



Report on  
**Maintenance**  
2010

Sponsored by



## Embracing the future

Mastering the fine art of truck maintenance is like chasing a constantly moving target. One year it's a new set of emissions controls and all the related electronics. The next it's a matter of getting up to speed on repairing and maintaining the latest fuel-saving equipment.

You'd be hard-pressed to find another line of work in which the need for continuous learning is so essential. Continuously upgrading your skills is not an option for the heavy truck technician, but a requirement.

This year's Report on Maintenance focuses on several changes coming down the pike for maintenance managers and truck operators.

An example of an emerging issue for technicians is the cleaning requirement for diesel particulate filters (DPFs). These filters have been a fairly low-maintenance item since they burst onto the scene in 2007. Now, they're coming due for their first cleanings and the results may not be pretty.

Early findings from one of the first fleets in Canada to invest in the cleaning equipment and begin pulling filters are showing some causes for concern. Cracks have been discovered on the cores of many of the filters. Just another problem needing a solution in the shop.

Maintenance managers and technicians are a special breed. You better enjoy a good challenge – otherwise, you're in the wrong line of work.

I wouldn't last one day in a shop environment without putting a wrench through something expensive.

Another change in the shop I've noticed over the past 10 years is the typical technician is no longer, well, typical. As a shortage of technicians continues to plague the trucking industry, talented people from all walks of life are stepping up to fill the void.

We came across the bright young lady on the cover of this section during a recent visit to Bison Transport's Mississauga shop.

We were there to shoot some video and take some stock photos when we met Josephine Park, a licensed heavy truck and coach technician who graduated from Volvo's prestigious Modified Apprenticeship Program (MAP). Park has a Bachelor of Arts and Science degree as well, and then decided on a career as a heavy truck technician. She and others like her represent the future of the business.

At times, it's hard to believe just how fast things are moving. But it isn't boring, is it? Welcome change and embrace the future and your work will always be gratifying, never boring. The same can be said of any work environment but nowhere does it hold more true than in the shop.

- James Menzies

REPORT ON

# Maintenance

SPONSORED BY



## Enhancing energy

Coconut shells, lithium batteries and accumulators all playing a role in energy storage

By John G. Smith

Who would have ever believed that Gilligan's Island could teach us lessons in engineering? The "professor" on the 1960s sitcom seemed to use coconuts to build everything shy of a boat for his fellow castaways. Now modern engineers are using coconut shells to create ultracapacitors, which are expected to play a key role in the development of energy storage systems for hybrid vehicles.

It is no garden-variety coconut shell, says Brendan Andrews of Maxwell Technologies, which makes energy storage and power delivery systems. Most of those with the required characteristics are harvested in an area close to the equator, generating activated carbon that is eventually rolled and formed into sheets.

"We put it into modules, and these modules have the higher energy density and the higher voltages," he says, referring to the can-shaped ultracapacitors that are anywhere from two inches in diameter to the size of a Coke can.

While a battery is used to store energy and can offer long-term voltage stability, an ultracapacitor can support short-term bursts of high power that are needed for tasks such as starting a vehicle or operating the tools on a utility truck. Think of the flow of energy like water escaping from a bucket. If you had a traditional battery, the water would escape from a hole as big as a nail. In a system that incorporates an ultracapacitor, the water could escape through a hole as wide as a basketball.

They are components that will be particularly important in the evolution of heavy-duty hybrid vehicles. An electric car may deal with 30 starts and stops per charge, but its heavy-duty counterpart will need to do that 750 times. And while a car may need 30 kW of peak power, a transit bus might need 200kW.

Refuse vehicles present a perfect application for ultracapacitors, says Rob Delcore, ISE Corporation's director of business development, energy storage systems. The components' high discharge rate makes it possible to launch away from a curb more quickly, without generating as much heat as a device that offers

more resistance. "If your application requires a huge amount of power, ultracapacitors are it," he says.

"You can almost think of an ultracapacitor as something that can accept a lightning bolt," Delcore adds, referring to the high charging rate. And while a lead battery can typically offer 3,000 load cycles, an ultracapacitor can be discharged millions of times.

Systems that blend batteries and ultracapacitors will extend the life of the batteries that like to be discharged gradually, and allow for energy storage systems to be downsized. "It's a really exciting concept," he says.

These components are hardly the tools of Star Trek. "This is proven technology," Andrews says. The ultracapacitors are already being used to increase the cranking power of more than 1,000 buses in service in Asia, the US and Europe. He also referred to the prototype of a 16.2-volt truck starter system has been able to start a 12-litre diesel engine six times on a single charge.

If anything, the ultracapacitors will be crucial to increasing the life of lithium ion batteries that the US Secretary of Energy has suggested will be vital to the future of hybrid vehicles.

The use of lithium batteries will be growing substantially with the introduction of vehicles like the Chevy Volt, says Kevin Snow, chief engineer for hydraulic application development at Eaton. But significant improvements in power density are probably at least eight years away.

