be held on the competition floor.



#### Session 3 – Innovative Approaches to Vehicle Electronics/Databus Diagnostics and Repair

Tuesday, September 17 — 1-5 PM

During this session, we will cover basic and advanced vehicle electronic/databus diagnostic and repair techniques to help you more effectively service and maintain today's vehicle electronic systems. This is an in-depth, four-hour training session to be held on the competition floor.



#### Session 4 – Roll-up Doors: Fundamentals of Inspection and Preventive Maintenance

Tuesday, September 17 — 1-2 PM

This session will provide participants the opportunity to take a deep dive into TMC RP 761, "Overhead Door Maintenance Guidelines for a Dry Van or Body," and its detailed maintenance and inspection checklist. The presentation will cover routine checkpoints to consider when inspecting a roll-up door system, what to diagnose, and how to set corrective action if needed.



#### Session 5 – Sensors, SPNs, and FMIs: What Every Technician Should Know

Tuesday, September 17 — 2-3 PM

This session will cover the relationship between sensors and subject parameter numbers (SPNs). An explanation of failure mode identifiers (FMIs) and how they are linked to various modes of failures will be included, along with sensor theory of operation and failures.



#### Session 6 – Tool Box Talk

Wednesday, September 18 — 8-9:30 AM

Patterned after TMC's successful Fleet Talk and Shop Talk, Tool Box Talk is a free and open discussion of shop floor issues just for technicians. Bring your most pressing questions and best ideas to share with your peers. This session will be facilitated by industry veterans.



#### Session 7 – How to Implement LEAN/Six Sigma Techniques on the Shop Floor: For Technicians and Managers

Wednesday, September 18 — 9:45 AM-12 PM

During this two-hour session, technicians and managers will work through real diagnostic problems using LEAN/Six Sigma approaches, designed to eliminate waste and increase efficiency in finding solutions. A cross-disciplinary approach will help technicians and managers see each other's perspectives during this interactive session. ■



» TMC's Recommended Practices assist equipment maintenance staff with guided shop processes and procedures.

E.Schueller

# A stepping-stone to the future

TMC membership can help industry members with professional development and growth.

By Janet Howells-Tierney, director of council development, TMC

## MEMBERSHIP

The smooth operation of any trucking company relies heavily on the proper maintenance of its equipment. A well-staffed maintenance shop includes trained technicians, supervisors, and managers who strategize how to eliminate breakdowns and increase efficiencies.

ATA's Technology & Maintenance Council (TMC) recognizes the importance of the equipment maintenance staff – especially the frontline technician – and develops Recommended Practices (RPs) to guide shop processes and procedures. Along with RPs, TMC provides an arena for networking with peers and real-time discussions about maintenance issues.

### Where to begin

Technicians can get their foot in the TMC door by participating in the annual National Technician Skills Competitions. The competitions – also known as TMC SuperTech – have challenged hundreds of professional technicians since 2005. The event features a written test (based on ASE standards) and skills stations that focus on various systems of heavy equipment such as wheel ends or HVAC. All skills stations are chosen by TMC's Professional Technician Development Committee (PTDC), which includes maintenance professionals and notable contestants from past competitions. The PTDC is also responsible for organizing training fairs that are offered in conjunction with TMC SuperTech.

Often technicians who participate and succeed in TMC's competitions become valuable trainers in their own organizations. The most successful trucking companies constantly train their maintenance shop technicians in the basics – such as scheduling of preventive service – as well as how to maintain new technologies which are becoming more prevalent in heavy equipment – such as safety tools that prevent over-the-road accidents.

As technicians improve their skills, they are often tapped to be shop supervisors and maintenance managers with increasing responsibilities. At the same time, their relationship with TMC often shifts from being tested at TMC SuperTech to being a tester – or they take the big step towards helping to develop industry standards in the form of Recommended Practices.

TMC is made up of 15 Study Groups or Committees that focus on various truck systems. TMC Study Groups identify current issues in their area and create educational sessions to explore possible solutions.

Under each TMC Study Group are multiple Task Force committees that work to develop RPs to address particular issues facing the specific equipment system.

### Other learning opportunities

TMC membership has other benefits for rising fleet professionals. Over the past year, dozens of TMC members have taken advantage of educational opportunities through the North American Transportation Management Institute's (NATMI) Certified Director/Supervisor of Maintenance

certification courses. Classes are scheduled at various times during the year and usually in conjunction with a TMC meeting.

