



Service Opportunity Learning Days

Sponsored by:



**HD AW 20**  
Heavy Duty Aftermarket Week '20

**SOLD! 2020 Schedule**

**Monday January 27**  
8 am-12 noon

**Thursday January 30**  
8 am – 12 noon



Service Opportunity Learning Days

Sponsored by:



**HDAW 20**

Heavy Duty Aftermarket Week '20

# How Advanced Technologies are Reshaping Today's Service Bays

Tyler Robertson

Diesel Laptops

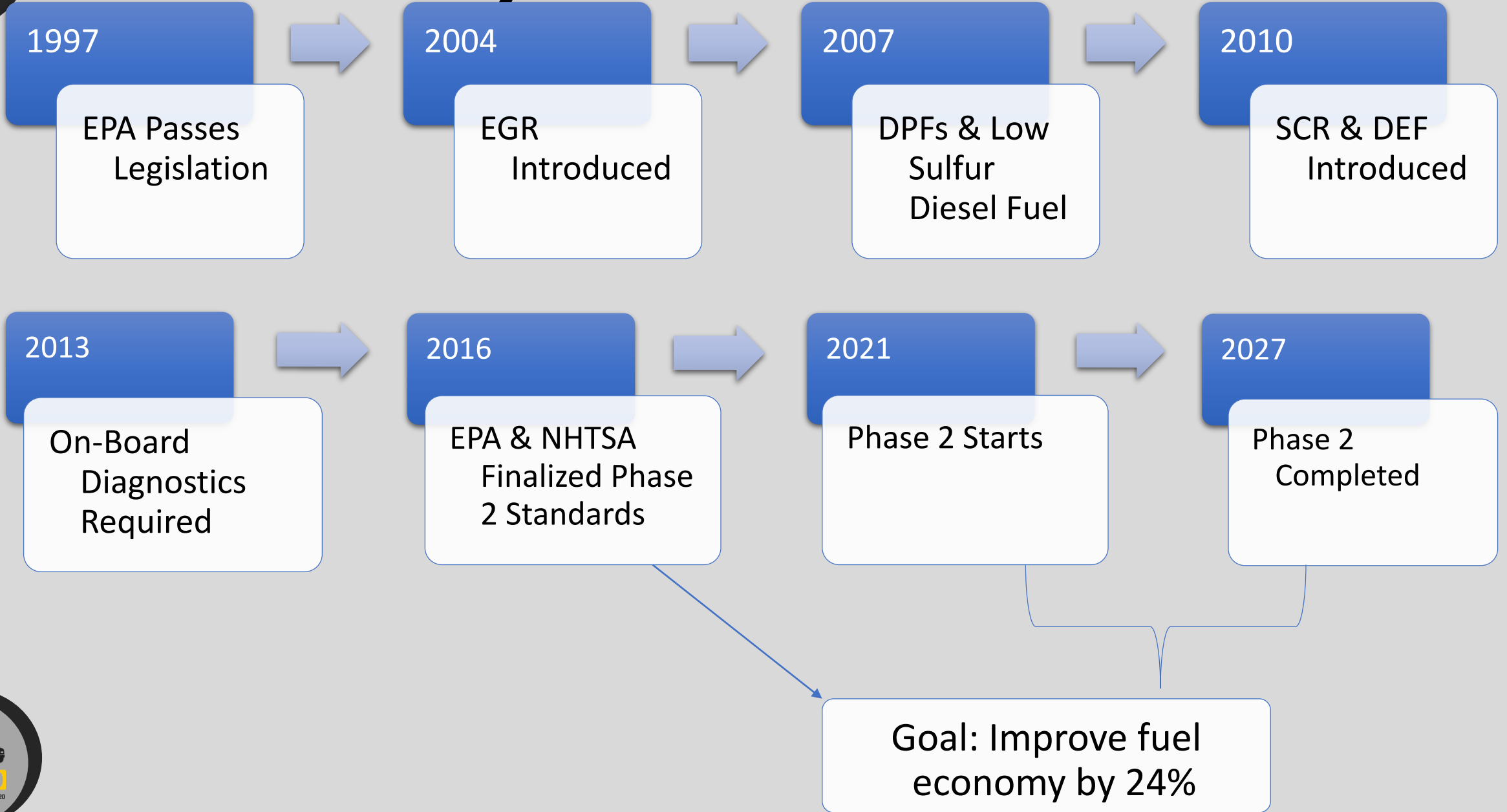


**You already know what is coming...**



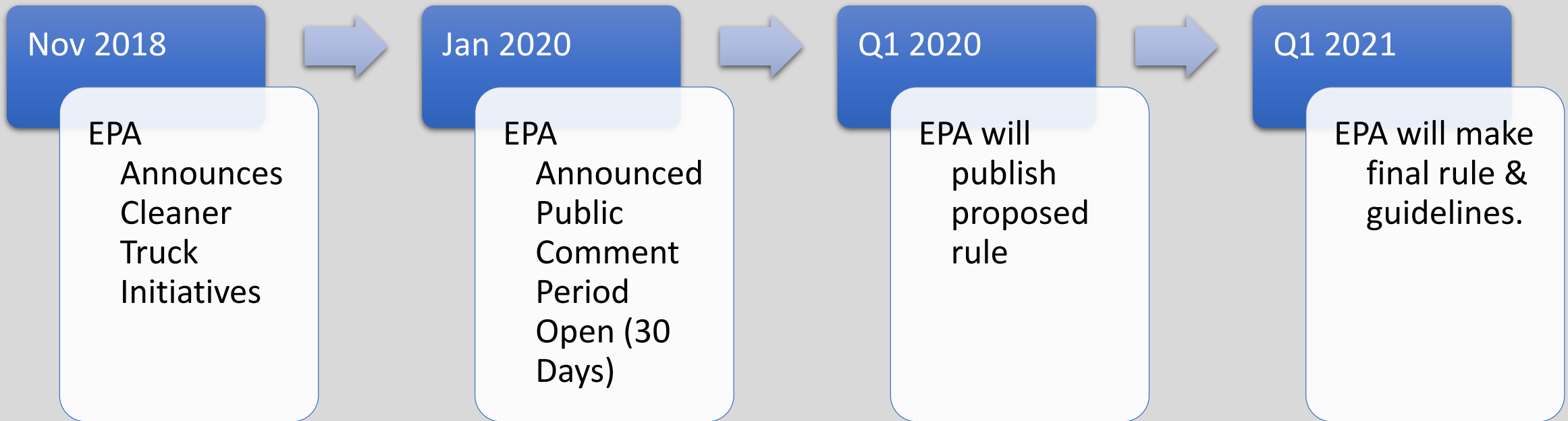


# Quick History Lesson





# More Emission Regulation Coming!



- From 2007 to 2017, NOx dropped by 40%
- From 1985 to current, NOx dropped 98%
- Last emission standard was done 20 years ago
- EPA's goal to make a 50-state standard (Eliminates need for CARB)
- Commercial trucks are on of the largest contributors to NOx



