2022 – ISSUE 3

NOZZLE CHATTER

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2023 International Convention 12

ADS Association of Diesel Specialists

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What Are You Going to Believe

I have been a lifelong fan of the American Western. As a child growing up in a small town, nothing captured the Free American Spirit more than a cowboy single handily rounding up all the bad guys, dispensing justice, getting the girl, and then riding off into the sunset. There were many great TV shows that idealized these heroes like The Lone Ranger (which I remember playing on the radio as well as a TV), The Rifleman, and Bonanza. There were even more great movies like The Good the Bad and the Ugly (you have to love this one just based on the title alone), How The West Was Won, and Tombstone just to name a few. The actors portraying these heroes like Clint Eastwood, Gary Cooper, and Jimmy Stewart became larger than life legends.

Out of all the great Western actors, my absolute favorite is John Wayne a.k.a. "The Duke". He epitomized what you would want your western hero to have; his size, walk, talk and toughness. He also displayed a great sense of humor and comedic timing that most Western actors didn't have and that made him my favorite. His list of hit movies is impressive: The Searchers, True Grit, Rio Bravo, El Dorado, The Cowboys, etc. etc. His characters produced some of what I think are the greatest lines in movies:

"You're short on ears and long on mouth."
"A man deserves a second chance, but keep an eye on him."
"(The) Governor of our territory is a cull……A cull is a specimen that is so worthless that you have to cut him out of the herd."
"You can't serve papers on a rat, baby sister. You gotta kill him or let him be."

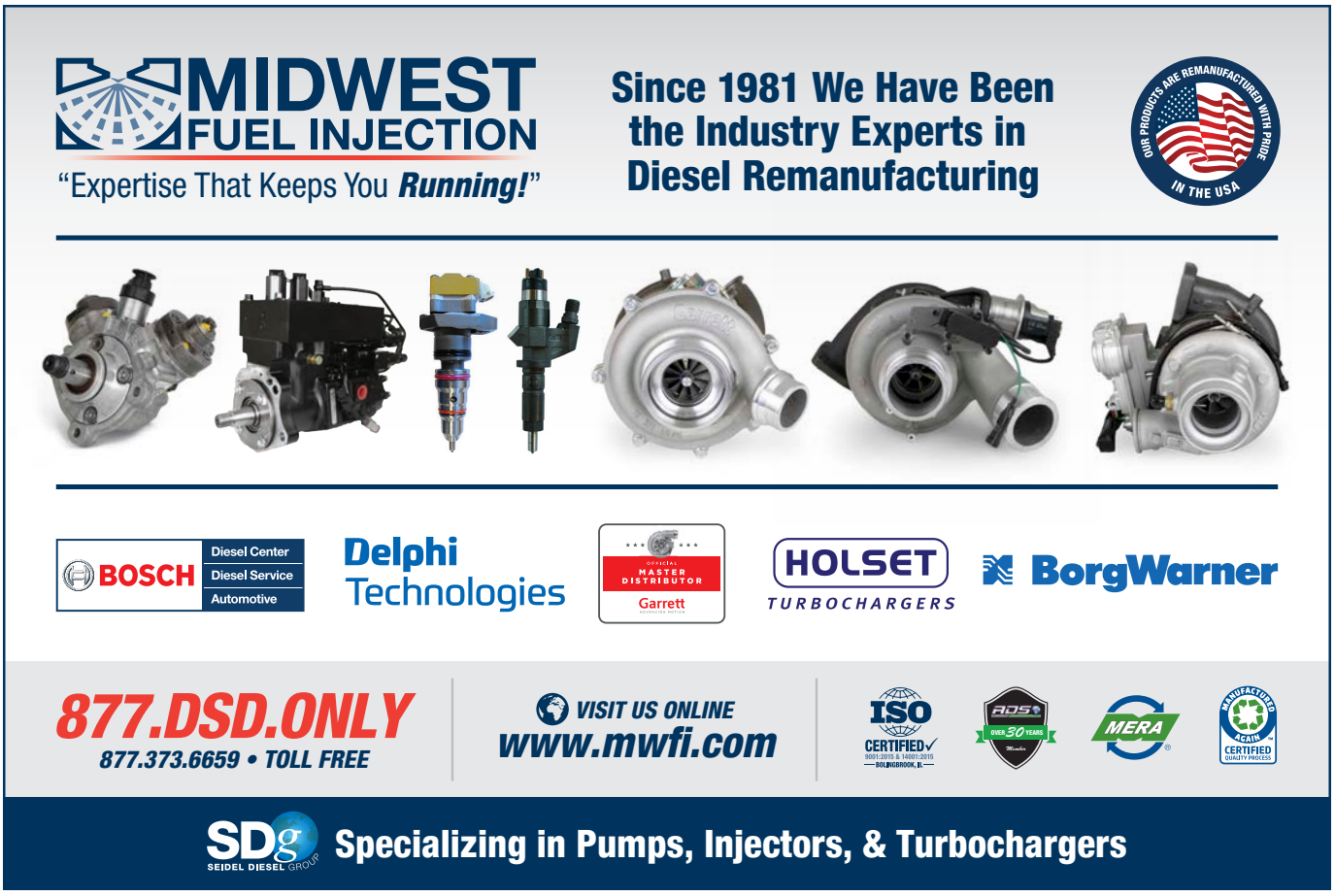
One of my favorite movies he starred in, McLintock!, displayed all of his great acting skills, especially his comedic timing. In one scene, our very drunk hero G.W. McLintock (John Wayne) is trying to help his also very drunk housekeeper Mrs. Warren (Yvonne De Carlo) up a grand staircase when they fall backwards down the stairs and end up with Mrs. Warren sitting on G.W.'s lap. G.W.'s extremely jealous wife Katie (Maureen O'Hara) comes running down stairs to see what had happened, quickly assesses the situation, and prepares to rip into G.W. when he cuts her off and says, "Now Katie…are you going to believe what you see or what I tell you?".

While this line has made me laugh many times over the years, I can't help but think about how it applies to what is going on in our country today. The U.S. (as well as the rest of the world) has seen historic inflation in the past year (which is crushing our middle-class), but we were told it would be transitory. Recently, in the U.S., we have seen the passage of the "Inflation Reduction Act". We have been told that this will help fight inflation, but when you review the law, what you see is that it stands no chance of fighting inflation and will most likely add to it. We were told that, "Nobody earning less than $400,000 (per year) will pay an additional penny in new taxes….not a single penny." What we see is $80 billion in increased funding allocated to the IRS helping to fund 87,000 new agents (this will more than double the size of the IRS making it larger than the State Department, FBI, & Border Security combined) and an

estimate that 91% of Americans making $75,000 or more will see their taxes go up. We were told that this would be a tax on the "rich", but what we see is a special carve out in the bill called the "carried interest loophole" that has long been used by the "rich" to avoid taxes. We were told that the government will subsidize the purchase of new electric vehicles up to $7,500 helping to make them "more affordable" to average Americans. What we see is the automakers announcing price increases of similar amounts on these vehicles. There again, if you want more of something (in this case higher prices), subsidize it.

Recently, we have seen the devastating effects of hurricanes Fiona on Puerto Rico and Ian on Florida's west coast. My thoughts and prayers go out to everyone that has been affected by these storms. As I watch the news seeing many thousands of people trying to escape the storm's path, over a million people without electricity, and 10's of thousands of first responders coming to help rescue people and restore basic services, I can't help but wonder what would happen if we had a totally electric transportation grid. What I see is the internal combustion engine (particularly the diesel when it comes to restoring basic services and rebuilding infrastructure) coming to the rescue as always. What we are told is that electric motors should totally replace internal combustion engines, but what I see is not only are they not ready for prime time, but in times of crisis, they could add to people's pain and suffering and even cost lives.

If you want to be able to believe in what you see and hear, make plans to attend the ADS International Convention in conjunction with HDAW week in Grapevine TX, January 15-19. We are planning some great programming as well as the always exciting exhibit hall. Registration is already open and you can make all of your reservations by going to diesel.org. If you were thinking of putting it off and waiting to make your reservations, I will leave you with one more quote from the Duke. "Slap some bacon on a biscuit and let's go! We're burning daylight!" ■



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ADS STAFF

Scott D. Parker
Chief Executive Officer
sparker@diesel.org

Casey Parker
Chief Operating Officer
casey@diesel.org

Kim Litscher
Accounting Manager
accounting@diesel.org

Nick Brown
Director of Marketing and Communications
marketing@diesel.org

Maureen O'Donnell
Executive Assistant
membership@diesel.org

ADS Headquarters
7250 Heritage Village Plaza, #201
Gainesville, VA 20155

Phone: 816.285.0810
E-mail: info@diesel.org
Website: www.diesel.org

Para servicios en español,
contacte a membresia@diesel.org

Find us on:

Scott D. Parker
ADS CEO

The EVs are coming! The EVs are coming!

