

ENERGY CONSERVATION THROUGH OIL IGNITOR UPGRADATION

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FLOW OF PRESENTATION

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- ❖ PROBLEMS ASSOCIATED WITH IFM
- ❖ HEA SYSTEM
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INTRODUCTION

- ❖ At DTPS, the boiler of both units is equipped with 3 oil elevations namely AB,CD and EF and six coal elevations.
- ❖ AB elevation has a provision of firing Light diesel Oil as well as Heavy Furnace oil, where as CD and EF elevations has been designed to fire only Heavy Furnace Oil.
- ❖ AB elevation has been provided with IFM as well as HEA system, where as only IFM systems had been installed at CD and EF elevations.
- ❖ Mainly these igniters are used during start up and shutdown of Boiler and in critical emergency operations

Problems Experienced

Quality:

- ❖ Time required to boiler light up was high due to
 - ❖ Frequent choking of oil guns at CD and EF elevations.
 - ❖ IFM system failure.
 - ❖ Non proving of Oil guns .
- ❖ Frequent leakages in the steam tracing pipeline.
- ❖ Chocking of the HFO line due to its high viscosity.
- ❖ Loss of DM water through steam traps.

Safety:

- ❖ Noise generated by steam traps.

Environment:

- ❖ Emission of heat due to steam tracing system.
- ❖ Spillage of oil due to frequent chocking of oil guns.

Solutions Suggested And Implemented

Following are the Suggestions selected for this project

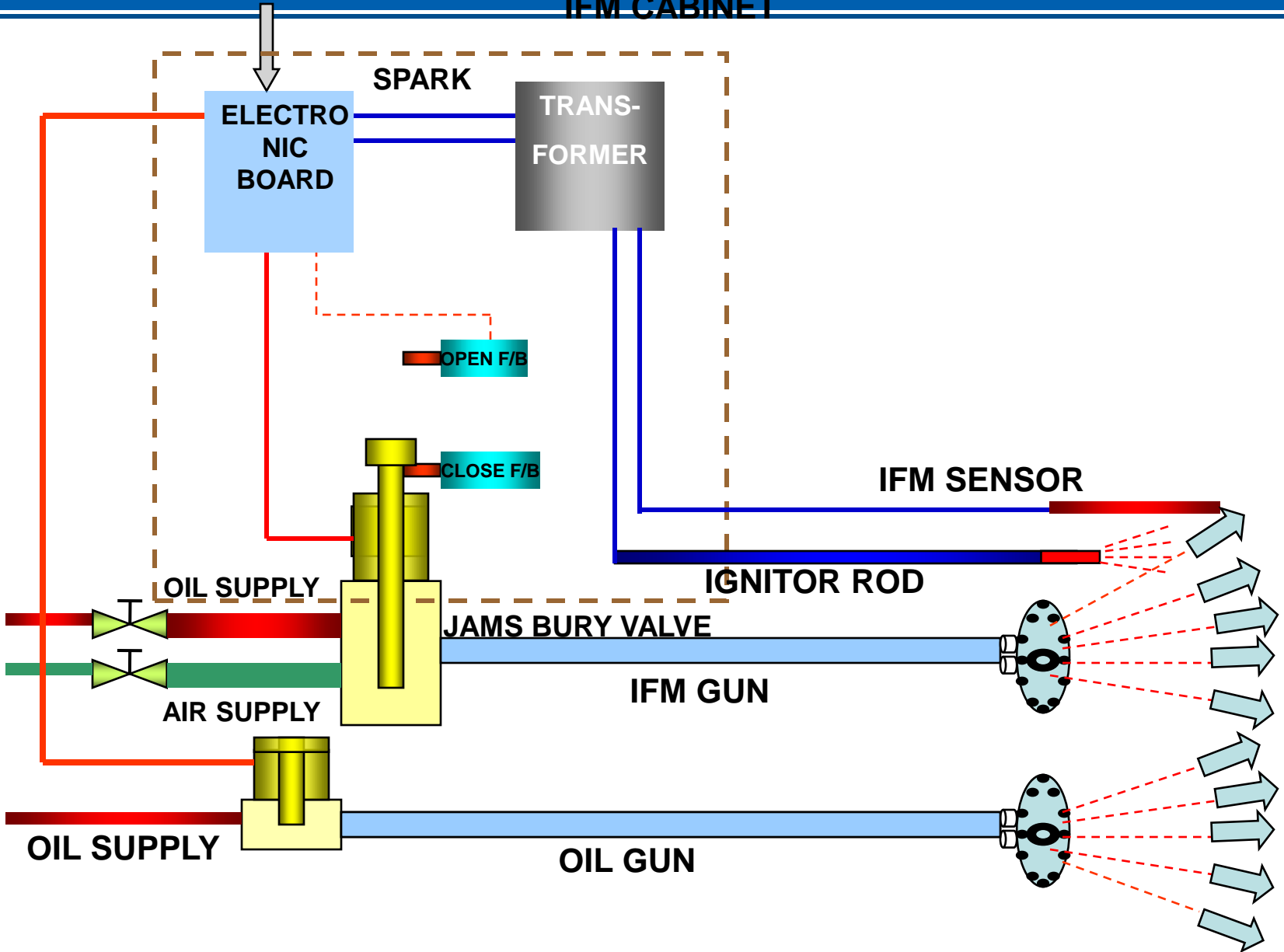
- ❑ IFM system to be replaced by HEA system.
- ❑ LDO should be used for all the elevations.