Or for a real-time benefit, check out the TMC/FleetNet America Vertical Benchmarking Program, a roadside breakdown benchmarking service which enables companies to compare their fleets' unscheduled roadside repairs with those of comparable fleets. The program works by tracking what systems are failing and compares that to similar fleets, which assists TMC members in reviewing the effectiveness of their overall maintenance operations.

Another useful member benefit is the trucking cybersecurity initiative known as ATA's Fleet CyWatch program. This program assists motor carriers in protecting their operations by identifying emerging cyber threats and helping guard against malicious actions of cybercriminals.

All these benefits are in addition to a weekly industry newspaper, Transport Topics, as well as a monthly newsletter and quarterly magazine. And we didn't even mention the networking and collaboration opportunities that are enjoyed by TMC members.

### TMC Leaders of Tomorrow program

Most newcomers to TMC are overwhelmed by all these offerings, so we created a program to help guide individuals through the membership benefits and ensure everyone succeeds as an equipment maintenance professional.

The TMC Leaders of Tomorrow (TLoT) program identifies and cultivates the next generation of TMC and industry front-runners by preparing them to take on leadership roles in the Council. These roles include study group chair or directors-at-large. The program provides all candidates with important skills that will serve them well at TMC and in their careers.

"My heart will always be with the technician," said Daniel Mustafa, assistant manager for technical development at TravelCenters and a recent graduate of the TLoT program. Mustafa was delighted to hear a panel of expert speakers say they all started their careers as technicians. "I share the mindset of those running the (TMC) show so I feel I belong in TMC." Mustafa first participated in the TMC SuperTech competition and judged one of the skill stations prior to attending the full meeting.

Through the TLoT program, participants are encouraged to cultivate new business relationships and friendships through peer networking opportunities and to increase their knowledge of trucking, regulatory, and leadership issues through professional development opportunities.

TLoT candidates can be nominated by a direct supervisor or company executive who completes a TMC Leaders of Tomorrow Nomination Form. ■



**JANET HOWELLS-TIERNEY** serves as the director of council development for TMC, the only industry association that is focused solely on truck technology and maintenance. She is responsible for the recruiting and building of TMC's membership, and also functions as the primary member services link for TMC's membership of more than 2,400 industry practitioners.



# Learn how to be a leader

TMC Leaders of Tomorrow program helps foster business relationships and prepare individuals to take on industry leadership roles.

By Janet Howells-Tierney, director of council development, TMC

## MEMBERSHIP

### The TMC Leaders of Tomorrow (TLoT) program

– which began two years ago with the inaugural class – set its sights on identifying and cultivating the next generation of TMC leaders. The program, as reported by TLoT class members, fosters valuable business relationships while preparing individuals to take on leadership roles in TMC and the transportation industry.

“The key objective of the program is to develop a strong foundation for these talented individuals to take on future leadership roles using a well laid out curriculum that factors in three key, core principles: Team, Train, and Transform,” said Abhishek Bharadwaj, national sales manager for Alcoa Wheel and Transportation Products and chair of TMC Leaders of Tomorrow.

### Recent graduates

Ten members of the program recently graduated and were honored during TMC’s 2019 Annual Meeting and Transportation Technology Exhibition in Atlanta.

- The 2019 graduates included:
- Amanda Schuier, Quality Transport Co.
  - Bryan Stewart, JB Transport
  - Chuck Kerr, FedEx Freight
  - David Piliro, Dunbar Armored
  - Matt Nolan, FedEx Freight
  - Daniel Mustafa, TravelCenters of America
  - Brandon Pashby, Ozark Motor Lines
  - Brandon Fackey, Clark Power Services
  - Mark Kennedy, Swift Transportation

### Participant feedback

According to current TLoT participants, the program is meeting its objectives.

“The learning opportunities of the TMC [Leaders] of Tomorrow program are invaluable,” said Daniel Mustafa, assistant manager for technical development at TravelCenters of America. Mustafa is a member of the TLoT Class of 2019. “I’m excited that there are so many cool requirements for TMC Leaders of Tomorrow. While I’m knowledgeable in the technician area, others in the class have experience in (Recommended Practices) development that will help me widen my horizons.”

Much of what the TLoT program offers happens during TMC’s events. “My take-home information (from TMC meetings) has been trends in equipment, where technology fits into what we see in our current fleet,” said Dave Piliro, director of maintenance for Dunbar Armored, adding that he’s all ears when TMC talks about future changes in fleet maintenance. “(TMC provides) education and information to help maintain a fleet and keep up with the latest technology challenges we face each day.”