Yes, but...

On the night of April 18, 1775 at the beginning of the American Revolutionary War, a silversmith named Paul Revere was informed that British troops were on the move. As part of an early warning system, Revere rode on horseback alerting the colonists "the British are coming". Revere's message played an important role in the Colonists' victory in the Battles of Lexington and Concord that happened the very next day.

The EVs are Coming!

If we were to use the media as our early warning system, we would think the internal combustion engine will be eliminated before we know it. Recent headlines obviously could cause concern for companies that specialize in diesel aftermarket.

While it is true that electric vehicle sales are on the rise, it is important to keep the facts in perspective – something that is a struggle for clickbait media.

Here are some facts.

The electric vehicle market is growing quickly but they represent a very small percentage overall market share. According to the New York Times, there are 250 million registered motor passenger cars and light duty vehicles on the road in the US today. Less than 1% are electric. Even under some of the most aggressive models, the market share for electric vehicles in 2035 may reach 13%.

How can it be that low? The average age of the vehicle fleet has increased by 27% in the last 20 years. In 2002, the average age of the fleet was 9.6 years. In 2022, that number increased to 12.2 years (diesels on average last even longer). Since the age of the fleet continues to increase, the ability of new technologies to dramatically impact market share is blunted.

There are other factors that should be considered when forecasting the pace of EV market share growth:

- **Battery Technology**: Current battery size and weight are serious concerns – particularly for medium/heavy duty, industrial and agricultural applications.
- **Precious Metals**: The price of lithium has surged tenfold over the last two years and supply gap is expected to be 24% less than demand by 2035. This challenges the promise of more affordable EVs.
- **Power Grid**: California, which recently passed a ban on the sale of new cars with internal combustion engines in 2035, sent 27 million text messages during the latest hot spell asking people to refrain from charging their electric vehicles.

Yes, there is downward pressure on the internal combustion engine, but it is reasonable to assume the services of the diesel aftermarket will be needed for the foreseeable future.

At the same time, it is important for ADS members to stay informed of these changes in the market. Many of the OEs are now referencing fuel-agnostic powertrain concepts for the future including hydrogen, propane, clean diesel, etc. which creates new opportunities for ADS members. Your association will work to be an honest early warning system to help keep your business ahead of the curve. ■

Scientists Retrofit Diesel Engines to Use Hydrogen as Fuel, Increasing Efficiency 26%

Engineers at the University of New South Wales (UNSW) have successfully retrofitted a diesel engine to use hydrogen as a fuel to reduce carbon emissions, TechXplore reported. The team spent 18 months developing the dual-fuel injection system that uses 90 percent hydrogen as fuel but is confident that future retrofits could be completed in a matter of months.

Hydrogen can be more environmentally friendly when produced using renewable energy than burning fossil fuels like diesel. The research effort led by Shawn Kook, a professor at the School of Mechanical and Manufacturing Engineering, has demonstrated to have reduced carbon dioxide emissions to 90 g/ kWh, which is about 86 percent lower than that produced by a diesel-powered engine.

The research team is confident of commercializing the technology within the next two years and plans to first deploy it in industrial locations such as mining sites where piped hydrogen lines already exist. Following this, the team will look to make its technology more mobile, where a hydrogen storage system will also be required.

Diesel Ram Owner Crushes Truck After State Orders Deleted Emissions Fix

The owner of a diesel 2008 Ram 2500 with deleted emissions equipment who found himself in the crosshairs of New Jersey's Department of Environmental Protection crushed his truck Friday after the state ordered him to spend thousands of dollars to bring it back into compliance or scrap it.

After attempting to sell the modified pickup on Facebook Marketplace in June, Mike Sebold was contacted by the DEP

with a notice of violation. Selling vehicles with deleted emissions equipment is illegal in New Jersey, and rather than returning the Ram to its stock configuration, he opted to turn in his plates so he could keep it for off-road use. DEP agents then followed up and told him he had two choices—fix it, or scrap it. The truck is now crunched and stacked at a junkyard in Newton, New Jersey.

State governments and, indeed, the feds are cracking down on trucks with deleted emissions. Up to now, most of their efforts have focused on aftermarket tuners and parts suppliers. Sebold's case is the clearest and most visible example yet of an individual owner being targeted.

California Looks to Ban Diesel Trucks Weeks After Facing Electric Blackouts

The California Air Resources Board (CARB) is proposing another ban to advance the state's efforts in reducing climate emissions. If passed, the Advanced Clean Fleets regulation would prohibit new diesel commercial trucks by 2040. The proposal comes weeks after abnormally high temperatures threatened mass blackouts in California, and state leaders called for electric-vehicle owners to avoid charging their cars during that time.

"We're flying blind into some pretty major questions about the practicality of actually implementing this rule," said Chris Shimoda, a senior vice president with the California Trucking Association.

Fox News reported that CARB is expected to vote on the proposal at the end of October. If the proposal is approved, state legislators would be forced into action to prepare the state's roadways for a potential flood of electric vehicles. The decision also could drastically affect the trucking industry, which operates trucks largely fueled by diesel. ■

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ADS HOSTS MEMBERS AT AUTOMECHANIKA RECEPTION

ADS hosted its inaugural "Get Re-Acquainted Reception" for its members at Automechanika on Thursday, September 15, 2022, in Frankfurt, Germany. Over 150 people attended the networking reception.

Automechanika Frankfurt is a large, international trade show held every two years in Frankfurt, Germany. The 2022 edition featured 2,804 exhibitors and 78,000 attendees from 175 countries.

"As we were planning for the reception, we didn't know what type of response we would get," stated ADS CEO Scott D. Parker. "The attendance far exceeded our expectations and provided amazing networking opportunities. The ADS reception provided a home for those in the diesel aftermarket within the much larger event."

In addition to the reception, ADS representatives visited each member booth and provided them a sign to promote their membership and the ADS brand.

Recently, ADS and Messe Frankfurt GmbH, the organizer of Automechanika Frankfurt signed a cooperation agreement that adds value to both organizations and strengthens their respective positions in the market. This agreement also establishes the framework for cross promotions and future content programming.

Because of the success of the program, ADS is planning on a similar reception at the next Automechanika Frankfurt, September 10-14, 2024 and perhaps other international aftermarket events.

ADS thanks the sponsors below whose generous support made the reception possible.

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Oscar Villafranca (left) and Christian Gómez (center) of Lucas Diesel Systems receive a member sign for their booth from ADS' Scott D. Parker.

Simon Quantrell (center) hosts ADS' Scott D. Parker (left) and Casey Parker (right) in the Carwood Motor Units booth.

Michael Oliveros, Williams Diesel Service (left), Nick Pantazis, Carbon Zapp (center) and Scott D. Parker, ADS (right) network on the Automechanika show floor.

ADS' Scott D. Parker and Automechanika's Olaf Musshoff on the show floor in Frankfurt, Germany.

Olaf Musshoff, Director of Automechanika Frankfurt, greeted over 150 attendees at the ADS Get Re-Acquainted Reception in Germany.

2023 ADS International Convention

The 2023 ADS Convention will be held in conjunction with HDAW 2023 in Grapevine, Texas, at the Gaylord Texan Resort & Convention Center. See hotel information below and visit the ADS website to book your room today before the room block sells out.

Registration is now available for ADS Members. Members may register for ADS convention only, ADS and HDAW only, or HDAW only. See pages 19–20 for registration information.

Sponsorships are a great way to gain exposure for your company at the 2023 Convention. See page 18 for sponsorship descriptions and contact at marketing@diesel.org with any questions.

ADS/HDAW Convention Information

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Hotel Information

Gaylord Texan Resort & Convention Center
1501 GAYLORD TRL, GRAPEVINE, TEXAS 76051

- The room rate of $195 per night is based on single or double occupancy
- Reservations are refundable if cancelled at least 72 hours prior to arrival.

Don't delay, the Gaylord Texan has sold out in prior years - reserve your rooms today!

Visit diesel.org/2023Hotel for information on booking your hotel room through HDAW.

ADS INTERNATIONAL CONVENTION & HDAW 2023

The Best of Both Worlds

The 2023 ADS Convention and HDAW Trade Show will be held January 15-19 in Grapevine, Texas.

