

Rashtriya Ispat Nigam Limited

UNIT PROFILE

Rashtriya Ispat Nigam Limited is the corporate entity of Visakhapatnam Steel Plant. The steel plant is located 26 km south of Visakhapatnam city. The company also has a blast furnace grade limestone captive mine at Jaggayapeta, a captive mine for dolomite at Madharam, a manganese ore captive mine at Cheepurupalli. All the captive mines are located in the state of Andhra Pradesh. It has also got a mining lease for river sand in river Champavathi.

The foundation stone of the steel plant was laid by the then prime minister on 20th January 1971 and the plant was dedicated to the nation on 1st August 1992 by the then prime minister. The main facilities of the plant are detailed at Fig 1. The plant has a capacity to produce 2.656 Mt of saleable steel of which 2.410 Mt is finished steel.

Besides receiving raw materials from the captive sources, the steel plant meets its iron ore requirements from Bailadilla mines of National Mineral Development Corporation, coking coal requirements through imports and coal washeries of Coal India Limited, SMS grade limestone through imports, quartzite requirements through purchase and boiler coal from the coal mines of Mahanadi Coal Limited.

The product profile of the plant comprises of wire rods, rounds, reinforcement bars (rebars), angles, channels, beams, squares, billets and blooms. The product profile also includes basic grade pig iron, granulated slag, coal chemicals and other by-products. The plant also exports power to AP Transco from its captive power plant.

The steel plant has many technological features, which are unique amongst the steel plants in the country. The company is a pioneer in introducing many new technologies in the country. The production of TMT rebars by tempcore process is a shining example in this respect. Because of high level of technology existing throughout the plant, the company has a very good

Sl. No.	Department	Unit	Capacity
1	Coke oven	3 coke oven batteries of 67 ovens each, of height 7 m, with 100% dry quenching.	2.261 Mt of blast furnace coke
2	Sinter plant	2 sinter machines with 312 sq.m grate area	5.256 Mt gross sinter
3	Blast furnace	2 nos. 3200 cum blast furnaces with bell less top equipment and cast house slag granulation	3.4 Mt hot metal
4	Steel melting shop	3 nos. 133 cum LD converter with 6 nos. 4 strands bloom casters	3.0 Mt liquid steel 2.82 Mt cast bloom
5	Light and medium merchant mill	7 stands continuous billet mill and 26 stands 2 strands continuous bar mill with tempcore facility for rebar rolling	1.857 Mt billets 0.710 Mt bar products
6	Wire rod mill	4 strands 61 stands continuous mill with stelmor cooling	0.850 Mt wire rods
7	Medium merchant and structural mill	20 stands continuous mill	0.850 Mt medium structural products

Fig 1 : Main facilities of the plant



manufacturing capability to meet the needs of various customers.

Human resource initiatives at RINL are closely linked to the corporate strategy of the organisation. It has exemplary industrial relations where the entire work force (both executives and non-executives) works as a well-knit team for the progress of the company. Participative management, by involving cross-section of the employees, in development of the policy and strategy is actively implemented in the company. The productive wholesome environment provides an atmosphere of growth, both for the employees as well as for the company. The welfare measures provided for the employees of the company are the best in the industry. With the availability of the positive growth environment, the company is registering a steady and consistent up

trend in the performance. It is achieving both incremental improvements as well as breakthrough improvements in its various performance measures. The theory of "success begets success" is very much visible here.

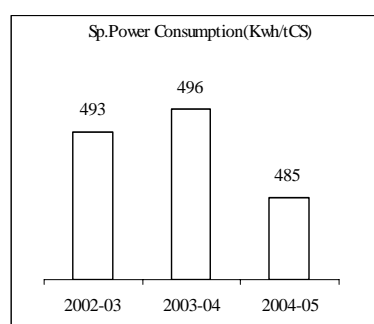
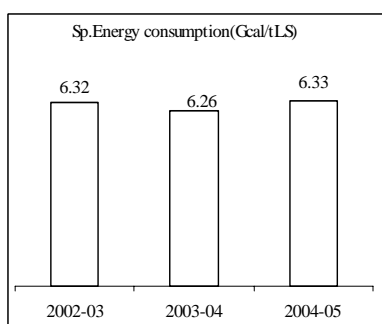
Exceeding of up rated capacities, which once seemed to be impossible, is a reality today. Records are being created only to be broken again. The company's rating amongst the largest steel producing companies in the world, as published by IISI is continuously improving (72 in CY 2000, 68 in CY 2001 and 67 in CY 2002).

Energy Consumption:

Steel making is energy intensive in nature and hence uses various types of energies for reduction of oxides and process heating. The main energy inputs are boiler coal (for power generation), furnace oil (in re-heating furnaces and boilers) and diesel. The electricity requirements were met from captive generation as well as imported from Grid. Surplus electricity is exported to grid. 96% of by product gases (Coke oven gas, Blast Furnace gas, LD gas) generated during the process of steel making at various stages are used for process heating. By-product liquid fuel (coal tar fuel) is used in kilns. The total energy consumption of main inputs and their monetary value during the last three years is given at Fig 2. The percentage of energy consumption in terms of manufacturing cost, for which coking coal and coke is considered in the energy bill, though these are mainly used as raw materials, is also detailed in Fig.2. The specific energy consumption and petrol-fuel consumption for the last three years is detailed at Fig 3 and Fig .4

Type of fuel	Unit	2002-03	2003-04	2004-05
Coking coal	t	3162259	3205791	3085241
Coke	t	100422	281769	451945
Boiler coal	t	1367060	1381524	1383452
Furnace oil	KL	396	997.22	659
Diesel	KL	2842.9	2804	2846
Electricity purchased	Lakhs KWH	848.58	905.28	792.9
Electricity exported	Lakhs KWH	1647.1	1180.2	786.5
Electricity consumption	Lakhs KWH	18836.1	19546.1	19539.3
Monetary value of energy consumed				
Coking coal	Rs.lakhs	99395	101255	118965
Coke	Rs.lakhs	6205	22667	69883
Boiler coal	Rs.lakhs	13023	13539	14429
Furnace oil	Rs.lakhs	39	122	78
Diesel	Rs.lakhs	545	590	716
Electricity purchased	Rs.lakhs	5347	6520	4987
Electricity exported	Rs.lakhs	3261.3	2382.8	1643.0
Energy cost	Rs.lakhs	121293	142310	207416
Manufacturing cost	Rs.lakhs	308544	344017	413281
% energy consumption in manufacturing cost		39	41	50