IFM SYSTEM

IFM system consists of following electronic and mechanical equipments and these are

- ❖ IFM electronic card.
- ❖ James burry valve.
- ❖ Oil flow control mechanical valve.
- ❖ Flame proven contactor.
- ❖ Spark Rod.
- ❖ IFM rod.
- ❖ Spark Plug.
- ❖ Oil and IFM Guns.
- ❖ IFM Horn.
- ❖ Air Regulators.

IFM CABINET



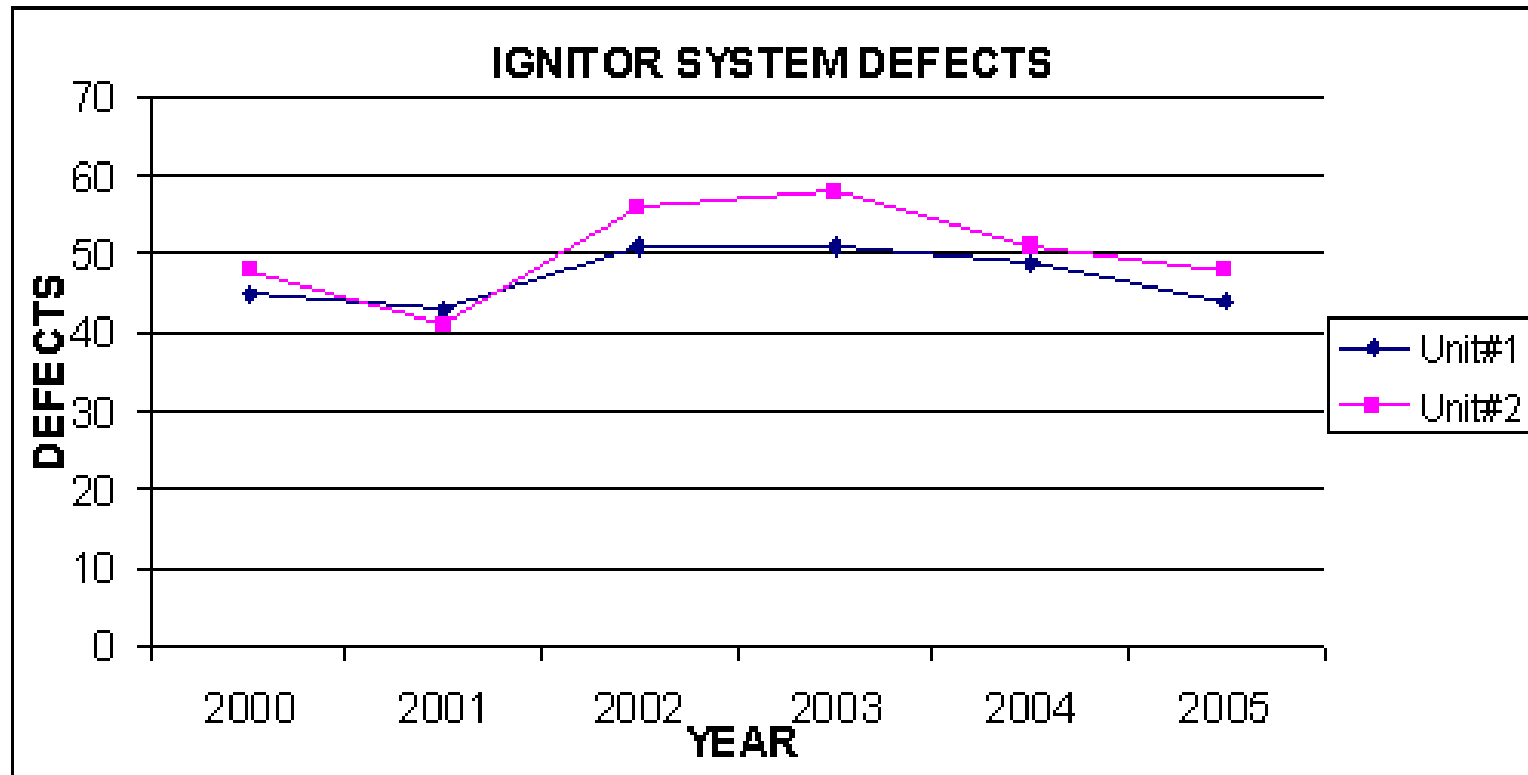
PROBLEMS ASSOCIATED WITH IFM

IFM system requires more preventive maintenance due to following problems.

- ❖ Malfunctioning of electronic card.
- ❖ Contactor malfunctioning.
- ❖ Carbon formation on spark rod, resulting in poor spark.
- ❖ Carbon formation on IFM rod, resulting in not sensing of actual gun.
- ❖ Chocking of oil gun and Horn resulted in wastage of Oil.
- ❖ Man power requirement for Maintenance.
- ❖ **Delay in Start up and Shutdown activities** on an average of 32 Minutes resulting in excess burning of IFM guns. (Oil Loss equivalent of 2 KL per incidence)