Register now to gain access to the latest industry education sessions as well as numerous networking opportunities.

ADS and HDAW will be co-locating in 2023 in Grapevine, Texas. This gives members of ADS the best of both worlds.

ADS: Diesel Specific Education & Networking

During the ADS International Convention (January 15-16), ADS members will receive diesel specific industry education and training as well as networking opportunities with hundreds of your diesel peers.

HDAW: Broader Industry Perspective & Diversification Opportunities

Immediately following ADS International Convention, Heavy Duty Aftermarket Week (HDAW) kicks off (January 16-19). ADS members will interact with more than 2,500 executives and managers at the largest North American gathering of light, medium and heavy duty aftermarket professionals in the industry.

Great Value

Because ADS members get huge discounts to register for ADS and HDAW, ADS members can register for both events for less than the cost of attending past ADS stand-alone meetings. That's right – you get more education, networking and value for less money.

Members of ADS save significantly on exhibiting and registration - make sure your company's membership is in good standing to qualify for discounted member rates.

Networking: *Business Development Opportunities*

The 2023 ADS/HDAW event will feature numerous events to connect with thousands of attendees to get ideas and leads for you to grow your business. The networking sessions include:

HDAW '23 Product Expo: The premier feature of HDAW is the Product Expo, which features over 300 suppliers in the trade show. The Product Expo includes dozens of ADS manufacturer, replacement parts and allied equipment members as well as many related suppliers. This is your chance to meet with these leading suppliers so you can attract new clients and retain your current customers.

HDAW All Industry Networking Receptions: HDAW provides ADS members numerous valuable networking opportunities with top industry executives of supplier manufacturers and distributors across the light, medium and heavy duty aftermarket. It includes All Industry Welcome Reception, Closing Reception and the Leaders of Tomorrow (LOT) Reception (for attendees under the age of 45.)

HDAW One-on-One Meetings: The industry's most successful One-on-One Business Meeting program between manufacturers and distributors – more than 1,800 pre-scheduled meetings took place in 2020. This is where deals get done. An integral part of HDAW, One-on- One Business Meetings match you with the suppliers you want to do business with. Here, you'll get a personalized experience with products and pricing tailored to your situation and focused on your business needs.

HDAW Education Workshops: The Education Program at HDAW builds on the diesel specific education during the ADS Convention. The workshops feature top notch aftermarket education to provide you the information you need to succeed.

HDAW Service Opportunities & Learning Day (SOLD!): SOLD! is an education program held during HDAW specifically designed for independent service shop owners and management, and distributor companies in the truck ser-vice business. It features a mix of management and how-to type training sessions focused on increasing the value and competitiveness of the independent service provider.

Tentative Agenda | 2023 International Convention

January 15 - 19, 2023
Grapevine, Texas

2023 Committee Meetings

The following committee meetings to be held via Zoom throughout the month of December, 2022:

Business Management	International General	Replacement Parts
Canadian General	Latin American	Technical Education
Communications	Manufacturers	TurboCharger
Convention & Trade Show	Membership	Ortner Foundation Meeting

SATURDAY, JANUARY 14

All Day Arrivals

SUNDAY, JANUARY 15

8:00 AM - 12:00 PM	Board Meeting *Committee Chairs Report to Board*
10:00 AM - 1:00 PM	ADS Welcome Desk
12:00 PM - 12:45 PM	Board and Committee Chairs Lunch
1:00 PM - 4:00 PM	Training Seminar
1:00 PM - 4:45 PM	Distributor Meetings *(by invitation only)*
4:45 PM - 6:45 PM	Owners Only Collaboration Meeting
6:15 PM - 9:00 PM	ADS Welcome Desk
7:00 PM - 9:00 PM	ADS Get-Acquainted Reception

MONDAY, JANUARY 16

8:30 AM - 3:45 PM	ADS Welcome Desk
8:30 AM - 9:00 AM	Morning Coffee
9:00 AM - 12:15 PM	ADS Convention Programming
12:15 PM - 1:15 PM	Lunch
1:30 PM - 3:45 PM	ADS Convention Programming
2:00 PM - 3:15 PM	Companion Afternoon Tea
4:00 PM - 5:15 PM	Forerunners Reception

HDAW 2023 Agenda

(HDAW 2023 Registration Required to Attend)

MONDAY, JANUARY 16

5:15 PM - 5:30 PM	Leaders of Tomorrow Reception
5:30 PM - 7:30 PM	All Industry Welcome Reception

TUESDAY, JANUARY 17

8:00 AM - 10:00 AM	Breakfast/Opening General Session/Awards Programming
10:00 AM - 1:00 PM	SOLD Educational Programming
10:00 AM- 1:15 PM	Pre-Scheduled One on One Meetings
1:00 PM - 2:00 PM	Lunch & Roundtables
2:00 PM - 6:00 PM	Product Expo & Happy Hour

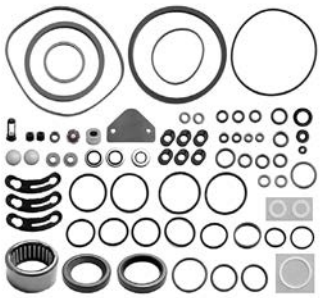
HDAW 23
Heavy Duty Aftermarket Week '23

WEDNESDAY, JANUARY 18

8: 00 AM- 9:00 AM	Breakfast/Education Session
9: 00 AM- 1:00 PM	Product Expo
1:00 PM- 2:00 PM	Lunch & Roundtables
2:00 PM - 5:55 PM	Pre-Scheduled One on One Meetings
5:00 PM - 6:00 PM	Reception
6:30 PM - 8:00 PM	All Industry Closing Reception

THURSDAY, JANUARY 19

7:00 AM - 8:15 AM	Grab & Go Breakfast
7:00 AM - 12:55 PM	Pre-Scheduled One on One Meetings
12:45 PM - 1:45 PM	Lunch
1:45 PM- 4:20 PM	Open Time for Unscheduled One on One Meetings



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The Economy: Take A Hike!

ADS Keynote
Dr. Elliot Eisenberg

Elliot Eisenberg, Ph.D. (aka, "The Bowtie Economist") promises to entertain and educate as he discusses the short-term and longer-term prospects for the US economy. Dr. Eisenberg will discuss key topics such as the condition of the current economic recovery, the timing, length and magnitude of the increasingly likely recession, GDP growth, household spending and savings rates, labor market conditions, inflation, future Federal Reserve policy, and what it all means for interest rates.

Along the way Dr. Eisenberg will spend considerable time looking at consumer confidence, construction activity, new and used auto sales, heavy truck sales and energy prices. Find out everything you need to know to interpret the most critical data and gain a better understanding of market conditions, what may lay ahead, and why. After his prepared remarks, and time permitting, Dr. Eisenberg looks forward to taking questions from the audience. Be ready to take plenty of notes.

Attend the 2023 ADS Convention to learn more about the future of our industry.

Biography

Elliot Eisenberg, Ph.D. is a nationally acclaimed economist and public speaker specializing in making the arcana and minutiae of economics fun, relevant and educational. Dr. Eisenberg earned a B.A. in economics with first class honors from McGill University in Montreal, as well as a Master and Ph.D. in public administration from Syracuse University. Eisenberg, formerly a Senior Economist with the National Association of Home Builders in Washington, D.C., is a frequent speaker on topics including: economic forecasts, economic impact of industries such as homebuilding and tourism, consequences of government regulation, strategic business development and other current economic issues.

He is the creator of the multifamily stock index (the first nationally recognized index to track the total return of public firms principally involved in the ownership and management of apartments), the author of more than eighty-five articles, serves on the Expert Advisory Board of Mortgage Market Guide and is a regular consultant to several large real estate professional associations, hedge funds and investment advisory groups.

He has spoken to hundreds of business groups and associations, often as keynote speaker. Dr. Eisenberg has been invited to testify before lawmakers and is often asked to comment on proposed legislation. His research and opinions have been featured in Bloomberg Businessweek, Bureau of National Affairs, Forbes, Fortune, and many other publications. He is regularly featured guest on cable news programs, talk and public radio, writes a syndicated column and authors a daily 70 word commentary on the economy that is available at www.econ70.com.

