

CFFP-BHEL-HARDWAR

(i) UNIT PROFILE:-

CFFP i.e. Central Foundry Forge plant is one of the 14 manufacturing units of BHEL (a "Navratna" public Sector undertaking). CFFP is engaged in producing Castings & Forgings which are mainly used in manufacturing of Power Plant equipments upto 500MW rating

Major manufacturing Shops are Steel Melting Shop, Forge Shop, Foundry Division, Machine Shop and maintenance & Service.

Steel Melting Shop, Machine Shop and Maintenance/Services are common for Forge Shop & Foundry Division. So Separate accounting of energy consumption in Steel Melting Shop, M/C Shop and Maintenance/Services on account of activities/requirement of Foundry Division and Forge Shop is not possible.

CFFP is one of the most Energy Intensive Units among all the 14 manufacturing units of BHEL. Expenditure on Power & Fuel in CFFP is 22% of Turnover.

Steel Melting Shop, which is equipped with 3 Electric Arc Furnace of 10 Ton, 30Ton & 70 Ton Capacity is a Major electric energy consuming Shop.

Thermal energy (mainly L.D.O/Furnace Oil) is consumed in the Reheating Furnaces (5 Nos) and Heat Treatment Furnaces (14Nos) in forge Shop & Foundry Division. LPG & Producer Gas (purchased from BHEL Sister Unit HEEP) is used for pre-heating of Castings while carrying out up gradation/ rectification of Castings.

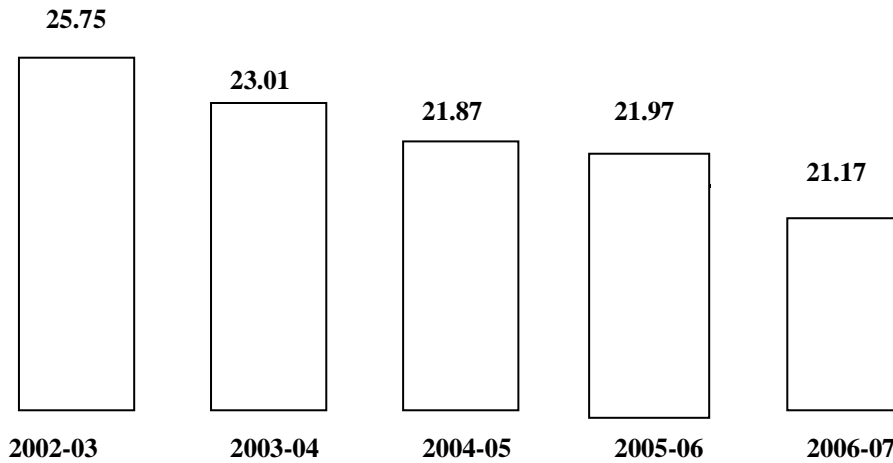
(ii) ENERGY CONSUMPTION:

Actual Energy consumption during 2006-07

	<u>Physical Quantity</u>	<u>Financial Value (Rs. Lakhs)</u>
• POWER	390 LAKH KWH	1140
• FURNACE OIL	2209 KL	510
• LDO	13352 KL	3764
• LPG.	870 TON	299
• PRODUCER GAS	7.27 LAKH M ³	8
	<u>TOTAL :-</u>	<u>5721</u>

Due to energy Conservation efforts in CFFP, expenditure on power & Fuel is continuously declining which has been shown in the following bar chart.

ENERGY COST (Power & Fuel) (AS % OF TURNOVER)



(iii) **ENERGY CONSERVATION COMMITMENT, POLICY AND SET UP.**

ENERGY CONSERVATION POLICY OF BHEL (COPY ENCLOSED)

BHEL IS COMMITTED TO CONTINUOUSLY ENHANCE ENERGY EFFICIENCY
 IN ALL ITS ACTIVITIES, PRODUCTS AND SERVICES THROUGH THE USE OF
 ENERGY EFFICIENT TECHNOLOGIES AND PREVENTION OF ENERGY WASTAGES,
 WITH THE FULL PARTICIPATION OF ALL EMPLOYEES.

