
Application report - 16

REWITEC® Caterpillar engine treatment

Application date: 01.-03.12.2015

Sector: Industry (Mining)

Client/Partner: Power Train Technologies
Santiago, Chile

Responsible: Maximilian Theis

Project Task: Application with REWITEC® PowerShot® 20 to reduce fuel consumption

Product: REWITEC® PowerShot® 20

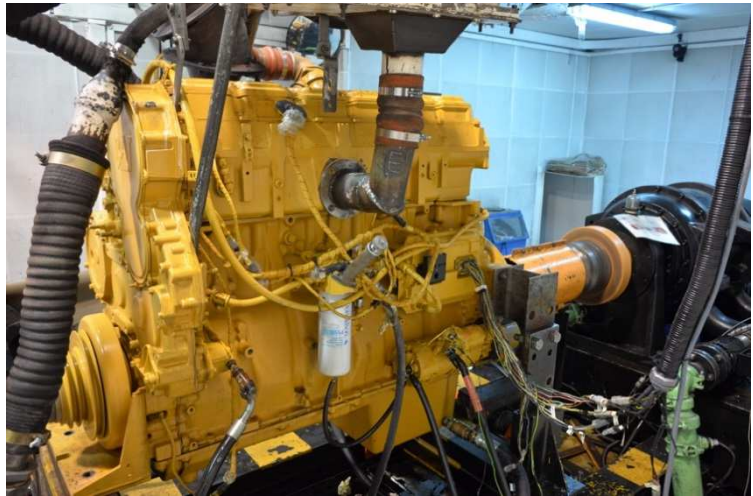
Engine: Caterpillar C16

Year of manufacture: 2003

Engine Size: 15,800 cm³

Goal of the treatment: Improving Efficiency

Partner: *Power Train Technologies* - a long standing engine re-manufacturer located in Santiago, Chile with major experience in the mining area.



Measurement

A precise Fuel Efficiency Measurement on-site during operation is nearly impossible due to different aspects. Every operation day is different: Trucks are driving with different loads in various rpm areas; even temperature, tire pressure and wind are having an impact on fuel consumption.



To provide a precise measurement the only option is to test an engine on a dynamometer.

That's what we did. The testing time was about 25 hours. More than 2,000 liters of fuel have been used.

For the measurements the engine was tested in 4 load varieties (60%, 70%, 80%, 90% load) at 1800 rpm.

The fuel consumption was measured precisely every second. For every measurement an average of 7-10 minutes was calculated, including the standard deviation.

The engine was observed by two technical employees of Power Train Technologies at all time to see if there were any irregularities.



Procedure

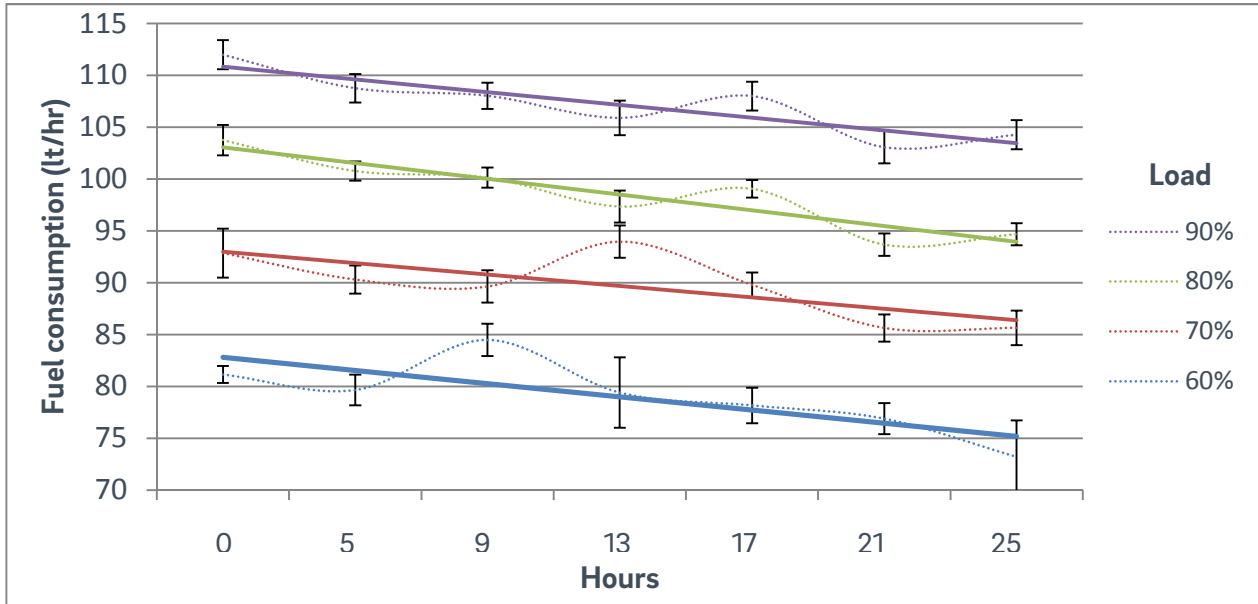
First the Caterpillar C16 Engine was running without REWITEC® for about 4 hours in order to compare the fuel consumption before and after the treatment with REWITEC®. The fuel consumption was measured during this time at 60%, 70%, 80% and 90% load at 1800 rpm. The time of each measurement was 10 minutes; the average fuel consumption of this time was calculated.

Now the engine was treated with REWITEC® PowerShot® 20. Afterwards the engine kept running in different load and rpm areas for about 5 hours until the next measurement was taken.

The following measurements (always 60%, 70%, 80% and 90% load at 1800 rpm) were taken constantly in fixed intervals of 4 hours. In between the measurements the engine was running in different load and rpm areas in order to simulate a normal - everyday use of the engine. All single measurements are an average of 10 minutes in order to provide a reliable accuracy.

Results

Measurements	60% Load		70% Load		80% Load		90% Load	
	L/HR	Std. Deviation in %	L/HR	Std. Deviation in %	L/HR	Std. Deviation in %	L/HR	Std. Deviation in %
without REWITEC®	81,15	1,00	92,86	2,55	103,75	1,41	111,98	1,25
with REWITEC®								
after 5 hours	79,65	1,86	90,31	1,51	100,77	0,91	108,76	1,27
after 9 hours	84,48	1,85	89,63	1,74	100,14	0,96	108,03	1,16
after 13 hours	79,40	4,28	93,96	1,67	97,35	1,60	105,90	1,58
after 17 hours	78,17	2,20	89,80	1,32	99,06	0,85	108,00	1,29
after 21 hours	76,89	1,95	85,64	1,53	93,67	1,14	103,07	1,52
after 25 hours	73,21	4,79	85,64	1,95	94,68	1,12	104,28	1,35
Savings	9,784%		7,770%		8,745%		6,884%	



The results are showing a significant decrease of fuel consumption. Please note, that REWITEC® actually needs about 100 operating hours to finish the treatment inside the engine. Considering that the fuel consumption should continue to decrease.