



Lesson learned in Tehran DPF retrofit project

Dec 2016 , Inspection Workshop, Hossein Izanloo

DPF Potential Failures

- High level soot generation
- High rate of ash build-up in the filter
- Low performance regeneration or no regeneration
- DPF catalyst poisoning
- Substrate cracking or deformation
- Back pressure monitoring system problem
- Low efficiency cleaning

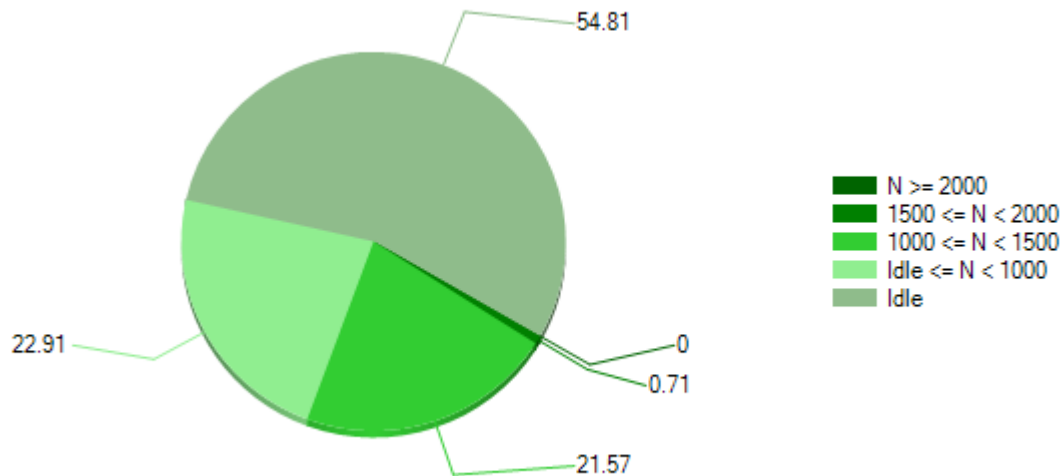
Main causes of high level soot

- ❑ Worn fuel injectors lead to excessive fueling
- ❑ Dirty air filter reduce air flow
- ❑ Low boost turbocharger do not produce sufficient air
- ❑ Low performance intercooler reduce air flow



Main causes of high level soot

- ❑ Vaporized coolant from head gasket leaks to cylinder
- ❑ Duty cycle of vehicle in real world is not compatible with duty cycle that DPF designed and adjusted for that



High rate ash - High rate lube oil consumption

- ❑ **Original old engine designed with high level oil consumption**
- ❑ **Excess oil from worn piston rings, fuel injectors, valves, ..**
- ❑ **Oil leakage from Turbocharger**
- ❑ **High oil splashing in oil pan because of oil filling more than max level**
- ❑ **Low quality oil because of fuel mixing, high mileage, ..**

High rate ash - High rate of FBC dosing

- ❑ Initial dosing adjustment is not correct
- ❑ Fuel tank level gage failed
- ❑ Electronic control unit failed



High rate ash - Oil quality and engine wear

- ❑ Using high ash lube oil
- ❑ High rate engine wear and exhaust component corrosion
- ❑ Adding clean or used oil to fuel tank



Low performance regeneration

- ❑ Looseness, fraying and corrosion of wiring and connectors of control system
- ❑ Lack of FBC in dosing tank because of leakage or not filling
- ❑ Fuel tank level gage failed which make dosing problem
- ❑ Duty cycle is low load, low speed with frequently stops at idle speed