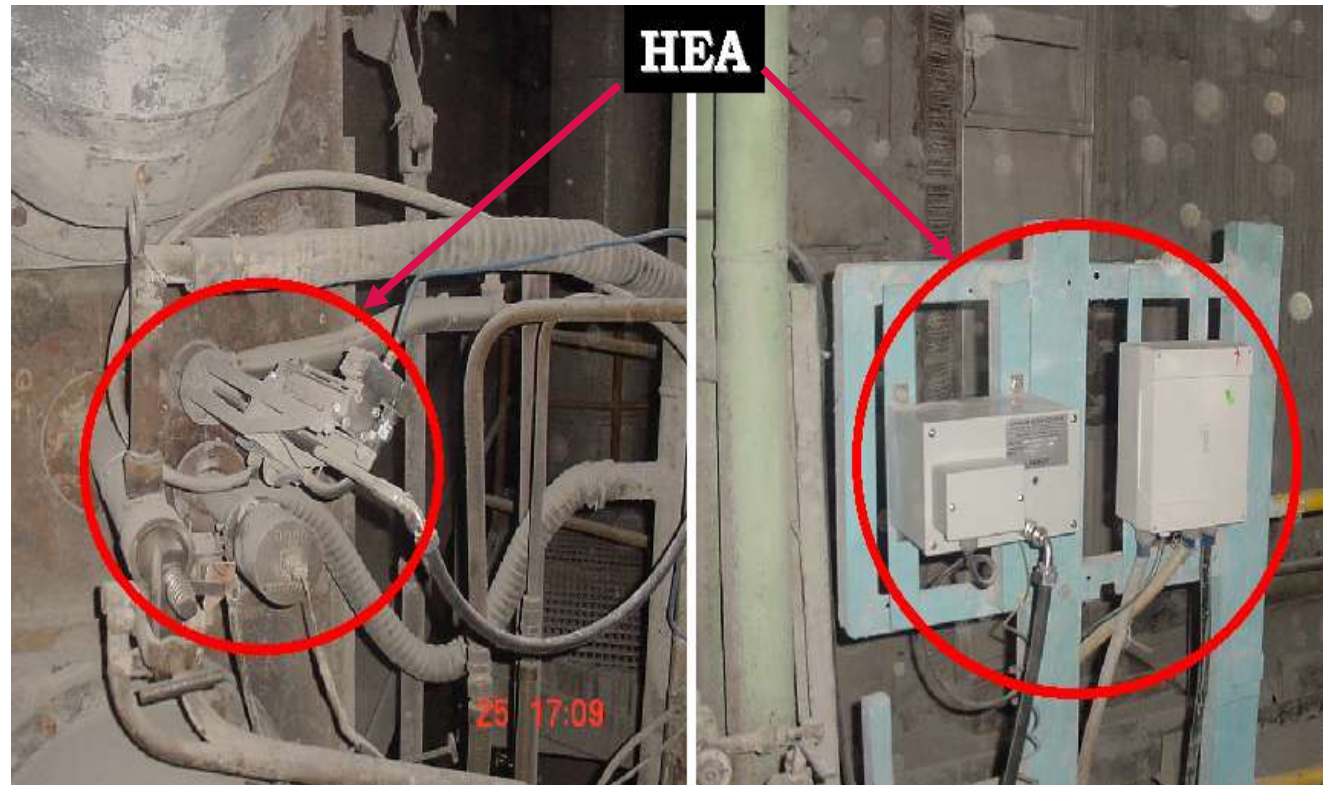
COMPARISON ON DEFECTS ANALYSIS

Defects generated on Ignition system from 2000 to 2005. This defect has been generated on both Unit IFM systems.