Fig.2: Energy Consumption



Energy conservation commitment, policy and set-up:

RINL has focussed on energy conservation in the design stage itself by adopting various types of waste energy recovery facilities like coke dry quenching, back pressure turbine station, gas expansion turbine station, LD gas recovery system, Supervisory control and data acquisition system, evaporative cooling systems etc. These facilities are contributing significantly in reducing the wastage of energy.

The commitment to energy conservation has reflected in the energy policy of RINL where in it is committed to reduce specific energy consumption by 1% per year up to 2010AD. The Energy policy is given below

The energy conservation activities are reviewed at Apex level on regular basis through various review meetings (Co-ordination meetings, cost control meetings). To monitor energy conservation activities, RINL has Energy Management Department headed by Deputy General Manager. He reports to General Manager(Energy & Environment) who is also the Designated Energy Manager of the company. The Energy Management Department monitors the levels of specific energy consumption on daily basis and provides base line information to top management for initiating appropriate action. RINL follows a cost effective energy conservation policy. Improving process management and increasing waste energy recovery from the existing facilities (CDCP,BPTS,GETS,ECS etc) by actively involving people is the strategy adopted for conservation of Energy. Involvement of people at working level in large numbers is achieved by formation of Departmental Energy Teams (DET).The team consists of people from all functional disciplines(Mechanical, Operation, Electrical & Instrumentation etc). QIP's are formed for energy conservation as a part of ISO-9000 and management objectives are taken on energy conservation as a part of ISO-14001.Awareness on conservation of energy at various levels is brought through month long energy conservation celebrations. Employees are empowered by encouraging suggestions and quality circles. RINL has successfully implemented strategy of minimizing petrofuel consumption by augmenting by product gases generation as well as usage.

In 2004-05,the global steel industry had faced raw material shortages resulting in throttling of production. The quality of coke deteriorated resulting in high energy consumption. RINL initiated steps to control energy consumption by initiating Energy Audit and intensification of activities of Departmental Energy Teams. RINL has formed Departmental Energy Audit Teams in 2004-05 in all DET departments by imparting training in Energy Audit techniques by M/S NPC. 35 Executives were trained in Energy Audit techniques. Using this expertise, these teams are working continuously for conservation of Energy .

To increase awareness among VSP collective, energy conservation programmes were conducted at departmental level. About 3000 employees were covered in this programme. Various Training programmes like Waste management, Energy Management & Audit were conducted to employees. About 250 employees were covered. Energy Conservation Month Celebrations were conducted from 14th December to 13th December by conducting various competitions among employees of VSP. An Exclusive Suggestion campaign on Energy Conservation was conducted during the above period. A Diary consisting of Information on Energy Conservation pertaining to Steel Plant was given as prima facie gift. About 1200 Suggestions were generated. The Best 12 suggestions as well as Energy Performance of the various departments were recognised during Energy Awards valedictory functions by giving shields.

As part of National Campaign on Energy Conservation initiated by Bureau of Energy Efficiency ,RINL has undertaken various training programmes to increase Energy conservation awareness. The Month Wise actions initiated are given in annexure. In addition to these, RINL has undertaken Energy Conservation Awareness Campaign to School children of Ukkunargam Schools. 135 School children were covered .

Energy Conservation Achievements

During the last three years, RINL implemented 130 energy saving ideas generated from various sources. There was marginal increase in Specific energy consumption over based period by 0.01 Gcal/tLS. The departmental energy teams have taken many initiatives in electrical energy and thermal energy consumption and contributed significantly in reducing energy conservation . Some of the energy conservation projects implemented during the year are:

- ❑ Reduction of Contracted Maximum Demand from 150 MVA to 100 MVA
- ❑ Increasing the yield of crude Benzol as well as reducing solar oil usage in Benzol scrubbers by installing muck drying bed in Coke ovens.
- ❑ Increasing coke yield by reducing burning losses of coke inside the cooling chamber by optimization of air entry by PLC modification.
- ❑ Reduction of specific heat consumption at CO battery -2 by reducing reversal pause duration from 50 seconds to 40 seconds
- ❑ Replacement of motor at CO-57 Conveyor
- ❑ Reducing electricity consumption in Blast furnaces by reducing impeller diameter of centrifugal pump in Blast Furnace-1, Stopping of KA1 and KP1 Conveyor , Optimising flow in BHS and CHS fans.
- ❑
- ❑ Reduction in Air-conditioning load in QATD/Steel lab, CCD computer center



- ❑ Reducing electricity energy consumption in water pumping system by reducing the number of pumps running in Final Gas Cooler circuit in CCP and running two pumps only instead of three pumps at Pump House-09 Heat Exchanger system.
- ❑ Enhancing the efficiency of Cooling Tower-4 by cleaning of the fills
- ❑ Reducing electricity consumption at Pump House-11 by Automation tunnel lighting to avoid continuous glowing
- ❑ Electrical Energy conservation by pulley modification in slurry pumps at Treatment Plant -1 & 2.
- ❑ Reducing electrical energy consumption at by locating and plugging the false air leakages in to kiln system, PLC modification for KF1, 3, 4 & 5 Main drives
- ❑ Replacing diesel oil by waste reclaimed oil in ore drying plant
- ❑ Reducing electrical energy at MMSM by replacing frequency converters and stopping of Mill drives of during SQ 90 rolling.
- ❑ Reduction of electrical energy consumption at Billet Mill reheating furnace by stopping HP Descaling System pumps and Hydraulic cellars pumps during shutdown period.
- ❑ Improving thermal regime in Blast furnace by installing PLC for simultaneous charging of battery coke and purchased coke in to Blast Furnaces.
- ❑ Installation of lighting saver in Forge Shop
- ❑ Improved usage of blast furnace gas in thermal power plant by increasing impeller diameter of ID fan of Boiler-1
- ❑ Improving performance of Boiler 1 by Replacement of Air heater baskets and Replacement of Tubular air heater
- ❑ Improving feed water temperature by 8°C by replacement of HP heater-3 in Turbo generator 2 in Boiler Feed Water Circuit
- ❑ Reducing oxygen consumption by reduction of full return heats and partial heats during Converter blowing



Energy Conservation Plans and Targets

The following projects are planned for implementation during the next 3 years, as given at Fig 5.

