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Extractive Industries and Sustainable Job Creation

Converting Naphtha and low Octane Gasoline to High octane gasoline using MXEY octane booster

By

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Converting Naphtha and low Octane Gasoline to High octane gasoline

using MXEY octane booster

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Octane booster “MXEY”

- This booster contains a mixture of methanol and other compounds
- The booster have been used to increase the research octane number of naphtha and low octane gasoline by **16.8 octane.**
- The final blend was tested over a temperature range of -5 °C to 55 °C.

On Low Octane Gasoline

When the booster was added to low octane gasoline, the octane number increased from 79.3 to 96.1

A gas chromatograph test showed that the percentages of aromatics, olefins, benzene and naphthenes have decreased.

The percentages are below the standard specification maximum ranges.

	Base Gasoline (79.3 RON)	**Final gasoline blend (96.1)**
Aromatics	26.1	**20.6**
Olefins	1.4	**0.962**
Benzene	1.72	**1.177**
Naphthenes	9.268	**7.69**

Exhaust analysis

The percentages of carbon monoxide, nitric oxides and unburned hydrocarbons have decreased compared to base gasoline.

- The unburned hydrocarbon emissions has decreased by 26%
- Carbon monoxide (CO) emissions has decreased by 16%
- nitric oxides (NOx) emissions has decreased by 14.5 %
- Carbon dioxides(CO2) emissions has increased by 5.6 %

The increase in carbon dioxide emissions is a result of the complete combustion of Carbon atoms which contributed in the decrease of the Carbon monoxide emissions.

Due to the addition of the oxygenate, the air required to burn the fuel decreased so the amount of NOx decreased.

This means using this booster will directly decrease air pollution.

