

WHAYNE
Technology Division

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Dyno Test of Wayne C-15 Lube Tanker



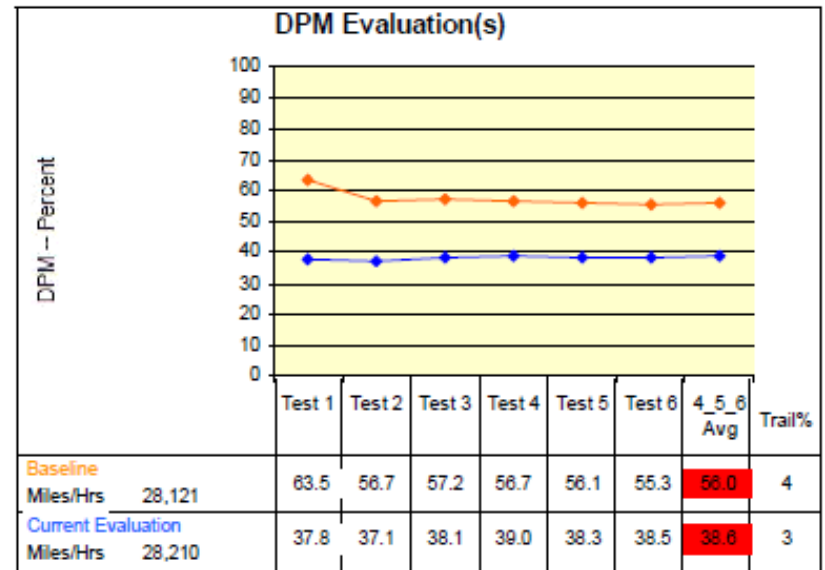
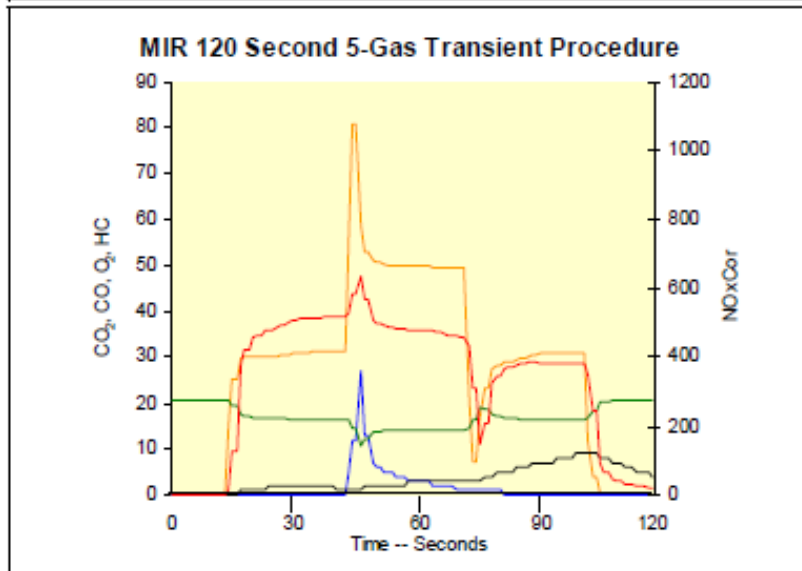
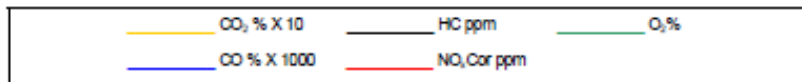
Kimballton Underground Evaluation Date: 10/27/2009

Vehicle #7

Evaluation Type: A/F Adjusted

Year:	1995	Engine mfr:	Caterpillar
Vehicle type:	Loader	Engine model:	3408 TA
Vehicle model:	988F	Injection type:	M
Vehicle SN:		Fuel type:	#2 Diesel

Annual fuel consumption (gal):		18,000
Average DPM Density (%):		56.0
Calculated fuel loss (gal):	Baseline	2,017
Calculated DPM produced (lbs.):	9/14/2009	817
Average DPM Density (%):	Current Evaluation	38.6
Calculated fuel loss (gal):	10/27/2009	1,390
Calculated DPM produced (lbs.):		563



Recommendations:

Evaluation results indicate the engine is injecting more fuel than it can burn during engine acceleration. Recommend checking the engine for an intake air restriction starting with the turbo and aftercooler.

Typical machine with poor combustion.

Whayne Supply Company - Lexington

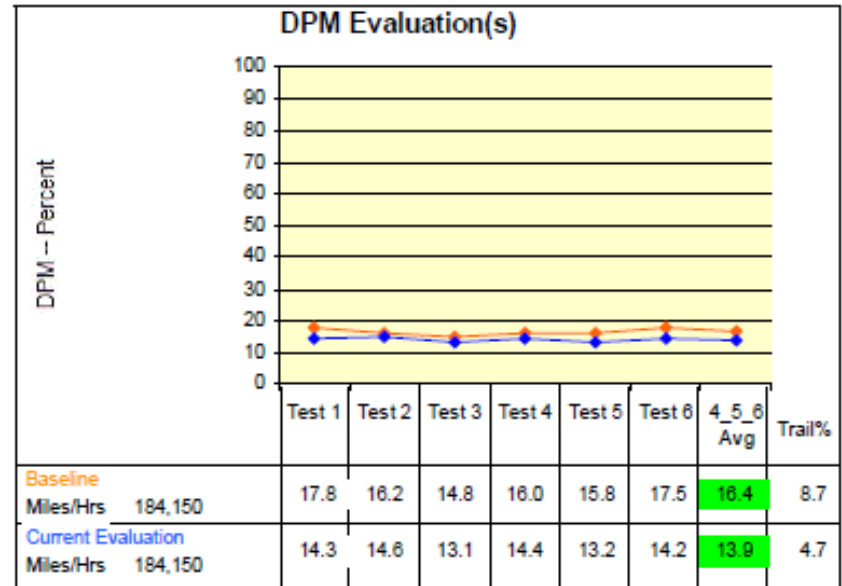
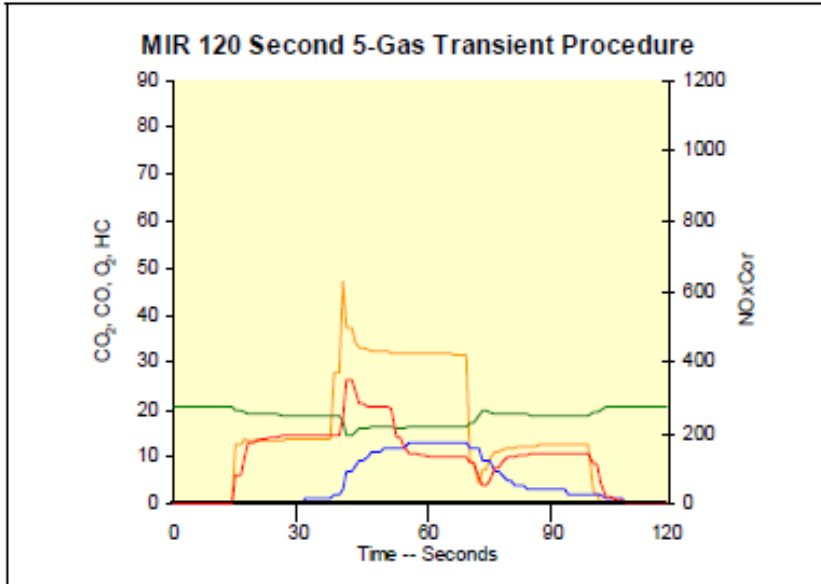
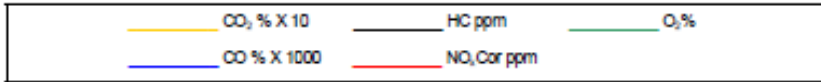
Evaluation Date: 10/18/2009

