Diesel Fuel enhancing Project

Bothma's Transport gas emissions and fuel consumption

Centron was tested on (2) Mercedes Benz Actros, truck # 245 and truck #266 & (1) MAN 26 – 480, truck #250 between 05/03/2011 and 11/05/2011. The result of this evaluation was extremely positive as it clearly demonstrated that the use of Centron diesel fuel additive significantly improves fuel economy performance.

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Fuel Enhancement Project
PRELIMINARY REPORT

Privileged, private and confidential

Exhaust Emissions and Fuel Consumption Results
Centron Diesel Fuel Additive Performance Evaluation
Bothmas Transport, South Africa

Prepared for

Bothmas & Seuns Transport

Compiled & Verified by

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Test Specialist: Clean Air Testing Solutions

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It is hereby declared that the results contained in this report are a true reflection of the conditions prevailed on site during the period of conducting this survey. The information and recommendations offered in this report are made in good faith with professional integrity.

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Executive Summary:

To determine possible carbon emission improvements & fuel savings benefits independent testing was performed on two Mercedes Benz Actros tanker trucks and 1 MAN tanker truck using the fuel additive called Centron, at the depot of Bothmas Transport in Sasolburg.

Based on the economic and environmental benefits, the recommendation is for Bothmas Transport to run a second phase of testing on all the equipment performing the respective routes. The ideal way of doing this is to bulk dose both the Sasolburg depot. The results of the emissions test-work was inconclusive and further testing and investigation will need to be performed. It is advisable to run test-work on the extended fleet of vehicles as it is valuable in confirming the current results, but with the full time needed to perform accurate test-work, additional savings might be realised. More time is required to run the Centron evaluation as it is defined as an accumulative product which needs a minimum of 30 working days to start seeing the true benefits and more accurate figures of such a product, from a fuel consumption point of view. Environmental savings are realised earlier but sometimes a longer test still proves further emission savings.

Introduction:

Pollutant regulations are not a matter of concern only for engine manufacturers but they also require policy implementation, commitment and important effort by all of industry in order to provide environmentally friendly working procedures and conditions. Use of fuel enhancers will help to achieve reduced emissions and improve the performance of new engines as well as older engine types and thus also reducing fuel usage among the old and new engine types. The aim of the present work is to perform a study of the effect of a fuel enhancing additive (Centron) added to 500 ppm diesel, on the combustion emissions, fuel savings, and related savings on maintenance and engine life, of the tankers and knock-on effects on all other vehicles at Bothmas Transport.

The components that make up diesel exhaust emissions are hydrocarbons (HC), carbon monoxide (CO), carbon dioxide (CO_2), oxygen (O_2), nitric oxides (NO_x) and sulphur oxides, namely sulphur dioxide and sulphur tri-oxide (SO_2 and SO_3) respectively. Reportable greenhouse gases are all those mentioned above besides the sulphur oxides. Sulphur dioxide is always present and this is dependent on the quality of the fuel being used, in this case, diesel with a sulphur content of 500 ppm. Emissions of sulphur di and trioxide depend upon the fuel sulphur content, which is legally restricted within maximum values.

Diesel exhaust emission gases are influenced by environmental conditions, operating conditions, parasitic loads, engine temperature, and altitude. Unless the

test conditions can be tightly controlled a high degree of variability can occur making it difficult to obtain reliable results for comparative purposes.

Different emissions mean different things and it is not always possible to reduce all emissions at the same time. Emissions formation and combustion in diesel engine processes are controlled by: piston bowl shape, swirl intensity, injection profile, number of holes, diameter of holes and directions of spray nozzles, interaction of sprays with cylinder walls and of wall surface flows formed by the sprays.

Methodology:

Testing on Centron Diesel Fuel Additive was conducted between 05/03/2011 and 11/05/2011, according to the standardised EPA protocol for cumulative effect fuel additive testing for diesel fuels, using an EPA compliant Autologic Gas analyser and Opacity Meter using the standard methodology for snap acceleration testing performed with the Autologic Opacity meter, SAE J1667.

The fuel consumption baseline data measured in kilometre per litre (KPL) for the tankers was constructed over the last 2 weeks of the driver's loggings prior to dosing the fuel with Centron. Fuel consumption data is based on the electronic motherboard of the vehicles as well as manually recorded data. This data collected from the driver's recordings was used as the standard for comparison for collected data after initiation of Centron. Exhaust emissions were monitored onsite at the Sasolburg depot before initiation of Centron. This was performed three times prior to addition of the product. These values were standardised as the baseline and were used as a comparison for data collected after initiation of the product.

The Autologic gas analyser was used to monitor the environmental emissions on the tankers and the gas analyzer as well as the Autologic Opacity meter. The tankers were dosed onsite at the Sasolburg depot, during each refuelling. Dosing with Centron was on a ratio of 3.2 millilitres of Centron per litre of diesel. The tankers were dosed after refuelling based on the amount of fuel refuelled. All fuel for the tankers was dispensed from the same fuelling point in Sasolburg. The electronic meter on the fuel pump was used to obtain diesel volumes put into the tankers. The fuel filter was changed after 3753 kms of truck 245, 3920 kms of truck 266, and 6355 kms of truck 250 respectively; of Centron use, as guided by the standardised fuel testing protocol.