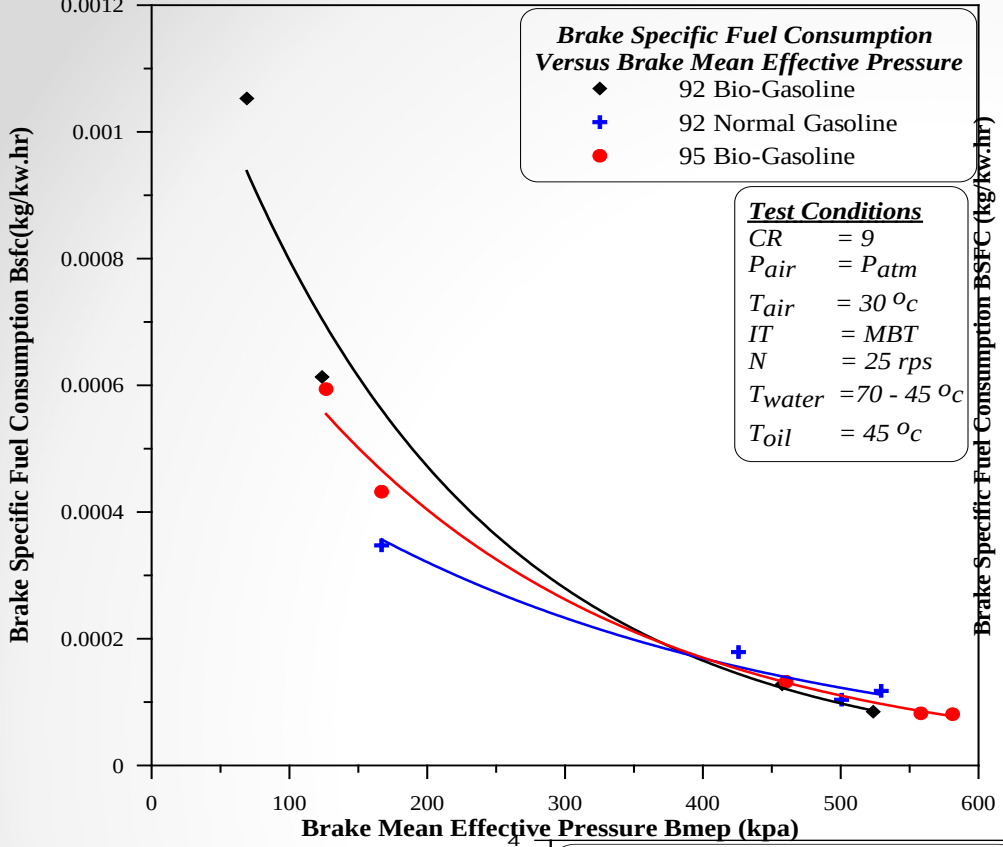
Gum and Corrosion

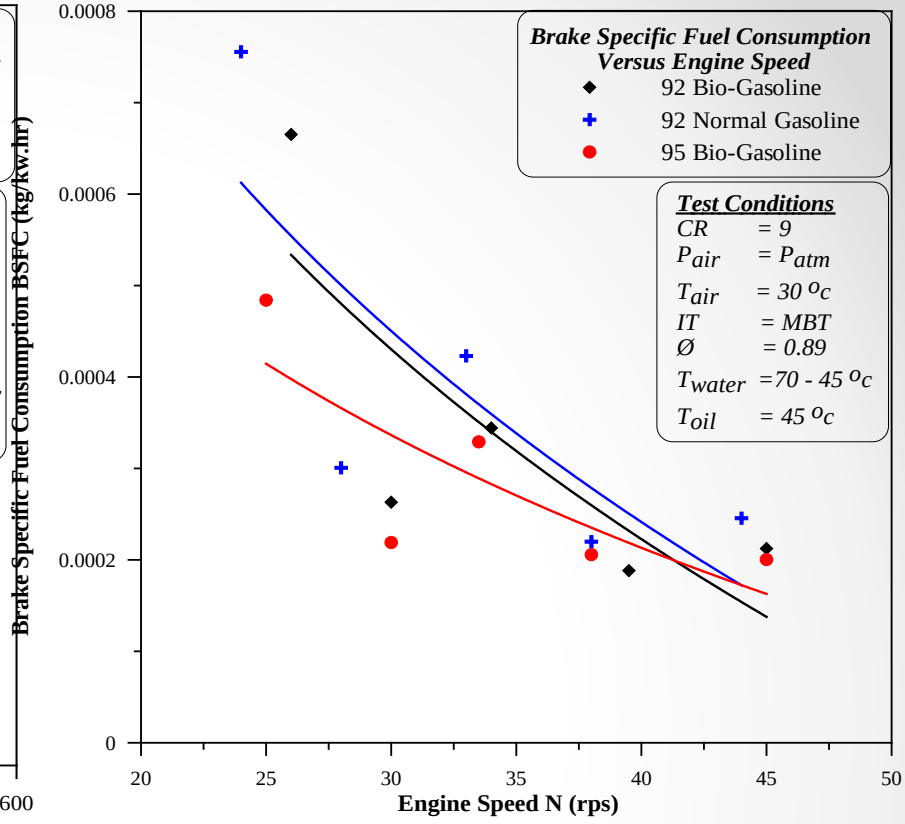
- The gum and corrosion tests were also performed in the final blend.
- The existent gum was measured using ASTM D 381 method and the result was 1mg/100ml.
- The corrosion test result, using ASTM D130 method, was 1a.