Vehicle # V2544

Evaluation Type: CMax Reprogrammed

Year:	2004	Engine mfr:	Caterpillar
Vehicle type:	Lube truck	Engine model:	C-15
Vehicle model:	_Unknown	Injection type:	E
Vehicle SN:		Fuel type:	No data

Annual fuel consumption (gal):		6,800
Average DPM Density (%):	Baseline	16.4
Calculated fuel loss (gal):	10/18/2009	223
Calculated DPM produced (lbs.):		90
Average DPM Density (%):	Current Evaluation	13.9
Calculated fuel loss (gal):	10/18/2009	190
Calculated DPM produced (lbs.):		77



Recommendations:
 87% throttle

Exhaust Gas Test showed fairly clean combustion in Whayne Lube Truck with C-15 engine.

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***Mirenco C-Max and
D-Max manages fuel
by 2 methods!***

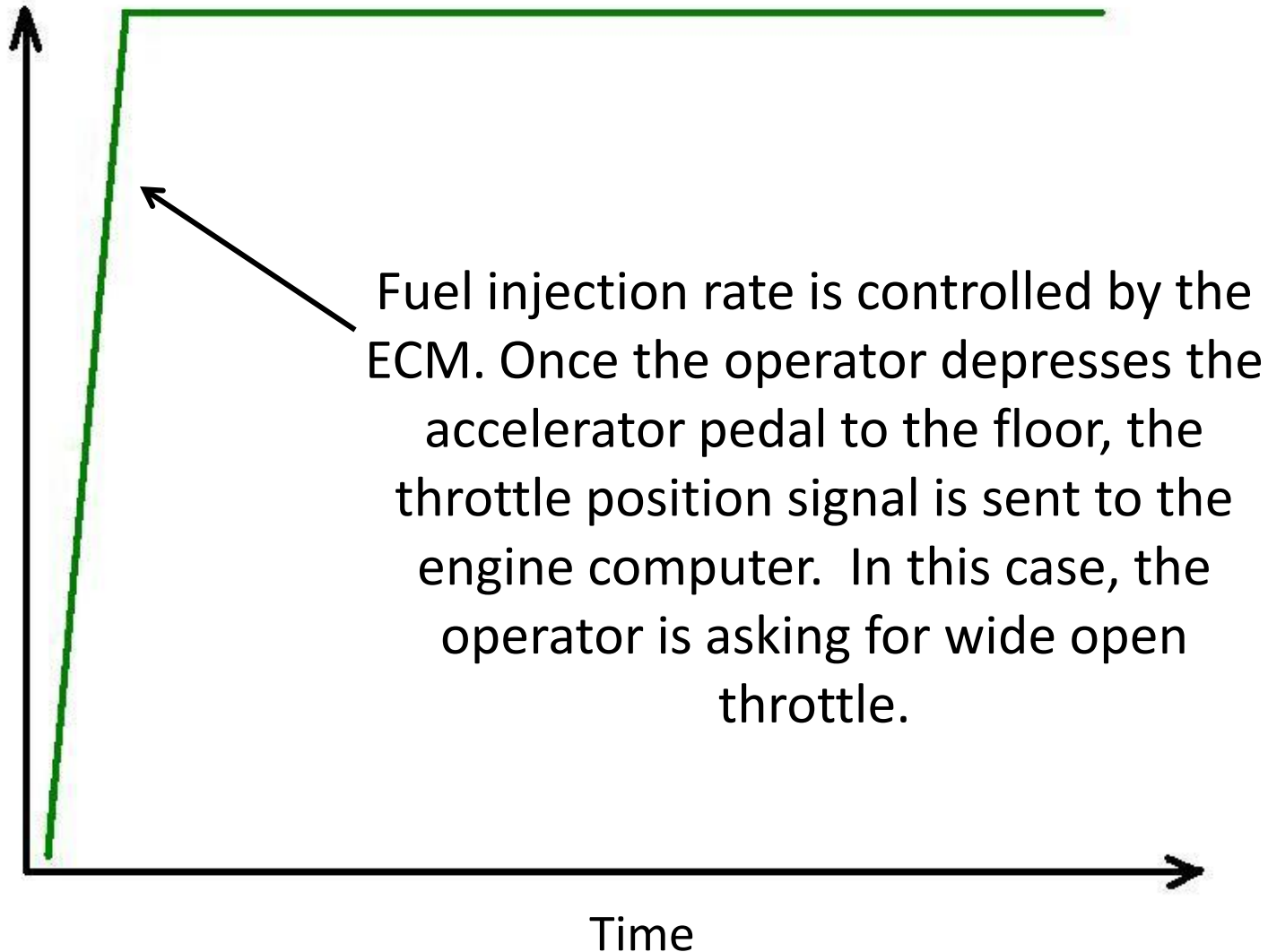




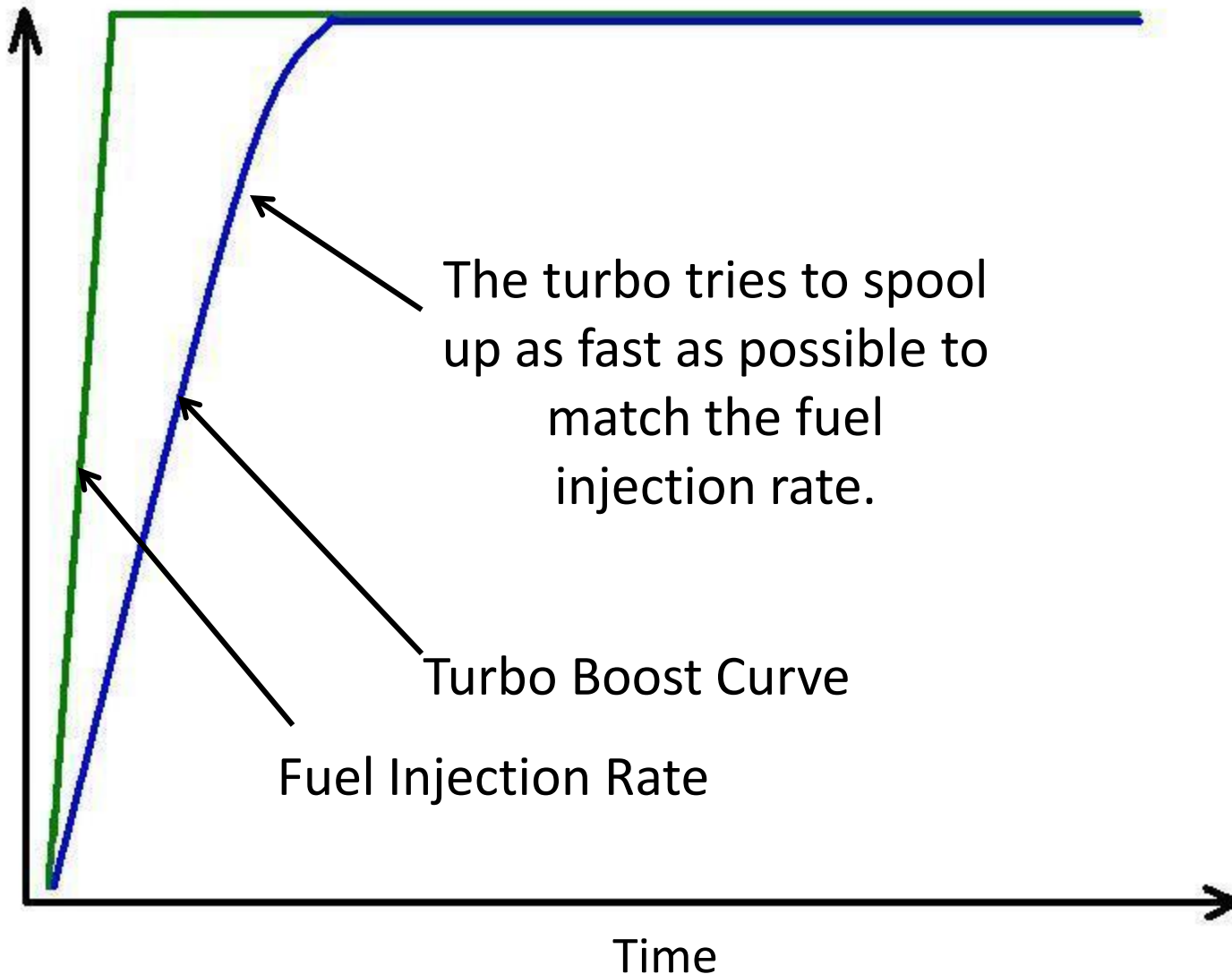
Method 1.