### Getting involved

Fulfilling one of the TMC Leaders of Tomorrow program requirements, Wayne Skinner, manager of worldwide fleet equipment engineering for FedEx Express, volunteered as vice chair for the S.11 Sustainability and Environmental Technology Study Group where he works with his mentor Marc Clark, also from FedEx Express.

“One aspect of ongoing career development is Wayne’s choice to participate in TMC activ-

» The TLoT program is looking to identify and cultivate the next generation of TMC leaders.

Photo courtesy of TMC

ities where he will create a network of other fleet leaders and manufacturer representatives,” Clark said.

Established TMC members recognize the fresh perspective brought to TMC’s working groups by the TLoT participants.

Brandon Fackey, fleet manager at Clarke Power Services, currently serves as the co-vice chair of S.16’s Developing and Leveraging the Next Generation of Leaders Task Force. “As a millennial himself, Brandon is uniquely qualified to help us understand the millennial mindset as we work to set up succession planning for those nearing retirement age,” explained Peter Savage, TMC’s S.16 Service Provider Study Group and director of fleet solutions at Clarke Power Services.

### How to sign up

The TLoT program is open to “up-and-coming” fleet maintenance professionals in their early 40s or younger who have a minimum of five years’ experience working in the trucking industry and are employed by TMC member companies.

Participants must attend four consecutive TMC general meetings (the Annual and Fall Meetings) in a two-year period. During these meetings they must attend all Technical Sessions, several Study Group sessions, all Study Group meetings to which they are assigned, attend all TLoT training sessions and events scheduled during the TMC general meetings, complete and pass online TMC exams, and participate as TMC SuperTech judges during the Fall TMC SuperTech Competition.

“This is an amazing opportunity to learn and grow with these individuals,” said Bryan Stewart, director of maintenance for Jones Logistics, LLC. Stewart will speak at his upcoming Class of 2019 graduation. “I met so many new people and have so many new resources to draw from.” ■

Join the TMC Leaders of Tomorrow program and take your first step towards becoming a future TMC leader. Your leadership journey starts here: visit <http://tmc.trucking.org>, call 703-838-1763, or email [tmc@trucking.org](mailto:tmc@trucking.org) for information. To nominate someone, go to [https://www.research.net/r/TMC\\_TOT\\_NOM\\_FORM](https://www.research.net/r/TMC_TOT_NOM_FORM).

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# The “shop improvement” conundrum

How can fleets measure productivity enhancements and time saved if it doesn't directly impact the bottom line?

**You believe in continuous improvement, don't you? Of course you do.** Since the 1970s when the first Japanese vehicles came to the U.S. and Toyota Production System (TPS) management techniques became known, manufacturers worldwide learned you must work on continual improvement to become a low-cost producer. The alternative tongue-in-cheek approach was famously offered by quality guru and management consultant W. Edwards Deming: “It is not necessary to change. Survival is not mandatory.”

Let's say you decide to move into the modern age (about 1970) and buy some pneumatic impact wrenches. These will certainly save time and help techs do a better job, especially if you do a lot of tire work. How would you know if they are a good idea? And, how good of an idea are they? The answer is: it depends.

Some improvements that can potentially pay well depend on what happens after the improvement is implemented.

It depends on what the technician does with that time. If he or she spends that saved time shopping for cool new jeans and reading their Twitter feed, then it wasn't a great idea. If they do an extra work order or two a week, then it was a very good idea. It is important to note that no one is working harder or speeding up, just wasting less time.

## Is it worth it?

There are a couple of ways to figure out if an idea is good. How good of an idea, again, depends on how the work would have been handled. If it was nothing special – no overtime avoided – then the savings might be the true wages of the technician (wage plus benefits). If the work was pulled in from an outside shop, then the savings is the outside shop rate.

Some improvements that can potentially pay well depend on what happens after the improvement is implemented.

» In order for a shop to survive, continuous improvements must be made.

iStock

Most organizations chose an average rate for all time saved. Explain the issue to your company's financial team and encourage them to choose a rate that fairly represents the value of the time saved.

This savings is why UPS locates parts rooms centrally. The central location saves steps. Saved steps are saved time. It is also why well-designed shops follow some common rules with toolboxes at the head of the vehicle, air lines at both ends, and bulk oil and anti-freeze hoses at the head of the bay. These and hundreds of other continuous improvements have become a competitive advantage.

