

The Samples were offered by Nanopetrol S.L. and Xiamen Xunsn Energy Technology Co.,Ltd.

The name of samples: Nano Fuel Saving Additive

The brand of samples: XSNano

EXPERIMENTAL SETUP

Laboratories for IC-Engines and Exhaust Emission Control of the Universidad Nacional de Colombia (South America) are used to carry out the experiments. Universidad Nacional de Colombia is located in Bogota at 2650 meters above sea level and local ambient pressure is 75 kPa. Experiments have been carried out in a Single Cylinder Lister Engine. The engine specifications can be found in the following table and a photo of the engine is shown in the next Figure.

Table: Engine Specification

Engine Type	A Single cylinder Lister Engine
Induction	Naturally Aspirated Engine
Displacement	0.756[L]
Bore and Stroke	90 120[mm]
Compression Ratio	Adjustable 4:1to 22:1 by a Variable Compression Unit, which consists of a piston with a diameter equal to the diameter of the spherical combustion chamber.
Cooling Type	Water Cooled
Peak Power	9 HP (6.62 kW) at 1800RPM and a Compression Ratio of 22:1
Speed	1800-800[RPM]. The dynamometer consists of a 220 or 110 V D.C. shunt wound inter polar machine with out cooling fan.
Connection Rod Length	200[mm]
Intake Valve Opening	10°ATDC
Intake Valve Closing	34°ABDC
Exhaust Valve Opening	40°BBDC
Exhaust Valve Closing	15°ATDC

Figure: Single Cylinder Lister Engine



Regulated Emissions from combustion of an HCCI engine are measured using a Motorscan Gas Analyzer model 8060. Specifications of the Motorscan Gas Analyzer 8060 can be seen in the next Table

Table: Motorscan Gas Analyzer Model 8060 Specifications

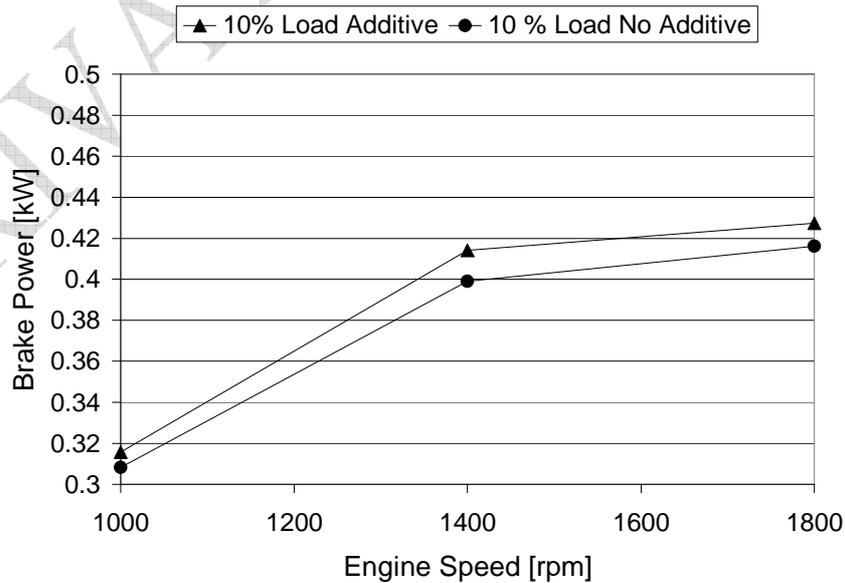
Value	Method of measure	Range	Resolution	Accuracy	Unit of Measure
CO	IR Bench	0/9.99 -10/14.00	0.001-0.01	0.01%	% vol
CO ₂	IR Bench	0/18.00	0.01	0.30%	% vol
HC	IR Bench	0/9999.00	1	4.00%	% vol ppm
O ₂	Electrochemical Cell	0/25.00	0.01	0.10%	% vol
NO	IR Bench	0/5000	1.00	25.00%	% vol ppm