Unlike lead acid batteries, the resulting hybrid technologies will need to be part of a larger system that is fully integrated into the chassis, Snow adds.

While lithium ion batteries can be safe, their temperatures need to be controlled to protect performance and the life of the battery itself. As energy storage needs increase, ultracapacitor modules might best be ganged together in a junction box that contains everything from relays to fuses and sensors.

Still, batteries are not the only tools being used to store energy in hybrid vehicles. Another form of hybrid technology has come

in the form of accumulators that have been incorporated into refuse trucks and delivery vehicles used by UPS and FedEx.

Accumulators come in a variety of forms. Some store the energy from a battery, hydraulic accumulators store the potential energy in a fluid, and hydro-pneumatic designs store energy in the form of compressed gas within a fluid container such as a piston or bladder.

Pressurized accumulators made of composite materials were first used in NASA's rocket casings, and moved into commercial applications as an option when making storage tanks for compressed natural gas, says Rafeal Toledo, an applications engineer with Parker Hannifin's hydraulic accumulator division.

It is the type of advancement that supports the use of accumulators in the weight-conscious environment of a vehicle. Parker Hannifin's Runwise system weighs 20% as much as a steel counterpart, can be stored in tighter spaces, and resists corrosion. A 20 US gallon composite model – seen as a typical size for a one-way system – weighs 250 lbs, compared to a 25 US gallon steel version that weighs 1,250 lbs. It can also be charged and dissipated very quickly.

An added advantage is that hydro-pneumatic accumulator bladders can be easily repaired. But they do require care. The high pressures in most applications will require some attention to sizing and handling. For example, those working with bladder-style versions need to add the first 50 psi slowly until the bladder expands within the shell.

"These systems are out there today," adds Guy Rini, chairman of the Technology and Maintenance Council task force looking at hybrid technologies. Three Tier 1 suppliers are working with hybrid hydraulic systems while there are more than a dozen working with hybrid electric systems. "On the capacitor, side I know of three systems that are on the road," he adds.

With all the energy being directed into hybrid vehicle development, there are likely more to come. ■



# Electronic evolution

Added sensors, quicker links and new ideas continue to extend the reach of vehicle electronics

By John G. Smith

Engineers are usually dreaming up ways to protect sensors and their connectors from the forces of vibration. But near the end of a Technology and Maintenance Council presentation about vehicle electronics, Paul Menig mused about the way these forces could be captured and put to work.

“Imagine a little sensor with a springboard going up and down,” said the Daimler Trucks North America’s chief engineer, mechatronics, describing the piezoelectric devices that are emerging in laboratory settings. “You can actually create enough electricity to sense something and send it out wirelessly.”

Within one or two decades, vehicle sensors may not require wires at all.

As far-fetched as that may sound, the electronics in a modern truck have evolved at a staggering rate, particularly in the face of tightening emission rules. Kevin Otto, the director of service for Cummins Emissions Solutions, points out the number of sensors and actuators when describing the change. One engine built in 1992 included a mere six sensors and seven actuators. This year, you can find a series of 28 sensors and 15 actuators on an engine block, and some of these actuators even incorporate sensors of their own to help manage different activities.

“The amount of information about the engine has become just staggering,” he said.

In relative terms, it has been a rapid evolution. Electronics didn’t make their first real push into heavy-duty trucks until 1987, when electronic unit injectors began to deliver their precise shots of fuel in the name of improving fuel economy. All heavy-duty engines were not electronic until 1994, and all medium-duty models followed suit in 1998.

New applications for every packet of data emerged along the way. Integrated instrument clusters emerged in the mid-1990s, anti-lock brakes became a reality in 1997, and by the end of the decade, transmission suppliers were starting to incorporate electronics of their own. In addition to simply monitoring factors such as oil pressure and coolant temperature, electronics allowed engine activities to be changed – limiting idle time, managing shifts, and controlling the actions of accessories as varied as fans and brakes.

The Technology and Maintenance Council itself played a role in helping to ensure that the electronic components could speak to each other.

“This organization came up with the j1708/1587 data link as long ago as the 1980s in anticipation of all those computers,” said Menig. “Now people started taking advantage of the data.” Once the j1939 standard was introduced, engines and transmissions were able to share information, and the technology opened the door to support traction control.

In some cases, economics were the only factors to slow a related change. Mechanics who replaced

electronics of their own, from ABS equipment to automatic traction control. Six-channel sensor and control valves emerged, giving every wheel a sensor. “Then not only could we turn air off, but we could turn air on,” Lindley added. And the Power Line Carrier (PLC) standard governing the pigtail between trucks and trailers made it possible to introduce anti-lock brakes on trailers, and set the stage for stability controls that track the position of steering wheels, yaw rate and G-forces.

“If it physically senses the vehicle doing one thing but the driver is doing something else with a steering wheel, there must be an

things that could happen.”