*Fuel Injection during
machine acceleration.*

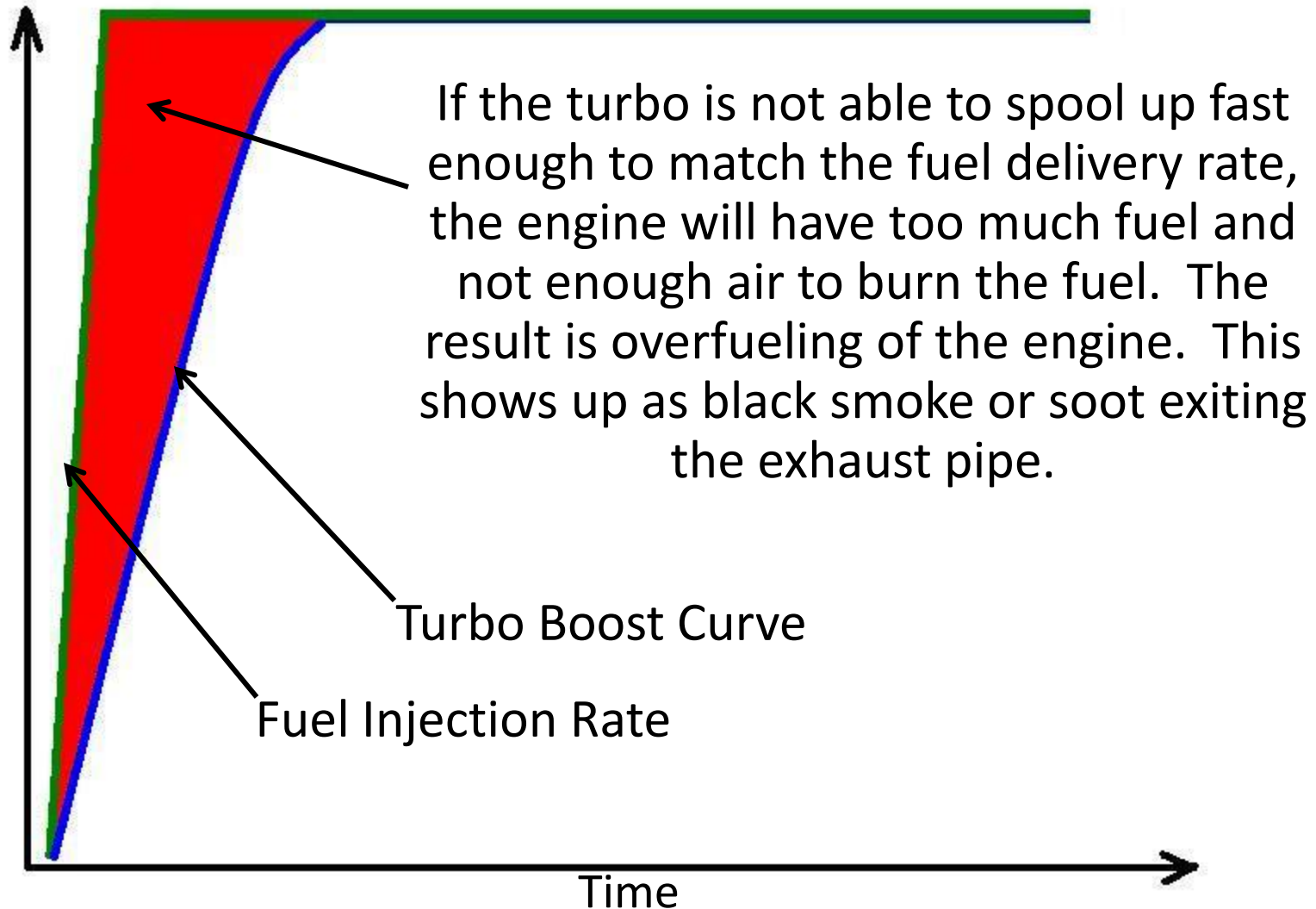
Fuel Injection vs Time



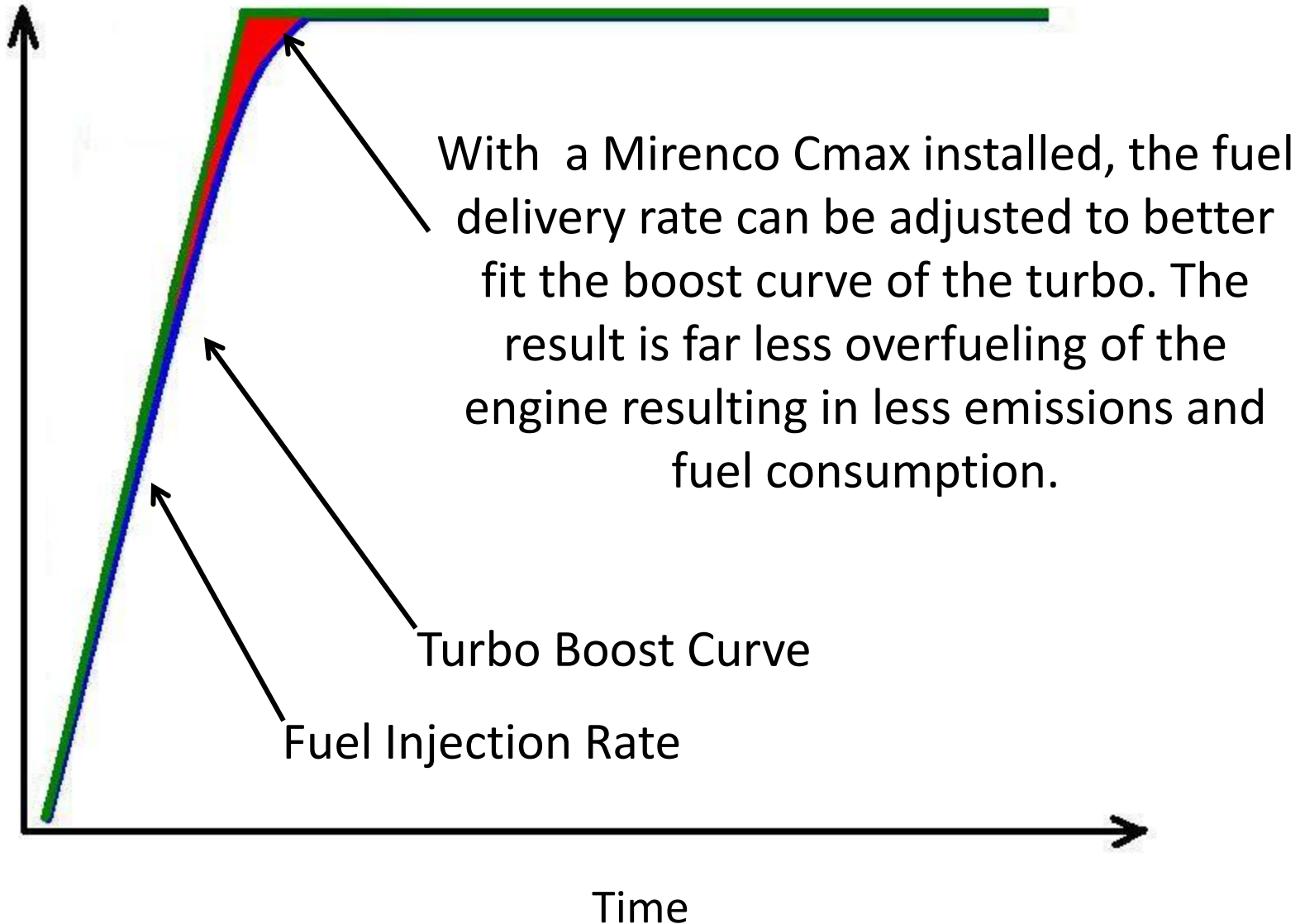