- Auxiliary fuel injection in Blast Furnaces.
 - Additional stream for LD gas recovery
 - Upgradation of SCADA
 - Usage of Coke oven gas in place of CTF in CRMP
 - Multislit burners in Sinter Plant
- Fig 5: Energy conservation projects**



Rashtriya Ispat Nigam Ltd

Visakhapatnam Steel Plant

Brief Description of Energy Conservation Projects taken up during the year 2004-05

Energy Efficiency improvement projects taken up at RINL are of short term in nature and mostly consist of process improvement which need practically little or no investment. Expenditure on these projects are met through normal maintenance budget. All these energy efficiency projects are part of continuous improvement. The identification of these projects is carried out through internal data analysis, data of the competitors and by target setting. Special task forces as well as quality improvement teams have worked on these projects. Knowledge sharing principles and statistical quality control techniques have been used for implementing these projects.

47 Energy Efficiency improvement projects were implemented during the year 2003-04. Out of these projects Project No.29,30 and 35 are trend setters in Indian Steel Industry. These projects are unique in nature and has involved lot of technological innovation.

Project No.1

Brief Description of the Project: Reduction of Contracted Maximum Demand from 150 MVA to 100 MVA

RINL is consuming electricity in the range of 230-240 MW for its motors. To meet electricity requirements, VSP is having captive power plant of 276.5 MW which includes 29 MW from Waste Energy Recovery also. The VSP grid is synchronized with APSEB grid and export and import also takes place. Since State Grid is universal grid, VSP grid is connected for ensuring uninterrupted supply. The VSP is having agreement with EPDCL of APTRANSCO for Contracted Maximum Demand of 150 MVA.

Observations:

The CMD is not revised with present conditions. Hitherto generation fluctuations are very high in Captive Power Plant necessitating import of electricity from the State Grid. The demand analysis is studied and observed that existing CMD is not utilized fully. The CMD drawn in the last few years shows that, it is always less than 100 MVA.

Technical and Financial Analysis:

To revise Contract Maximum demand, a study was conducted to arrive at maximum demand at various patterns. The following table shows the import from grid at various types of disturbances.

Modifications done:

In view of consistent generation of electricity from Power Plant as well as meeting critical loads in eventuality, the CMD has been revised from 150 MVA to 100 MVA.

Implementation:

With Revision of CMD from 150 MVA to 100 MVA and ensuring steady generation from captive power plant, resulted in financial savings of Rs 176 Lakhs in the year 2004-05.

Sl No	Case	Disturbance	Import from Grid in MVA
1	All four TGs are available	Islanding due to grid condition may put load to the extent of 60 MW and 30 MW load will be reduced by stopping Rolling Mills.	37.5
2	3 TG's are available	Islanding due to grid condition may put load to the extent of 110 MW and 30 MW load will be reduced by stopping Rolling Mills.	100
3	All four TG's are available	Tripping of One TG and One Boiler may cause load of 110 MW on grid and 30 MW load will be reduced by stopping Rolling Mills	100

Project No.2

Title of the Project: To improve operational performance of air compressor at Coke ovens

Background and description of the project and observations made:

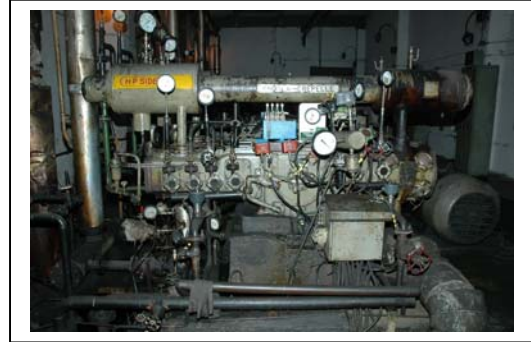
The Coke Oven department is equipped with 4 Nos of Compressors for meeting compressed air requirements of coke ovens. The Compressors are designed with pressure of 6 kg/Cm² and the capacity is 1200 Cum/hr. The Compressors are driven by 122 KW motor. The Compressors loading time is 40 minutes and un loading time is 20 minutes. The Compressed air is stored in receiver and from receiver; the air is drawn for consumption. Every month, single compressor is operated for 10 days and two compressors are operated for 20 days. During Two compressors operation, the unloading doesn't take place resulting in high current of 180 Amperage.

It is observed that the compressor house is having following problems:

- ❑ Frequent bleeding of air through safety valve
- ❑ Over heating of compressor Cylinders
- ❑ High Network pressure
- ❑ Moisture carryover to the pipeline
- ❑ Irregular performance by solenoid valves leading to choking
- ❑ The Motor is drawing huge amount of current (180 Amperage)

Technical and Financial analysis:

- ❑ There is need to remove moisture from compressed air
- ❑ Performance of solenoid valves is not satisfactory and irregular



Modifications done:

Modification in the pipeline by providing drain for removal of moisture by rerouting of pipeline
 Providing better solenoid valves in place of old one

Implementations and Savings achieved:

With this modification, the compressor loading and unloading takes place regularly and during unloading the motor amperage is reduced from 180 Amps to 130 Amps. Implementation of above project has resulted in energy savings of 1.95 KWh and financial savings of Rs 4 lakhs in the year 2004-05.