“What drives the future? It’s driven by trying to get more of some things, less of other things,” Menig suggests. Regulators defined by almost every letter in the alphabet – EPA, CARB, NHTSA, NTSB and OSHA – all have rules that could be addressed through electronics. For example, Japan already requires vehicles to have collision warning systems with automatic braking, Europe is about to embrace it, and North American trucks are expected to follow suit.

Requirements for Tire Pressure Monitoring Systems still exist, he adds. “They just haven’t figured out a way to do it.”

“The biggest thing I see out there is carbon footprint regulations,” Menig said during another presentation. “In Europe, there is a goal called Vision 2020 which is trying to reduce the carbon footprint of vehicles by 20% by 2020.” One of the unknown issues is whether the target will be based on 2005 or 2007 figures. And he also expects electrically-powered systems for coolers and condensers, and waste heat recovery.

Every change will also require added training at a shop level.

“You really must follow the OEM recommendations,” Lindley says. “There are no generics on this. You really need to follow the book.”

This year alone, smart devices that have traditionally talked over the older j1587 databus are migrating to the quicker j1939 standard. “You’re not going to get all the engine information you used to get,” Menig says, noting how diagnostics will be affected. In the newest vehicles, however, a central gateway will be used to collect messages from the j1939 bus and put them on the j1587 datalink.

And he expects more in the way of dedicated links for gauges, or from one engine control to the next, some of which will run at baud rates that are 50 to 100 times faster than the data links being replaced.

“There are lots of ideas about what the future holds,” he adds, asking for a quick show of hands from people in the audience who own noise-canceling headphones. (Plenty of hands went up throughout the crowd).

An option such as a vibration cancelling seat is not too far-fetched, he suggested.

The electronic evolution shows no sign of stopping. ■



**The electronic evolution** has paved the way for stability control systems that continuously read data such as steering wheel position and G-forces.

signal flashers every few months would likely have embraced solid state versions of the devices as early as possible, but they didn’t really emerge until 2003 because of costs. (The first solid state designs cost \$35 while traditional designs only cost \$2.35, Menig notes).

The electronic evolution has also played a key role in the introduction of safety systems such as the air bags in truck cabs, noted Vince Lindley of Volvo Trucks North America.

“The physics of a truck collision are much different than what you see in a car,” he explains. A sensor in the control module is mounted in the bulkhead close to the driver’s right knee. “We’re interested in what the driver is feeling,” he says. Rather than watching for a quick spike in G force, the software monitors deceleration over a period of time.

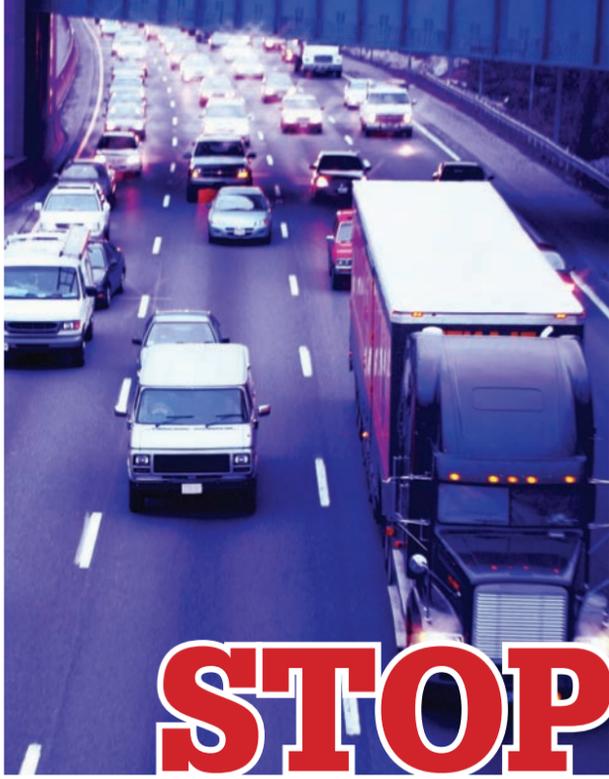
Other safety systems introduced

event,” Lindley explains. “These systems can de-throttle the engine, they can apply brakes as necessary, they can also release brakes if necessary ... This will become a mandatory requirement in the very, very near future.”

Collision avoidance systems that began with a radar-generated warning and evolved into adaptive cruise control even show the promise of proactive braking and engine de-rating to avoid collisions.

“Active proactive braking will actually be on the throttle as well as cruise control,” Lindley adds. “People have already figured out how to use it.”

Electronics will likely play a larger role to come, Otto agrees, referring to the potential of the widespread use of variable valve timing or Homogeneous Charge Compression Ignition to reduce the amount of NOx from a combustion event. “There are a lot of



# STOPPING POWER

As the industry prepares to build new tractors that can stop more quickly than ever, it can also expect rules to govern trucks after they are put in service

By John G. Smith

The National Highway Traffic Safety Administration (NHTSA) has left no doubt about the fact that the stopping distances for trucks need to change. Today's unloaded tractors are designed to stop from speeds of 60 mph within 335 ft.. In August 2013, that allowable limit will shrink to 235 ft.. Their loaded counterparts that once had to stop within 355 ft. will need to do the job somewhere between 250 and 310 ft., depending on the number of axles and Gross Vehicle Weight Ratings.