Results:

Table 1: A summary table from phase 1 of the evaluation at Bothmas Transport, showing the fuel economy improvement on the 2 Mercedes Benz (245 & 266) and 1 MAN (250), after the initiation of Centron:

		Baseline	Results Phase			% Change to baseline
Unit	Route	KM/L	KMs	Litres	KM/L	
TRK245	Local	**1.47**	15857	9640	**1.47**	**-11.56%**
TRK250	Local	**1.78**	14489	7428	**1.95**	**-9.55%**
TRK266**	Local	**2.28**	17439	7956	**2.19**	**+3.95%**

***** Newer Truck***

Conclusion:

In summary, Centron produced an average 11% improvement in fuel economy performance on trucks #245 & # 250 whereas there was a slight decrease of 3.45% on truck #266. This result is not unexpected as Centron has a cumulative affect on fuel economy performance that continues to improve on a gradual basis until its maximum performance level is achieved, which could take up to 8 weeks to fully realize. Further, Centron achieves greater fuel savings on trucks that have been in service for one year or longer use such as #245 & #250 where deterioration in performance over time has been reinstated to a new like condition through the use of Centron. Less fuel savings is typical with newer equipment such as truck #266. Similat applications indicate fuel economy performance will continue to approve to approx 5% with the continued use of Centron.

These results are extremely positive and indicative of the fuel savings that can be expected, across all of the equipment in use by the Bothmas Transport, when the entire fuel supply is treated with Centron on a continuous basis.

Further, based on other applications of Centron Bothmas Transport will also benefit from improved operability & performance, decreased maintenance costs, fewer fuel related issues and extended equipment life through the continued use of Centron

The emission test results were inconclusive therefore further testing is required to finalise these results.

Recommendations:

Based on the results of the Centron performanceevaluation it can be concluded that Centron favourably modifies the composition of diesel fuel resulting in improved fuel economy performance. It is therefore recommended that Bothmas Transport implement Centron as a fuel enhancement project dosing the bulk fuel depot at Sasolburg for a minimum of 6 months to quantify the full benefit of Centron. Please note that the following are merely recommendations for Bothmas Transport to consider regarding strategies to improve fuel economy performance and fleet performance plus reduce harmful exhaust emissions

Further, it should be noted that the cost of implementing Centron is more than offset by fuel cost savings resulting in net positive cash flow and enhanced bottom line profit for Bothmas Transport.

The results of the Centron evaluation confirms the manufacturer's claims of reduced improved fuel economy performance. Therefore it is reasonable to conclude that the potential for additional maintenance and financial benefits exist for Bothmas Transport by treating its fuel supply with Centron. .

Addendum A

Paola's Credentials

PAOLA NICOLE TREVISAN

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Tel: 011 979 5132 (H), 082 887 8863 (Cell). Email: pawutrevi@gmail.comPROFILE

- **ID Number:** 840404 0221 083
- **Date of Birth:** 1984-04-04
- **Nationality:** South African
- **Home Language:** English
- **Second Language:** Afrikaans
- **Drivers Licence:** Code B (own car)
- **Marital Status:** Single
- **Health:** Excellent

QUALIFICATIONS

BSc Natural and Agricultural Sciences – Human Physiology, University of Pretoria, 2007

- Currently enrolled for a Masters in public health at the University of Pretoria - completing 2010
- Registered SAIOH occupational hygiene assistant

Monitoring & Evaluation, UP, 2009

- Certificate

EDUCATION

Matriculation, St Andrew's School for Girls, 2002

- Subjects (HG): English, Afrikaans, Maths, Biology, Science, Speech & Drama
- Passed with Exemption
- Excelled in Rowing
- Leadership roles: Monitor, Captaincy

KEY STRENGTHS

- Work well under pressure
- Perseverance
- Integrity

- Self-disciplined
- Caring
- Assertive
- Public speaking / presentations

WORK EXPERIENCE

Trevi File, South Africa ; 1996 – 2004

- Part time – Machine operator, Factory Assistant
- Reference: Mauro Trevisan – +2711 979 2124

Impala Platinum refineries, South Africa; January 2008

- Part time – Health and hygiene assistant
- Reference: Stephen C. Engelbrecht - +2711 360 3156/7

FHG Scientific Services (Pty) Ltd, South Africa; June 2008 – July 2009

- Full time – Field officer for two (2) months and Operations Director from the Middle of September 2008 until July 2009.
- Reference: F Henk Grabe III - +2783 373 7077

SANSAT International Trading cc, South Africa; July 2009 – May 2010

- Full time - Fuel and environmental specialist managing and running a fuel enhancement and environmental project at Letseng Diamond Mine, Lesotho since March 2009 until May 2010
- Reference: Jannie Pretorius - +2782 561 6444

Clean Air Testing Solutions cc, South Africa; May 2010 – Present

- Company owner – Fuel and environmental specialists providing services to all mining, logistics, industrial and automotive applications, since May 2010