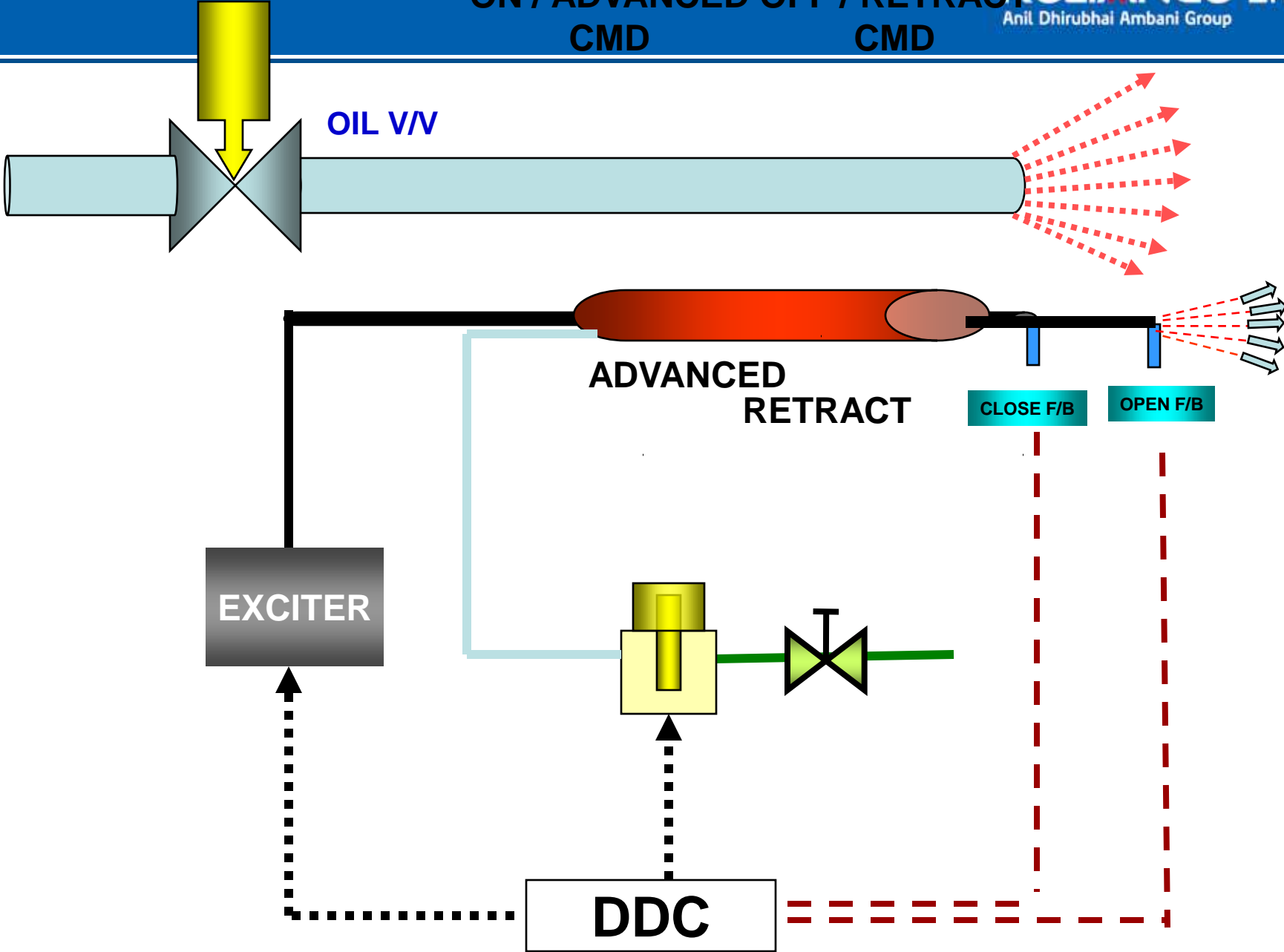


HEA SYSTEM

- ❖ Excitor box.
- ❖ Flexible spark rod.
- ❖ HEA Assembly.
- ❖ Solenoid valve.
- ❖ Limit switches.

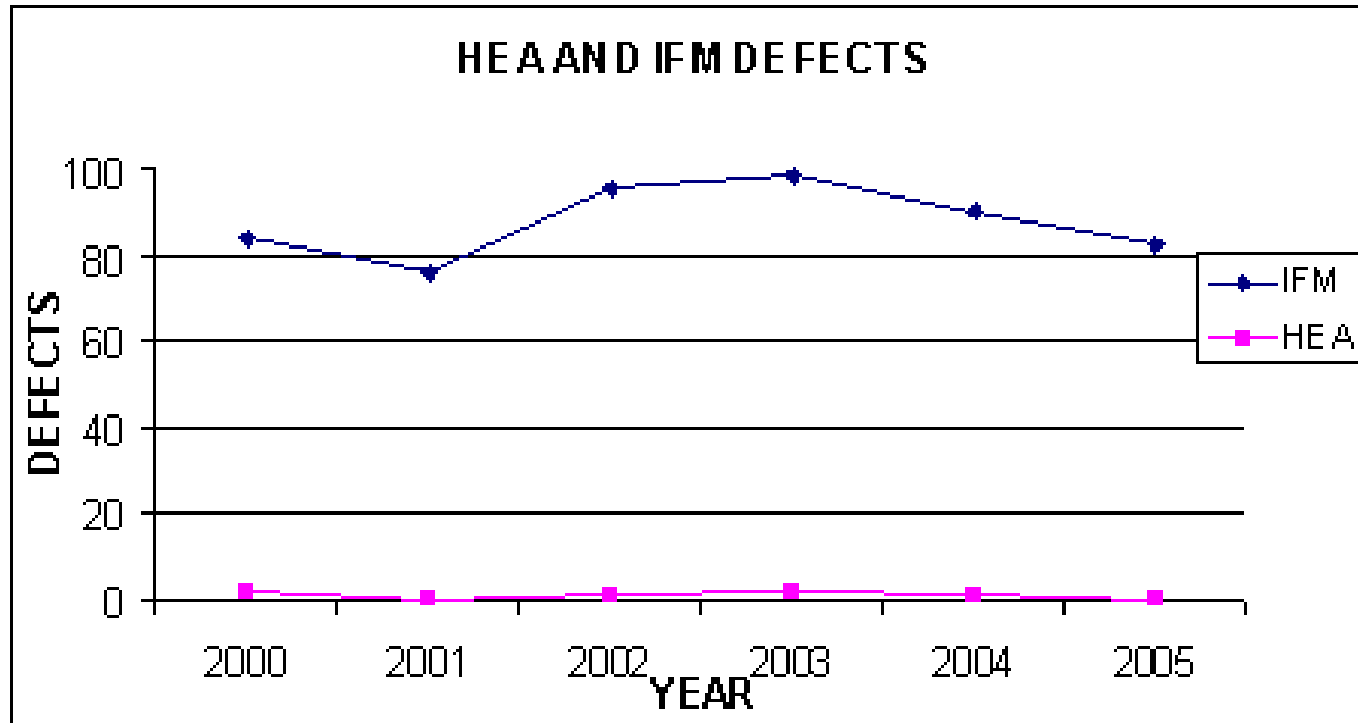


ON / ADVANCED OFF / RETRACT
CMD CMD



BENEFITS OF HEA

- ❖ Main advantage is, it does not require any oil support to ignite main oil gun.
- ❖ Power and less man hours of maintenance personnel.
- ❖ Increases the availability and reliability of Ignitor system.
- ❖ Quicker cold starts & considerable fuel savings.
- ❖ Less failure rate or fewer defects ultimately benefited in engaging less man.
- ❖ Due to minimum components, inventory is reduced
- ❖ Stabilizes main flame for improved combustion and wider turndown capability
- ❖ HEA systems are more reliable and maintenance free compare to IFM system.
- ❖ Unit startup is reduced considerably; this saves the generation loss due to delay in startup.