Project No.3

Title of the project: To enhance the yield of crude Benzol

Background and description of the project and observations made

During the process of coke making at Coke Ovens, Coke oven gas is generated due to release of volatile matter during heating of coal at 1000^oC. The Coke oven gas is cooled in final gas cooler by cooling water and scrubbed with Solar Oil. The Benzolised Solar oil is sent to Benzol distillation unit for debenzolisation and returns as solar oil and Benzol is produced. This crude Benzol is further distilled for various Benzol products. It is observed that the yield of crude Benzol was low due to increased down time of equipment. The impurities in coke oven gas are carried along with Benzolised Solar Oil to Benzol Distillation Unit and resulting in accumulation of muck. Excess muck in circulating solar oil settles in the system resulting in built up. Due to this, Benzol unit is operating at low capacity and resulting in high shutdown time of equipment

Technical and Financial analysis:

This muck is to be removed from the system on regular basis and frequently.

Installing muck drying bed and drying benzol muck

Since benzol muck contains some amount of solar oil, placing benzol muck on muck drying bed will separate both and solar oil can be reused again.

Modifications done:

Enhancement of muck removal through mud drying bed in Benzol distillation station. A mud drying bed was installed. It will allow drying the muck on the bed. The Solar oil can be used again. The muck dried in the bed contains carbon and it can be recycled in to coke ovens.

Implementations and Savings achieved:

- ❖ Installation of muck drying bed has reduced machine down time.
- ❖ Reduced usage of solar oil.
- ❖ Capacity of Benzol Distillation unit is improved.
- ❖ The Benzol muck dried is recycled in to Coke Ovens by Y-11 Conveyor
- ❖ It has increased crude Benzol production by 4 tons per day.

This project resulted in energy savings of 14600 Gcals and financial savings of Rs 86 lakhs in year 2004-05.



Project No.4

Title of the project: Reducing burning losses of coke inside the cooling chamber by optimization of air entry by PLC modification

Background and description of the project:

Heating of coal in Coke ovens produces Coke in the absence of air. Pusher discharges the coke and it is charged into CDCP chambers for cooling of coke. Air is supplied to CDCP chambers by observing gas analysis to prevent increase in CO and H2 content in circulating gas.

Observations:

It is observed that irregular supply of air increasing burning of coke inside the CDCP chambers and excessive Carbon monoxide accumulation.. It is observed that CO & H₂ will rise after charging of coke immediately and comes down after 15-20 minutes and needs Oxygen/air only during the period. But, manually it is very difficult to ensure every time opening and closing of air valve during the period. In view of this, the air valve is kept open continuously as long as the chamber is in operation. The Coke production is reduced and the steam generation in waste heat boilers is increased

Technical and Financial analysis:

Installing Programmable Logic controller for air regulation.

Modifications done:

- Installed PLC for air intake valve
- The PLC will open-air valve after charging of coke and close after specified time

Implementations and Savings achieved:

After Installation of PLC, the air entry is regulated. The Steam generation is reduced by 2kg per ton of Coke cooled. It has resulted in additional production of coke by 12 T per day from each CDCP. This project has resulted in financial savings of Rs 251 lakhs and Energy Savings of 30003 Gcals in the year 2004-05.

**Project No.5****Title of the project: Reduction of Nitrogen consumption at Ammonium Sulphate Plant of CCP****Background :**

Nitrogen is consumed in Ammoniums Sulphate Plant, Primary Gas Cooler and Benzol Distillation Plant instrumentation system. Nitrogen is used for saturator stirring at ASP. The Consumption was high at ASP.

Observations:

It is also observed that usage of high nitrogen in Primary Gas cooler is reducing calorific value of coke oven and resulting in lower heat generation at various furnaces.

Technical and Financial analysis:

Nitrogen used for saturator stirring at ASP was high due to malfunctioning of flow meters. The consumption was 3000 Nm³/hr instead of 2000 Nm³/hr .The flow meter is showing less. Usage of more nitrogen is reducing calorific value of Coke oven gas and reducing heat utilization in various furnaces.

Modifications done:

Rectification of flow meter

Implementations and Savings achieved:

1000 Nm³/hr of Nitrogen is saved by rectification of flow meter and resulted in improved calorific value of coke oven gas. This project has resulted in electrical Energy savings of 32 lakh Kwh and Financial savings of Rs 107 lakhs in the year 2004-05.

Project No.6**Title of the project : Reduction of specific heat consumption at CO battery –2.****Background:**

In the process of coke making at Coke ovens, coking coal is heated in coke oven in the absence of air. The heating requirements of ovens are met by burning Coke oven gas. The Coke oven gas consumption is 17000 Nm³/hr

Observations made:

It was observed that, the heat consumption in batteries is high . Generally the battery is kept under pause .During pause period, battery heat is lost upon cooling by air draft . Due to this,the battery consumes extra CO gas to make up the loss. During pause, the gas stoppage is for 80 seconds. During the stoppage of gas, for short time,the gas cannot be utilized elsewhere and bled to atmosphere. The reversal pause duration is 50 secs. During reversal, the gas to battery is stopped. Battery reversal takes place every twenty minutes.

Technical and Financial analysis:

The reversal pause duration can be reduced. By reducing reversal pause duration, the gas can be saved.

Modifications done:

Reversal pause duration setting was changed from 50 seconds to 40 seconds. So the gas stopped period was brought down by 10 seconds in every 20 minutes (at the time of reversal). CO gas availability to network also got increased thereby reducing bleeding losses.

Implementations and Savings achieved:

By reducing reversal pause duration, coke oven gas bleeding is reduced by 17000 Ncum/hr for 10 seconds. It amounts to bleeding of 141 Ncum/hr and energy savings of 5109 Gcals and financial savings of 34.3 lakhs in year 2004-05.

Project No.7

Title of the project: Installation of VVVF drive in ventilation fan in DE system of CSP.