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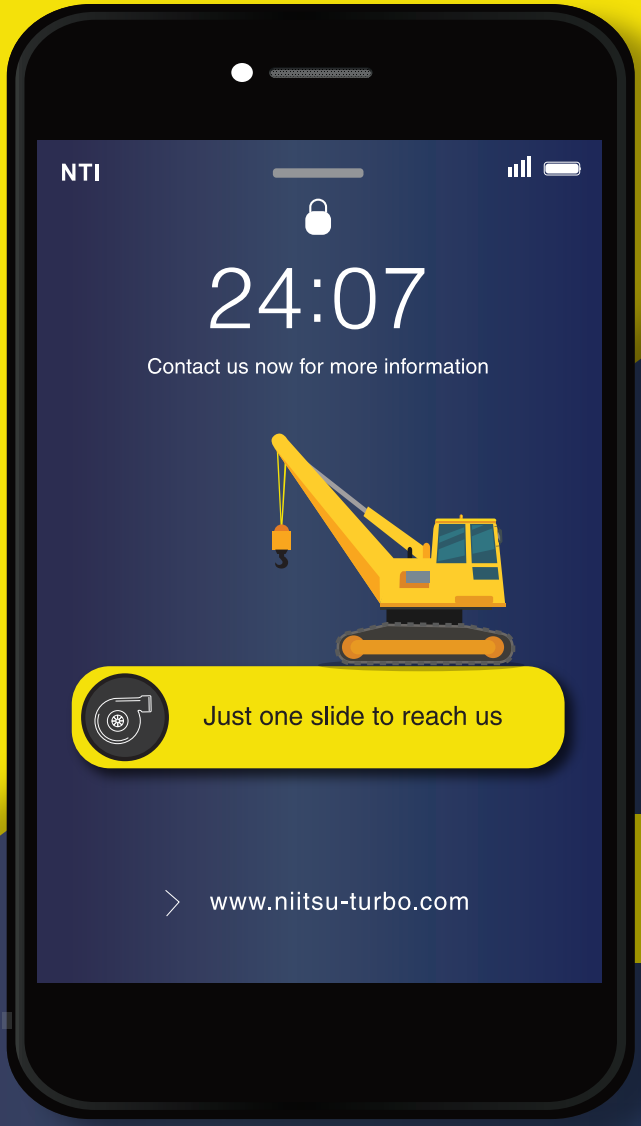

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Niitsu Turbo Industries-Official

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2023 SPONSORSHIPS CONVENTION

GRAPEVINE, TEXAS | January 15 - 16, 2023

ADS LANYARD SPONSOR **SOLD ~~$2,500~~**

Your company logo will be printed on lanyards distributed on Sunday and Monday at ADS check in. Lanyards will be given to attendees of the ADS Convention. Only one available.

ADS GET ACQUAINTED RECEPTION

Your company logo will be prominently displayed on large signage at the reception, on the ADS website and in the pre- and post-Convention *Nozzle Chatter* magazine. Logo size based on sponsorship level.

Platinum: $2,500
Gold: $1,500
Silver: $1000
Bronze: $500
Copper: $250

ADS A/V SPONSOR **SOLD ~~$1,500~~**

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ADS 23 International Convention
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1st + 2nd person from company	~~$850~~ ☐ **$795**/attendee	~~$900~~ ☐ **$845**/attendee	~~$950~~ ☐ **$895**/attendee
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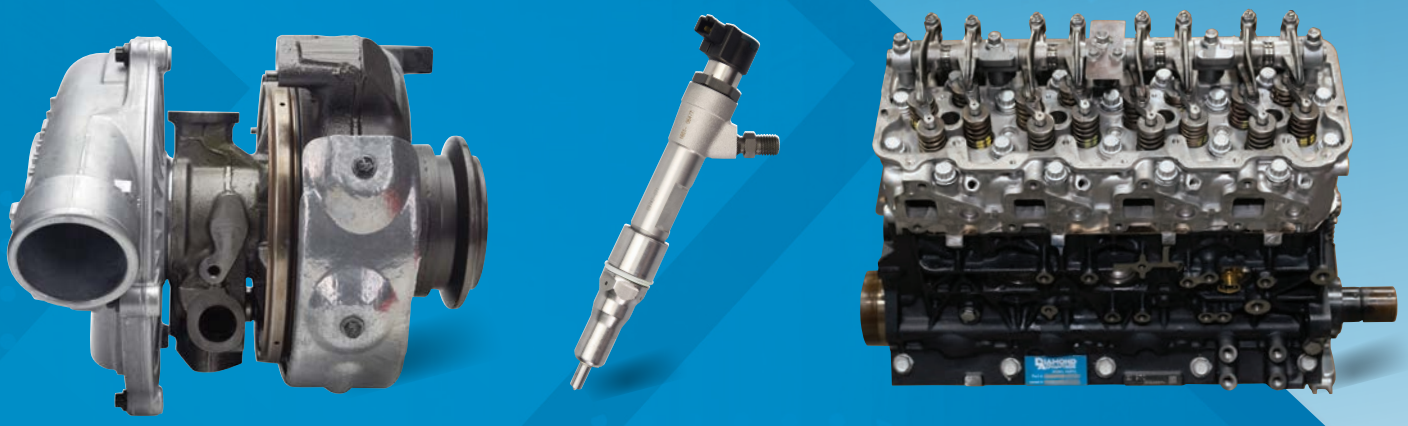

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The ABCs of Aftertreatment

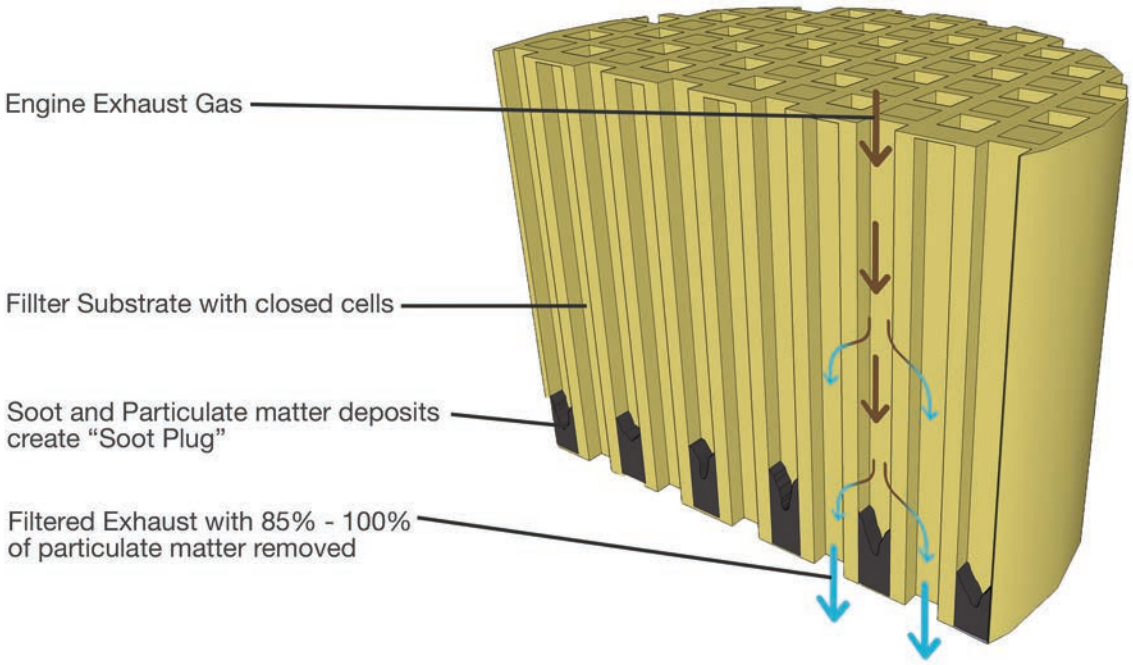
BY: MICHAEL OLIVEROS

It's hard to believe that exhaust aftertreatment systems have been a mainstay on the vehicles we work on for 15 years now. As with any change, these systems were not welcomed with open arms, but with resistance. Granted, these systems have not been infallible and have certainly encountered growing pains. Yet, in the grand scheme of things, these devices have achieved the desired results and have become more reliable with each iteration. In recent years, these aftertreatment systems have permitted for the increased power and fuel economy of late model diesel engines. This has been achieved by allowing engineers to optimize engine performance while any additional emissions are handled by the aftertreatment system. As diesel specialists, I believe it is our duty to not only understand these systems, but also possess the ability to explain them to our customers and employees. Like it or not, exhaust aftertreatment systems are here to stay and I believe that we should embrace them. The purpose of this article is to not make you aftertreatment experts, but to give you an introduction to the major systems being used and their purposes.