This analysis clearly indicates that defects on IFM system are almost 10 times more than HEA system.

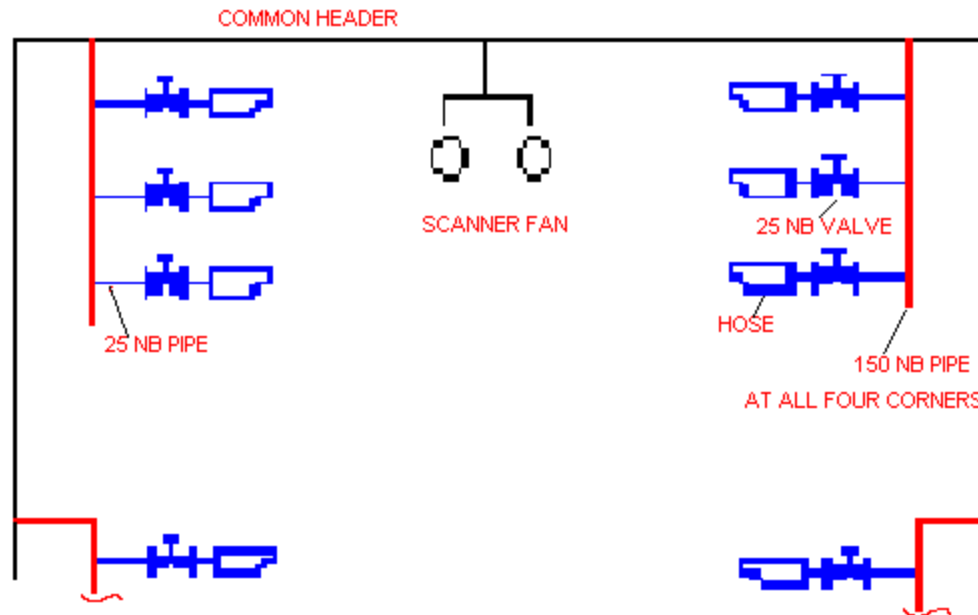
Implementation

Following work has been carried out departmentally which includes :-

1. Engineering issues
 - ❖ General Arrangement.
 - ❖ Cable study.
 - ❖ Software Modifications.
 - ❖ Installation Drawings.
 - ❖ Cooling arrangement.
2. Procurement
3. Installation
4. Testing