Background :

In Coke sorting plant, a ventilation fan of 180KW extracts the dust fumes. The fan is designed for handling of 70000 Ncum/hr of air and flow is damper controlled.

Observations:

It was observed that, it was running with 80% damper opening. Starting current was 2000A for 12 to 15 seconds. Due to high starting current, power losses are very high and motor breakdown is very frequent.

Technical and Financial analysis:

- Flow control can be done through speed control instead of damper.
- Installation of speed control will control the flow and accordingly, the starting current can be reduced.. The load profile of the motor is studied and found that it is varying considerably.

Modifications done:

Variable voltage and variable frequency drive has been incorporated in B1 fan

Implementations and Savings achieved:

With introduction of VVVF drive, the starting current problems were minimized and fine speed control is achieved. With Speed control, the flow is also adjusted. It resulted in energy savings of 1 lakh KWH and financial savings of Rs 2 lakhs in the year 2004-05.

Project No.8

Title of the project: Replacement of Motor at CO-57 Conveyor in RMHP

Background : CO-57 conveyor of RMHP day bins stream was originally designed for carrying a mix of generated iron ore fines from lump crushing, procured ore fines from wagon tippler and lime powder. To carry the combined load, the designed capacity of the belt was 1400TPH.

Observations:

In view of process modification, the CO 57 is needed to carry only a load of 500-600TPH. The drive motor, which was rated for 180 KW was thus being run only at 50-60% load operating at poor efficiency and power factor.

Technical and financial analysis:

The motor is operating at 50-60% of load and it was observed that 75 KW motor was able to perform the function at 80-85% load current for another conveyor-CO-67 with similar loading. Hence replacement of motor can reduce loss of efficiency. Replacing the motor with lower size motor requires modification to foundation

Modification done

The existing 180KW 355M-frame motor replaced with 75KW 280Sframe motor after necessary modification to the motor foundation.

The fluid coupling is changed from FCU23 to the next lower size FCU20.

Implementation and savings achieved:

Implementation of this project has resulted in energy savings of 0.966 lakh Units and Financial savings of Rs 2 lakhs in the year 2004-05.

Project No.9

Title of the project:Reduction in running hours of Central AC plant in main Administrative building.

Background :

Administrative building is equipped with centralized AC plant of 240TR capacity. The total connected load of the plant is 402.8KW. This AC plant meets cooling requirements of Corporate offices.

Observations:

- The AC plant is operated from 7 am to till close of all Director's /CMD office and is operated throughout the year.
- With one compressor running, the power consumption is 145KW/Hr (minimum). This condition arises even if one Director is staying beyond general shift hours or attending office on holidays/Sundays.

- Even with a load requirement of around 5 to 10 TR, Minimum 120TR is to be run.
- It is resulting in power consumption of 156KW/Hr besides cooling water recirculation as well as make up water losses.
- The EER (Energy Efficiency Ratio, BTU/Hr/W) during off-peak load is 5.7

Technical and financial analysis:

- A Study was conducted to measure TR for these offices, so that standby backup air-conditioning system can be installed with lower capacity. It was observed that 39 TR is sufficient for each of these offices
- Restricting Central AC plant operation from 7am to 6 pm only
- Operating Backup AC after 6 PM on wards

Modification done

- Running of Central AC plant is restricted to 7AM to 6PM.
- After 6 PM, individual AC's are started
- AC plant is stopped on Sundays/holidays.

Implementation & Benefits achieved:

With the installation of Individual AC systems, the power consumption is reduced from 156 KW to 39 KW. It has resulted in Energy Savings of 1.05 lakh units and financial savings of Rs 2.10 Lakhs in the year 2004-05. It has reduced water consumption and improved the availability of AC plant for maintenance.

Project No.10

Title of the project: Interconnection of AHU s to convert running unit into standby unit in ECR – 1 /SMS

Background :

In Electrical Control room-1 of SMS, 5 Nos of Air handling Units are installed in one room and supplying air to various locations .These are designed for cooling load of 36 TR each. Out of five AHU's, two AHU's are catered to converter room, one to computer room and one to Electrical Control Room-1 (Electrical hall).

Observations:

It has been observed that during winter the heat load of computer room AHU is 50 % of installed capacity and that of converter control room is 60 – 70 % of installed capacity.

Technical and financial analysis:

- A study was made to balance the heat load by distributing excess capacity to converter control room and stop one Air handling unit during off-season.
- Modifying duct for interconnecting AHU
- Introduce Programmable Logic Controller

Modification done:

- Duct modification was carried out by interconnecting the AHUs
- Introduced programmable ON/OFF timer.

Implementation and savings achieved:

Implementation of this project has resulted in energy savings of 0.5 Lakh KWH and Financial savings of Rs 1 lakh in the year 2004-05. In addition to energy savings availability of equipment has increased for maintenance.

Project No.11

Title of the project: Reduction in Air-conditioning load in QATD/Steel lab, CCD computer center

Background :

Cooled air is supplied to QATD Steel Lab and CCD computer center by AHU installed at SMS QATD lab.

Technical and financial analysis:

- It is observed that the air conditioning load can be rationalized.
- Reduction in air conditioning load by eliminating space cooling of unwanted areas like corridors and few rooms in consultation with their department.
- The supply and return grills in corridors are to be closed
- Installing On/OFF programmable timers

Modifications done:

- ON/OFF programmable timers are installed for AHUs to reduce the running hours during off peak time (night and during winter seasons).
- The supply and return grills in corridors are closed
- Eliminated unwanted space

Implementation and savings achieved:

Implementation of this project has resulted in energy savings of 0.9 Lakh KWH and Financial savings of Rs 1 lakh in the year 2004-05 . In addition to energy savings availability of equipment has increased for maintenance.

Project No.12

Title of the project: Modification of condenser coil in MMSM (K3 pulpit)

Background :

In MMSM K3 Pulpit , a packaged air conditioner is installed with 7.5 TR to meet the cooling requirement of various flow instruments.

