

STEAM BOILER ENERGY EFFICIENCY TEST

Description of a comparison test in a NN Power Plant in Guatemala, conducted January 2009, using a thermal oil boiler, showing the fuel efficiency effect of FEROX:

Boiler # 1: Take untreated **Heavy Fuel Oil bunker** data made with a duration of 1 h. in periods of 5 min., from January 5 to January 8 at 9:00 pm schedule till 15:00 Hrs.

Boiler # 1: Take **Heavy Fuel Oil bunker with Ferox** on data with a duration of 1 h. in periods of 5 min., from day to day January 21 January 23 at time of 9:00 hrs till 16:00 Hrs.

Description of results for Boiler # 1:

From the data provided by the control personnel Boilers 1 in conjunction with generating staff (load-consumption), the data are taken more concise, for every 5 min., In order to make an equation describing the behavior boiler load versus consumption in gallons

Bunker treated with Ferox	
Load %	Consumption (USG)
74	4.73
81	5.41
81.50	5.74
83	6.09
86	6.33
98	7.46
Bunker untreated	
Load %	Consumption (USG)
73.5	5.94
76	6.19
77	6.25
77	6.30
78	6.34
79	7.48

Step 1:

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Regression analysis of boiler efficiency 1 with test data obtained with Ferox treated bunker:

Bunker treated with Ferox	
Load %	Consumption (UGS)
71	5.60
77.5	5.74
81	6.30
85	6.49
94	7.17

With a confidence level of 98% we get the following correlation coefficients:

Resumen

Estadísticas de la regresión	
Coefficiente de correl:	0.983710554
Coefficiente de deterr	0.967686455
R^2 ajustado	0.959608069
Error típico	0.142819811
Observaciones	6

ANÁLISIS DE VARIANZA

		Grados de libertad		Media de los cuadrados		F	Valor crítico de F
Regresión	1	2.44335715	2.443357154	119.787099	0.00039586		
Residuos	4	0.08158999	0.020397498				
Total	5	2.52494715					

	Coefficientes	Error típico	Estadístico t	Probabilidad	Inferior 95%	Superior 95%	Inferior 98.0%	Superior 98.0%
Intercepción	0.079320887	0.55171572	0.143771301	0.892633359	-1.45248753	1.6111293	-1.9879289	2.14657067
Variable X 1	0.075450028	0.00689373	10.94472928	0.000395858	0.05630996	0.0945901	0.04961958	0.10128048

Consumption Formula = $[0.075450028 * (\text{Load})] + 0.073920887$

With the above formula with a confidence level of 99%, we can simulate the data obtained from the boiler # 1 with the FEROX treated bunker and get the prediction of consumption of the boiler with the data obtained with the bunker without prior treatment.

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Comparison of data: the simulated data we obtain

	Bunker untreated		Simulation of Ferox treated bunker
	Load	Consumption (USG)	Consumption (USG)
	73.5 %	5.94	5.62
	76 %	6.19	5.81
	77 %	6.25	5.89
	77 %	6.30	5.89
	78 %	6.34	5.96
	79 %	6.48	6.04
AVERAGE	76.75%	37.50	35.21

Efficiency boiler untreated bunker oil:

Average Load: 76.75%

Consumption: 37.50 USG

Average Power: $(3488 * 0.7675) = 2677.04\text{Kw}$

Conversion

$2677.04 * 56.92 = 152377,116$ BTU per minute

$152377.116 * 0.252 = 38399.033$ Kcal per minute

$38399.033 * 60 = 2303942.006$ Kcal per second

Efficiency: $2303942.00 / (37.50 * 2) = 30719.22$ Kcal per second per USG HFO

CONCLUSION:

In one (1) hour of labour with one (1) gallon of untreated fuel can generate in this specific installation 30,719.22 Kcal per second.

Efficiency boiler FEROX treated bunker oil:

Average Load: 76.75%

Consumption: 35.21 USG

Average Power: $(3488 * 0.7675) = 2677.04\text{Kw}$

Conversion

$2677.04 * 56.92 = 152377,116$ BTU per minute

$152377.116 * 0.252 = 38399.033$ Kcal per minute

$38399.033 * 60 = 2303942.006$ Kcal per second

Efficiency: $2303942.00 / (35.21 * 2) = 32717.15$ Kcal per second per USG HFO

CONCLUSION:

In one (1) hour of labour with one (1) gallon of FEROX treated bunker fuel can generate in this specific installation 32,717.15 Kcal per second.

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Analysis

Savings analyses in bunker fuel per hour.

Bunker with Ferox: 70.42 USG

Bunker without Ferox: 75 USG

Consumption reduced by 5 USG per hour.

% Savings: 5 USG / 75 USG: 0.06

Calculation: $1 - 0.066: 0.9333 \times 100: 93.33:100 - 93.33:$

CONCLUSION: 6.66% increased fuel efficiency.

Economic Analysis

Table of bunker costs untreated		
Volume in gallons consumed per 24 hrs:	USG	900
Cost per USG of bunker fuel Q.8.09	Q.	7281.00
Total	Q.	7281.00
Table of bunker costs treated with FEROX		
Volume in gallons consumed per 24 hrs:	USG	845
Cost of Ferox treatment	Q.	179.56
Cost per USG of bunker fuel Q.8.09	Q.	6836.05
Total	Q.	7015.61

NOTE FROM THE TRANSLATOR:

This power plant is a current buying customer, but it took longer than just that one test to convince them. They had been testing FEROX in different boilers and engines for a year when they got a bad batch of fuel with too high of sulfur content. Several turbo's were destroyed by the fuel, but all of the turbo's that had been running Ferox treated fuel were fine. That was the point when they finally started buying for all of their equipment.

More information on:

www.FEROXFUEL TABS.com

www.POWEREDBYFEROX.com

www.FEROXLA.com

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