The interest in altering brake performance is a matter of saving lives. While large trucks are involved in fewer fatal crashes per 100 million vehicle miles in the US, they continue to account for about 13% of all fatal crashes. When NHTSA unveiled its rule, it suggested that the shift to shorter stopping distances will save 227 lives, 300 serious injuries and US\$169 million in property damage per year.

The question that remains is how truck makers will meet the new requirements.

"Right now the OEMs don't really have a game plan," Jeff Spitzer of Eaton said during a presentation at this year's Technology and Maintenance Council meetings. "They don't have a full understanding of what the parts manufacturers are going to do."

Stopping distances can be met by using additional friction material, more aggressive linings or air disc brakes, but it is still unknown which will become the most popular options.

"What will the fleet do? That's the question," said Mike Colaccino, commercial vehicle safety manager at TMD Friction. "The options are there and they are many."

The changes will largely influence brakes at the front of the truck. A brand new tractor will place a static load of about 12,000 lbs on the steer axle, but the loading and extra torque during a stop will increase that load up to 34,000 lbs as the axles to the rear begin to lift, said Jim Clark of Vehicle Brake System Con-

sulting. The 15-inch brakes on a typical steer axle simply do not produce enough torque to stop the vehicle in time.

"It's only when you come to the panic stop where you get the tremendous surge to the steer axle," he added, noting how a heavy truck experiences about one panic stop a month. Engineers need to focus on the changes that will address these situations. "And any time you change anything, something is going to come up and bite your butt."

The engineering challenges can certainly have an effect on experiences at the fleet level. "The vehicle will feel more aggressive. The drivers might be more sen-

sitive to that," Clark said. The added torque could also present some potential maintenance challenges such as premature tire wear or suspension damage.

trucks that are already in service, but panelists at the recent meeting of the Technology and Maintenance Council expect some sort of change in this regard as well. Research by Battelle Memorial Institute shows why these regulations might be justified. Of 23 randomly selected trucks tested in New Mexico, 13 did not meet the minimum stopping distance requirement of 40 ft. from a speed of 20 mph. Of those 13, three failed under the watch of the Performance Based Brake Tester (PBBTs), and only two were taken out of service after a visual inspection.

"The visual inspections really don't tell you how that vehicle is

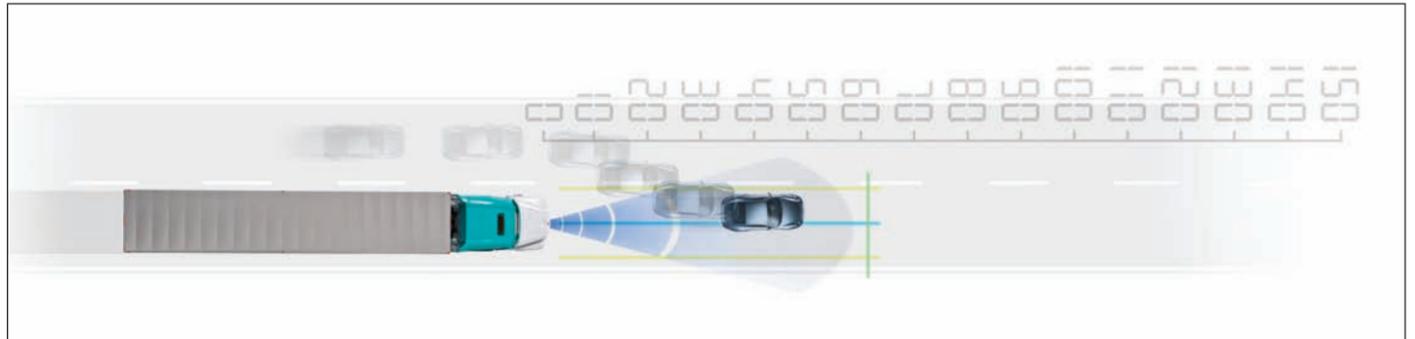
nents. "You want to be more sensitized to your OEM brakes and make sure the stopping capabilities are maintained," Clark said.

Of course, the regulations that affect vehicle stopping characteristics may not end there.

Rear-end crashes accounted for about 20% of all heavy truck crashes in 2004, and the heavy vehicles hit the vehicle ahead of them in 60% of these cases. In 26% of cases, the lead vehicle had stopped, while 14.5% were decelerating and 13.3% were moving at a constant speed.

There are technologies that could make a difference here.

An autonomous cruise control, intelligent cruise control,



**Collision warning systems** such as Meritor Wabco's OnGuard can help reduce the risk of rear-end collisions, which account for about 20% of heavy truck crashes.

going to stop," Clark noted, referring to the limits of measuring push rod travel.

While there are in-service requirements for stopping distances, they are virtually never enforced by NHTSA, Clark says. But they could be measured with roller dynamometers or other PBBTs.