# Future of Commercial Trucks



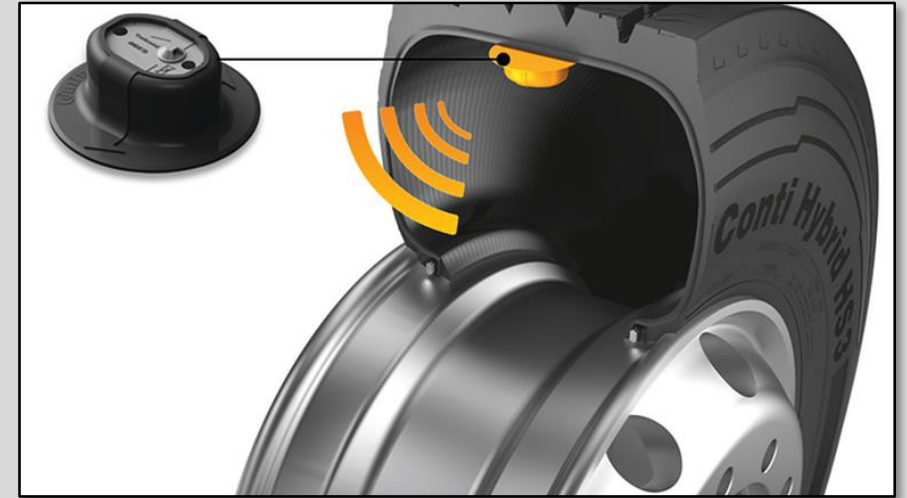
- Non-diesel commercial trucks are **HERE**
- Autonomous trucks are years in the future
  - 2025 best case, likely 2030



Bosch Virtual Visor



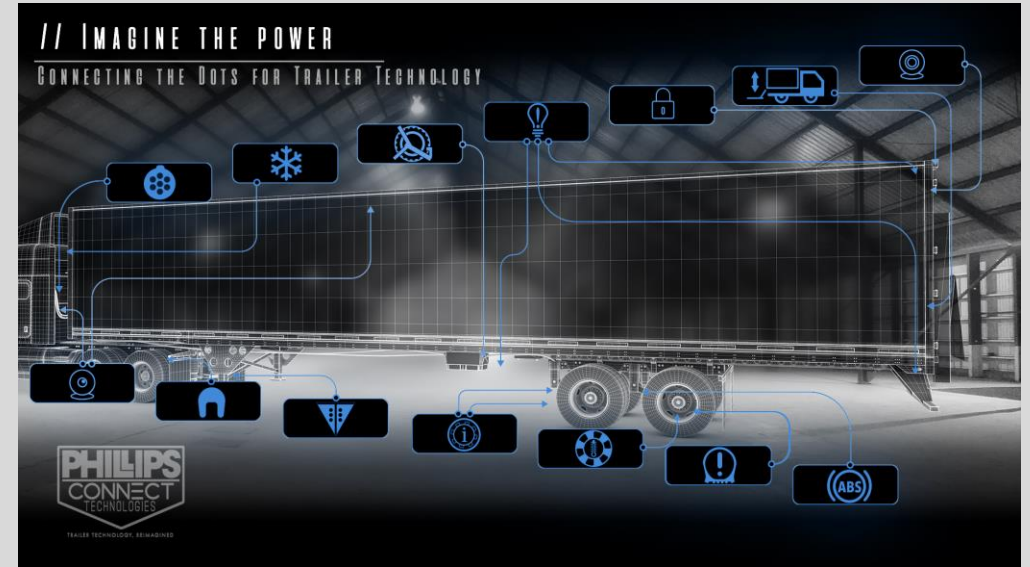
Bendix Intellipark



Continental Smart Tire (HSR3)



Mirror Eye by Stoneridge



Phillips Connect Smart Trailer





# ... and even more coming!

- In-cab gas detectors
- Trailer mounted rear-view cameras
- Cybersecurity
- Cryogenic Cooling Systems (Reefers)
- Augmented & Virtual Reality Training
- Disc Brakes (Better stopping & less maintenance)







# Future Facts

- Trucks will get more complex
- Alternative energy trucks are HERE
- The rate of new technology & change is increasing
- There will be more sensors, more wiring, more fault codes
- Self-driving trucks are coming ... eventually
- Government mandates will continue past 2027





# Creates Opportunity



- Electrical Diagnostics
- Emissions System Diagnostics
- ADAS
- Be a Maintenance Expert
- Provide value to your clients.