Fuel Injection & Turbo Boost vs Time



Fuel Injection & Turbo Boost vs Time



Fuel Injection & Turbo Boost vs Time





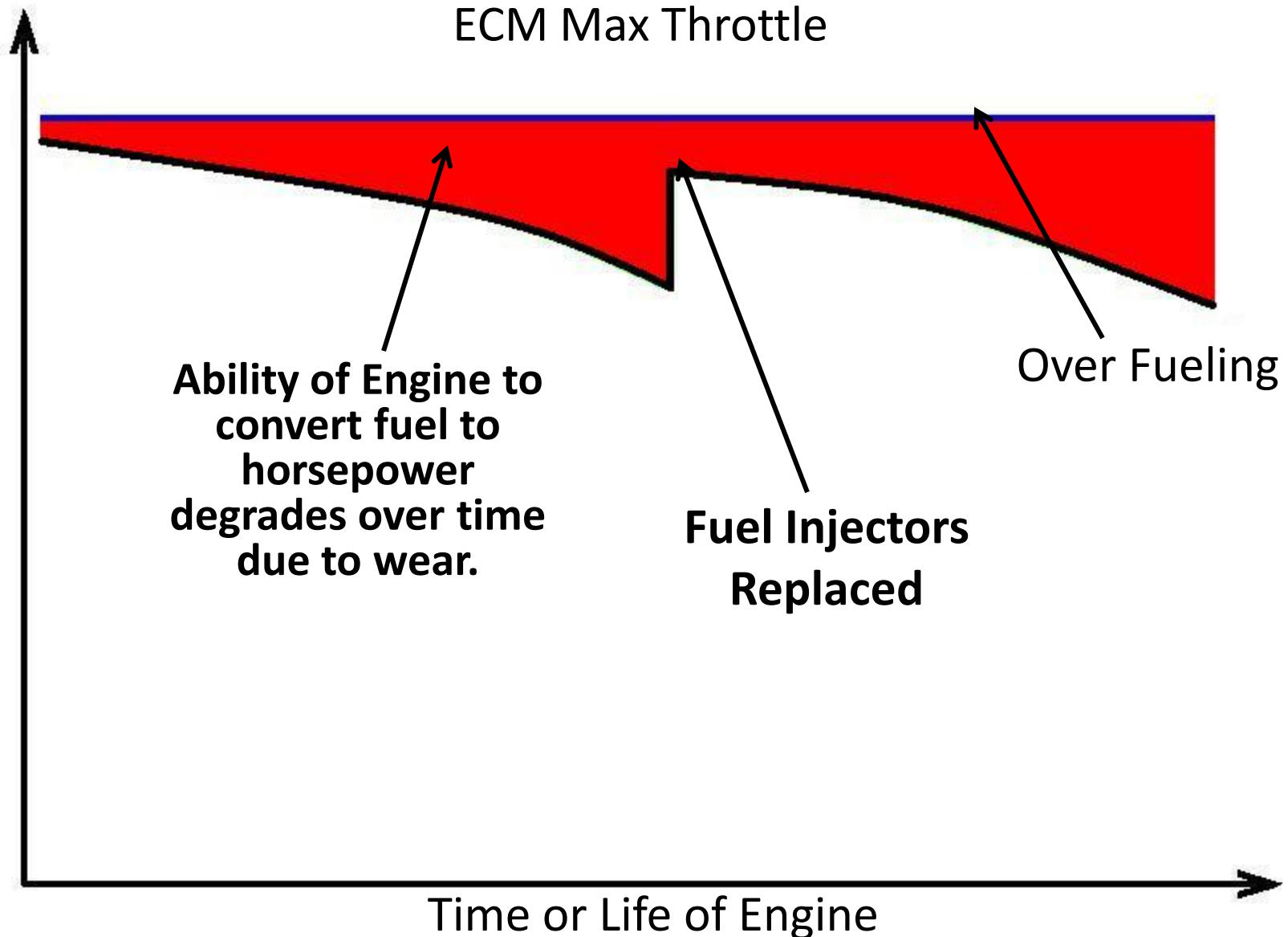