"We think we can stop the truck and still not cause an unacceptable amount of degradation to the drum," Colaccino observed, referring to one potential issue. Fleet tests over the next year will be measuring noise, lining and drum life in real world settings to address potential challenges just like that. But suppliers will also want to ensure their products do better than NHTSA's absolute minimums. "Brake manufacturers are requiring an additional margin of 10%, making the real distance 225 ft.," he added.

#### Future regulations

Nobody knows exactly what NHTSA will eventually require in terms of stopping distances for

or active cruise with braking can automatically accelerate or slow a vehicle. Other options including a collision warning system could warn a distracted driver to take action.

A third form of technology comes in a variety of names such as a collision mitigation, dynamic brake assist or automatic brake application.

"This is one where there is a lot of confusion," says Mark Mellett of Meritor Wabco. "This function is on regardless of whether there is cruise control or not." But it does not activate until the moment there is an imminent collision.

Most of the studies on these systems have been limited to light vehicles, but research is underway to test their use in heavy-duty counterparts.

Everyone continues to look for the combinations that will offer the best possible stopping power. ■

# Talk it out

Fleets, service providers continue to stress importance of better communication

By John G. Smith

It seems trite to suggest that many of the arguments between fleets and service providers could be addressed through some improved communication, but it is a theme that emerged time and again during a panel discussion hosted by the Technology and Maintenance Council.

The need for a better definition of “shop supplies” offered a clear example of some common challenges that exist.

“What is a shop supply? Is it a doughnut?” asked Paul Wion, corporate fleet supervisor for Lewis Tree Service, a fleet with 4,200 assets. The comment generated a few chuckles from the crowd, but other fleet representatives quickly echoed similar thoughts. There certainly tended to be wide differences in the charges, whether they involve flat fees or calculations based on a fixed percentage of the invoice.

Wayne Corron, road rescue manager for PAM Transport, suggested he’s been particularly baffled by miscellaneous shop charges that appear on what should be a labour-only invoice. He wants to see details about all the bolts, nuts and washers that are used.

But fleets have to realize that shop supplies such as those to clean parts are very real, added Chip Huber of Q Fix Truck Service, referring to the figure that he calculates as 4% of the parts costs.

It was just one example of the issues that can emerge when communication falters.

In some cases, communication issues are being addressed by leveraging technology. If the request for a repair on a Waste Management truck is not addressed within 24 hours, for example, e-mails are automatically generated to service representatives, dealers and anyone else who is involved in the job.

“Every fleet out there has their own preferred (communication) method and every service centre out there has their own preferred method,” says Gary Cummings, executive vice-president and COO of FleetNet America, which coordinates roadside service and maintenance management services for 500,000 vehicles. But e-mail itself may not solve a problem because the information still needs to be collected in one place.

“We use a portal system to interface with customers. (It) sends estimates to fleet people and it’s a quicker response time, which keeps the technician on the truck,” says Jim Pennington, service manager at Truck Centers in St. Louis, Mo. That can be a particularly important step in the process. If the mechanic is pulled away from the job, it could set back a repair by eight to 24 hours, he adds.

Some of the tools will be decidedly low-tech. “A telephone call (to pre-approve diagnostic work) is generally right to you, whereas an e-mail can sit in the queue and wait and wait and wait,” says Wion.

Corron ensures that there is always staff on duty that can authorize repairs without making yet another phone call. The only challenges seem to emerge if the final dollar figures are higher than an initial estimate. “If it’s within reason, you know we’re going to pay it and go on,” he says.

Still, one of the greatest frustrations of all continues to surround the variations in cost that can take place on the road.

“We’ve had incidences where we’ve had a breakdown on the road and we’ve had to pre-pay,” Wion says. “They took advantage of that situation ... are you really getting what

you paid for? That’s what you tend to think about.”

“We, as dealers, typically don’t treat other dealers very well when it comes to a rework situation,” Pennington agrees. “You’ve got the dealers out there who think their way to make a profit is through another dealer’s woes.”

Some of the issues will be addressed as more service networks move toward national pricing, establishing predictable standards, suggested Dick Hyatt, president of Decisiv Inc., which has a Web portal that connects fleet managers and service locations.

Still, shops agreed they were frustrated by the nature of some of the negotiations that can emerge. Huber, for example, is discouraged by the number of disputes over credit card charges. “There is a lot of consumer cardholder protection, but as far as merchant protection there is very little ... many times the cardholder doesn’t even respond.” The most vulnerable transactions of all are those completed without a credit card in hand, he adds. Negotiations are also a two-way street, Pennington says.

“You may want to fire that small fleet that may want to beat you up (on price) no matter what.” ■



## EVERYTHING A MAINTENANCE PRO COULD WANT.

**For customer care that goes beyond delivering the right parts fast, call Meritor.**

We think like maintenance pros by delivering all the support you need before and after the sale. Including full technical information, installation know-how, online parts catalogs, ordering and assistance, plus expert answers in the field from the North American Field Organization (NAFO) District Managers. Our attitude is, “What can we do to help you?” Experience it for yourself – call our Customer Care Center at 888-725-9355. Or visit [XpresswayPlus.arvinmeritor.com](http://XpresswayPlus.arvinmeritor.com).