**Shops that can properly  
diagnose & repair trucks,  
WIN.**

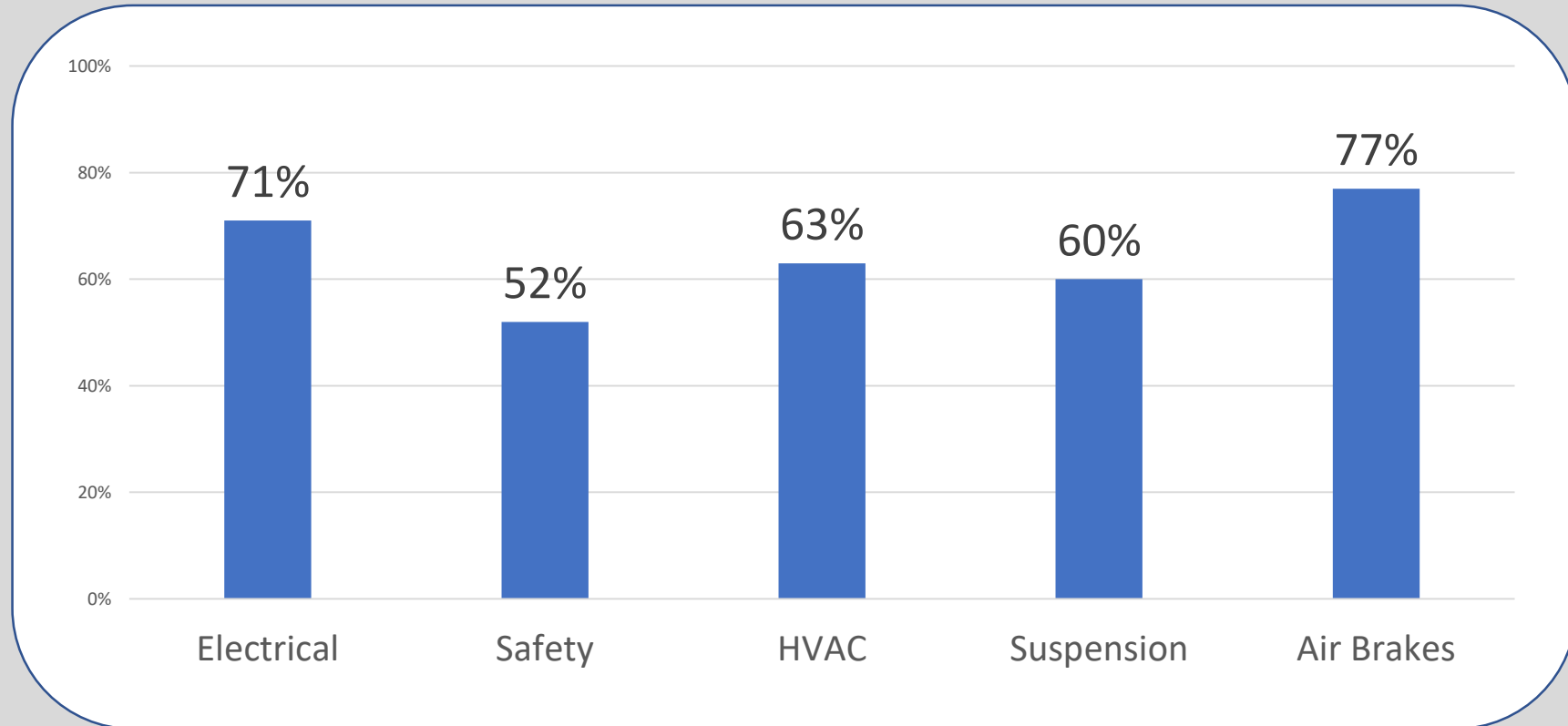




# Opportunity #1 – Electrical Diagnostics



- Over 80% of our students fail Electrical I pre-test



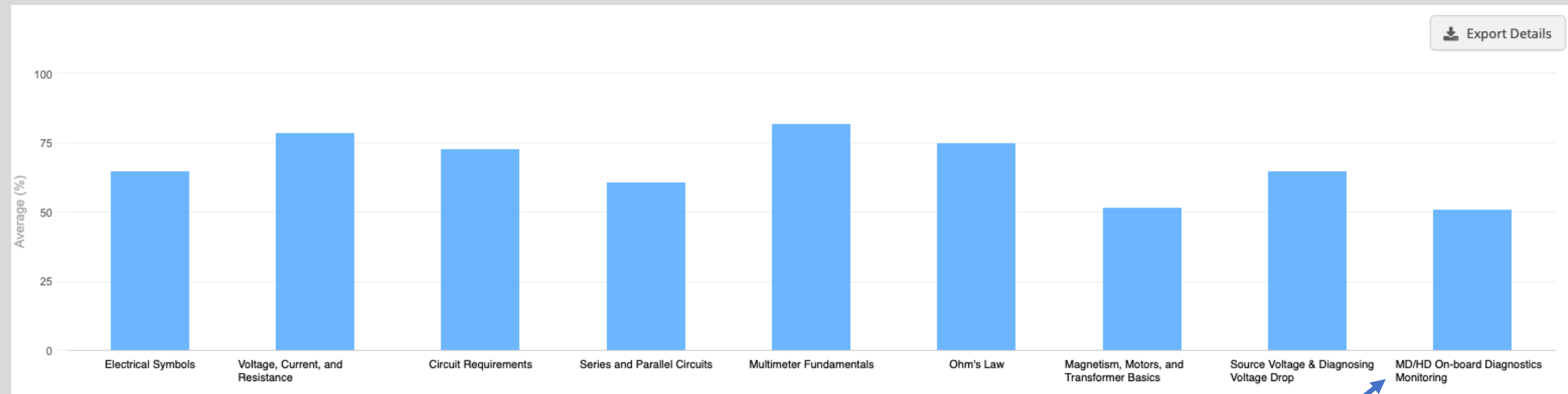
On average, diesel technicians have less than 80% of the knowledge they need in the key areas.





# Opportunity #1 – Today's Class Data

Export Details



Only 50% answer electrical diagnostic questions correctly!





# Opportunity #1 – Today's Class Data

Question	Answered Correctly
Which symbols represent a bulb in an electrical schematics (Select all that apply.)	50%
What are the two types of sizing scales for measuring wire size in the trucking industry?	53%
What does Voltage equal?	57%
Select the correct definition of Voltage	63%
Which symbol represents a momentary switch in an electrical diagram?	65%





# Opportunity #1 – Electrical Diagnostics

3 Questions to Ask your Technicians:

- What is the difference between an open circuit and a short circuit?
- What would a reading of .1 ohms between two conductors mean?
- What is a load test, and why do you need to do this?





# Opportunity #1 – Electrical Diagnostics

What is the difference between an open circuit and a short circuit?

**Answer:** An open circuit allows no amperage to flow, a short circuit allows high or unintended amperage flow in the circuit.





# Opportunity #1 – Electrical Diagnostics

What would a reading of .1 ohms between two conductors mean?

**Answer: A short circuit or good continuity between the conductors. (The acceptable range is 0 to .2 Ohms)**







# Opportunity #1 – Electrical Diagnostics

What is a load test, and why do you need to do this?

**Answer:** Multimeter's don't draw a lot of amperage through it when performing continuity or voltage tests. If wiring is passing other tests, this test is then used.





