



Sean McGinn
MKNIZD Factors Inc.

 MKNIZD | Factors

 **mdec**
MINING DIESEL
EMISSIONS COUNCIL

October 8th, 2015

Opportunities and Challenges Managing Diesel Emissions at the Source

Overview

- Using What We Know Now
- Assumptions versus Facts
- Mining versus Other Diesel Sectors
- Performance Standards
- Maintenance
- DPF Systems
- Leading Edge Technologies

What We Know

Hope is not a management tool

Bill – Mine Manager

What We Know

-  ????
- DEEP
 - <http://camiro.org/mining/diesel-emission-evaluation-program>
- NIOSH
 - <http://www.cdc.gov/niosh/mining/topics/DieselExhaust.html>
- Engine Technology and Certification

Assumptions Versus Facts

- Bill – Mine Manager
- Everything backed by proof – accurate numbers
- Be as good as you believe you are
- We are not bound by technology (perceived lack thereof)
- We are bound by motivation to change (lack thereof)

Where Does Mining Stand?

Mining Versus Other Diesel Sectors

- **On Road – Truck, Coach, etc.**
- **Agriculture**
- **Construction**
- **Forestry**
- **And the gold standard is ???**
- **And which sector has the highest sensitivity to emissions?**

Performance Standards

- Order of Priority
 - Diesel Emissions versus The Rest
- Ambient DPM and Gases
- Raw DPM and Gases
- Ventilation
- Y = Output of the Process
- X = Variables that affect the Y

Diesel Maintenance

- Engine Component Life Cycles
- Preventive and Predictive
- Measure – Measure – Measure
- Boost / Stall Speed / Codes
- Fixed Intervals – Injectors, Valve Sets, etc.
- Intake Systems – Donaldson
- Exhaust Systems – measuring DOC's and DPF's
- Fuel Systems – Fuel Quality
- Quality Assurance
 - **Your equipment experts need to be your equipment experts**

Diesel Maintenance

Emissions Testing

- Transmission / Hydraulic Stall – Steady State
- SAE J1667 – Snap x 3 (LD Vehicles)
- Chasing NO₂
- Smoke Control Mode

Engine PMs

- How many points allocated on your 250 hr services?
- Performance Guarantee?
- Bill – Mine Manager

Diesel Maintenance

Emissions Test – Inlet DPF

Date / Time: 8/30/2015 2:24:54 PM
 User Name: MECHANIC
 Test Location: Inlet DPF
 Sample Duration: 0.5
 Comment:

Vehicle:
 Fuel: Diesel
 RPM: 1980

		Sample Value	Target Value
SMOKE		9	8
O2	%	10.9	12
CO	ppm	214.4	150
NO	ppm	432.3	600
NO2	ppm	48.4	50
CO2	%	7.4	6
T.GAS	C	427.2	350
MEQI		42	50
NOx	ppm	480.7	650

Diesel Maintenance

Emissions Test – Outlet DPF

Date / Time: 9/30/2015 2:41:49 PM
 User Name: MECHANIC
 Test Location: Outlet DPF
 Sample Duration: 0.5
 Comment

Vehicle:
 Fuel: Diesel
 RPM: 1985

	Sample Value	Target Value
SMOKE	1	8
O2	% 10.8	12
CO	ppm 42.8	150
NO	ppm 469.5	600
NO2	ppm 17	50
CO2	% 7.5	6
T.GAS	°C 329.7	350
MEQI	26.2	50
NOx	ppm 486.5	650

DPF Systems

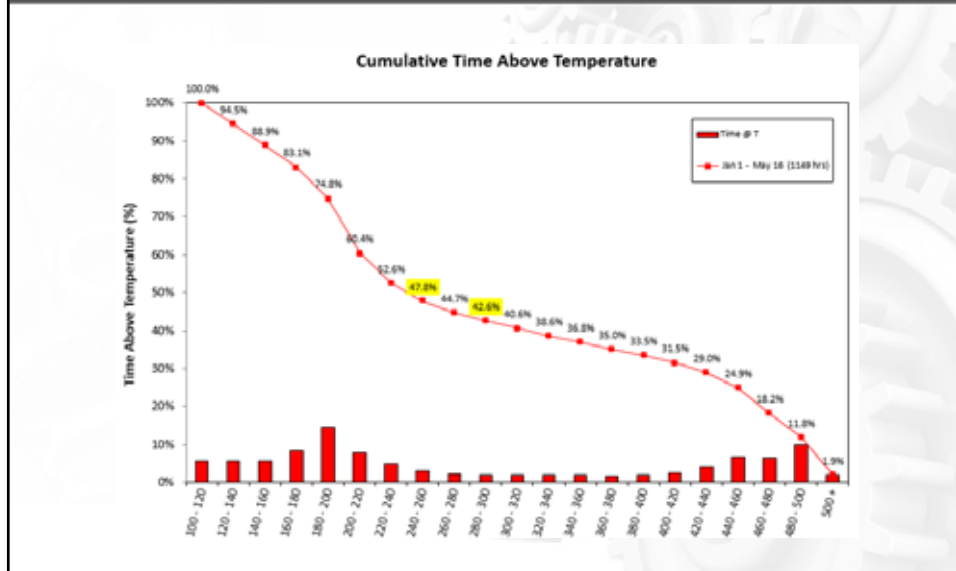
Passive regen retrofit DPF solutions can be successful

- Step 1:** Use maintenance to optimize engine performance
- Step 2:** Application engineering – loggers, duty cycles, etc.
- Step 3:** Work with manufacturers to build solutions
- Step 4:** Test multiple solutions to find the best fit for you
- Step 5:** Have maintenance and cleaning solution in advance

Know the life cycles and total cost of ownership in advance – because Bill will be asking and you know what not to say!

Note: Be double certain there is no NO₂ slip

DPF Application Engineering



DPF Issues

- Ways to clean and not to clean DPFs
- Ways to manage backpressure
- Ways to manage heat and leaks
- Ways to manage substrate failure and uncontrolled regen
- Ways to manage filtration efficiency



New and Emerging Technology

Tier IV Engine Technology

- DOC / SCR solutions
- DOC / DPF solutions
- All about reliability – support-support-support
- They don't come with auto-maintain option

Battery Technology

- The next step-change in UG air quality
- Think maintenance

A Promising Outlook

Emissions Based Maintenance

- Renewed interest and new entries
- Sense of necessity and acceptance

Retrofit DPFs

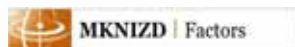
- Canada and Australia – not just the U.S.
- Looking for solutions not simply evaluating
- Some driven by corporate standards, not just regulations

Summary

- We can and should be the leaders amongst diesel sectors in managing emissions at the source
- Managing change – not technology, is our biggest hurdle to overcome
- Think about how to make the business case through a very challenging down cycle in mining commodities
- Apply your « make it happen » skills to managing emissions just as you do with the other mine priorities

Thank You!

QUESTIONS?



Sean McGinn
(613) 808-3031
mknizd@gmail.com
www.mknizdfactors.com