Before we get into the specific details on these systems, lets discuss why we need them. Obviously, this starts with diesel exhaust, specifically engine-out emissions. The majority (98-99%) of diesel exhaust is made up of nitrogen (N2), carbon dioxide (CO2), oxygen (O2) and water vapor (H2O). The last little bit of the exhaust is the pollutants: carbon monoxide (CO), hydrocarbons (HC – aka unburned fuel), nitrogen oxides (NO, NO2 – aka NOx) and particulate matter (PM – aka soot). Of those four pollutants, nitrogen oxides (NOx) and particulate matter (PM) are considered our major offenders and are the ones emission regulations focus the most on. It's also important to know that in engine development/design/tuning, when NOx is low, PM is high and vice-versa. This see-saw of NOx and PM is a restriction/rule of the science behind the engineering of a diesel compression engine.

On the regulation side of things, in 2007 the North American standards for heavy duty on-highway vehicles limited PM to 0.01 g/bhp-hr and NOx to 0.20 g/bhp-hr. The PM emission standard took full effect in 2007, while the NOx standard was phased-in between 2007 and 2010. For CO, the limit is 15.5 g/bhp-hr, a standard which has been in place since 1985. Hydrocarbons (regulated as non-methane hydrocarbons - NMHC) also were limited in 2007 to 0.14 g/bhp-hr. As of this writing, these are the current federal standards, but there have been regulations put in place by the California Air Research Board (CARB) to further reduce the NOx standard to 0.05 g/bhp-hr by 2024 and then to 0.02 g/bhp-hr by 2027. Time will tell if these CARB standards will eventually be implemented federally, but chances are they will be. Emissions are measured over an engine or vehicle/chassis test cycle. These test cycles are supposed to create repeatable emission measurement conditions and, at the same time, simulate a real driving condition of a given application. The analytical methods that are used to measure particular emissions are also regulated by the standard.

We now know what is in diesel exhaust and what the regulatory limits are for specific pollutants. So how do we get there? What devices and technologies do we have to put in place to achieve these standards? One thing to recognize is that the technologies discussed below are not new or



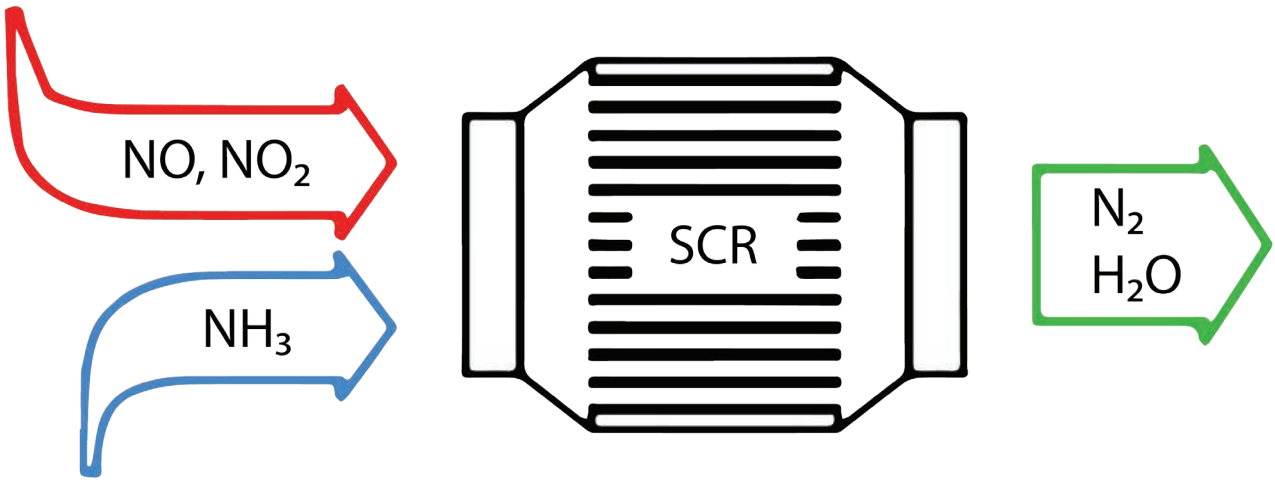
cutting edge. Oxidation catalysis, particulate filters, and selective catalytic reduction have been around for over 50 years in the industrial gas and chemical production sectors. But in those applications, the emissions loads are fixed or at least predictable and scheduled accordingly. Applying these technologies to an on-highway application is especially challenging as the conditions are dynamic and are therefore constantly changing and unpredictable. With that in mind, you can think of the diesel exhaust aftertreatment system as a mobile gas refinery.

We can break down the modern exhaust aftertreatment system into three major sections or systems: (1) the diesel oxidation catalyst (DOC), (2) the diesel particulate filter (DPF), and (3) the selective catalytic reduction system (SCR). Each of these devices/systems have a particular role and even though they are related to one another, it is easier to think about them as individual systems.

The DOC is a flow-through substrate that has a washcoat of a propriety blend of platinum and palladium-based catalysts. When passed over an oxidation catalyst, carbon monoxide (CO) and gas phase hydrocarbons (HC) can be oxidized to harmless products. The DOC also plays an important role in converting the NOx ratio from predominantly nitric oxide (NO) to nitrogen dioxide (NO2). This enhances SCR performance and further promotes passive DPF regeneration. Furthermore, when the DOC is combined with additional HC the resulting exothermal reaction is used to raise the inlet temperature for active DPF regenerations. As with any catalyst, the DOC must be heated to a specific temperature before the reactions can occur. Because of this, the DOC is always positioned first in the aftertreatment stream. In some applications, it's even mounted directly to the outlet of the turbocharger itself. DOC's may be constructed out of a ceramic or metallic substrate, each with their own advantages and disadvantages.

Unlike the DOC, the DPF is not a flow through device. As its name states, it is a filter. It is a porous cellular structure with individual channels open and plugged at opposite ends. This is known as a wall-flow design. As soot laden exhaust gases enter these channels, the exhaust gases pass through walls while the soot is trapped on the surface of the filter walls. Much like the DOC, most DPF substrates have a washcoat containing platinum and palladium-based catalyst to aid in the oxidizing of hydrocarbons. Periodic regenerations are required as filter back pressure increases. During regeneration, the majority of soot is then oxidized while the remaining material is converted into ash. This ash stays trapped inside of the DPF until the unit is removed from the vehicle and cleaned. Its construction is a monolith substrate made from either cordierite (cream in color) or a silicon carbide (dark gray in color), each having their own advantages and disadvantages.

The SCR system is tasked with the conversion of our final pollutant, NOx. To do this, the SCR system requires the use of a consumable substance known as diesel exhaust fluid (DEF). DEF is an aqueous solution made with 32.5% urea and 67.5% deionized water. When DEF is injected into the exhaust stream, it vaporizes and decomposes to form ammonia (NH_3) and carbon dioxide (CO_2). The SCR catalyst itself is a flow through substrate (like a DOC) but is coated with iron and copper exchanged zeolite (Cu-ZSM-5). When the ammonia and NOx come in contact with the SCR catalyst a reaction converts the NOx into harmless nitrogen (N_2), water (H_2O). The amount of injected DEF is calculated by a control unit with inputs from NOx sensors located before and after the SCR catalyst. The SCR system is supported by several other