An ArvinMeritor® Brand



An ArvinMeritor® Brand



An ArvinMeritor® Brand



# Gearing up for 2010:

SCR technology requires no major changes for engine oils, manufacturers say

By Julia Kuzeljevich

On-highway diesel engines using selective catalytic reduction (SCR) to meet EPA2010 emissions standards will not require a new grade of engine oil, suppliers say.

For most North American OEMs, according to oil experts, there will be no difference in lubricant needs for SCR, which works by mixing diesel exhaust fluid (DEF) with engine exhaust. This then flows through an SCR catalyst and reacts to form nitrogen and water vapour. DEF consumption will depend on the engine manufacturer, but expectations are that it can be about 1-3% of the diesel fuel consumed.

According to the Diesel Technology Forum ([www.dieselforum.org](http://www.dieselforum.org)), SCR technology can reduce NOx emissions up to 90%, hydrocarbon and CO2 emissions by 50-90%, and particulate matter (PM) emissions by 30-50%, a win-win for both the trucking business and the environment.

By all accounts, the American Petroleum Institute-designated CJ-4 group of oils, which were formulated for the demands of EPA07 engines with exhaust gas recirculation (EGR) technology and diesel particulate filters (DPFs), should also be suitable for all 2010 engines.

"The recently launched CJ-4 category seems to be performing quite well in the EPA07 engines and is expected to do the same for the new 2010 engines. No new oil specification has been generated for the needs of the 2010 engines," said Allan Murray, category manager for automotive/commercial and industrial engines at Petro-Canada Lubricants.

"Generally, the new CJ-4 products have been well-received by mixed fleets as this new spec' is back serviceable. However, the use of lubricants that do not meet the CJ-4 specification would not be recommended for the 2007 engines and newer," he said.

Dan Arcy, OEM technical manager for Shell Global Solutions (Shell Lubricants), said that while there are two different technologies in the post-2010 engine market, existing oils will work with both.

"Navistar is the one outlier using advanced EGR, which is basically higher levels of exhaust gas recirculation. Everyone else is going with SCR. In both cases though, the recommended oils will be the CJ4, API-recommended oils. I've been in the business over 20 years, working with heavy-duty engine oils. For 2010, this is the first time that oil hasn't had to change to lubricate the new engines. So in one sense one of the real benefits is not having to worry about changing engine oils for the 2010 trucks. These oils are also backwards-compatible, and can be used on 2007 and

earlier engines," said Arcy.

The CJ-4 engine oils came out in 2006 with improvements in wear and deposit control, and restrictions on the amount of sulphated ash that accumulated in the particulate filters when the oil is burned off. The OEMs asked for limits to this sulphated ash, noted Arcy.

"Our tests have shown that SCR does not add any new requirements as far as oil properties are concerned," said Gary M. Parsons, global OEM and industry liaison manager with Chevron Oronite Company (which develops, manufactures, and markets fuel and lubricant additives). "In fact, SCR is less restrictive than DPFs are. DPFs require low SAPS (Sulphated Ash, Phosphorous, and Sulphur) oils to prevent premature plugging due to ash-forming components,"

## Drain intervals, DEF and fuel economy

For 2010 engines, required drain intervals will depend, as they usually do, on a variety of factors relative to the fleet's operations, such as OEM recommendations, how much fuel is consumed, and the quality of the oil.

Parsons noted the use of SCR systems allows the OEMs to modify their combustion strategies to optimize their engines for fuel economy and "allow more engine-out NOx knowing the SCR system will take care of the NOx reduction in the exhaust aftertreatment system."

"In those cases, EGR rates will be reduced from 2007 levels which may allow for extended drains," he said. "Lower EGR rates should reduce soot loading, operating temperatures, and acid formation. All of those should lead to directionally longer drain intervals. However, operators do need to employ used oil analysis because nitration may become more of an issue than in the past. Nitration leads to nitric acids which will deplete the total base number (TBN) of the oil," said Parsons.

Parsons noted that he has not heard of any specific scepticism regarding oil technology.

"The SCR/DEF OEMs are all recommending 35,000 to 60,000 mile drain intervals. Navistar, which is using 'optimized EGR' has recommended 25,000 mile drains," said Parsons.

Shell's Arcy said engine oil can also contribute to improved fuel economy with new or existing engines.

"With fuel pricing starting to inch up a little bit, fuel economy is definitely a topic of conversation. We see some of the OEMs starting to lean in that direction. From an oil standpoint, we can improve fuel economy with synthetics or semi-synthetics in

the engine. Most are already using them in the driveline," said Arcy.

"We have seen a 1.6% reduction in fuel use using a 10W30 in the engine. Some of these little numbers do add up. We see this as a trend. Volvo is factory filling with 10W30 right now. The synthetics offer better cold starting, and it is worth checking for fleets if this may be an option," he added.