(CMD)
 BHEL

Salient Feature of Energy Conservation Cell

• **Constitution:**

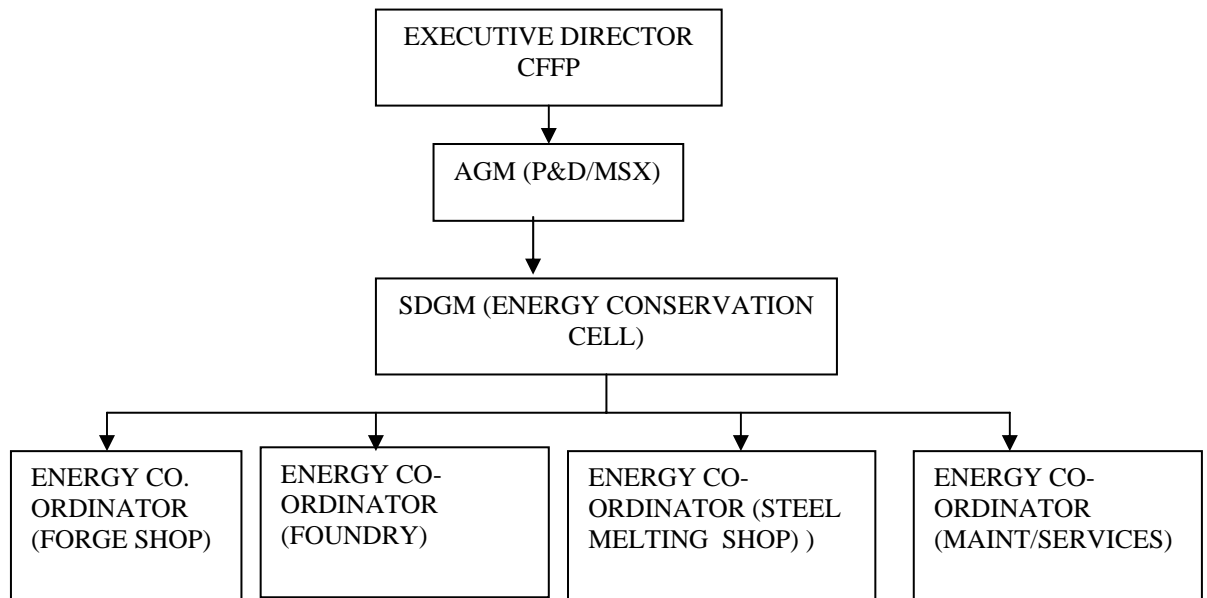
Energy Conservation Cell is the nodal agency for all energy Conservation activities in the plant. Sr.DGM (Energy Conservation) is the in charge of EC Cell who is looking after this function as **Full Time activity.**

Functions of Energy Conservation Cell:-

- To keep record of power & fuel consumption by various production Shops and Services areas.
- To identify Energy Conservation Improvement projects and prepare a time bound action plan for their implementation.
- To help in preparation of Project Reports for submission to management for approval and arranging funds.
- To monitor the progress of Energy Conservation projects to ensure their timely completion.

- Preparation of Daily / Monthly consumption reports of LDO, LPG & Power along with trend analysis w.r.t. previous year.
- Preparation of Periodic Progress Reports for sending to Corporate Office.
- Preparation of "entries" for contesting various National Awards.
- To get the Energy Audit done from an outside agency from time to time.
- Arranging periodic review meetings for Energy Conservation Activities.
- To help Sister Units of BHEL in Energy Conservation Activities

ENERGY CONSERVATION CELL STRUCTURE



(iv) **ENERGY CONSERVATION ACHIEVEMENTS:-**

Due to various energy conservation projects/measures implemented in the past 5 years, energy expenditure (as % of Turnover) is continuously declining which has been depicted in the following table.

Year	Energy expenditure (as % of turn over)
2001-02	28.75%
2002-03	25.75%
2003-04	23.01%
2004-05	21.87%
2005-06	21.97%
2006-07	21.17%

BRIEF WRITE UP OF MAJOR ENERGY CONSERVATION PROJECTS UNDERTAKEN DURING 2006-07:-

PROJECT NO. 1:-

Title :- Creating Infrastructure for using Furnace Oil in place of LDO in Heavy Forge Shop Reheating Furnace.

Previously, the Reheating furnace of Heavy Forge Shop was using Light Diesel Oil (LDO). This furnace, which operate at a temperature of 1260 degree centigrade is used for heating & soaking of ingots before these are forged under the forging press.

There was huge expenditure on fuel because LDO is an expensive fuel. With the purpose of reducing the cost of fuel, a decision was taken to create infrastructure to enable us the use of Furnace Oil (a less expensive fuel) .

LDO can efficiently burn in the furnace even if it is preheated to a temperature of 60-70 degree centigrade but in case of furnace oil, pre-heating temperature must be 100-105 degree centigrade for its proper atomization & combustion in the furnace. Heating of oil is done in the 22 KL day oil tank (service tank) and also in the Heating & Pumping unit installed on the back side of the furnace.