# Opportunity #1 – Electrical Diagnostics



Google “Diesel Laptops Free Training”





# Opportunity #1 – Electrical Diagnostics

- Paid – Community Colleges, Online Courses, Diesel Laptops Training Centers, Today's Class

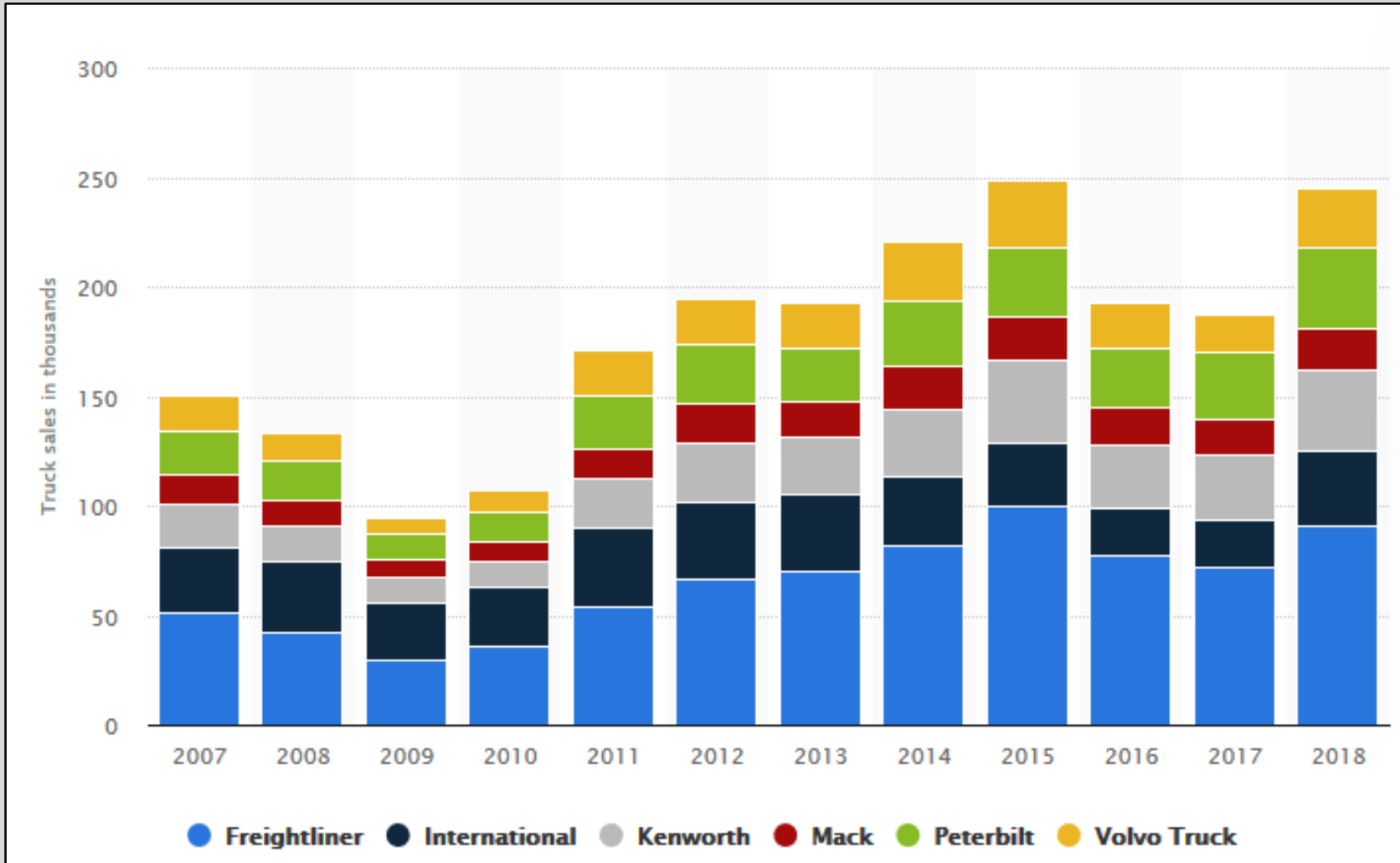


<https://training.diesellaptops.com/>  
Or Google “Diesel Laptops Training”





# Opportunity #2 – Aftertreatment



Market	Annual
MD Diesel	600,000
Buses/RV	Unknown
Off-Highway (Global)	1,100,000

In 2017, the USA manufactured 890,000 diesel engines.

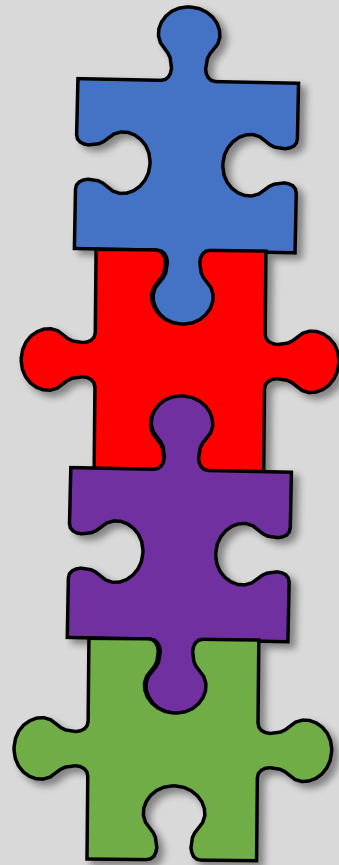
In 2018, 21% of Cummins engines produced were for Off-highway

Over 2.2 million Class 8 trucks in USA with DPF's





# Opportunity #2 – Aftertreatment



Maintenance

Properly Trained

Diagnostic Tool

Repair

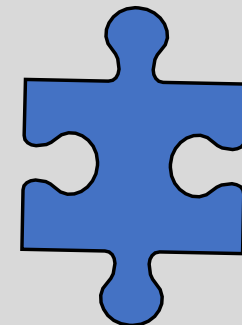




# Opportunity #2 – Aftertreatment

On a long haul 2018 Peterbilt with a MX13 engine, how often should the DPF be cleaned and the DEF filter replaced?