Method 2.

*Fuel Injection at wide
open throttle.*

*This is the method used
during the Dyno Tests.*

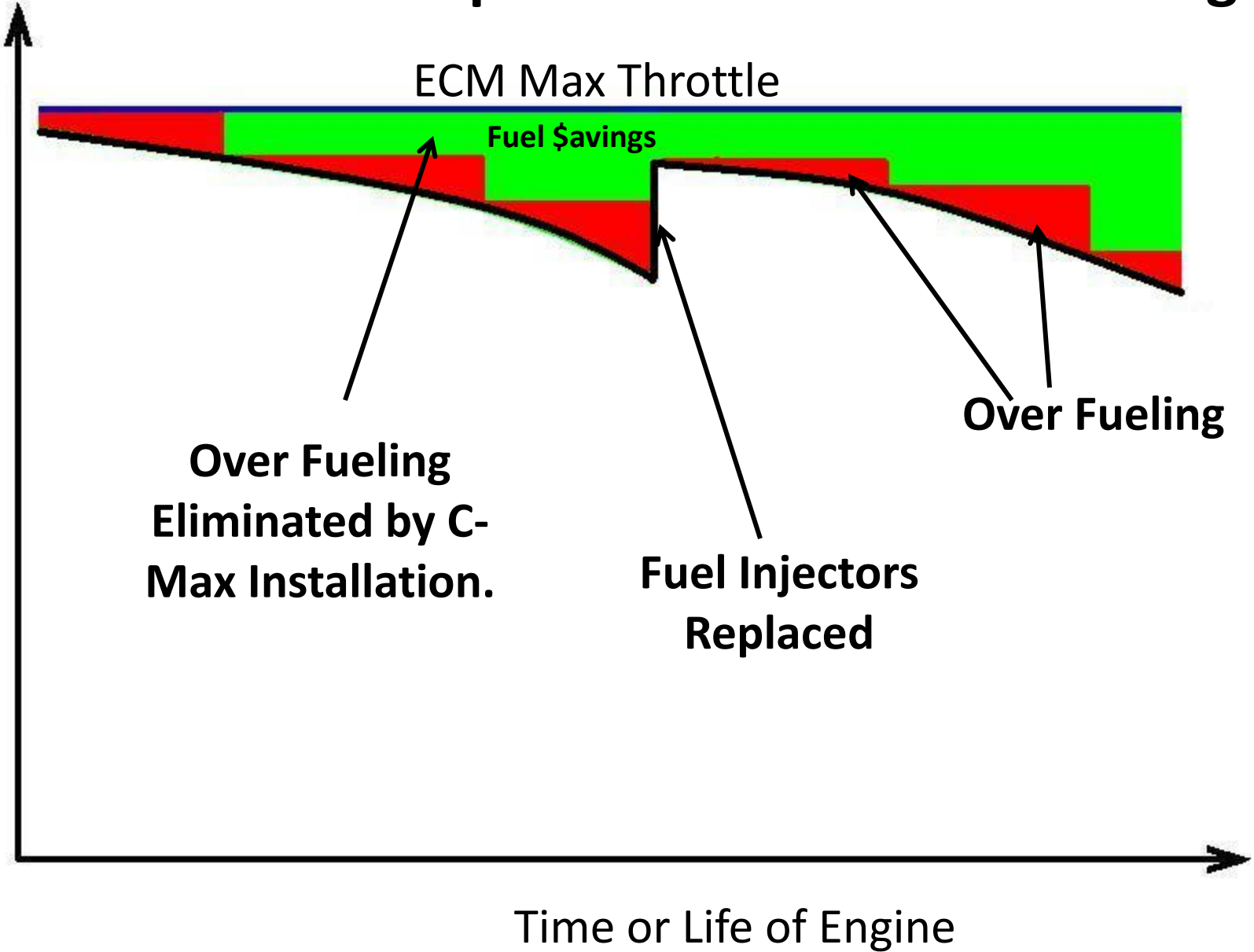
Method 2.

