TECHNICAL REPORT

on results of trial of bunker fuel conditioner FP10000

On

The Main Engine Onboard

Pelayaran Tempuran Emas Tbk, PT

MV. Ayer Mas

February – March 2006

PT FIREPOWER BUANA INDONESIA (FBI)

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LIST OF EXECUTIVES

- Project Manager PT Firepower Buana Indonesia ***Ferdinand A. Tampi***
- Technical Coordinator PT Firepower Buana Indonesia ***Tashuri***
- Technical Engineer PT Firepower Buana Indonesia ***Sutrisna***
- Fleet Manager TEMAS, Tbk ***I Dewa Putu Sukardi***
- Marine Superintendent TEMAS, Tbk ***Yansen***
- Master MV. Ayer Mas ***Capt. Fachruddin Djakfar***
- Chief Engineer MV. Ayer Mas ***Abd. Kadir Fatahuddin***

SYNOPSIS

On the results of exploitation trials of application of bunker fuel conditioner FP10000 for bunker fuel RMF 25 on the main engine UBE MAK 6M453B.

Object of trials :

Bunker fuel conditioner FP10000 for bunker fuel used in main engine.

Trials objective :

1. Reduction of carbon build up around combustion chamber at cylinder head side, top piston and fuel delivery system.

2. Increase in vessel speed (knot).

3. Evaluation of economic efficiency of application of bunker fuel conditioner FP10000.

Method of trials :

Practical usage of regular bunker fuel RMF 25 and bunker fuel with addition of bunker fuel conditioner FP10000 with different dosages.

Scope of application :

All types of bunker fuel used in main engine of different types.

INTRODUCTION

Bunker fuel conditioner FP10000 is a petroleum based product with multi-functional fuel enhancement properties. This proprietary package provides the conditioner with detergent agent, combining a fuel combustion catalyst to promote a more efficient burn in combustion chamber.
The end resulting in a cleaner engine producing less emissions, with engine component life extended due to less carbon deposit build up and lower exhaust gas temperature.

PT FBI proposed that a trial is conducted on a vessel to determine if bunker fuel conditioner FP10000 could perform effectively in reducing fuel consumption and maintenance cost of TEMAS Line operating budget.

The trial was then conducted on one of TEMAS vessel (MV. Ayer Mas). Based on mutual agreement between PT FBI and TEMAS LINE, should this trial can prove positive results in fuel saving consume by the main engine of MV. AYER MAS then TEMAS LINE will appoint PT FBI to implement Firepower application on their 22 (twenty two) vessels.

Given bellow is the detail of the machinery on the vessel designated for the bunker fuel conditioner FP10000 trial.

Vessel name	:	MV. Ayer Mas	
Ship data	:	Built	1986
		Gross tonnage	3288
		Fuel grade	RMF 25

The main engine specification is as follows :

Engine maker	:	UBE MAK
Type	:	6M453B
Rated capacity	:	2450 PS
Fuel consumption	:	7 MT/day

The bunker fuel conditioner FP10000 trial begin February 2006 and end in March 2006

PROCEDURE OF TRIALS

The trial is for comparison purposes. Before the trial a test of the main engine was done to set base line data meanwhile analogical procedures were done at the end of trial.
Before the trial and after using BFC hourly bunker fuel consumption was measured by flow-meter. To obtain reliable results on efficiency of fuel conditioner FP10000 application, the temperature of exhaust gases behind the boiler was measured before and at the end of trial.

STAGES OF TRIALS

Stage I : Purging of the fuel system, fuel delivery pipe and combustion chamber with FP Purge Liquid.

Stage II : Initial engine running with dosage 1 : 2000.

Stage III : Selection of the optimum performance at dosage 1:3000.

Stage IV : Increase BFC FP10000 at dosage 1:4000.

TECHNICAL EVALUATION OF BOILER CONDITION

The main engine of the vessel was working without application of the conditioner before. At this period the temperature of exhaust gases of all cylinders was increasing due to the growth of carbon build up inside combustion chamber and exhaust gas pipe.

Internal examination of the main engine *before* the application of the conditioner revealed:

- Carbon deposits inside fuel delivery pipe were 3-4 mm as a result of bunker fuel application.
- Carbon deposits on the nozzle hole were many and dense.
- Carbon deposits on the valve seat either inlet or outlet was dense, hard to be removed by mechanical procedures.
- Carbon deposits on the piston top were dense, hard to be removed by mechanical procedures.

Internal examination of the main engine *after* the application of the conditioner revealed:

- Carbon deposits inside fuel delivery pipe are in the form of moderate soot, can be easily removed.
- Carbon deposits on the nozzle hole are slightly reduced.
- Carbon deposits on the valve seat either inlet or outlet is moderate and soft, easy to be cleaned using mechanical procedures.
- Carbon deposits on the piston top are moderate and soft, can be removed using mechanical procedures.

TECHNICAL-ECONOMICAL EFFECT OF APPLICATION OF BUNKER FUEL CONDITIONER FP10000 ON MAIN ENGINE ON BUNKER FUEL RMF 25

The dynamics of reduction of bunker fuel RMF 25 consumption with and without application of the conditioner is provided in the Annexes 1.

In summary the application of the bunker fuel conditioner FP10000 provides:

- 7.3% savings
- Changes of carbon deposits structure (quantity reduction)
- Improve quality of fuel combustion
- Reduction of the hourly bunker fuel consumption by 7.3 % from 240 L/H into 223 L/H

In the future & continuous operation, application of fuel conditioner on the main engine is necessary to reduce the cost of expensive engine overhaul by extending overhaul period interval.

COMMENTS

Currently where bunker fuel price is high, the economical effect would be much higher. The calculated economy does not include the cost for annual engine overhaul as with continuous application of fuel conditioner, the period of interval between overhaul can be extended.

CONCLUSION AND SUGGESTIONS

The application of the bunker fuel conditioner on the main engine let to:

1. Reduce of the fuel consumption on 7.3 %.

2. Improve the quality of the fuel combustion.

3. The character of the carbon deposits on the valve seat, injection valve and piston top are softened and this will lead to extended liner wear rate.

4. The carbon deposit inside the fuel delivery pipe is reduced thus make the fuel flow rate reach the maximum point.

5. The settling tank, service tank with bunker fuel, fuel system filters, regulating and stop valve were cleaned without mechanical means.

For efficient usage of the conditioner FP10000, it is recommended to:

1. Install dosing pump to obtain proportional pumps of conditioner to the fuel flow rate of the double bottom transfer pump.
2. Service the broken purifier resulted due the removal of solid particles from bunker fuel.
3. Adjust the bad atomizing nozzle to achieve better fuel spray into compressed air.

Based on the aforesaid it is rational to use the bunker fuel conditioner FP10000 continuously on day to day operation of the main engine and treat the auxiliary engine with FP4000.

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Annex 1

FUEL CONSUMPTION TABLE OF MAIN ENGINE

BEFORE FIREPOWER

DATE	FUEL CONSUMPTION	ENGINE SPEED/ CPP ANGLE	VESSEL SPEED
	(L/H)	(rpm)	(knot)
18-02-06	240.9	600/10.1	8.5

AFTER FIREPOWER

DATE	FUEL CONSUMPTION	ENGINE SPEED/ CPP ANGLE	VESSEL SPEED
	(L/H)	(rpm)	(knot)
03-03-2006	219	600/10	9.1
10-03-2006	224	600/10	9.0
18-03-2006	227	600/10	8.5

Average fuel consumption **223 L/H**