- A) 300,000 Miles
- B) Once a year
- C) 500,000 Miles
- D) 200,000 Miles

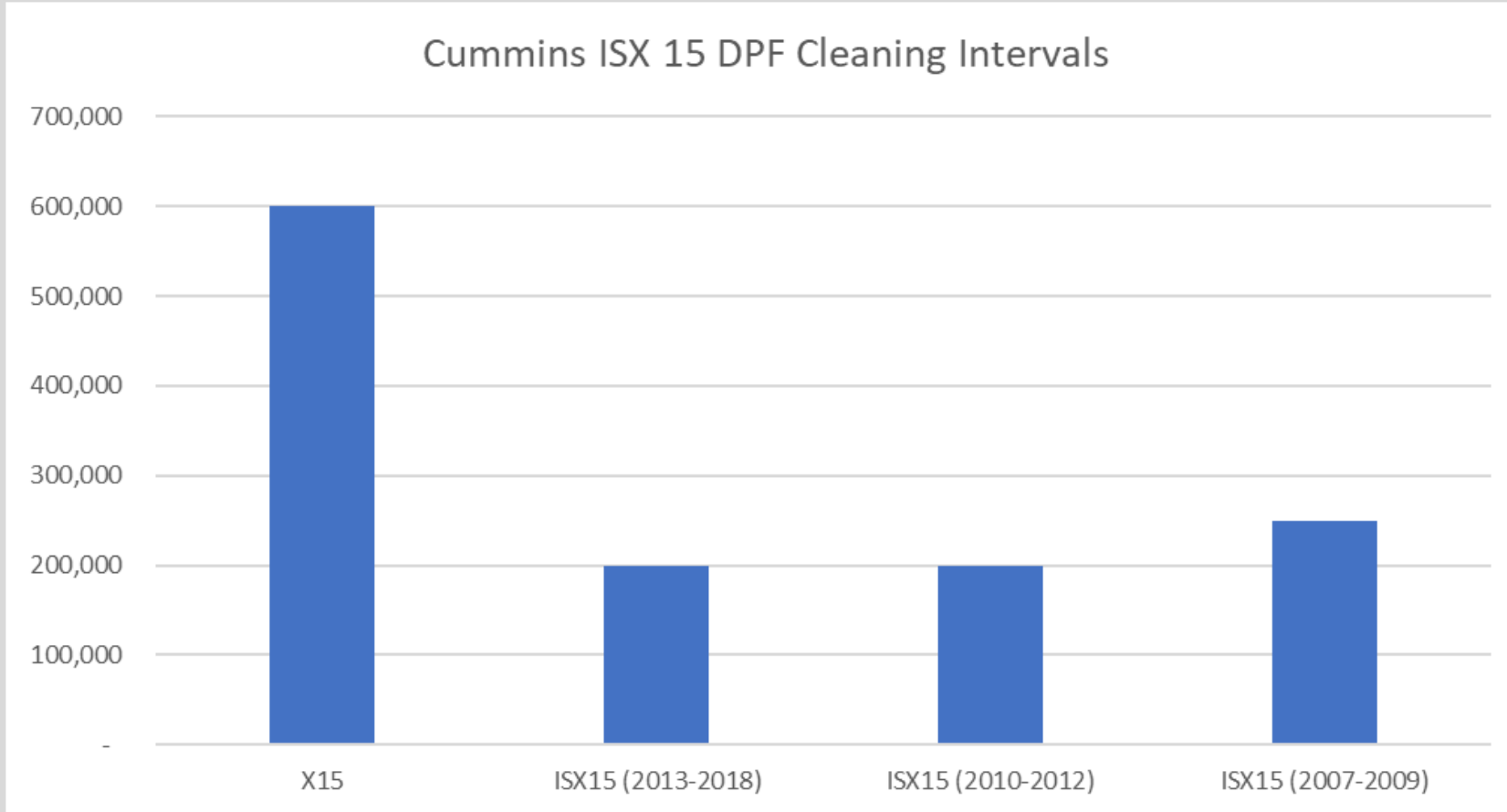


Maintenance





# Opportunity #2 – Aftertreatment



- DPF Cleaning
- DPF Inspections
- Aftertreatment Injector Cleaning/Replacement
- DEF Filter Replacement
- Ignition Electrodes

<https://blog.diesellaptops.com/2018/12/11/aftertreatment-system-maintenance-intervals/>

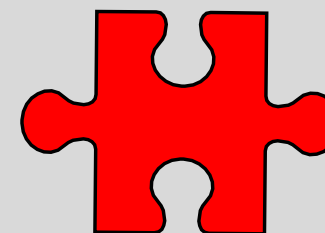
Or Google “Diesel Laptops Aftertreatment Intervals”





# Opportunity #2 – Aftertreatment

The driver states that the truck is requesting frequent stationary regens. You've checked, and there are no logged emission fault codes (But there are several other inactive ones) that point to any problem. What would be the first 3 things you would do?



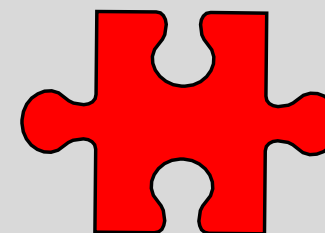
Training





# Opportunity #2 – Aftertreatment

- A) Look at the other inactive codes to see what they are.
- B) Check all the fluid levels
- C) Pull the DPF filter off and see what it looks like
- D) Go check all the sensor readings to make sure they are accurate
- E) Inspect the truck for any exhaust or intake leaks
- F) Screw it. I'm deleting the emission system and not dealing with this anymore.

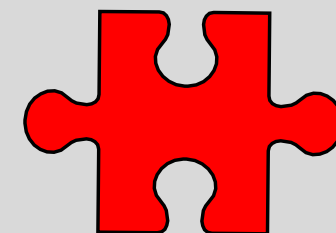


Training



# Opportunity #2 – Aftertreatment

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Training



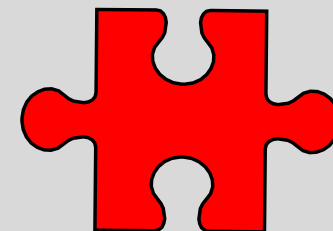
# Opportunity #2 – Aftertreatment



## **ACTION TAKEN WHEN THE FAULT CODE IS ACTIVE**

- The ECM illuminates the amber CHECK ENGINE lamp and/or the Malfunction Indicator Lamp (MIL) immediately when the diagnostic runs and fails.
- A default value of the intake manifold pressure reading is used.
- Diesel exhaust fluid injection into the aftertreatment system is disabled.
- Active and stationary regeneration of the diesel particulate filter will be disabled.
- Exhaust Gas Recirculation (EGR) valve operation will be disabled.
- Engine torque will be reduced if the engine is operated for an extended period of time with this fault active.