Diesel Fuel Consumption over the life of an Engine.



Method 2.

Diesel Fuel Consumption over the life of an Engine.



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Whayne Chassis Dyno, Louisville, KY

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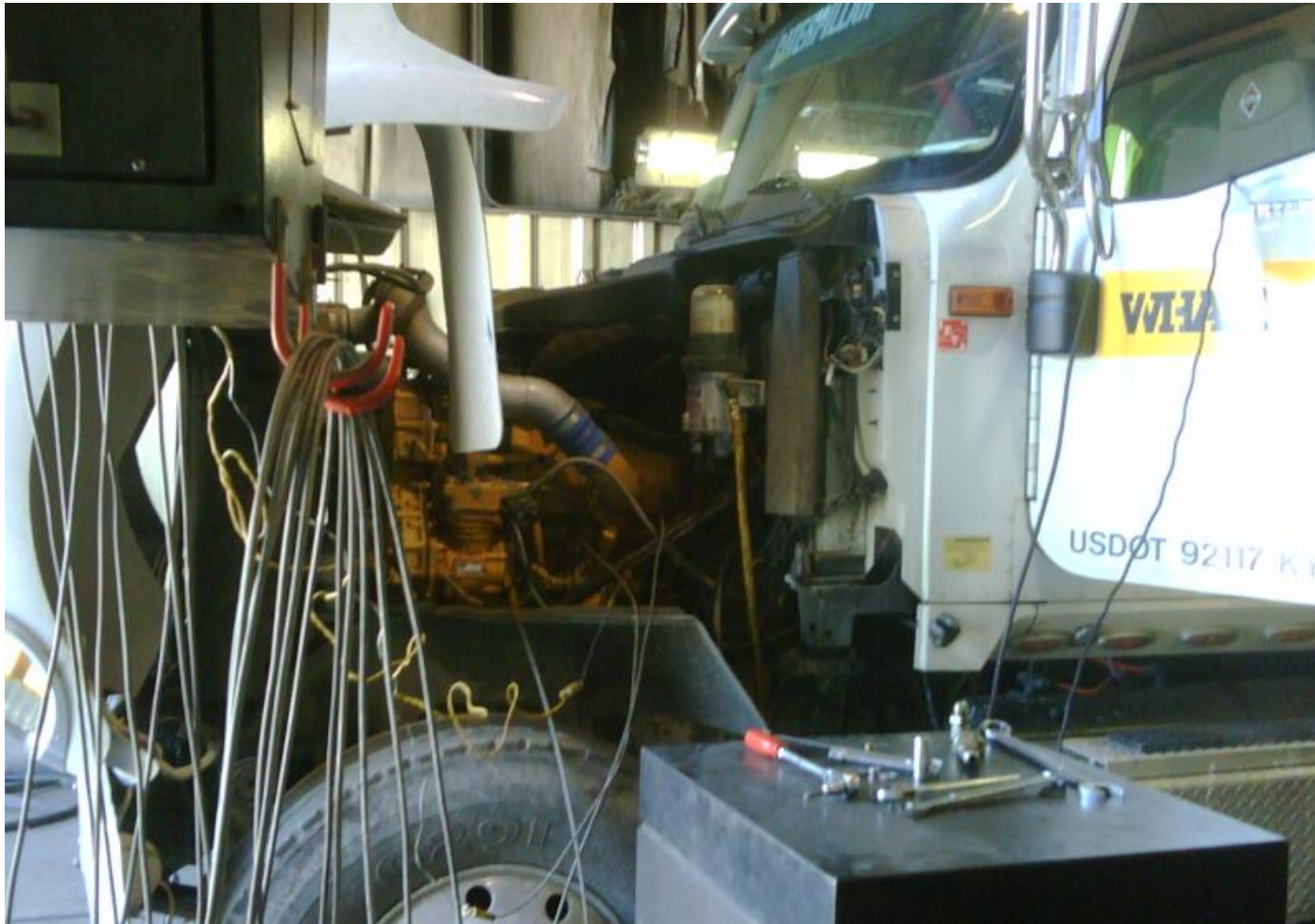
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Technician straps truck to Dyno

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Fuel, rpm, torque, boost and temps measured

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Truck rear drive axles on dyno rollers



Fuel is measured by weight during dyno runs.

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Technician performs dyno runs from cab.