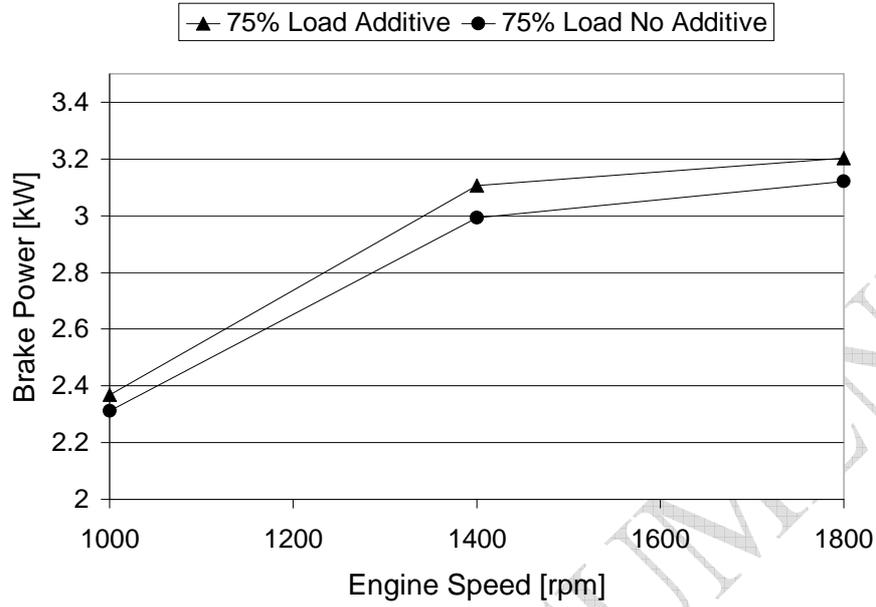
Opacity is measured using an OPA100.

Experiments were carried out at three different engine speeds 1000, 1400, and 1800 RPM. Several load conditions were tested 0, 10, 25, 50, 75, and 100%.

PRELIMINARY RESULTS

Brake Power (BP) at three different speeds can be seen in the following Figures for different loads



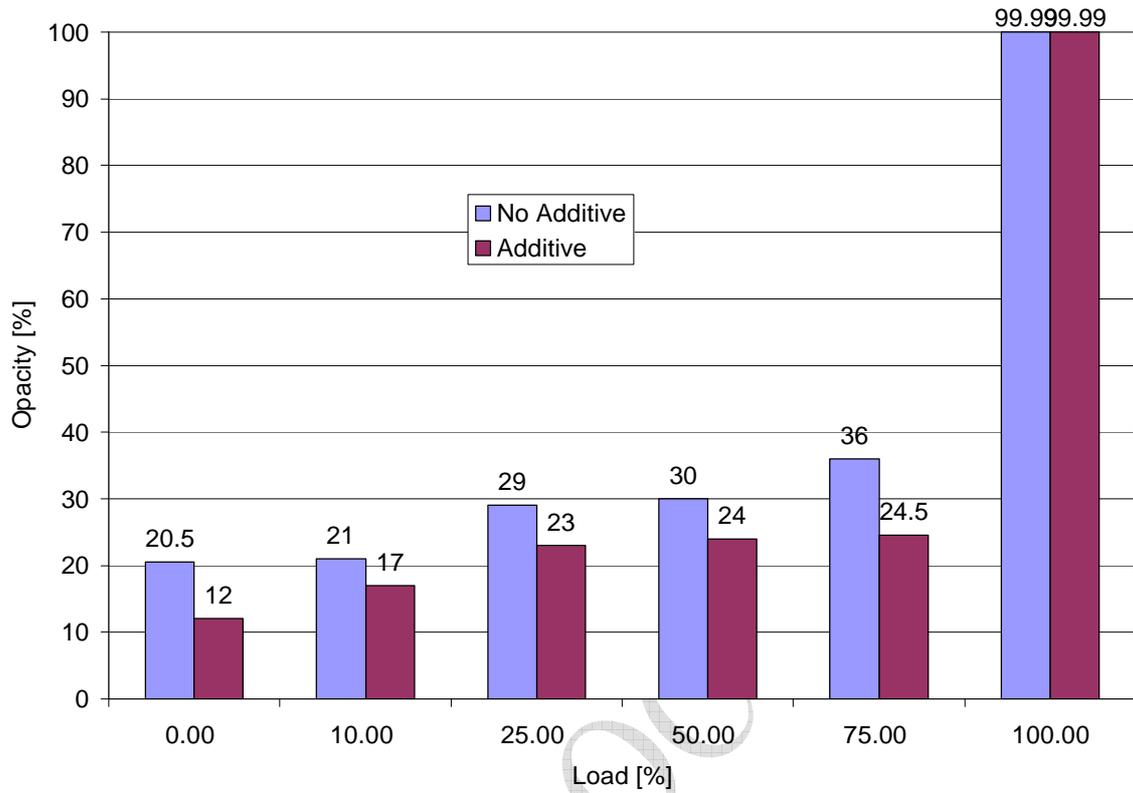


Other Variables Studied:

- Brake Specific Fuel Consumption
- Brake Specific Oxides of Nitrogen BSNO_x
- Brake Specific Carbon Monoxide BSCO

Opacity:

Next figure shows engine opacity for 1000 rpm and load conditions tested



PRELIMINARY CONCLUSIONS

Nano additive used in this experiment could:

- Increase brake power output of the engine without increase of fuel consumption
- Decrease opacity of the engine
- Decrease oxides of nitrogen

