

THERMOL-D – Diesel Combustion Catalyst

Conclusion Report of Arcelor Mittal, Ostrava

Client	Trial conducted by
Arcelor Mittal, Ostrava, Czec	Abhitech Energycon Ltd, Mumbai, India (AEL)

TRIAL OBJECTIVE

The trial objective was to reduce the Diesel consumption of the Locomotive Engine.

AEL received opportunity from AMO to conduct a performance evaluation trial of THERMOL -D, multifunctional combustion catalyst for Diesel on their Locomotive Engine.

As per earlier discussions the evaluation was conducted on constant Load test.

Meeting was held between the following AMO & AEL officials on 14/05/2013, to discuss THERMOLD- performance evaluation report.

For AMO	For AEL
Mr Kamil Brucek – Continuing Improvement (Manager Transport)	Mr. Vinu Subramanian –Chief Manager (Tech) Mr. Amarjeet Yadav – Asst Manager (Tech)

>The trial was based on "Reduction in consumption on constant load" which was evaluated by following methods:

- ✓Diesel Consumption on Load test
- ✓CO Gas Analyzer procured by AEL
- ✓Sound level meter
- ✓Diesel Density (Hydrometer)

>The gist of the trial is tabulated below:

Date	Fuel Consumption (Liters)	CO (ppm)	HC (ppm)	Sound Level (db)	No of Hours (minutes)	Density of Fuel g/m ³
Without Thermol D						
29/04/2014	352	230.0	10.3	111.3	5 hrs 40 min	0.837
30/04/2014	348	227.6	10.6	111.4	5 hrs 40 min	0.835
Average	350	228.8	10.5	111.3		
With Thermol D						
06/05/2014	320	181.6	9.07	105.3	5 hrs 40 min	0.837
07/05/2014	318	181.2	9.1	105.3	5 hrs 40 min	0.837
Average	319	181.4	9.1	105.3		
Reduction %	8.85	20.7	13.4	5.53		

Locomotive Details

Locomotive	:	CKD Praha
Loco No	:	740-463-5
Serial No	:	VYRCIS9946
No of Cylinder	:	6 No
year	:	1977
Tank capacity	:	4000 Liters
Fuel Used	:	High Speed Diesel (HSD)

TRIAL PROCEDURE

The Trial Study was carried out on "**Constant Load Test**" basis.

The trial was conducted on Locomotive Engine no. 746-463-5, on constant load where the engine was kept idle and was run in forward and reverse notch (0-8 forward & 8-0 reverse). The output of the engine is connected to the resistance of capacity 2000 kW. Locomotive output thus speed is typically controlled by the notched that produce corresponding electrical resistance.

The trial was conducted by running the loco engine from 0 to 8th Notch and reversing back to 0 notch. The running time for each notch was 20 minutes. The diesel consumption was measured accurately by measuring the diesel consumption from a separate calibrated fuel drum of 200 liters capacity. On this drum diesel level marking was done using a calibrated 1 liter measuring glass cylinder at 200 liters and the drum level was maintained by level gauge. During pre and post-trial diesel intake and return line was connected the 200 liter drum instead of the fuel tank of the Locomotive.

The carbon monoxide (CO) and Hydrocarbon (HC) and sound level was checked by gas analyzer and sound level meter. Before starting the pre and post trial the density of the fuel was checked with Hydrometer at noted room temperature.

During the exercise carried out for 20 minutes for each notch (0-8 forward & reverse) following parameters were noted:

- Minute Clock reading
- Diesel consumption in liters (By calibrated measuring equipment)
- Engine RPM
- Diesel Pressure (bar)
- Lube oil Pressure (bar)
- Water Temperature (^oC)
- HSD consumption in liters
- Lube oil Temperature (^oC)
- Diesel Density (g/m³)
- CO, HC (ppm) By Gas analyzer (Model no EFM 2000)
- Digital sound level meter (decibel)

Using the above data, the Diesel Consumption for one complete cycle of 5Hrs 40 Mins was calculated.

Diesel Consumption = one complete cycle and no. of Hours

TRIAL OBJECTIVE

The trial objective was to reduce the Fuel consumption of the Locomotive Engine on constant load basis for one complete cycle.

PRE TRIAL

The Pre-trial was conducted on 29th & 30th of April'14, wherein the above parameters were noted on each notch basis.

THERMOL-D DOSAGE

THERMOL-D was added in the Locomotive storage tank in the ratio of 1:2000 on v/v basis i.e 2 liter of THERMOL-D was added to 4000 liters of fuel on 30th April after completion of pre trial readings.

POST TRIAL

After THERMOL-D addition, the Loco engine was operated on its routine schedule till 5th May. The Post-trial was conducted on 6th and 7th May'14.

OBSERVATION

The average Diesel consumption for the total running time of 5 hours and 40 minutes in each cycle during the Pre-trial was 350 Liters & that during Post-trial was 319 Liters. This indicates reduction in Diesel consumption of the Locomotive with usage of THERMOL-D.

CALCULATION

$$\text{Diesel Saving \%} = \frac{\text{Without Thermol D} - \text{With Thermol D}}{\text{Without Thermol D}} \times 100$$

$$\text{Diesel Saving \%} = \frac{350 - 319}{350} \times 100$$

$$= 8.85 \%$$

CONCLUSION

Usage of THERMOL-D has resulted into a diesel savings of 8.85 % on during the performance evaluation trial conducted on locomotive engine. During post-trial 638 litrs of diesel fuel of estimated value 17 864,- CZK and 0,319 litrs of additive THERMOL - D of value 15,95 USD (50 USD/l) were spent.


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