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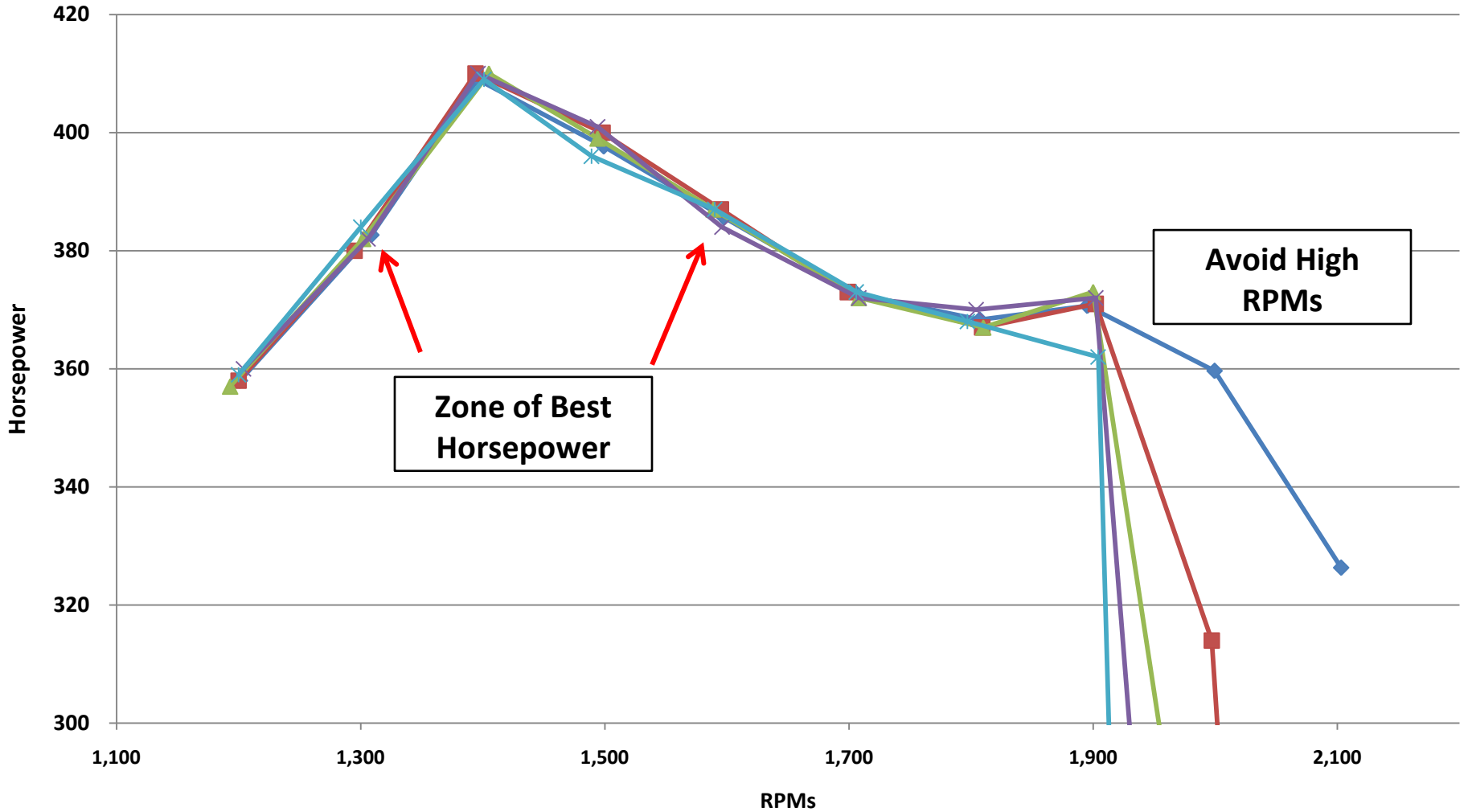
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Mirengo C-Max settings are made between dyno runs.