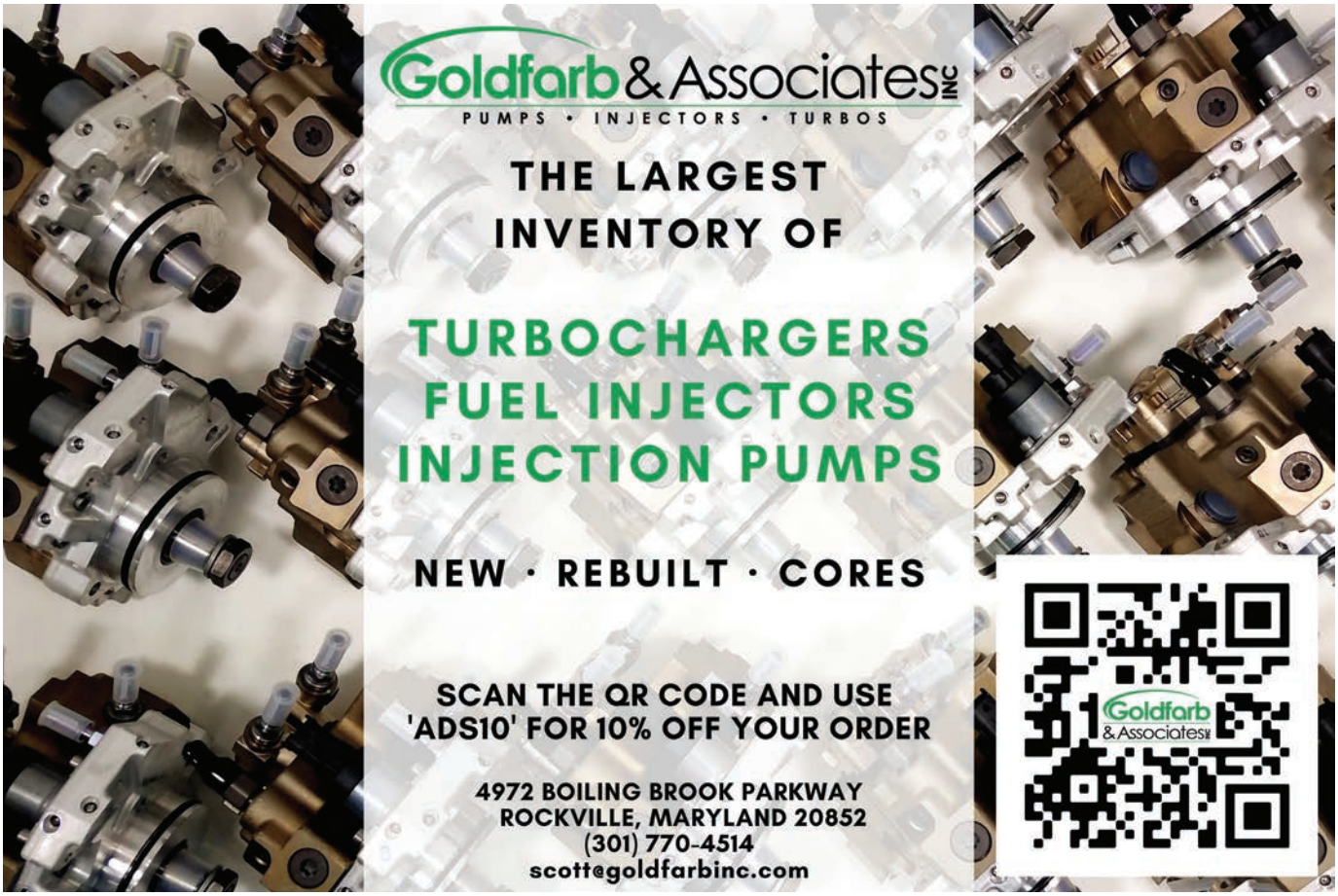


devices such as a DEF storage tank(s), pump(s), and hoses, all of which are heated to aid in the thawing of frozen DEF. The tank(s) also include level sensors, filters and sometimes even fluid quality sensors.

The three systems above are aided by multiple sensors monitoring temperature and pressure throughout the system and act as the "eyes and ears" for the engine control module. The positional order of the DPF and SCR may also swap depending on the application or test cycle it was approved under. In some off-highway applications, the DPF may be eliminated altogether, with the application only utilizing a DOC and SCR system. Remember the NOx/PM see-saw analogy earlier?

Even though there is a lot going on in the aftertreatment system, once you break it down into smaller systems, each with its own role, it becomes less intimidating. As mentioned before, exhaust aftertreatment systems are here to stay and as diesel specialists it is up to us to embrace and share the knowledge of these mobile gas refineries. ■

Michael Oliveros, Williams Diesel Service Inc., michael@ocaladiesel.com



TROUBLESHOOTING FAILED DPFS

BY: STEVE HOKE

When ADS asked if I had any topics to write about, one came to mind quickly. How or Do DPF Cleaning Facilities troubleshoot overloaded or failed filters? And who do they share this information with?

Since DPF cleaning facilities make money by servicing doc, dpf and scr units, how far do they go into telling the shop that dropped it off or the filter owner what the filter condition was or that a further look into the engine is necessary to keep from having more aftertreatment issues quickly.

Repair shops make money by doing repairs, if they remove a DPF for cleaning and its compromised or needs to be replaced, they need to dig deeper into the engine or run diagnostics to see why the engine has overloaded the DPF. No one or shop should be installing a replacement filter without understanding and correcting the root cause of the failed unit they are replacing.

We have also seen several DPF's sent in for warranty that had been cleaned a few times within a short period. Once we dug into this further, we asked if a DOC efficiency test had been completed. The answer was "No", and when we asked what repairs had been completed prior to the replacement DPF needing to be cleaned we saw that an EGR cooler had been replaced. The shop did the replacement and sent the truck on its way. Within a few weeks, the truck needed the DPF cleaned, the cleaning facility cleaned and replaced the unit back into service. Within weeks, the truck needed the DPF serviced

again. This time they told the truck owner the DPF must not be any good. They installed a new aftermarket unit. Another 30 days had passed, and the truck is showing high back pressure and the trucks owner takes the truck back to the shop and asks, "what the heck?". The shop feels it must be from a bad DPF and sends it in for warranty.

This is why repair shops, including DPF cleaning facilities need to get involved in the trouble shooting process. The shop should have done a DOC efficiency test after the EGR cooler was found to be defective. The shop should have also done this same test after the filter plugged up several times and had to be cleaned.

In this scenario if the DPF cleaning facility used a filter cleaning tracking program they should have contacted the shop or customer and advised that engine diagnostics needed to be completed as its not normal to clean a DPF more than once a year or 75k miles, under normal conditions.

The shop finally did a DOC efficiency test and replaced the poisoned DOC. Most people still don't know that ethylene glycol from coolant and excessive lube oil can stop the regeneration features from a catalyst quickly.

Lesson - anytime there is a DPF issue, we need to use diagnostic tools to help us see what's happening with the aftertreatment system. Most failures to the aftertreatment system come from the upstream source, the engine. ■

Steve Hoke, Diesel Emissions Service, steveh@des.direct

Diagnostic Tips for Diesel Particulate Filter (DPF) Bypass Failure

"There are many forms of DPF failure; the most common failure mode is called 'bypass'."

Exhaust aftertreatment is one of the top maintenance costs. The biggest reason for this is misdiagnosis, which leads to repairs that fix the symptom, but not the root cause. Diesel particulate filters (DPFs) are maintenance items, meaning they are designed to be cleaned and reused multiple times. If maintained properly, they should not have to be replaced on a regular basis. DPFs are not mechanical – there are no moving parts. When a DPF does fail, it is indicative of a problem somewhere else on the vehicle. Before you change another DPF, read on to find out where your problem really is.

Around 2007, all over-the-road diesel powered commercial

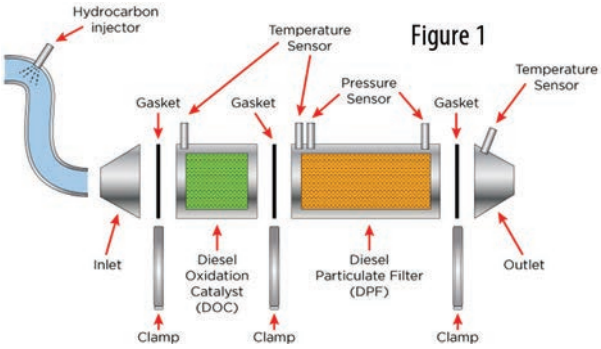
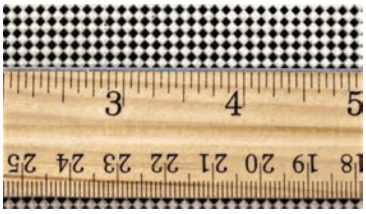


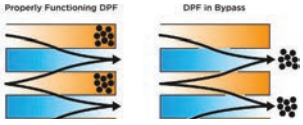
Figure 1

vehicles were outfitted with a particulate matter trap in the exhaust system. Typical particulate filtration configurations (Figure 1) consist of a hydrocarbon injector or fuel source, a diesel oxidation catalyst (DOC), a diesel particulate filter (DPF) and temperature and delta pressure sensors. They are held together with gaskets and V-band clamps. The DPF is the particulate matter trap, blocking 95-99.9% of elemental carbon (soot or ash) from moving downstream; it is commonly constructed of a wall-flow monolith, which is easily distinguished by the checkboard pattern at the inlet and outlet (Figure 2). The DOC oxidizes soot during passive regeneration and acts as the primary heat source during active regeneration (regeneration will be discussed in a future article).

What is bypass?