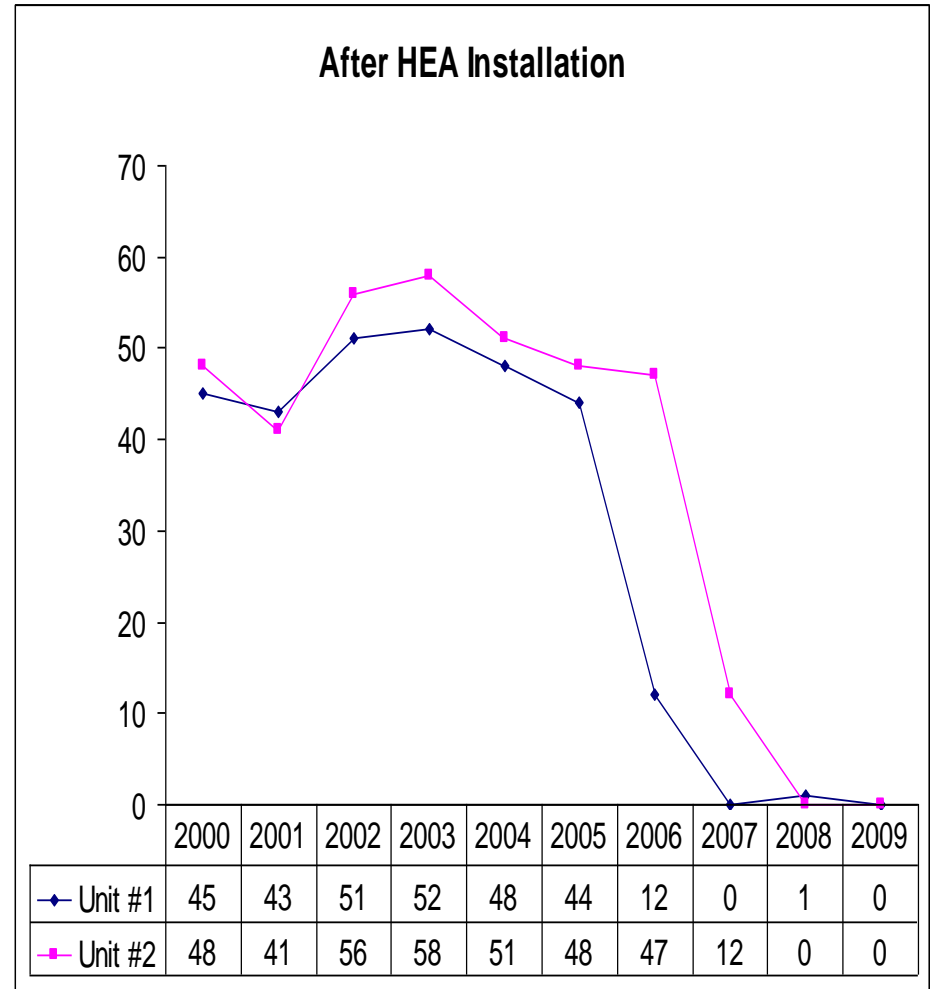
❖ HEA Cooling arrangement

HEA required cooling air for cooling flexible spark rod. Additional header has been created at each corner and necessary tapping has been provided. This cooling arrangement has provision of Ignitor cooling air fan as well as from Instrument air Header.



CONCLUSION

- ❖ During capital overhaul of Unit#1 in July '2006 & Unit#2 in Aug'2007 old IFM type igniters were replaced by HEA type igniters. After these installations defects have reduced considerably. Reliability of the igniter system increased with quicker cold starts & considerable fuel savings as well as man power saving.



Direct Monetary Saving

- ❖ The HEA replacement has resulted into reduced net cost of LDO oil consumption per unit, which reflects on saving of **Rs.4,73985/-** per year per unit.

"CD" ELEVATION IGNITOR RUNNING TIME							
MON	TUE	WED	THR	FRI	SAT	SUN	Total
5 Min./Ign	13 Min./Ign.	5 Min./Ign	5 Min./Ign	5 Min./Ign	5 Min./Ign	5 Min./Ign	
20 Min/Ele	52 Min/Ele	20 Min/Ele	20 Min/Ele	20 Min/Ele	20 Min/Ele	20 Min/Ele	172 Min/Ele

"EF" ELEVATION IGNITOR RUNNING TIME							
MON	TUE	WED	THR	FRI	SAT	SUN	Total
5 Min./Ign	5 Min./Ign.	13 Min./Ign	5 Min./Ign	5 Min./Ign	5 Min./Ign	5 Min./Ign	
20 Min/Ele	20 Min/Ele	52 Min/Ele	20 Min/Ele	20 Min/Ele	20 Min/Ele	20 Min/Ele	172 Min/Ele

Direct Saving per Year

- ❖ Man Power utilization for attending defect has been reduced. Saving around **Rs.12 Lacs** per Year.
- ❖ Cost of Inventory has reduced from Rs. 4.72 Lacs to Rs. 1.5 Lacs , Saving is **Rs. 3.22 Lacs** per Year.
- ❖ Total cost saving against LDO consumption on regular trials for both Units is **Rs.947970**
- ❖ Reduction in Start up and Shutdown activities on an average of 32 Minutes due to HEA installations (Saving of 1.25 KL oil per Unit per activity). **Resulted in saving of 8KL LDO per unit.**
- ❖ Total Saving is near about Rs. 25 lacs per Year.