Observations:

The package AC condenser coil of K-3 pulpit is located in front of furnace and is exposed to radiation heat. This has resulted in unit running always at very high load and low efficiency. The unit condensation is also affected .

Technical and financial analysis:

- A Study was made to examine the high load and low efficiency.

Modification done:

The condenser coil is relocated and converted to water cooling system.

Implementation and savings achieved:

Implementation of above measure resulted in energy savings of 0.13 lakh KWh and financial savings of Rs 0.26 lakhs in the year 2004-05.

Project No.13

Title of the project: Modification of Packaged Air Conditioner in Ore Control Room in Raw Material Handling Plant.

Background :

In Ore Control Room of RMHP is installed with 2 Nos package Air conditioner of 5 TR each is catering to air conditioning requirement of instruments. The units are located at +0 Mtr level whereas the control room is at +12 Mtr level. Both package AC are working continuously.

Observations:

It is observed that units are located at ground level causing pressure drop .

In case of any maintenance or breakdown, the Air conditioning load from one unit is not sufficient for the control room cooling.

Technical and financial analysis:

- If these are shifted to 12-meter level, the pressure drop will be reduced.
- Duct to be modified.

Modification done:

The units were located inside the control room with duct modification. Relocation of the equipment has reduced the pressure drop. Instead of two units operation, one unit operation is sufficient. It has increased the availability of equipment for maintenance.

Implementation and savings achieved:

Implementation of above measure has resulted in Energy Savings of 0.35 lakh KWH and financial savings of 0.7 Lakhs in the year 2004-05.

Project No.14

Title of the Project: Reducing the number of pumps running in Final Gas Cooler circuit in CCP.

Background:

In Pump House-18, located in C&CCD Zone, there are four pumps installed in Group-II. These pumps are meant for pumping cooling water to two final gas coolers viz FGC-1 & FGC-2. Each pump has a capacity of 600 m³/hr. at 60 m head. Each pump is coupled to a motor of 135 KW. Two pumps are run continuously for pumping water. The hot return water comes back to the sump via cooling towers-20 & 20A. The flow in each FGC is maintained at 400 m³/hr. The excess water pumped is taken back to the sump through a by-pass line in the supply header in pump house.

Observations made:

The flow through the by-pass line is high. The by-pass line valve is fully opened to ensure that the flow to two final gas coolers does not exceed 400 m³/hr each i.e. a total of 800 m³/hr. If the by-pass valve is closed the flow to FGC's is increased causing disturbance of tar levels in coolers and affecting the process. If delivery valves of the pumps are throttled, the motors are grossly under loaded. So, two pumps are always run with by-pass line valve fully opened and motors running at 190 Amps load whereas the motor full load current is 235 Amps.

Technical & Financial Analysis:

- During two pumps running ,the electrical energy consumption is 218.3 KW and the electrical energy consumption during single pump running is 97.66 KW .
- Running only one pump and parameters to be observed

Modification done:

Running only one pump and observe the parameters like flow and pressure and its impact on FGC process. Flow to individual coolers was maintained at 360 m3/hr. The By pass valve is closed.

Implementation & savings:

Implementation of above project resulted in Energy Savings of 8.55 lakh KWH of Electricity and financial savings of Rs 17.11 Lakhs in the year 2004-05.

Project No.15

Title of the Project: Automation of Pump House-11 tunnel lighting to avoid continuous glowing.

Back ground :

The installed load for tunnel lighting at Pump house -11 is 8 KW . When ever people wants to work in the tunnel, these are switched on the lighting circuit and these lights are to be put off after completion of work in the tunnel.

Observations:

It is observed that the procedure for stopping lighting was not followed strictly.

Technical & Financial Analysis:

Circuit is to be modified to glow the lights whenever required.

Incorporating lighting timer.

Modifications done

Lighting timer was incorporated in the lighting circuit. The timer setting was done in a way that the lights should glow only 12 hours per day. Implementation of above modification reduce load by 50%.

Implementation ::

Implementation of above project resulted in Energy Savings of 0.35 lakh KWH of Electricity and financial savings of Rs 0.70 Lakhs in the year 2004-05.

Project No.16

Title of the Project: Lighting segregation at Pump House-12 to avoid day time glowing.

Back ground :

The lighting load in Pump House -12 is about 2 KW

Observations:

It is observed that inside & out side lighting was connected in one circuit only. Whenever inside lights are switched on, at the same time out sidelights are also glowing, leading to energy wastage.

Technical & Financial Analysis:

Inside lights can be put in working condition whenever lighting required.

Out side lights should work after sun set only.

Modifications done

Inside & out side lighting circuits are separated and different controls were provided for each circuit.

In addition to this timer was installed for the out side lighting circuit in a way, that the out side lights should glow from 6 PM to 6 AM only. With this modification 1 KW energy is saved.

Implementation:

Implementation of above project resulted in Energy Savings of 0.0438 lakh KWH of Electricity and financial savings of Rs 0.087 Lakhs in the year 2004-05.

Project No.17

Title of the Project: Pulley modification in slurry pumps at TP-1 & 2.

Back ground :

Treatment Plant 1 & 2(TP-1 &2) are envisaged for treating the slurry. There were 4 Nos. of pumps were installed at TP-1 & 2 for slurry transfer. The motor rating is 15 KW. The rated current for these motors was 24 Amps.

Observations:

It was observed that these pump motors are drawing more current than their rated current (30 Amp) resulting in overloading of motor.

Technical & Financial Analysis:

Change the pulley of the pumps without causing any unbalance to the system.

Replace existing pulley 1.66 speed ratio pair with speed ratio of 1.5

Modifications done

Existing 1.66 speed ratio pulley pair was replaced with pulley pair of 1.5-speed ratio.

It is observed that the motor is taking 24 Amps, which is the normal as per the motor design.

Implementations & savings achieved

Implementation of above project resulted in Energy Savings of 1.51 lakh KWH of Electricity and financial savings of Rs 3 Lakhs in the year 2004-05.