While carrying out necessary changes, heating elements of day oil tank and heating & pumping unit were replaced from lower rating to higher rating. Electric heat Tracing was provided on the pipe line from day oil tank to heating & Pumping Unit and from heating Pumping unit to burners of the furnace. Pipe line from main Oil Storage Tank (140 KL capacity) to day oil storage tank was also insulated to prevent heat losses.

GAINS ACHIEVED.

Average price of LDO = Rs 28189/- per KL

Average price of furnace oil = Rs 23,091/- per KL

Furnace Oil used during 2006-07 = 790 KL

Financial Saving:- $790 \times (28189 - 23091) = \text{Rs } 40.27 \text{ Lakhs.}$

INVESTMENT MADE:- Rs 14.0 LAKHS

PROJECT NO.2:-

Title:-Modification of Heat Insulation System on 10 M (V) Reheating Furnace of Medium Forge Shop.

The above furnace of 60Ton Capacity is a bogie hearth Furnace which is used to heat the ingots upto 1260 degree Centigrade before forging under the forging press.

The Insulation system was very old (refractory brick type) on account of which LDO consumption was very high which was 6 KL/Day. The heat storage in refractory mass was high and heat losses to the atmosphere were also high.

After detailed study it was decided to carry out following improvement in the furnace:-

Replacement of refractory brick lining with improved Monolane Heat Insulation system which can withstand furnace temperature upto 1300 degree C. Ceramic blankets are first soaked in monolane solution, then its density is increased by compressing it under a light roller and thereafter it is applied inside the furnace under wet condition.

The density of new Heat Insulation System is 6 to 7 times less in comparison with refractory bricks.. There was significant reduction in the body mass of the refractory material and hence less storage of heat.

The co-efficient of thermal conductivity of new Insulation material is also six times low. Hence less heat is transmitted to the atmosphere from the furnace.

The above improvements were implemented successfully and it gave us following benefits.

GAINS ACHIEVED.

Average L.D.O. Consumption reduced from 6 KL/day (before modification) to 5.5 KL/day.

Fuel saved after modification during 2006-07 = 50 KL

Financial Saving :- Rs 11.50 lakhs.

INVESTMENT MADE:- Rs 30.0 LAKHS

Project No.3:-

Title:- 100 FRP Transparent Sheets installed at the roof top of various production shops.

In production shops, overhead lamps (provided for general lighting) used to glow during day time also to provide desired illumination level at work place .

To save electric energy, it was decided to provide transparent Fiberglass Reinforced plastic (FRP) Sheets at roof top of production Shops at regular interval so that natural Sun light is used for illumination of work place during day time.

A detailed study was conducted to decide the location of such sheets. 100 such sheets were provided due to which glowing of electric lamps could be avoided during day time. It gave us following benefits.

Gains Achieved:-

Units Saved:- 1.08 Lakh KWH

Financial Saving:- Rs 3.0 Lakhs.

INVESTMENT MADE:- Rs 2 Lakh approx.

PROJECT NO.4:-

**Title:-Combustion System Modified on 10 M (Vulcan)
Reheating Furnace .**

The above furnace of 60Ton Capacity is a bogie hearth Furnace which is used to heat the ingots upto 1260 degree Centigrade before forging under the forging press.

The burner system was very old & inefficient on account of which LDO consumption was very high i.e 5.5 KL/Day.

After detailed study it was decided to carry out following improvement in the furnace:-

Replacement of existing Encon burner System of (having 32 burners of 3A size) with new fuel efficient burner System of Wesman make (having 16 burners of 5422-6 size)

The above improvement was implemented successfully and it gave us following benefits.

GAINS ACHIEVED.

Average L.D.O. Consumption reduced from 5.5 KL/day (before modification) to 5.0 KL/day (after modification)

Financial Saving :- Rs 11.50 lakhs.

INVESTMENT MADE:- Rs 33.0 LAKHS

Project No.5:-

Title :-Energy Saving in Compressor House by controlling leakages

Compressed air is a very costly form of energy. There is huge consumption of power in the compressor house of CFFP.

After detailed study at the shop floors using compressed air for operating various pneumatic tools, compressed air leakages were observed at many places which were on account of following two reasons.

- (i) Defective air control valves.
- (ii) Damaged rubber tubes carrying compressed air to the point of use.

All the points of leakages were recorded along with there location and reasons of leakage. Defective air control valves were rectified and damaged tubes were replaced with new tubes. Following gains were achieved after implementation.

Gains Achieved:

Units Saved/Annum = 1.75 Lakh KWH

Financial Saving = Rs 5.10 Lakhs

Investment Made : = Negligible