- Derate/Disable Codes
  - **Result, not cause!**
- Component Failure Codes
  - **Start here!**
- Example: Code 122 for Cummins Engines (Intake Manifold Pressure Sensor Circuit)



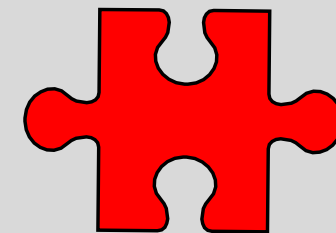
Training





# Opportunity #2 – Aftertreatment

- Quick visual inspection
- Exhaust leaks = heat escaping = system not operating properly
- Can be “downstream” or “upstream”



Training



# Opportunity #2 – Aftertreatment

- Use Regens for diagnostic purposes instead of a quick fix
- EX: Inverted temperatures due to inefficient DOC

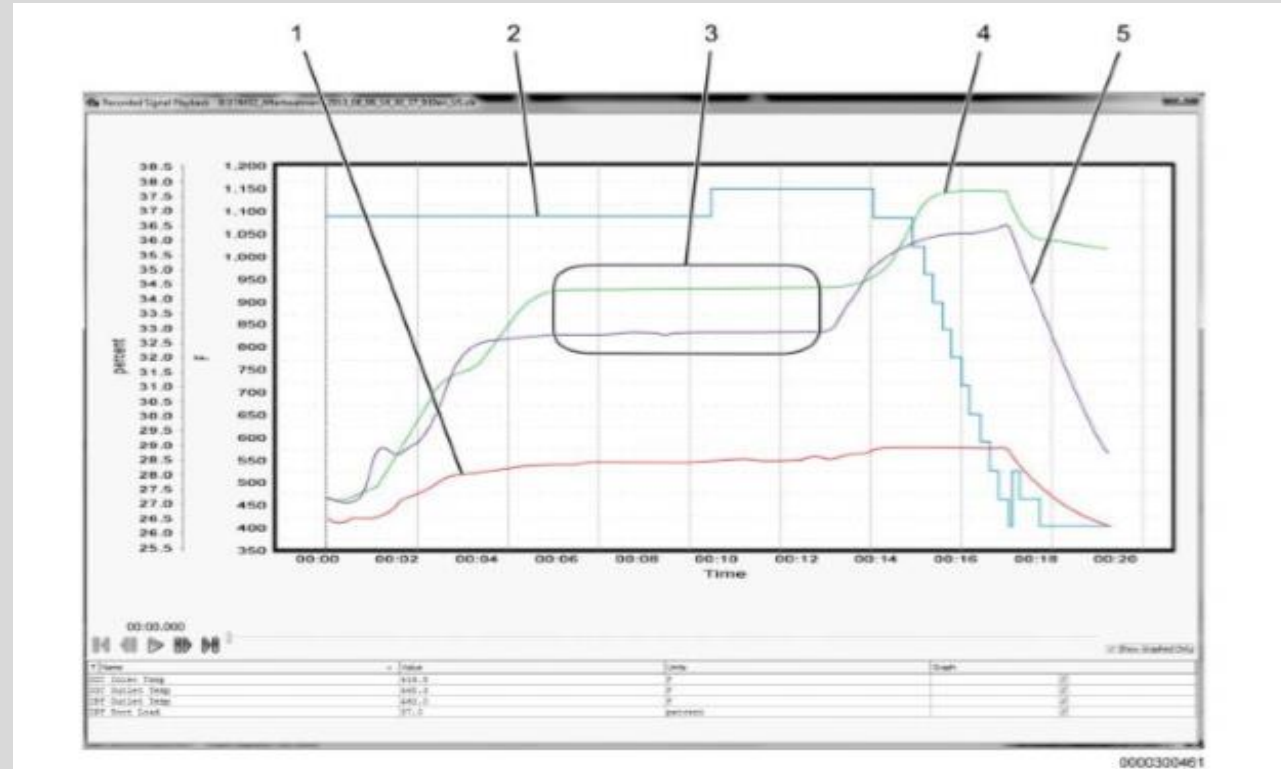
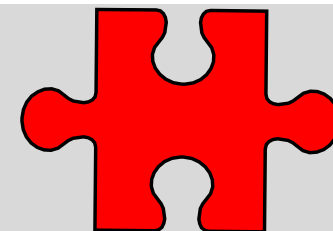


Figure 728 Graph 7: Inverted exhaust Gas Temperatures (Inefficient DOC)

1. Diesel Oxidation Catalyst Inlet Temperature (DOCIT) (degrees Fahrenheit) [Red]
2. Diesel Particulate Filter (DPF) soot load (percent) [Blue]
3. Diesel Oxidation Catalyst (DOC) at operating temperature and stabilized. [Green]
4. Diesel Particulate Filter Outlet Temperature (DPFOT) (degrees Fahrenheit) [Green]
5. Diesel Oxidation Catalyst Outlet Temperature (DOCOT) (degrees Fahrenheit) [Purple]



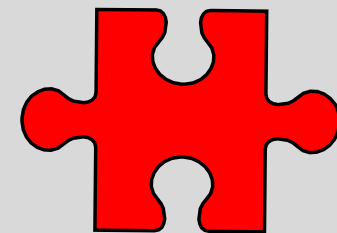
Training



# Opportunity #2 – Aftertreatment

3 Questions to Ask your Technicians:

- What are the basic steps to troubleshoot an emission problem?
- What should you be looking for when watching the graphs on a DPF regen?
- What could cause a frequent regen on a truck?
- How do you test diesel exhaust fluid, and what spec are you looking for?



Training



# Opportunity #2 – Aftertreatment

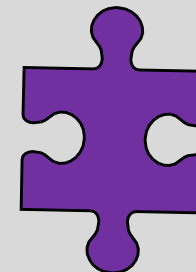


## OEM vs Aftermarket

- Upfront Price
- Functionality
- Required or Optional Annual Fees
- Support
- Repair Information
- Training

<https://www.diesellaptops.com/blogs/news/tool-time-webinar-wrap-up>

Google “Diesel Laptops Tool Time”



Diagnostic Tool

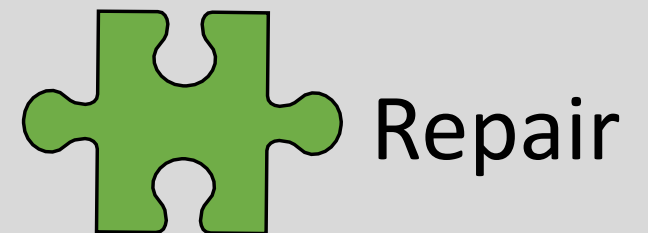




# Opportunity #2 – Aftertreatment

How do you clean your DPFs and DOCs?