Project No.18

Title of the Project: Optimizing number of pumps running in Pump house -9 heat exchanger system

Back ground :

In Pump house 9 , there were five pumps of 285 KW each in group –I for supplying cooling water to heat exchanger to the hot water coming from the converter.

Observations:

It is observed that three pumps are supplying water to heat exchanger irrespective of converter operation to maintain requisite cooling parameters. Converter operation is batch process . During two converter operation, the cooling water requirement is less . Two converter operation is for 7 days in a month.

Technical & Financial Analysis

During two converter operation, cooling parameters can be examined by running two pumps.

Modifications done

Trial was conducted to operate two pumps during two converter operation and it was observed that there is no change in cooling parameters.

Implementation:

Two Pumps operation during two converter operation has resulted in stopping of one pump . It resulted in energy savings of 4.21 lakh units of electricity and financial savings of Rs 8.42 lakhs in the year 2004-05.

Project No.19

Title of the Project: Enhancing the efficiency of Cooling Tower-4 by cleaning of the fills.

Back ground :

Cooling Tower 4 meets the cooling requirements of Power Plant Turbo generators. There were three cells installed in Cooling Tower-4. The air requirements are supplied by Cooling Tower fan which is driven by 55 KW motor for each cell.

Observations:

During Energy audit ,it is observed that the effectiveness of this CT is very poor due to chockage as a result of heavy deposition on concrete fills. Due to low effectiveness, three fans are operated and resulting in loss of energy.

Technical & Financial Analysis

The effectiveness of Cooling Tower can be improved by cleaning of all the internals.

Modifications done

All the fills were removed one by one, cleaned thoroughly and fitted back. By fills cleaning, the effectiveness of the Cooling Tower was improved. Instead of operating three fans, two fans are only running and temperature was within the range.

Implementation:

Implementation of above project resulted in Energy Savings of 4.81 lakh KWH of Electricity and financial savings of Rs 9.6 Lakhs in the year 2004-05.

Project No.20

Title of the Project: Diversion of slurry directly to mini pond by by- passing Filter House.

Back ground :

The slurry from Treatment Plant -01 is pumped initially to filter house slurry tank, which is again pumped to mini sludge pond through a 90 KW emergency sludge pump.

Observations:

It is observed that it is resulting in double pumping and consequent loss of energy.

Technical & Financial Analysis :

To carry out direct pumping ,slurry line is to be extended from Treatment Plant -01 to Mini Sludge pond and the Sludge pump of 90 KW can be stopped.

Modifications done

The Slurry line from TP-01 was extended up to mini sludge pond and the Sludge pump of 90 KW is stopped.

Implementation :

Implementation of above project resulted in Energy Savings of 6.70 lakh KWH of Electricity and financial savings of Rs 13.4 Lakhs in the year 2004-05.

Project No.21

Title of the Project: Optimising Power consumption during low oxygen demand .

Background :

The Oxygen is used in Steel making for blowing of hot metal and enrichment of cold blast. To meet oxygen requirements in Steel Plan, three air separation units are operated. The Air separation units separate oxygen and nitrogen and later compressed in oxygen and nitrogen compressors. The oxygen consumption during three converter operation and blast air enrichment is 35000 NM³/hr – 40000 Nm³/hr .

Observations:

It is observed that two converters are operated during production throttling and oxygen enrichment is also stopped. During this period, the consumption of oxygen is 20000 Nm³/Hr to 25000 Nm³/Hr.

Technical and Financial Analysis:

During two converter operation, the total requirement of oxygen is around 20000 Nm³/Hr to 25000 Nm³/Hr. and in such a situation stopping one ASU saves power to tune of 7 – 8 MWHR.

Supply pressure is to be maintained.

Modifications Done:

During two converter operation, one ASU was taken shutdown. However the supply pressure of oxygen to consumers was maintained as per the norm (>30 Kscg). One ASU was taken shutdown. One FAC, One OC were stopped during this period.

Implementation :

Implementation of above project resulted in Energy Savings of 41.30 lakh KWH of Electricity and financial savings of Rs 82.6 Lakhs in the year 2004-05.

Project No.22

Title of the project : Reducing electrical energy consumption by locating and plugging the false air leakages in to kiln system.

Back ground :

The calcination and refractory materials produces lime by burning the lime stone in kilns and the flue gases exit through chimney. The various consumers of electricity in CRMP are Induced Draft fans, Cyclones .

Observation:

There were 5 Nos of ID fans of 660 KW capacity. It was observed during energy audit that these ID fans are fully loaded due to heavy air ingress from the various air entry points at cyclones, preheaters etc. There were leakages in the suction path of the kiln bag filters and resulting in increase in density of the air . If air leakage points are plugged, the air density will decrease and the load on ID fan shall decrease.

Technical and Financial Analysis:

Arresting of leakages in the duct upto ID fan

Installation of alarm signal for overload of ID fan

Continuous monitoring

Modifications done:

- Located and covered the cracks.
- Tightened all flange bolts by continuously monitoring ID fan ducts and bag house screw conveyors covers with sealant.

Implementation :

Implementation of above project resulted in Energy Savings of 3.84 lakh KWH of Electricity and financial savings of Rs 7.68 Lakhs in the year 2004-05.

Project No.23

Title of the project : Reducing electrical energy consumption for FK1, 3, 4 & 5 Main drives by PLC modifications.

Back ground and description of project:

The calcination and refractory materials produces lime by burning the lime stone in kilns and the flue gases exit through chimney. The various consumers of electricity in CRMP are Induced Draft fans, Cyclone . The connected load of these motors is about 4 MW. The kiln main drives are operated by relay logic system. There are 50 Nos of relays with rating of 0.6 Amp inrush current and 0.3 Amps of running current.

Observations:

It is observed that frequent failure of relays is occurring due to inherent nature of relay logic system

Technical and Financial Analysis:

Installation of PLC System will improve reliability due to superior technological features

Modifications done:

The relay logic system is replaced by PLC logic system for FK1, FK3, FK4 & FK5 main drives.