Whayne Dyno Test Cat C-15 Lube Truck

◆ 100% throttle ■ 92% Throttle ▲ 90% Throttle ✕ 88% Throttle ✧ 83% Throttle

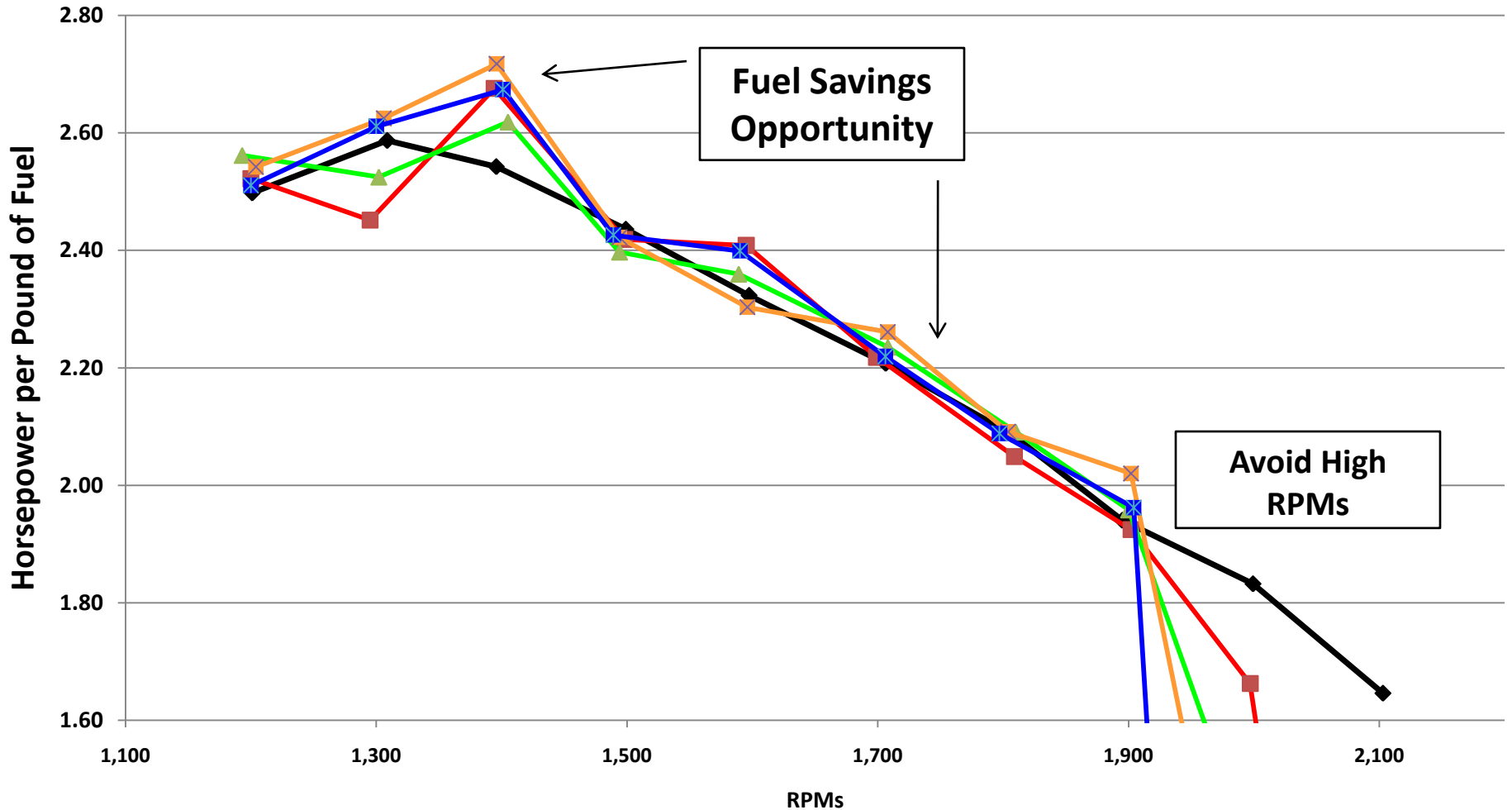


Horsepower Observations

- * The C-Max does not effect HP in the working range of 1300 to 1700 rpm.
- * HP is only effected in the far upper ranges of rpms 1900+.
- * C-15 Diesel engines have a "sweet spot" around 1400 rpm.
(best HP per pound of fuel burned)

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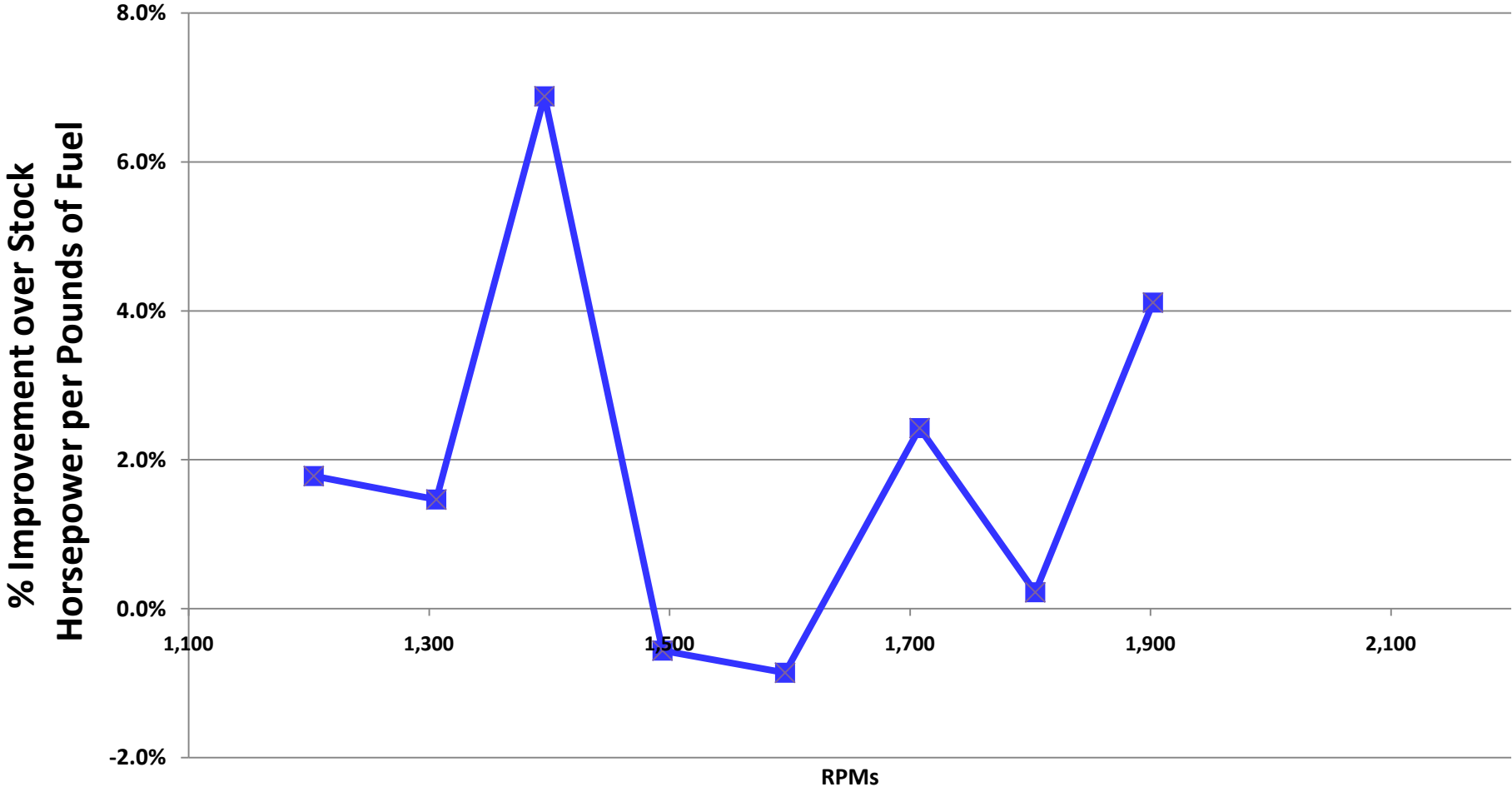
Fuel Efficiency Observations

- * The HP per pound of fuel burned really drops off quickly once the engine is above 1700 rpm
- * It makes great sense to keep the truck engine RPMs as close to 1400 rpm as possible for best efficiency.
- * Our truck is now set at 90% throttle max application....driver is happy with performance...we are seeing a 6% increase in mpg.



Wayne Dyno Test Cat C-15 Lube Truck

88% Throttle





Questions?



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