## Direct versus indirect savings

Direct savings are savings that make it through to the books of the company. For instance, if you change a PM frequency that requires a parts replacement from monthly to quarterly, the avoided parts (four sets rather than 12 sets) will show up on the books as a reduced expense.

There are also indirect savings to consider. If the PM takes an hour, then the fleet will save eight hours a year. Where will eight hours a year show up? These kinds of savings are more of a challenge to calculate because the savings will be very difficult, if not impossible, to see in the company's books.

Since small savings of labor are not real, should we still do those time-savings projects?

It turns out those indirect savings are also important. Think of the UPS parts rooms being a few steps closer to the bays. That setup means more valuable work and less wasted effort.

Constant improvement in processes, products, or techniques is the key to a well-run fleet. We pursue both kinds of savings. By being vigilant about reducing the labor, parts, and overhead of the maintenance operation, we are contributing to the success of the enterprise. ■



**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 38 countries. He is also the creator of Laser-Focused Training, a flexible training program that provides specific, targeted training on your schedule, online to 1-250 people in maintenance management, asset management, and reliability.



# FLEET PARTS & COMPONENTS

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



## » Designed to provide better load distribution

The **Cooper Pro Series LHT Tire** features 12/32nds of tread depth and a V-shaped tread pattern with ribs evenly spaced for better load distribution. The design helps ward off irregular wear, and its four-belt steel casing construction helps ensure a long-lasting trailer tire that will provide multiple retreads to drive down costs, the company says. The long haul trailer (LHT) tire is available in size 295/75R22.5 and also features Cooper's ECO (Energy Conservation Optimization) technology and Wear Square.

For more information visit [VehicleServicePros.com/21084081](http://VehicleServicePros.com/21084081)

## » Converts rusted surfaces to a hydrophobic passive layer

The **Cortec CorrVerter Rust Converter Primer** is a fast drying, water-based one-coat system that converts rusted surfaces to a hydrophobic passive layer and helps prevent further rusting through the formulation of chelating agents and PVC resins. This product provides long-term corrosion protection by itself or by topcoating with the company's VpCI-398 for extended performance. Remove loose rust before applying. CorrVerter is dry to touch in two to three hours and fully cures in three to seven days.

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» Prevents fuel site operators from distributing contaminated DEF

The **PetroClear DEF Dispenser Filter Housing and DEF Dispenser Filter Element** are designed to help prevent retail and commercial fuel site operators from distributing contaminated diesel exhaust fluid (DEF). The DEF Dispenser Filter Housing is constructed of heavy duty 316L stainless steel for maximum durability and includes a mounting bracket kit and wrench. The DEF Dispenser Filter Element filtrates urea crystals and other contaminants to prevent them from reaching a vehicle's on-board DEF filter.

➔ For more information visit [VehicleServicePros.com/21084709](http://VehicleServicePros.com/21084709)



» Designed to decrease rolling resistance

The **Bridgestone R123 Ecopia Tire** is a SmartWay verified trailer tire engineered with IntelliShape sidewall to reduce the overall tire weight and minimize rolling resistance. The tire uses patented NanoPro-Tech polymer technology to limit energy loss and help improve fuel economy. It also features a tread pattern that increases traction and grip on wet roads, as well as absorption of tread edge stress to promote long, even wear. The R123 Ecopia tire provides retreadability and works together with Bandag FuelTech retreads to capitalize on tire performance potential, drive down fuel costs, and make mobility more efficient for fleets.

➔ For more information visit [VehicleServicePros.com/21084360](http://VehicleServicePros.com/21084360)



» For gasoline Ford F-150s

The **Transfer Flow 50-Gallon Replacement Fuel Tank System** is designed for gasoline Ford F-150 Crew Cab pickups with 6.5" beds. The fuel tanks are available for 2009-2014 and 2017-2019 model years. Each fuel tank is manufactured from 12-gauge ReliaSteel for durability and strength, and comes equipped with a highly engineered emissions system to reduce the amount of hydrocarbons released into the atmosphere. The fuel tank system comes with straps and mounting hardware.

➔ For more information visit [VehicleServicePros.com/21084363](http://VehicleServicePros.com/21084363)



» Includes undercoats, topcoats, and clearcoats

The **PPG Delfleet One** paint system features ease of use and ready-to-spray viscosities across color families, eliminating the need for painters to adjust each color before application or change spray-gun settings. The compact paint system has 42 toners, four binders, and four paint additives, efficiently reducing on-hand inventory requirements yet providing the resources needed to address all refinish or OEM work. The Delfleet One paint system includes undercoats, topcoats, and clearcoats. It features 57 percent fewer volatile organic compound (VOC) emissions compared to a traditional paint system, ensuring compliance with regulations in all regions of North America, the company says.