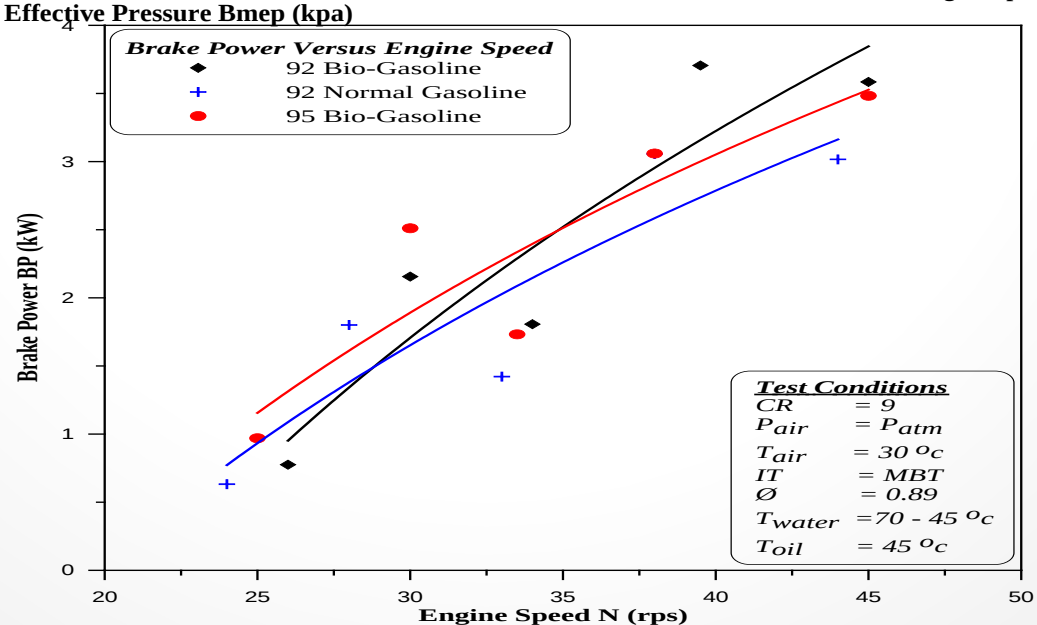
This means that MXEY will increase the life time of the engine.

Ricardo E6MS

- Experiments were carried out to evaluate the engine performance when running steadily on boosted gasoline and compared to commercial gasoline.
- The results show that boosted gasoline has out performed commercial gasoline.


Brake Specific Fuel Consumption Versus Brake Mean Effective Pressure
92 Bio-Gasoline
92 Normal Gasoline
95 Bio-Gasoline
Test Conditions
CR = 9
Pair = Patm
Tair = 30 oc
IT = MBT
N = 25 rps
Twater =70 - 45 oc
Toil = 45 oc
Brake Specific Fuel Consumption Bsfc(kg/kw.hr)
Brake Mean Effective Pressure Bmep (kpa)
0.0012
0.001
0.0008
0.0006
0.0004
0.0002
0
0
100
200
300
400
500
600


Brake Specific Fuel Consumption Versus Engine Speed
92 Bio-Gasoline
92 Normal Gasoline
95 Bio-Gasoline
Test Conditions
CR = 9
Pair = Patm
Tair = 30 oc
IT = MBT
Ø = 0.89
Twater =70 - 45 oc
Toil = 45 oc
Brake Specific Fuel Consumption BSFC (kg/kw.hr)
Engine Speed N (rps)
0.0008
0.0006
0.0004
0.0002
0
20
25
30
35
40
45
50


Brake Power Versus Engine Speed
92 Bio-Gasoline
92 Normal Gasoline
95 Bio-Gasoline
Test Conditions
CR = 9
Pair = Patm
Tair = 30 oc
IT = MBT
Ø = 0.89
Twater =70 - 45 oc
Toil = 45 oc
Brake Power BP (kW)
Engine Speed N (rps)
4
3
2
1
0
20
25
30
35
40
45
50

Feasibility study

A feasibility study was made in Egypt using FOB Italy prices.

- The cost of Gasoline 95 will decrease from 592 $/mt to 492 $/mt.
- Since Gasoline 80 and Gasoline 92 are produced from mixing Gasoline 95 with Naphtha, the decrease in the cost of Gasoline 95 will lead to the decrease in the cost of Gasoline 80 and gasoline 92.
- The cost of Gasoline 80 will decrease from 482.5$/mt to 429 $/mt
- The cost of Gasoline 92 will decrease from 570.1 $/mt to 484 $/mt.

Feasibility study

Gasoline	Saving
Gasoline 95	107.5 $/mt
Gasoline 92	86 $/mt
Gasoline 80	53.5 $/mt

In addition to the savings in the carbon credit due to the decrease in carbon emissions.

Total Savings based on Egyptian market only:

Over 405 Million $/year

The total importation of Gasoline 95 will decrease by 57%.

Using MXYEY results in:

- Direct savings from producing high octane gasoline of lower cost than conventional methods.
- Indirect savings from:
  1. The decreased amount of Carbon emissions.
  2. The extended life of the engines
- Direct decrease in air pollution due to the decrease of harmful exhaust emissions

MXEY could be used on Naphtha and low octane gasoline.

Questions


Thank You!

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