There are many forms of DPF failure; the most common failure mode is called "bypass." DPF bypass occurs when particulate matter escapes the DPF and exits the vehicle's exhaust unfiltered (Figure 3). Typically, bypass occurs when there is a breech in cell walls due to an uncontrolled thermal event (Figure 4). The uncontrolled thermal events take place when excessive soot or raw fuel are present in a DPF during active regeneration. According to a publication by the SAE International, most DPF issues are caused by "(1) poor, slow regeneration, or (2) rapid, 'uncontrolled' regeneration."*





Figures 2 (left) and 3 (below)

As mentioned previously, DPFs are not mechanical – they are the waste basket of the exhaust system. When a DPF is in bypass, it's similar to a trash bin with a hole in the bottom – it's no longer doing its job. The question to ask is, "How did that hole get there?" If the waste basket is swapped for a new one and the garbage that caused the hole in the first place continues to get thrown into it, then the symptom was fixed – not the problem that caused it. This is often the case when mechanics change out bypassing DPFs.

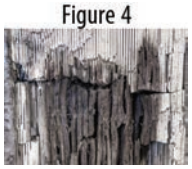
Why do you need to diagnose the upstream failure?

In nearly every instance, bypass failures are due to unresolved

upstream faults, such as over-fueling or exhaust leaks. **If a mechanic decides to simply replace a DPF that is in bypass and not resolve the upstream failure, they will continue replacing costly DPFs over and over again.** Often when this type of misdiagnosis occurs, the new replacement DPF may fail within a matter of a few weeks or even days!

Before removing your DPF, it is essential to determine what caused the DPF to fail in the first place. The number one question that needs an answer is: What is the root cause of the DPF failure? Determining the root cause of a DPF failure requires a true diagnostic technician. Diagnostic technicians find the root cause of a failure first, before replacing any component. This is vastly different than swapping expensive aftertreatment parts and hoping that the problem is solved.

Figure 4



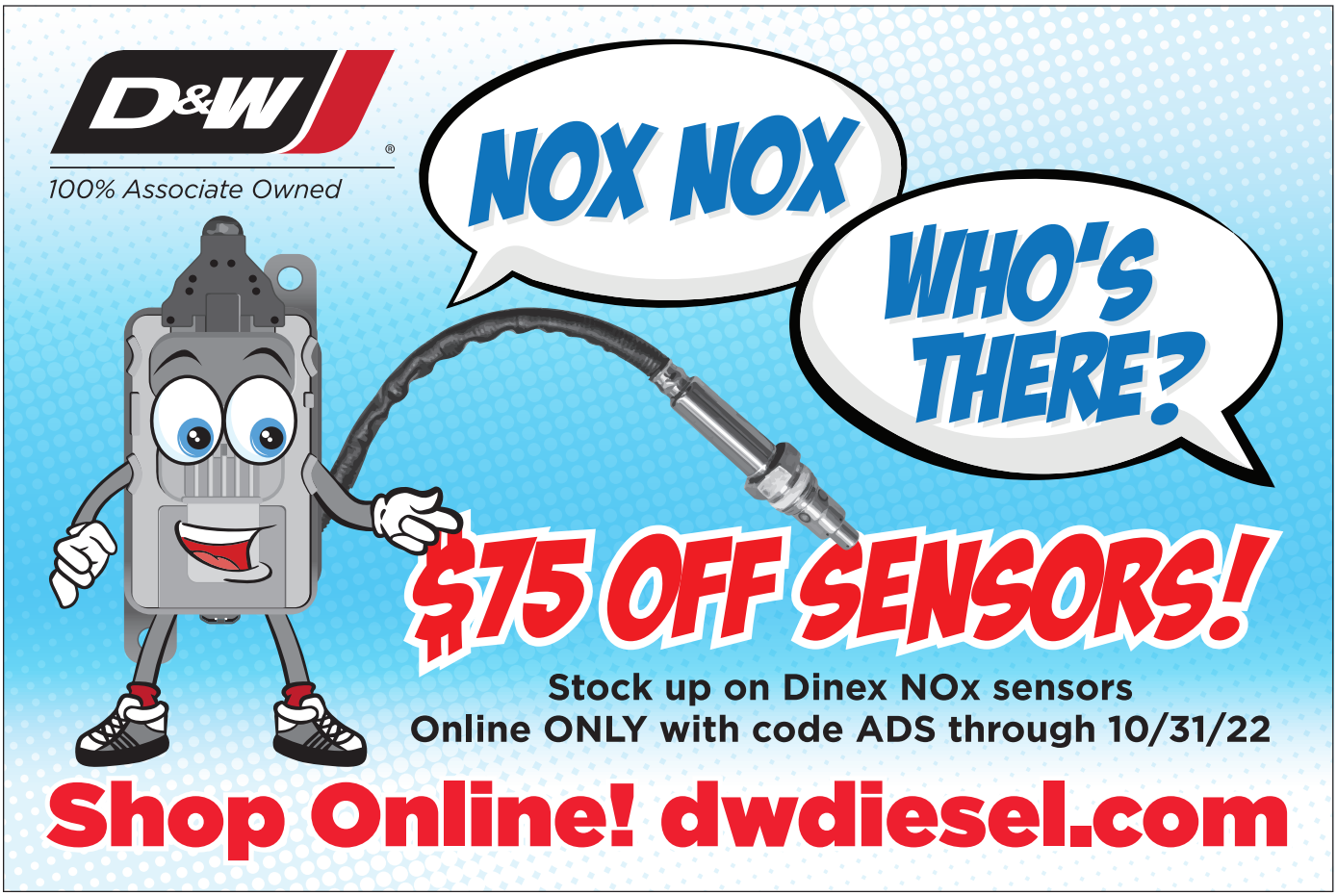
How do you properly diagnose a DPF failure?

When you have a DPF failure or receive an engine fault code for your exhaust aftertreatment system, check out the following items *before* simply replacing your DPF:

- Prioritize and correct current diagnostic trouble-shooting codes (DTCs) or any DTCs saved in history before replacing the DPF.
- Install any new calibration updates. Many DPF and exhaust aftertreatment issues can be solved with a simple calibration update.
- Check your EGR and turbocharging systems are working properly. For example, test EGR valve position and turbocharger vane response.
- Ensure your fuel injection system is operating correctly. For example, test your fuel injection balance rates.
- Check your hydrocarbon injector for carbon build up, volume of fuel being injected and metering valve performance.
- Look for leaks. Exhaust leaks are detrimental to your exhaust aftertreatment system and, if unresolved, can lead to premature DPF failures. Although some exhaust leaks are easy to find, many smaller leaks require a high-pressure smoke machine to identify.
- Inspect the condition of your DPF. Signs of coolant, oil or raw fuel ingestion can be indications of why the unit failed in the first place. Be sure to look at the outlet side of the DPF to determine if there has been significant bypass.
- Any time you remove a DPF, also inspect the DOC, exhaust gas temperature sensors and the differential pressure sensor and tubing. These components are critical to ensuring that your DPF is working properly.

Remember, finding the root cause of your DPF failure before you remove it is key to saving money on costly replacement components. ■

D&W Diesel, www.dwdiesel.com



MANAGING CUSTOMER EXPECTATIONS

BY: ERIC WADE - VICE PRESIDENT OF OPERATIONS– SEIDEL DIESEL GROUP –
ADS BUSINESS MANAGEMENT COMMITTEE AND VICE CHAIR OF FORERUNNERS COMMITTEE

In February 2005, the traditional way of making purchases in the United States started a significant change. We just didn't know it at the time. This was when Amazon launched their Prime subscription service, offering free two-day delivery to subscribers. This gave that group access to millions of products within two days. Amazon was no longer the go to for college students in need of cheap text books. It had taken its first steps to becoming a global powerhouse, that would eventually topple Walmart as the center of consumer purchasing in the United States. By January 2019, Prime had 100,000,000 US subscribers, with only 328,000,000 citizens this is a truly astounding feat. Right now, in Bolingbrook where Seidel Diesel Group Headquarters and my home are located, we have two one million plus square foot Amazon distribution centers within five miles. I can login and have the majority of items I order delivered by tomorrow and at times same day. Amazon has disrupted almost all markets, including vehicle parts. I can order common rail diesel fuel injectors and components to rebuild my own injectors, Turbochargers components or units, and virtually anything that one could want. Although the quality of many items found through this channel can be inferior products, it remains a disruption in our Industry.