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» Flexible design fits many applications

The **Optronics LED Flexible Strip Lighting UCL91/92 Series** features a flexible design to fit many applications. The UCL91/92 series is IP44 rated for dust and water resistance. The strip lighting is supplied in rolls (5m/196" and 1.5m/59") that can be cut to a desired length and has a 3M adhesive backing. The series is available with white or blue diodes and has a lifetime LED warranty.

For more information visit [VehicleServicePros.com/21084671](http://VehicleServicePros.com/21084671)



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» 50-second set time

The **SEM Products, Inc. Dual-Mix Quick Set 50 - Clear** is a transparent, two-component urethane adhesive designed for plastic repair and general bonding for virtually any substrate. Dual-Mix Quick Set 50 - Clear is for technicians seeking increased versatility, speed, and convenience when mounting emblems and trim components, or completing tab repairs and other general-purpose bonding. It offers transparent color, a 45-second working time, and fast cure that is ready to sand in five minutes. In addition, all Dual-Mix Quick Set adhesives now offer an expanded range of suitable substrates, including glass, concrete, and wood.

For more information visit [VehicleServicePros.com/21075110](http://VehicleServicePros.com/21075110)



» Removes carbon from HEV fuel system and engine

The **BG Hybrid Performance Service Kit** is designed to remove carbon from the HEV fuel system and engine. The service kit clears deposits from valves and combustion chambers, cleans oil deposits and micro passageways in today's gasoline engines, and improves spark plug life.

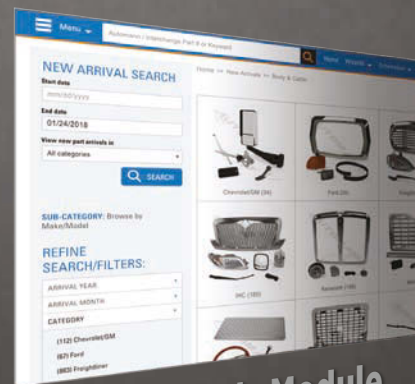
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# TOOLS & EQUIPMENT

A roundup of the latest tool and equipment offerings.

## » Compact size to work in confined areas

The **Mighty Seven Mini 90 Degree Air Die Grinder** features a compact size at 4-3/4" in total length to work in confined areas. The unit has a running free speed of 22,000 rpm and a sound level of 84 dBA. It also features a grease port that allows the user to extend life of gears and restores power, as well as a safety lever to prevent premature start-up. It is backed by a three-year warranty.

➔ For more information visit [VehicleServicePros.com/21083824](http://VehicleServicePros.com/21083824)



## » Designed for easy fastener removal in tight spaces

The **KT Pro 90 Teeth Ratchet Series** is designed to provide a smooth ratcheting action, with a 4 degree arc swing and a streamlined teardrop ratchet head for easy fastener removal in confined spaces. Both ratchets, C4364-08P and C4464-10P, are made from high grade steel with a mirror polished finish for corrosion resistance that exceeds ANSI standards by 30 percent. Both drive sized ratchets, 3/8" and 1/2", come with a patented rubber grip strip and backed by a lifetime warranty.

➔ For more information visit [VehicleServicePros.com/21084268](http://VehicleServicePros.com/21084268)



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## » 108-pc tool assortment set

The **Beta Easy 2047E/C108 Tool Set** from **Beta Tools** has 108 tools to choose from including sockets, pliers, hex keys, wrenches, screwdrivers, ratchets, and an engineer's hammer. The tools include 1/4" drive sockets (4mm, 4.5mm, 5mm, 5.5mm, and 6mm-14mm), 1/2" drive sockets (10mm-22mm, 24mm, 27mm, 30mm, and 32mm), 1/2" drive spark plug sockets (6mm, 5/8 in; 21 mm, 13/16 in), 1/4" and 1/2" drive universal joints, hex keys (1.5mm, 2mm, 2.5mm, 3mm-6mm, 8mm, 10mm), combination wrenches (7mm-19mm), screwdrivers (PH1, PH2 and four slotted screwdrivers), 1/4" and 1/2" drive reversible ratchets, 1/4" hex bit set in a plastic case, 10" slip joint pliers, along with diagonal, combination, needle nose pliers. The set comes in a hard plastic carrying case.