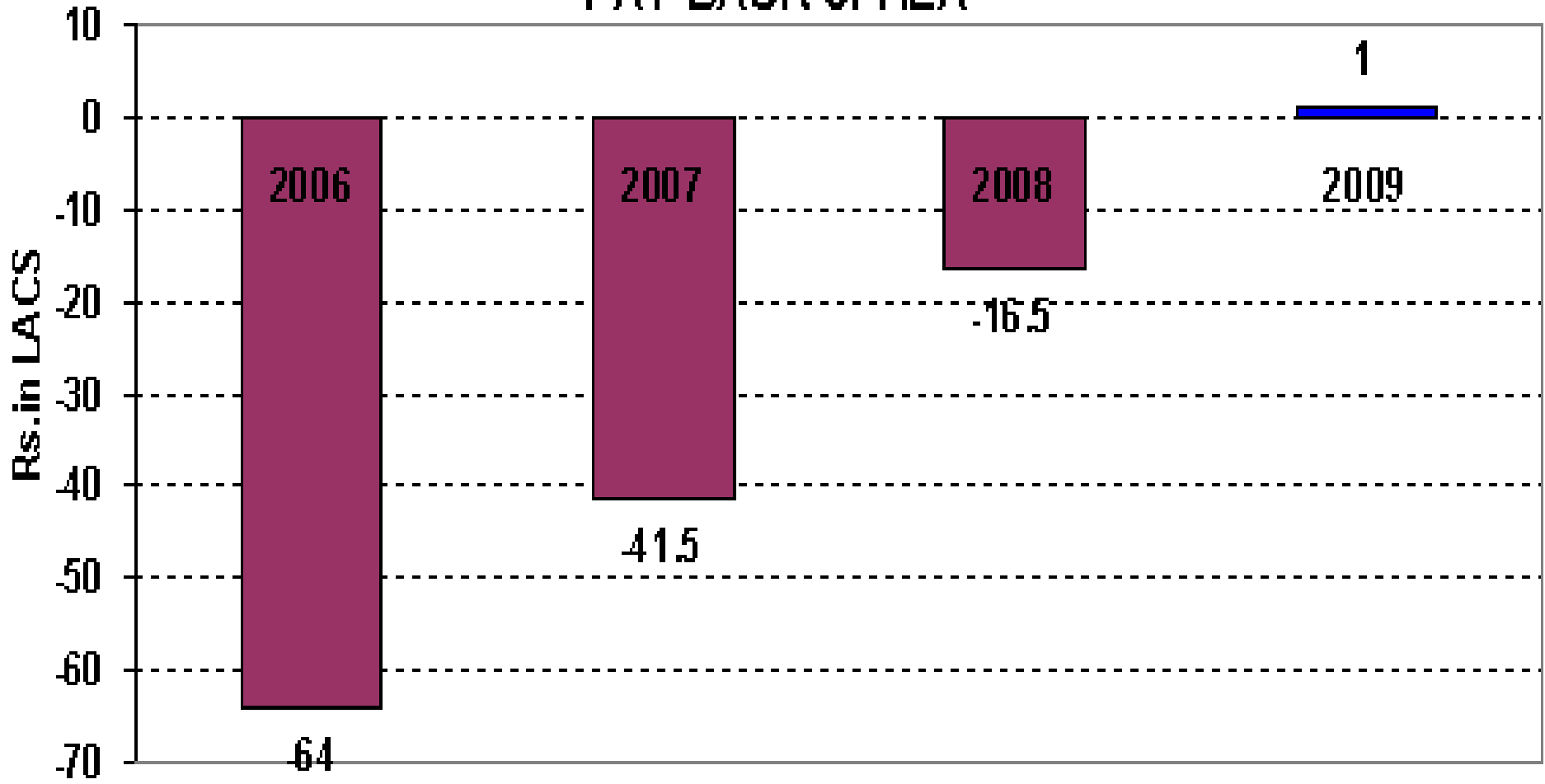
One time Saving

❖ In House Software and Hardware Modification

Other than hardwired modification logic modification is carried out departmentally, for which M/s BHEL has submitted their offer costing Rs.10 Lacs for both the units.

Software Logic development and testing has been carried out departmentally , thus saving of 10 Lacs for both the units.

PAY BACK of HEA



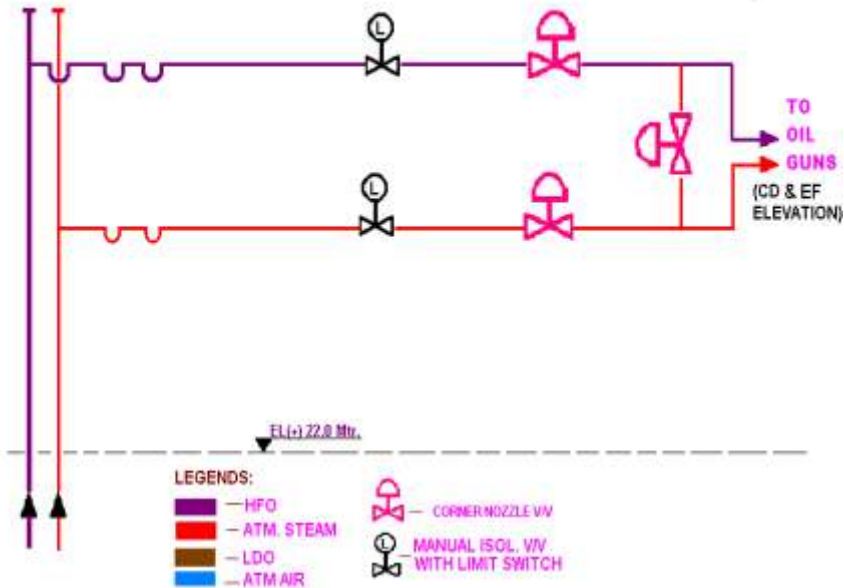
HFO to LDO Conversion

Project Execution

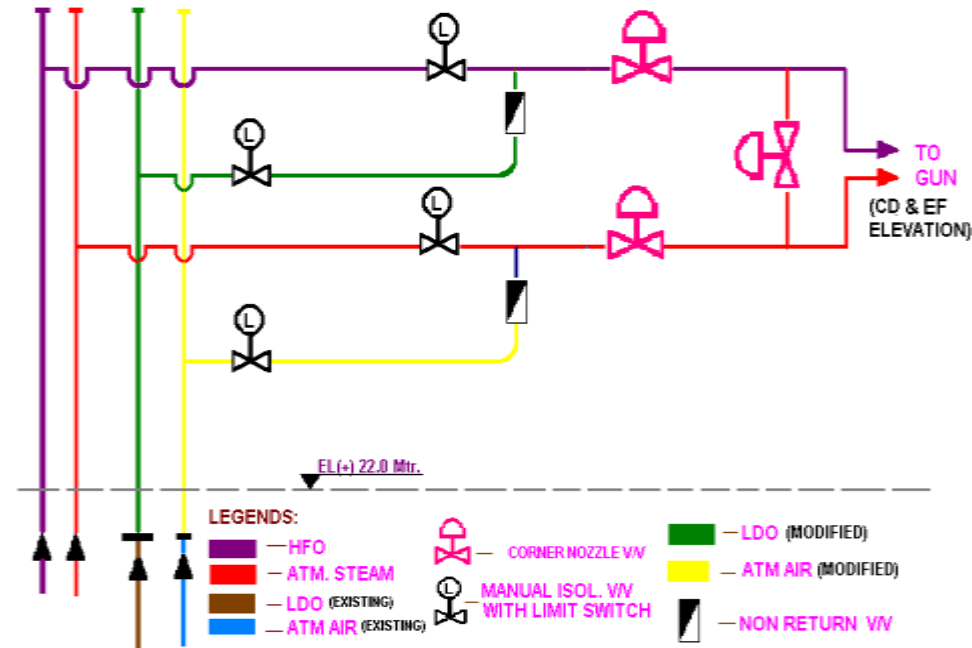
- Laying of oil Pipeline for connection of LDO to all elevations.
- Existing control nozzle valves & firing system of HFO line used for the new LDO firing system.
- Installed new pump to cater additional flow requirement.