- A) We have our own cleaning equipment.
- B) We send them out to another company.
- C) We use shop air to clean them out.
- D) We use a pressure washer to clean them out.

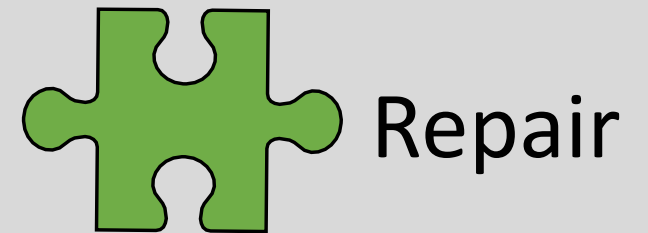






# Opportunity #2 – Aftertreatment

- Typically over 70% of companies send them out.
- Cleaning prices range from \$99 to \$700.
- Why not buy your own equipment?





# Opportunity #2 – Aftertreatment

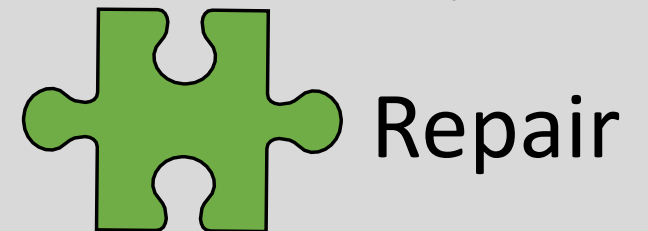
Assumptions: Paid MSRP with all options, “OK” credit, 4-year lease, includes freight

- Monthly payment can be lowered with better credit & longer terms!

<b>Monthly Payment</b>	<b>\$1,369</b>
DPF Cleaning Charge	\$250
DPF Cleaned Per Week	2
Revenue Per Month	\$2,000



List Price = \$55,000



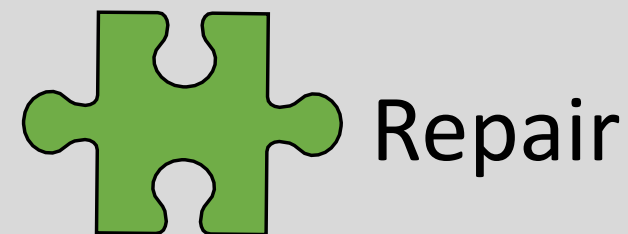


# Opportunity #2 – Aftertreatment

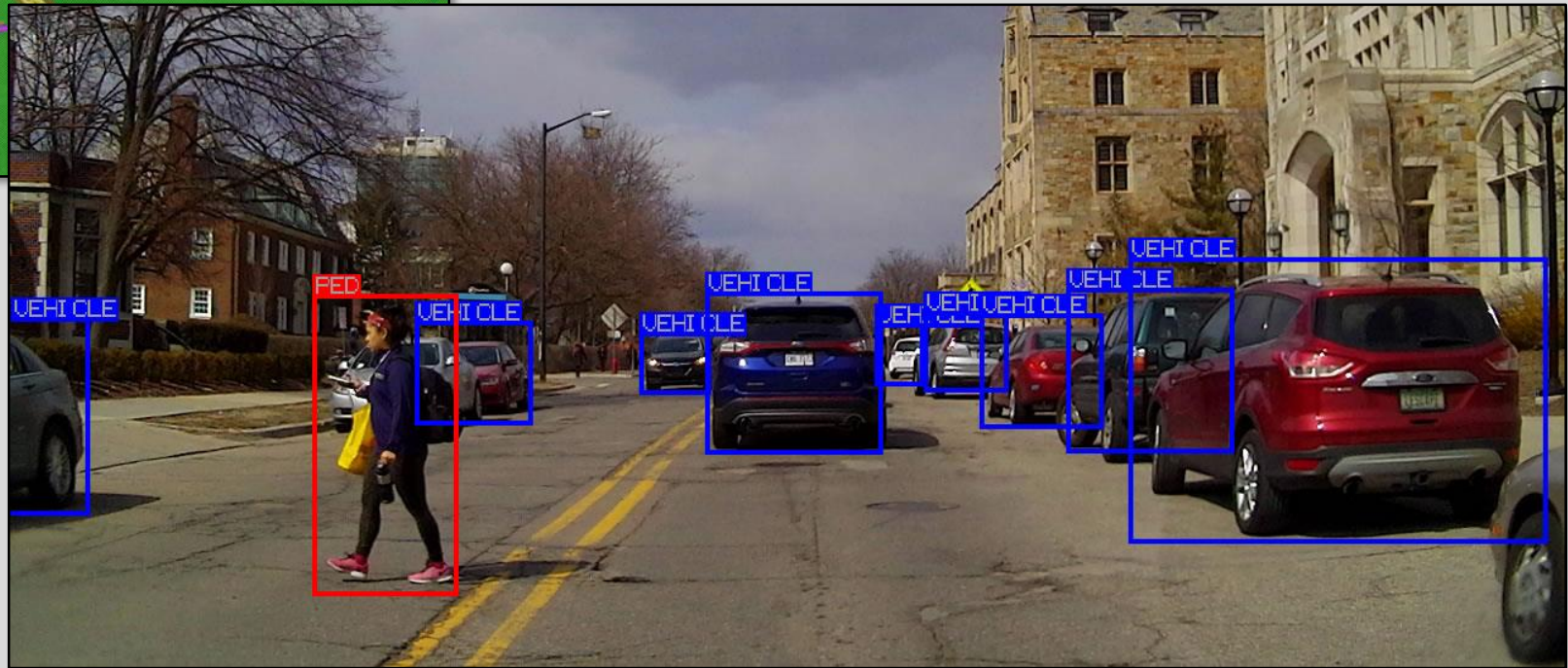
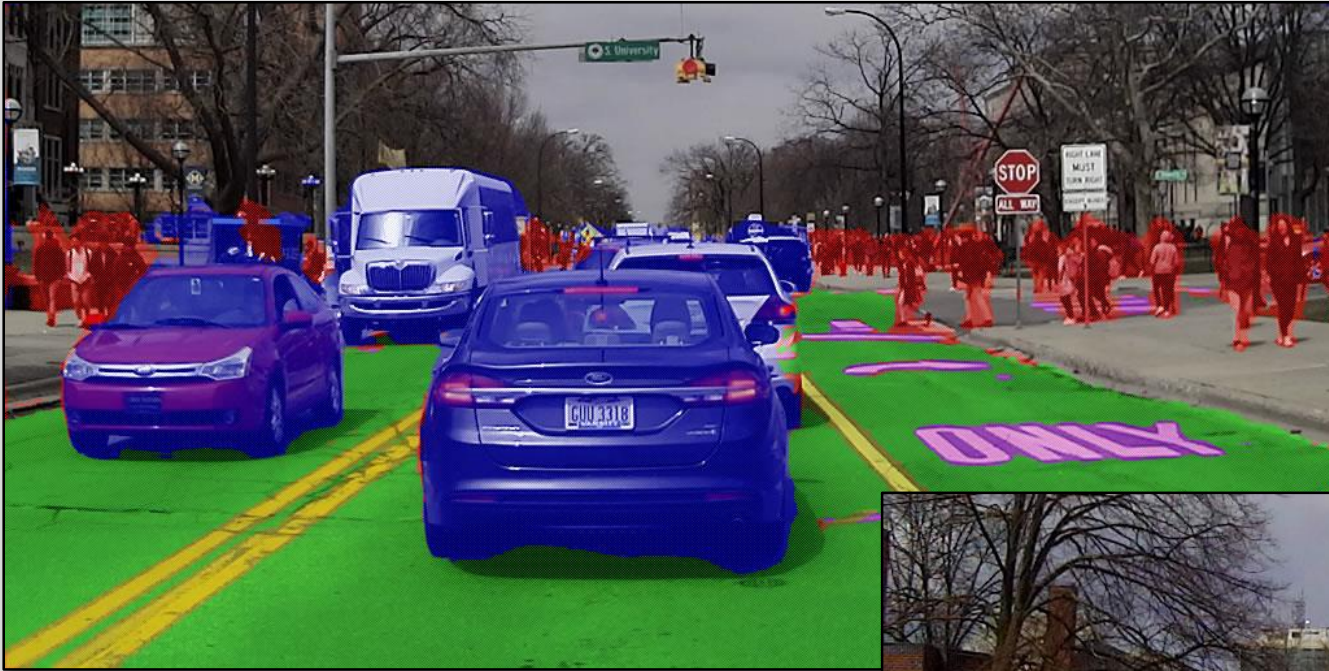
## Aftermarket vs OEM