Delivery Time

On Delivery Time: This is not an argument for ADS Members attempting to compete with Amazon. This is an argument that the expectations of all of our customers have changed significantly. The change is even more pronounced in new diesel owners, and millennials. In most shops a two day turn around is possible, if all of the parts needed for the reman are in stock, and if the technicians have no other customer work in front of the new incoming job. I can certainly say that in 2022, with the parts and labor shortages, both of these assets are in short supply. So how do we respond? What has worked very well for us is honestly and clearly communicating the expectations with the customer. Today, still dealing with the fallout of the global supply chain shortages sometimes getting parts in two days is a small miracle. Considering that this is likely the customer's expectation, we first ask what actions the customer would like us to take. Based on the customers requests we let the customer know an estimated turn around time, and an estimated cost. At times this can be up to two weeks for pumps that we know to be difficult to find parts. If the Fuel Pump, Fuel Injector, or Turbocharger has to be shipped to one of our locations that specializes in that product line, and based on the work load of our technicians. We want to know our customers expectations because if we have two customers who need a pump remanufactured have very different expectations, we can make every effort to satisfy both customers. Meaning if one customer is rebuilding an engine and has four weeks, but our other customer is engine down without his livelihood until the pump is returned, we can prioritize based on the products. This is why the communication between all of our Customer Service Representatives (CSRs), our Production Scheduler, and the Branch Manager is paramount. This is the first line of communication with the customer. That team then coordinates with our Technicians, Purchasing Team, and Warehouse team to ensure that the customer's expectations are met, or communicated to prior to any delays to update any

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customer and let them make the best decisions for their situation. Once the pump is in our shop it is immediately disassembled, cleaned, and estimated. The purchasing team works directly with the customer service team and the production scheduler to make sure all of the necessary parts are available and the associated lead times. The customer is then contacted to verify or discuss deviations to the estimates and a formal quote is provided. If lead time on sub-components is longer than initially expected, this happens more than we would all like right now, the customer is offered the option to pay for expedited shipping to if that is an option. If components are not immediately available the discussion becomes reaching out to all of our ADS partners, and considering alternate cores or other non-traditional methods to take care of every Customer opportunity. The most important factor is to keep in constant communication with the customer. We have found that the extra few minutes that we spend with customers consistently brings them back. The level of service and expertise we offer as members of ADS cannot be matched online, in a national chain parts store, or anywhere outside our ADS Network.

If a promise is made to the customer for delivery on Friday, it is vital that any potential delay is communicated to customer prior to that day arriving. If you communicated a potential delay and are able to still meet the original estimated delivery date, the customer is even more satisfied. You can help manage the customer expectations, which gives them the choice; HONESTY always wins in the long run. The worst thing we can do is say nothing to that customer until he arrives Friday for his pump and it is not ready. That customer will be extremely disappointed. So as soon as we know we are not going to hit a deadline we reach out to the customer to explain why and give a new ETA. "*Bad news isn't wine. It doesn't improve with age.*" *~Colin Powell.* We then do everything in our power to achieve that deadline, and communicate with our customer throughout the process. Including letting our customer know if the product ends up being early.

Quality

We all build a quality product; we would not be members of ADS if we did not. One of the biggest issues we all run into is the influx of non-ADS products flooding into the market today. These mass-produced products are often off-shored, built with sub-standard products, and if they are tested, they are not tested to OEM specifications. In the words of the Founder of the Seidel Diesel Group, Geret Seidel *"I am too frugal to buy cheap"*. So, how do we communicate the differences to our customers? A big part of our interactions with customers is comparing our products to online competitors. It is also important to talk about the difference between Rebuilt and Remanufactured. All member companies take a lot of pride in being part of the ADS network and we should all be confident and prepared in talking to customers about the quality of products that we offer. If a customer comes in asking about

the differences, we take them on a tour of our facility and explain the process of remanufacturing. There are many more options available today for the customer, and at every price point. It is up to us to provide the superior knowledge, quality products, and stand behind the products that have built our respective companies and reputations. The performance they can expect from our products is no different than the pump, injectors, or turbocharger they had when the vehicles were brand new. This is especially important to those customers who are either repair facilities making a living installing these products or customers paying those facilities, as it is quite literally their dollars that are on the line. I am a proponent of the Nationwide ADS Warranty for the customers. This is another benefit that customers can rely on for service in nearly any area in the country. Will we reach everyone? Frankly no, but we should try. There are customers who are price sensitive, even more so in todays inflationary environment, but the customers that do give us an opportunity to earn their business often become repeat customers for our expertise and quality. One product example that seems exacerbated by offshore products, is turbochargers. SDg's two Turbocharger Reman Plants see nearly daily instances of turbochargers that were purchased on-line new, no core from an unknown brand, and now it needs tested due to lack of performance or even worse, came apart. Now they have to purchase another replacement, the cost of more downtime, and potentially progressive damage if the inferior products were not caught in time. Our CSR's are trained to help customers with education on the options, and OEM new or Reman. At any of our twelve locations, our team works with each customer on what potentially caused the turbocharger to fail in the first place, and to correct that issue prior to only replacing a turbo that may fail again for the same reason that caused the first failure.

Warranty

As much as I want to quote the movie *Tommy Boy* here, I will hold off, but you know what I am going to say. Sadly, the expectation has become that remanufactured products are more likely to fail. To the point where our customers often suffer confirmation bias and the pump/injector/turbocharger that they purchased from us failed, just like the original part and it was due to a defect in quality. Just see the last paragraph for how to deal with that objection. Yes, your customer can go online, or to a big box retailer and get a product cheaper, with a "guaranteed warranty". Meaning, bring their failed or suspected failed product in for a free replacement unit, no questions asked. Only to have a similar issue today, in a week, or a month down the road. As

we just discussed this is besmirching the good name of all of us in the ADS, and remanufacturing at large. I am not saying this to be cynical, but to look at the harsh truth and how we address the elephant in the room. This is why communication with the customer is so important. We need to differentiate ourselves on our quality yes, but back that up with our service. Not that we will just give the customer a free replacement, but we will help them get to the root of the problem with our knowledge. That customer came to us on the one of the worst days of their lives asking for help, not to treat the symptoms, but to cure the root of the problem. Replacing the customers part and sending them on their way does not fix the problem, using our years of experience and significant expertise helps change the rules of the game. Now we are explaining why the customer had an issue, how we can fix the problem, and how to prevent that issue in the future. At this point we are not just managing customers expectations we are shaping them in a way that the online and big box competitors can never match. *"A customer is never out of warranty, even if his product is." ~ Seth Godin.*

Customers have become accustomed to immediate delivery, acceptable but not exceptional quality of disposable products in the last decade. The supply chain shortage and pandemic have not changed those opinions, only reenforced them. It is our duty to work to change that, but the way we do that is through communication. Competition is everywhere, even in our niche industry, but we hold the key to not only our own survival, but our own ability to thrive. We can all provide knowledge, and through that service that no one outside ADS can provide. Discussing the customer's expectations and making sure they are achievable keep your customer happy with delivery. Explaining what differentiates your products from the competitors will help you close the sale and shape the perception of your product before and after installation. If the customer ever has a warranty claim not only will this build trust, but analyzing the product and educating your customer will help shape the perception of remanufactured diesel fuel injection components for years to come. I leave you with one last quote to remember where the auto industry was one hundred years ago, and remind you where we can never go again if we want to continue to compete with the online and big box retailers.

"If I had asked my customers what they wanted, they would have said a faster horse." ~ Henry Ford ■

Eric Wade, Midwest Fuel Injection, eric@mwfi.com

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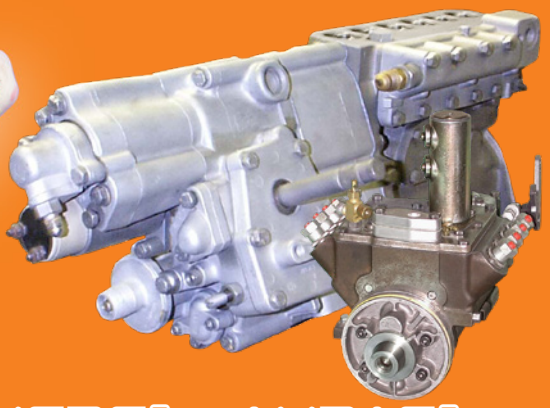

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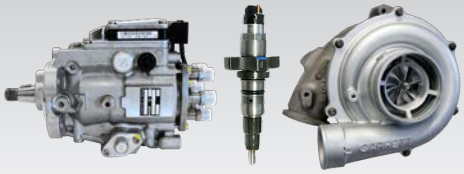

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