➔ For more information visit [VehicleServicePros.com/21079904](http://VehicleServicePros.com/21079904)

## » Charges almost all 12V battery types, including AGM and Lithium

The **Associated Equipment Intellamatic Smart Battery Chargers and Analyzers**, Nos. IBC6008 and IBC6008MSK, feature an adjustable power supply mode and a four-line backlit digital display allowing technicians to adjust both the charging voltage and/or amperage based on manufacturer specifications, safely charging almost all 12V battery types, including AGM and Lithium (SLI). A "partial charge mode" and patented battery diagnostics enables quick check and charge of batteries. The 70A re-flash power mode can be adjusted to specific voltages to perform extended diagnostics or ECU re-flash. Additional features include overcharge protection, safe in any weather operation, as well as both audible and visual alarms for reverse polarity protection. They are approved by major OE vehicle manufacturers.

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## » Designed specifically for heavy duty capabilities

The **Matco Tools Maximus 3.0 HD Diagnostic Scan Tool**, No. MDMAX3HD, is designed to be the fastest, strongest, and most intuitive member of the Maximus family specifically for heavy duty capabilities. The scan tool runs on an upgraded open Android system with a 10.1" touch screen display, so that multiple applications can be utilized simultaneously at high speeds. It performs wireless diagnostics, including read/clear trouble codes, view/graph and record the PID, bi-directional test, coding, reset, and more.

➔ For more information visit [VehicleServicePros.com/21085463](http://VehicleServicePros.com/21085463)



» For draining anti-freeze in high volume shops

The **Graco Coolant King 25-gal Used Anti-Freeze Receiver** is ideal for draining anti-freeze in high volume shops. This receiver features oversized wheels that move smoothly across uneven surfaces, and a funnel that collects fluids from both a drain plug and a filter port. A removable filter screen helps prevent debris from entering the tank. The green tank color makes it easy to identify, and the receiver features a large collection pan for ease-of-use.

For more information visit [VehicleServicePros.com/21026229](http://VehicleServicePros.com/21026229)



» Restores threads to factory-new condition

The **ProMAXX Exhaust Manifold Mounting Bolt Thread Repair Kit** restores stripped or damaged exhaust manifold mounting threads. It is engineered to fix problems caused by previous repair attempts. The repair kit includes a bushing, machine grade tooling bit, tap, and six 8 mm x 125 mm inserts.

For more information visit [VehicleServicePros.com/21082090](http://VehicleServicePros.com/21082090)



» Designed for commercial vehicle diagnosis

The **Launch Tech USA Gear HD** is designed exclusively for commercial vehicle diagnosis. Gear HD starts the autocoding process as soon as it's connected to the vehicle.

Manual diagnosis is also available. The Gear HD features 10 modes of OBD11 tests including EVAP, O2 sensor, I/M readiness, MIL status, VIN info, and on-board motors testing. It also features a community platform for promotion, advertising pushing, software subscription, and other information releasing. Gear HD operates on Android 7.0 and has a 5" touch screen.

For more information visit [VehicleServicePros.com/21086532](http://VehicleServicePros.com/21086532)



» Features long-reach 60" cables

The **Snap-on Tools 12V Lead-Acid Engine Starter+**, No. EEJP600i110G, features dual 110 VAC receptacles to provide electricity for outdoor activities or during a power outage via a 400-watt inverter. This unit offers 350 cranking amps (290 cold cranking amps) from a high-output sealed AGM battery. The tool also features long-reach 60" cables and tough 2-gauge wire. Its arc-less connection is designed to be safer and not allow operation with clamps connected in reverse polarity, and includes a separate on/off switch for engine starting. The digital display indicates internal battery charge percentage and DC voltage, and a USB port charges smartphones or other small electronic devices.

For more information visit [VehicleServicePros.com/21031815](http://VehicleServicePros.com/21031815)



» Made by hand in the U.S.A.

The **LocknClimb 15MINISTAND Ergonomic Safety Ladder** is ideal for engine maintenance service. This ladder offers a slip resistant surface that helps prevent falls, full foot support to reduce the chance of foot thrombosis, and is field tested and designed by mechanics. The ladder is made of 6061 industrial aluminum, and is designed to fit between strut and bumper. This product exceeds OSHA and ANSI specifications, features a lightweight, portable, one-piece design and is 100 percent made by hand in the U.S.A.