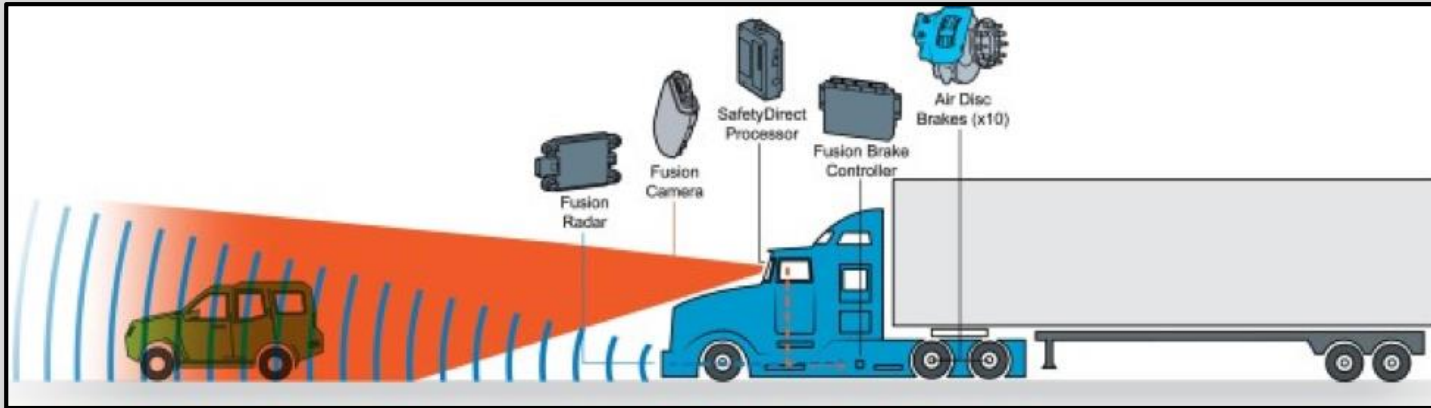
1. Flange
2. Retaining ring
3. Substrate
4. Insulation matting under the retaining ring
5. Outer heat shield



# Opportunity #3 – ADAS



# ADAS (Advanced Driver Assist Systems)



- Forward Collision, Lane Departure, Automatic Braking
- Europe required in 2016
- Volvo made standard in 2018
  - 40% of all orders





# Opportunity #3 – ADAS



- Inspections required at maintenance intervals
- Calibrations often required, but not done
  - Tires changed, wheel alignments, suspension repairs, steering system components replaced, etc.
- Requires proper diagnostic software





# Free Mobile Apps



## Truck Parts Cross

- Every truck
- Every engine
- Every part
- Available as a mobile app for iOS and Android
- Available as web app: [TruckPartsCross.com](http://TruckPartsCross.com)

**FREE**



## DieselVIN

- Easily decode VINs
- View vehicle and engine information
- Available as a mobile app for iOS and Android
- Available as web app: [DieselVIN.com](http://DieselVIN.com)

**FREE**



## TruckPartsLookup.com

- Find parts without a VIN
- Cross-reference truck parts
- Add parts to your favorites list
- Available as web app: [TruckPartsLookup.com](http://TruckPartsLookup.com)

**FREE**





# Free Mobile Apps



TruckFaultCodes.com

## Truck Fault Codes

- Fault code information
- Wiring diagrams
- Troubleshooting trees
- Freemium Model
- Mobile Apps
- Available as web app:  
TruckFaultCodes.com

COUPON CODE: **HDAW20**  
1 Free Year / Expires Feb 7<sup>th</sup>



TRUCK LABOR  
**TIMES**

## TruckLaborTimes.com

- Detailed estimate
- Professional template
- Customize logo
- Unlimited Lookups
- Freemium Model

COUPON CODE: **HDAW20**  
1 Free Year / Expires Feb 7<sup>th</sup>







# Fork in the Road

- Opportunities Exist
- Resources are Available
- Invest in You Future

**Google “Diesel Laptops HDAW20”**





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**Tyler Robertson**

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