Modification

Scheme Before Modification



Scheme After Modification



Benefits

- Cost saving of Rs. 7 lacs per year.
 1. Reduction of auxiliary power consumption as one continuous running motor rated **20 KW**.
 2. Saved DM water @ 30 tons/day.

- Saved in HFO inventory. (75 KL HFO)
- Elimination of maintenance of entire HFO system.
- Preservation of natural resources is achieved by eliminating steam traps.
- Minimized noise pollution by eliminating steam traps.

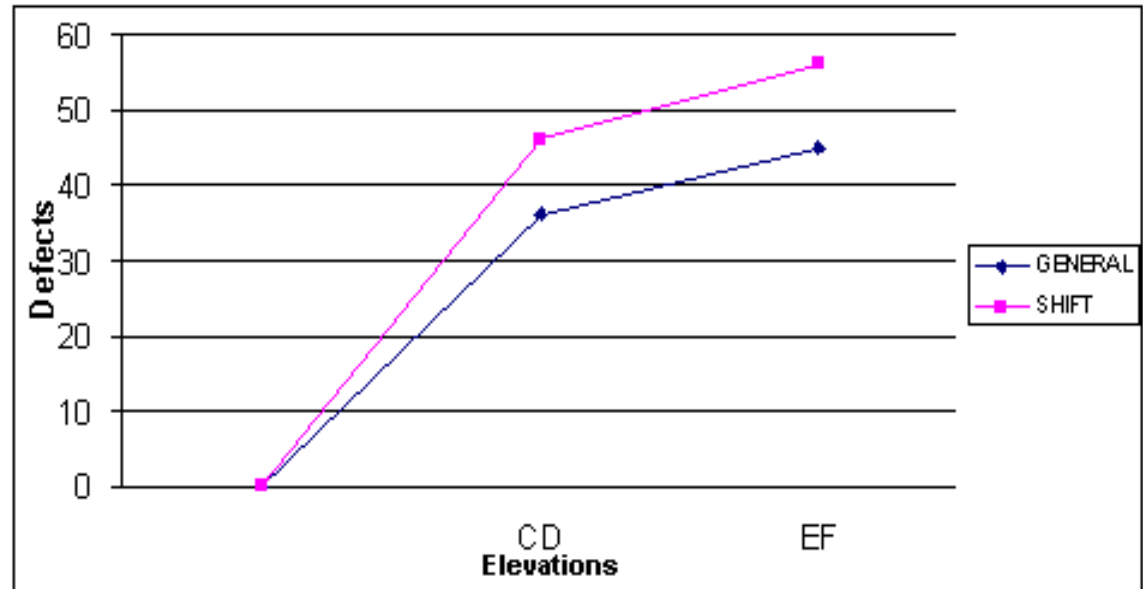
Total Saving

	HEA Project	HFO – LDO Project
Direct Saving per year	25 Lacs	7 Lacs
One time Saving	10 Lacs	
Oil saving	17.1 KL LDO	75 KL HFO
Energy Saving		20 KW

Thank you.....

Manpower utilised (Quarterly) to maintain IFM

- ❖ Total defects: 245.
- ❖ Working persons/defect: 4
 - 1- Executive
 - 1- Technicians
 - 2- Helpers
- ❖ Total working hrs: 3072 hrs
- ❖ % Man Power utilisation:
 $(245 * 4 / 3072) * 100 = 32\%$



Direct Monetary Saving

- ❖ The HEA replacement has resulted into reduced net cost of LDO oil consumption per unit, which reflects on saving of **473985/-** per year per unit.
 - ❖ Igniters trial has been carried out on daily basis. This requires to ensure healthiness of the IFM systems.
 - ❖ Total time for two elevation igniters per week: 344 Min.
 - ❖ Total time for two elevation igniters per year; 17888 Min.: 298.13 Hrs.
 - ❖ Total oil consumption per unit per year: = $52.9956 \times 298.13 = 15.7995$ KL.
 - ❖ LDO oil cost per kl (including all taxes) = Rs.30000.
 - ❖ Total cost of LDO oil consumption in igniters per year per unit is: Rs.4,73985.
 - ❖ Hence Total cost saving against LDO consumption for both Units is $4,73985 \times 2 =$ **Rs.947970**
 - ❖ **Standard time taken for calculation:**
 - ❖ During scavenging: 5 min.
 - ❖ During oil gun trial: 3 min.
 - ❖ Scavenging after oil gun trial: 5 min.
- Total time for one ignitor per day : 13 min.

Planning for IFM replacement

- ❖ Power Supply arrangement

HEA and IFM system requires 110V AC supply, hence existing supply of IFM has been utilized.

- ❖ Cabling for Command and Feedback

Existing IFM cables diverted for HEA system.

- ❖ Software Modification

To accommodate HEA system necessary software modifications has been carried out departmentally in respective oil stations of CD and EF elevations .