Fleets and owner/operators running APUs may also want to consider a 5W40 synthetic oil, Arcy noted, "because if the truck is going back and forth from a northern climate and then heading south, the engine on the APU must be able to start in extreme climates. Synthetics were designed to protect under extreme conditions, both extreme hot and extreme cold."

With regard to diesel exhaust fluid and access to refills, fleets will have to decide the approach that works best for them, said Arcy.

"The fleets will have to decide whether they will top it up at the fleet's terminal or have them top up on the road. It will mean extra equipment.

"If they're terminalling it, they're going to have to have it somewhere warm because diesel exhaust fluid will freeze. Those are things they are going to want to talk about with their supplier," he said.

## Are fleets prepared for 2010?

Increases in truck prices in both 2007 and 2010 related to more stringent exhaust emissions standards have made fleets aware of the extra equipment on the trucks.

"I believe that learnings from the EPA07 engine introductions were not lost on the 2010 engine introductions," noted Murray.

"From what we have heard, the diesel particulate filters have proven to be very durable and most fleets have not accumulated enough mileage since 2007 to require a removal and cleaning of the DPF ash yet," said Parsons.

He noted that the move away from APICI-4PLUS to APICJ-4 was slow to begin with for a couple of reasons. "First, the number of post-2007 trucks in the fleet requiring API CJ-4 oil is relatively small, especially with the drop in new truck sales due to the downturn in the economy. The fleets have had good success with API CI-4 PLUS oils in the pre-2007 trucks and have little incentive to change to API CJ-4 until an appreciable number of post 2007 trucks are in the fleet. Second, until the start of 2010, the off-highway market is still allowed the use of low-sulfur diesel fuel (up to 500 ppm sulfur). API CI-4 Plus has a higher TBN and is better formulated to neutralize the higher levels of crankcase acids formed due to higher fuel sulfur levels."

However, the switch to CJ-4 oils is gaining momentum, Parsons noted.

"Beginning in 2010, all diesel fuel has to be ultra low-sulfur diesel fuel (ULSD = 15 ppm sulfur maximum). Now that all the diesel fuel is ULSD, many of the on- and off-highway fleets can and will switch to API CJ-4 oils. In addition, many of the major lubricant marketers have discontinued the widespread availability of API CI-4 Plus oils in favor of API CJ-4 oils," said Parsons.

With regard to any scepticism about the emergence and adoption of the 2010 engines, Parsons said that with additional costs announced by the OEMs for 2010 trucks (about US\$8,000-\$10,000 more than equivalent 2007 trucks), and with the slowdown in the economy and financing still difficult in some areas, purchasing new trucks is difficult.

"It remains to be seen if the diesel exhaust fluid infrastructure will be an issue for early adopters, but that is a concern. The OEMs such as Volvo, Daimler, and Cummins are all advertising up to 5% fuel economy gains of 2010 trucks versus 2007 trucks. That's exciting to the fleets and will become an even bigger factor if fuel prices rise," he said. ■

## Want more info?

Check out the following Web sites for more information on your 2010 oil and lube requirements:

**Castrol:** [www.castroltectionextra.com](http://www.castroltectionextra.com)

**Chevron:** [www.deloperformance.com](http://www.deloperformance.com)

**Imperial Oil:** [www.imperialoil.ca](http://www.imperialoil.ca)

**Petro-Canada:** [www.lubricants.petro-canada.ca](http://www.lubricants.petro-canada.ca)

**Shell:** [www.shell.ca/rotella](http://www.shell.ca/rotella)

**Total Lubricants:** [www.total-lubricants.ca](http://www.total-lubricants.ca)





# A DPF dilemma

By James Menzies

Fleets running post-2007 model year trucks will soon need to develop a diesel particulate filter (DPF) cleaning program. While the DPFs, found on all truck makes since 2007, have thus far exceeded EPA requirements for longevity, some fleets are beginning to pull the first of those filters for cleaning and are making some alarming discoveries in the process.

After exploring the various options for having its DPFs cleaned, Bison Transport opted to invest in the necessary equipment and do its filter cleaning in-house. It's no small investment, with each of the company's three FSX DPF cleaning machines costing about \$80,000.

However, what's more upsetting than the cost of the equipment, as far as director of fleet assets Itamar Levine is concerned, is the potential costs of replacing the significant number of cracked filters the company has discovered. So far, Levine said about one-third of the DPFs pulled off Bison trucks have had hairline cracking along the filter core, Levine said. He's frustrated that the filters are no longer covered by warranty and the

OEMs seem to have no answers as to what caused the cracking. Levine is confident the cracking wasn't caused by the way the fleet



**Diesel particulate filters** have been quietly going about their business relatively problem-free since they were introduced in 2007. But as they come due for their first cleaning, a major fleet says there's cause for concern.

operated its vehicles.