For more information visit [VehicleServicePros.com/21026409](http://VehicleServicePros.com/21026409)



» Wear on neck for hands-free use

The **E-Z Red Multi-Position LED Neck Light**, No. NK10, offers a sleek, comfortable design that provides 200 lm and has a run-time of up to two and a half hours. The light wears around your neck for hands-free use and rotates up and down 70 degrees. The neck light weighs 4.6 oz and includes two AA batteries.

For more information visit [VehicleServicePros.com/21081582](http://VehicleServicePros.com/21081582)



» Service up to 58" wheels and 95" tires

The **John Bean 8058 Heavy Duty Tire Changer** is capable of servicing up to 58" wheels and 95" tires. This tire changer offers a wireless control pendant and is designed to easily allow a single operator to change even large and heavy assemblies. This unit helps expand the variety of tires a shop can change, while still being able to change simple truck assemblies.

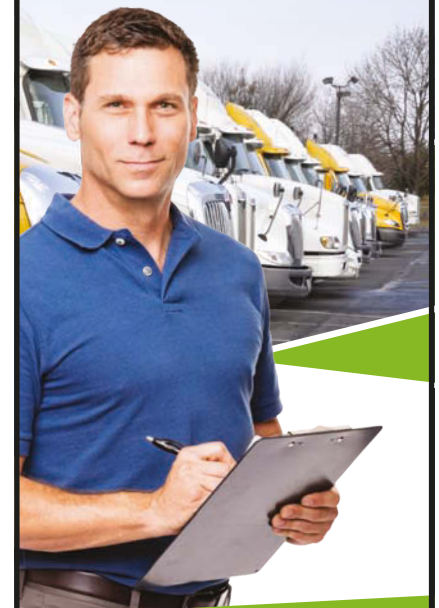
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» Designed for user comfort

The **Lumax Heavy Duty Swivel Handle Oil Filter Wrenches** are ergonomically designed for user comfort and feature cushion grip handles and slim, adjustable designs. The yoke and link assembly allows a strong grip but prevents crushed oil filters. These wrenches are constructed from high quality components and built for lasting use and durability. These wrenches are available for a variety of filter sizes. Each filter wrench is sold separately in case pack.

➔ For more information visit [VehicleServicePros.com/20988712](http://VehicleServicePros.com/20988712)



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» Patented drawer interlock system

The **Versatility 6-Drawer Mechanics Rolling Workstation, No. VT-42000** is designed to get tools close to the job while providing a large, stable work surface. The Mechanics Rolling Workstation features a lockable high capacity side cabinet with adjustable shelf. The item has a 150-lb drawer weight capacity with foam inserts that can be customized for customers to organize tools, gauges, and instruments. It also features a patented 1-ata-Time drawer interlock system that allows only one drawer to be opened at a time.

➔ For more information visit [VehicleServicePros.com/21081453](http://VehicleServicePros.com/21081453)



» Features pneumatic height adjustment

The **Carlyle Tools Multipurpose Stool, No. 815-1343**, is a pneumatic height adjustable stool designed to suit most workshop or repair facility applications. Notable features include: a plush, 3.5" thick by 14" diameter vinyl upholstered seat for comfort and easy cleaning; five 2-1/2" industrial casters for wobble-free mobility; and an 8" pneumatic height adjustment range from 19" to 27" high. An optional swing out parts tray is also available.

➔ For more information visit [VehicleServicePros.com/21060114](http://VehicleServicePros.com/21060114)

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by Joel Levitt

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### » UN/DOT approved

The **JohnDow 15-gal portable fuel station, No. JDI-FST15**, is UN/DOT approved for the transport of gasoline by motor vehicle and to gravity dispense fuel into gas powered portable equipment, vehicle fuel tanks, or other approved containers. The steel portable fuel station has been tested for leakage, rupture, stability, abuse, and endurance. It was specifically designed to be bolted into a trailer for those needing to transport fuel working in the landscaping, farming, recreational, construction, and golf course maintenance fields, greatly reducing the number of trips to the gas station to refuel. According to the company, the fuel station features include: full retail packaging, durable welded steel tank, gravity feed tank, 10' dispensing hose, built-in shut-off valve, ground wire for safety, and squeeze handle dispenser. The gross weight when filled is 116 lbs, and the dimensions are 38.3" x 11.15" x 15.9".

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» Well-designed systems, such as Graco's Pulse Pro Fluid Management system, can answer the five "Ws" for every dispense job: Who performed the dispense? What specific fluid was dispensed? Where in the facility did this dispense take place? When did it occur? Why (i.e., which work order and customer record the dispense was tied to)? And even, how much fluid was dispensed?