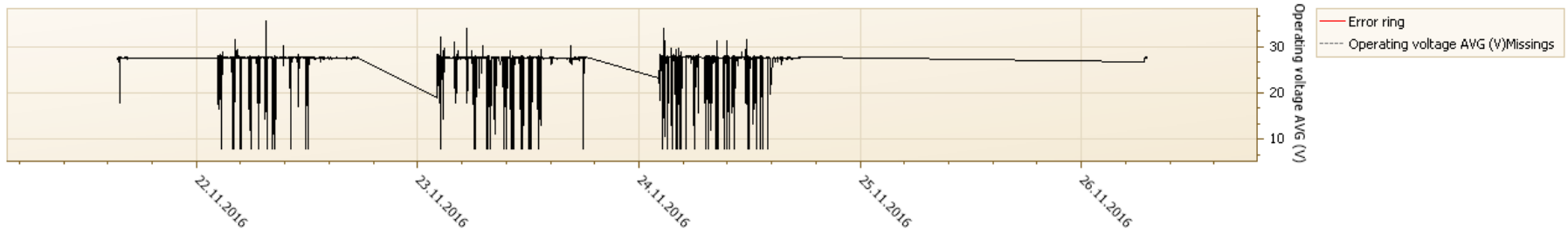


Low performance regeneration

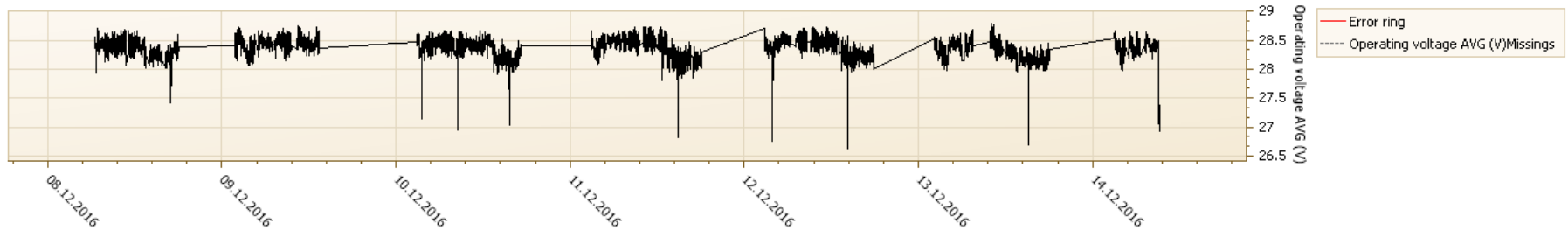
- ❑ Control unit stop regeneration to protect high voltage (battery or alternator problem)
- ❑ ECU, sensor or actuators failed
- ❑ Interaction made between ash and soot prevent oxidation progress
- ❑ DPF cleaning by steam water made cement-like species from unremoved



Battery over voltage problem



Aged battery voltage



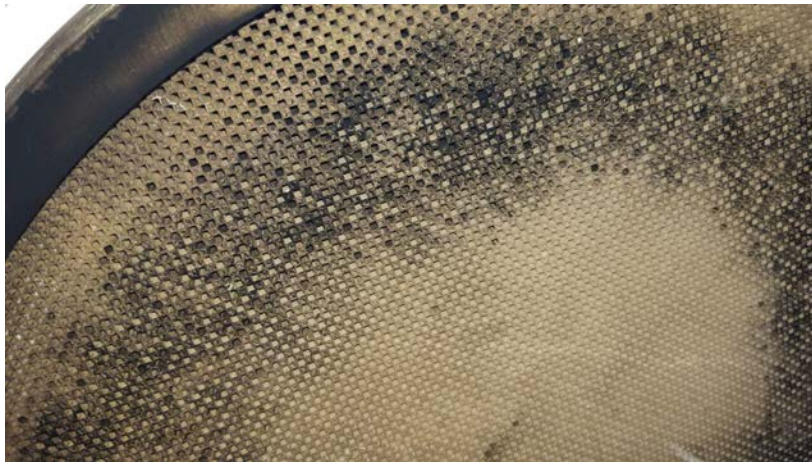
New battery voltage

DPF catalyst poisoning

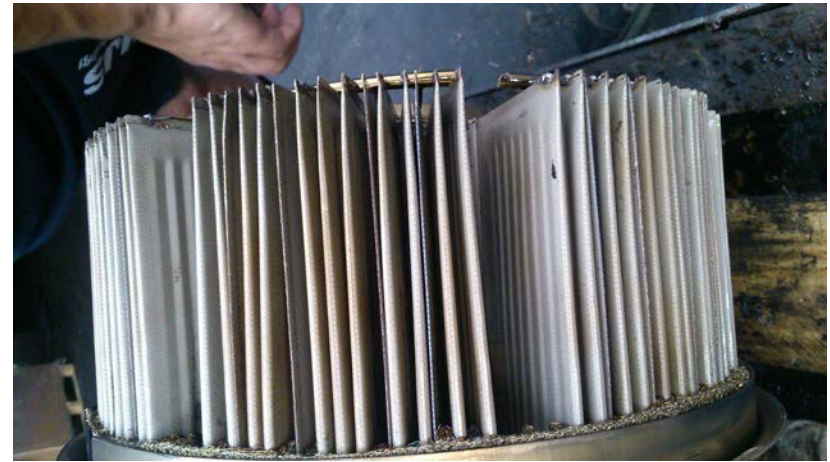
- Frequently using high sulfur fuel
- Adding oil or additive to fuel tank
- Oil leakage from turbocharger to exhaust
- Coolant leakage from EGR system to exhaust
- Water cleaning, extra air pressure cleaning or extra heating in cleaning process

Substrate deformation, melting or cracking

- ❑ Oil leakage to DPF
- ❑ Fuel leakage to DPF
- ❑ Regeneration strategy failures against high soot rate, low FBC rate, high sulfur fuel and ..
- ❑ Failure in Heat-up and cool-down of cleaning process



Oil leakage from Turbo made crack



Fuel leakage from injector deformed DPF

Substrate deformation, melting or cracking

- ❑ Failure in Heat-up and cool-down of cleaning process
- ❑ Substrate dropping accident
- ❑ Hammering on mounting surface to remove ash during cleaning
- ❑ DPF vibration because of looser or missing fastener
- ❑ Leaving substrate near to welding services



Back pressure monitoring system

- ❑ **Sensor failures**
- ❑ **Wiring and connectors loosening, corrosion,..**
- ❑ **Disconnecting, taping over or blocking displayer**
- ❑ **Misunderstanding the meaning of indicator lights**



Solid green - system ok
Flashing green - system regenerating



Solid orange - service needed
Flashing orange - regeneration needed



Flashing red - regenerate ASAP
Warranty at risk

Low efficiency cleaning

- ❑ One type of cleaning machine and cleaning procedure may not be suitable for all DPF types
- ❑ Cleaning takes time
- ❑ Visual Inspection, weighting, flow measurement and endoscope inspection are necessary



Discussions are welcome
Thank you for your attention