"We can't do anything to make that filter crack by the way we operate the truck," he said. "This whole issue is really puzzling to us. The frustrating part is, I seem to be the only guy who's having this problem according to the OEs. It's definitely not something just Bison Transport is going to see. This is something we're going to hear a lot

of talk about six months down the road or a year down the road."

Initially, Levine was replacing each of the cracked filters. But at a cost of a couple grand each, it was no longer feasible to do so. Since then, he has put dozens of cracked filters back into service, yet he wonders if they're doing the job they're designed to perform.

"I've installed dozens of cracked DPF filters back onto my tractors, which may not be the right thing to do as far as having the system do what it's supposed to do and clean the air," he said.

What exactly has caused the cracking remains a mystery. There are many theories, but the one Levine believes is that the cracking was caused by specific events, such as the many EGR valve

failures Bison experienced on its early generation EPA07 engines.

A catastrophic event such as an EGR valve failure can cause excessive heat in the filter, Levine said.

"I'm absolutely convinced that the many other problems we've had with those engines over the last two to three years and the many EGR valves we've had fail, that every time you have one of those

events where you create really high heat build-up in the DPF is what's causing this," he said. "Every time one of those (EGR valves) fails, you are creating tremendous stress in the exhaust system and overloading the DPF and creating really high temperatures. The only thing that'll crack the DPF is if it runs too hot."

Levine said he's frustrated that suppliers haven't been more accountable and he's surprised more fleets haven't yet had similar findings. At this year's Technology and Maintenance Council meetings, Levine stood up during a Shop Talk forum and voiced his concern. To his surprise, not one other maintenance manager in attendance complained of similar problems. Levine feels that's not because their filters are fine, but rather because they've yet to clean and inspect them.

"In talking to other fleets, it's all Greek to them right now," he said.

For now, Levine said he'll continue putting cracked filters back into service, but he'd like to see the issue addressed – even if it means bringing it to the attention of the EPA. In the meantime, the fleet's putting its new cleaning machines to good use and shortening cleaning intervals in hopes more frequent cleanings will help prevent further cracking. ■

## A DPF cleaning primer

By James Menzies

There may come a time when every fleet has a diesel particulate filter (DPF) cleaning machine in its shop. But for now, it's still a pretty rare piece of machinery.

Bison Transport believes it's among the first fleets to invest in its own DPF cleaning equipment. It chose the FSX cleaning machine, which has earned a reputation as the cleaner of choice among most OEMs and their dealers.

We visited Bison Transport's Mississauga terminal to see a filter cleaning first-hand. Demonstrating the technology was Mark Irwin, regional maintenance manager with Bison. He said before the fleet could even begin operating its DPF cleaning machines, it had to upgrade its facilities to accommodate its newest toy.

"We initially thought we'd just have to do a quick and simple installation, but it turned out to be a little more complicated than that,"

he said. "We had to increase the shop air, we needed a 160 cfm air compressor for the shop and with the additional air requirements, we needed additional power requirements. So there was a little bit of infrastructure required."

The cleaning process begins with an evaluation of the filter's current condition, using the FSX Trap Tester. The tester measures the volumetric efficiency of the filter before the cleaning takes place, Irwin explained. The Trap Tester subjects the filter to roughly the same amount of airflow the filter would experience while on a truck travelling down the road at 60 mph. This stage also involves a pin test, which measures 17 different areas of the filter to measure the thickness of the ash in the filter core, Irwin explained.

Next, it's time for the cleaning itself. The filter is placed in the FSX cleaning machine where it sits on

a turntable. Streams of high-volume air are blown into the filter core from both the top and the bottom, which is aimed at removing the ash. Plumes of black ash are seen billowing from the filter during the cleaning process. An ash vacuum, as Irwin describes it, collects the ash and deposits it into a pail. It will then be disposed of along with the company's waste oil.

Once the cleaning has been completed, the filter goes back to the Trap Tester to ensure it was properly cleaned and is ready to be placed back into service. If the cleaning didn't restore the filter to acceptable OEM levels, it is then placed into a kiln and baked for eight or nine hours, which is followed by a three-hour cooling down process, Irwin explained.

Now that Bison has a better understanding of particulate filters and their requirements, the com-



**In its performance tests**, PAC-CAR Parts found that the FSX diesel particulate filter cleaning machine got filters 9% cleaner than the next best performing machine. A two-stage HEPA filtration system called SootSucker 2 captures ash from each DPF, eliminating the problem of dust settling back on the filters.

pany is establishing a preventive maintenance program.

"We're anticipating the first cleaning to be around 400,000 kms and the second cleaning will be around 300,000 kms," Irwin said. ■

**BRIDGESTONE**

# What's inside a Bridgestone radial?



**Experts - with  
REAL Answers**

## **Tires are just the beginning**

Wherever you are, there's an experienced Bridgestone representative to help you get the most from your truck tire investment. Ask your dealer or truckstop what else choosing Bridgestone can do for you.



[BridgestoneTrucktires.com](http://BridgestoneTrucktires.com)