Photo courtesy of Graco Inc.

# Increase shop efficiencies through fluid management

## Considerations for system conversion.

**Effective fluid management in fleet vehicle,** automotive, heavy truck, and heavy equipment service can reduce costs and improve operational efficiencies, while generating helpful data about dispense history. Complete engineered systems successfully deliver these benefits, as components are designed to work together to deliver the most accurate data possible.

### Why choose fluid management?

Effective fluid management systems allow fleets to control expenses by accurately managing their inventory of fluids such as oils, gear lube, coolant, and antifreeze. One benefit offered by fluid management systems is that metering all dispenses ensures the right quantity of the correct fluid is used, avoiding costly mistakes. With this added control, facilities are able to capture additional savings by

purchasing fluids in bulk. With an increasing number of vehicles on the road today requiring expensive synthetic oils rather than conventional ones, precise dispense and inventory management is key to keeping costs down.

With the large volume of fluid being stored and dispensed, inventory accuracy and shop efficiencies are critical for expense management. Well-designed fluid management systems provide parts and service managers with the information necessary to order enough fluid at the right time and track volumes of used or wasted fluids. Fluid management systems that allow pin code and work order entry at the meter increase technician productivity as they can stay in their bay and have everything they need at their fingertips. This will result in an increase in both efficiency and the number of vehicles serviced while turning more profit for the service facility.

Another critical reason for implementing a high-quality fluid management system is the ability to recall transaction data. The detailed dispense history provided can help shop managers in visualizing production and discovering patterns or workflow roadblocks in order to improve efficiency. Additionally, having fluid dispense history can provide an audit trail showing the date, time, type of fluid, and how much fluid was dispensed for a particular vehicle, confirming that the correct oil was used or the proper volume replaced.

In short, fluid management systems deliver a range of benefits to fleets, including increased inventory control, greater dispense precision,

improved operational efficiency, and detailed dispense history.

### Factors to consider

There are several factors to consider when looking to update a fluid management system. These include:

- **Not all fluids need to be converted at once.** Oftentimes customers migrate only one or two oils over to a fluid management system. Typically, customers will choose fluids that are the most expensive and are causing the biggest financial burden due to shrinkage. Another idea is to start with the mobile roll-around dispense carts or specialty fluids. The wireless capabilities of some systems allow for easy monitoring and tracking of mobile carts and drums.
- **Migrate one bay at a time.** Another phased approach is to convert one bay at a time to a fluid management system. This is a great method to understand the true ROI from a single bay being transitioned to fluid management. Fleets can get a comparative analysis on technician productivity and fluid reconciliation for that bay compared with bays not using fluid management.
- **Fluid management is easy to install and use.** While some may believe that fluid management systems are difficult to install or operate, the wireless fluid management systems available are in fact easier (and less expensive) to install than a wired system. Furthermore, they provide fleets more control than standard written or oral dispense and tracking practices, and greatly simplify processes.
- **Expanding fluid management to tank level monitoring will save a fleet money.** While installing tank level monitors in a fluid management system isn't necessary, it does provide huge benefits. Imagine no longer having to call a bulk fluid supplier to schedule a refill of fluids, or having to call a fluid recycling vendor to evacuate used oil before an overflow occurs. With some fluid management systems, uncertain manual processes can be replaced with a reliable automated system that monitors tank levels and schedules deliveries and pickups for the fleet.
- **Work with a good lubrication partner.** A fleet must trust who they choose to install their fluid management system. Look for suppliers who have years of experience in fluid management and lubrication, and who have dedicated technicians available to provide service, when it's needed.

### Cost savings and improved efficiency

The complete picture offered by top-quality fluid management systems gives insight into how to improve shop efficiencies. With this kind of comprehensive data, fleets can make smart business decisions about inventory and processes.

In combination, the data, system efficiency, and precision dispensing make fluid management critical to managing costs and ensuring success in fleet and municipality vehicle service applications. ■



**By Joshua Holmstadt**  
SENIOR GLOBAL PRODUCT MARKETING MANAGER,  
GRACO INC.

Graco Inc. supplies technology and expertise for the management of fluids and coatings in both industrial and commercial applications. Graco designs, manufactures, and markets systems and equipment to move, measure, control, dispense, and spray fluid and powder materials. A recognized leader in its specialties, the Minneapolis-based company serves customers around the world in the manufacturing, processing, construction, and maintenance industries. Holmstadt is a senior global product marketing manager for Graco's Lubrication Equipment Division.



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