Implementation :

Implementation of above project resulted in Energy Savings of 0.784 lakh KWH of Electricity and financial savings of Rs 1.568 Lakhs in the year 2004-05.

Project No.24

Title of the project : Reducing electrical energy consumption by lighting circuit modification

Back ground :

The CRMP shop floor and other areas is illuminated by twin tube light fittings of 40w, 400wsv, 250wsv lamp fittings .

Observations:

It was observed that these are continuously glowing .

Technical and Financial Analysis :

- A study was done to calculate lighting require to maintain same illumination .
- It is observed that 70 W sodium vapor lamps will meet lighting requirement of 400 W and 250.
- Installation of timer
- Providing On/Off Switch in MCC and LCSS room's light fittings.
- These measures will reduce lighting load by 3.7 KW

Modifications done:

- Modification to LC3 switch gear room and mill house MCC room lighting circuit
- On/Off switch to control full room lighting is provided outside the rooms.

Implementation and savings achieved:

Implementation of above project resulted in Energy Savings of 0.295 lakh KWH of Electricity and financial savings of Rs 0.59 Lakhs in the year 2004-05.

Project No.25

Title of the project : Reducing electrical energy consumption by replacing the ID fan motors for FK1 and FK4.

Back ground :

The calcination and refractory materials produces lime by burning the lime stone in kilns and the flue gases exit through chimney. The various consumers of electricity in CRMP are Induced Draft fans,Cyclone . There were 5 Nos of ID fans of 660 KW capacity.

Observations:

It is observed that the ID fan motor of FK1 and FK 4 is drawing more current than desired

Technical and Financial Analysis :

Operating ID fan with new motor may increase efficiency .

Modifications done:

The ID Fans old motors have been changed with new motors for Klin No.1 & 4. Load on ID fan reduced by 6 Amps

Implementation :

Implementation of above project resulted in Energy Savings of 9.3lakh KWH of Electricity and financial savings of Rs 18.6 Lakhs in the year 2004-05.

Project No.26

Title of the project : Reducing fuel consumption in ore drying plant by using waste reclaimed oil.

Back ground:

Ore drying unit is installed at RMPHP area to dry the wet iron ore before sending to SMS. Originally wet iron ore is to be dried in rotary dryer by burning CTF or Furnace oil. As there is no provision of steam at drier plant, CTF or Furnace oil cannot be used and instead diesel oil is used .

Observations:

It is observed that diesel is used as fuel . Used lubricant oils are reclaimed by Hydraulic & lube oil cell. There is a problem in disposing of these waste oils as it creates environmental problem. This used lubricant oil can be used in rotary driers partially for drying Iron ore.

Technical and Financial Analysis :

Using used lubricant oil partially by mixing with diesel for drying of iron ore.

Modifications done:

Mixing of reclaimed waste oil with diesel oil in fuel tank.

Implementation:

Usage of used lubricant oil has reduced the diesel requirement in rotary driers by 40500 liters and resulted in energy savings of 400 Gcals and financial savings of Rs 7.47 lakh in the year 2004-05.

Project No.27

Title of the project : Reducing impeller diameter of centrifugal pump in Blast Furnace-1

Back ground :

In slag granulation Plant at BF, there are two centrifugal pumps for supplying water for slag granulation. These pumps are designed for Pressure of 6.3 Kg/cm² with motor rating of 630 KW. The pump flow is 1900 m³/hr.

Observations:

It was observed that due to high pressure of pumps,slag carryover to cooling water circuit resulting in damage to both pumps and pipe line. The pump life was also short. The pipe line was damaged for four times in one year causing enormous loss of production. Flow and pressure can be reduced.

Technical and Financial Analysis :

Trimming of impeller can reduce flow and pressure.

Modifications done:

The Impeller diameter is reduced from 1050 mm to 1000 mm to arrive flow requirement of 1840 m³/hr and pump discharge pressure of 5.7 Kg/cm². Reduction of impeller diameter has reduced the flow and minimized damage to pipelines and slag carryover is reduced. The load on motor is also reduced.

Implementation and Savings achieved:

Implementation of above project resulted in Energy Savings of 0.3 lakh KWH and financial savings of Rs 0.60 Lakhs in the year 2004-05 Other intangible benefits are wear of pipe and pump got reduced. Life of pumping system is increased. Basket and seals failure is also minimized. Nozzle plate and Nozzle life improved. Impact on vessel shell got reduced

Project No.28

Title of Project: Stopping of KA1 and KP1 Conveyor

Background:

The KA1 and KP1 conveyors are envisaged for transporting of Iron ore and Coke to Blast Furnace Bunkers. The KA1 & KP1 Conveyor capacity is 800 tons/hr each . It is required to transport about 11200 tons per day to meet Blast Furnace requirements.

Observations:

It is observed that KA1 conveyor is operating for 14 hours and 10 hours is kept idle. Similarly, the KP Conveyor is operating for 10 hours per day and 14 hours is kept idle. These conveyors are driven by 250 KW motors .

Technical and Financial Analysis :

These conveyors can be stopped after meeting the requirement at Blast Furnaces.

Modification done:

During idling, the motors of these conveyors are stopped.

Implementation:

Implementation of above measure resulted in energy savings of 17.6 lakh KWh and financial savings of Rs 36.6 lakhs in the year 2004-05.

Project No.29

Title of the Project: Replacement of thyristor based frequency convertors with IGBT type in AC roller table drives in MMSM

Background:

Medium Merchant & Structural Mill (MMSM produce finished products like Angles , Channels , Beams , Billets , Rounds etc from the semi finished Blooms sizing 250 mm * 250 mm*6 metre . There are 6 Nos of 473 KVA Frequency convertors (F.C.) These Frequency .Convertors are used to feed the AC roller table drive, which carry the rolled material from one portion of the Mill to other. Each AC roller table drives consist of 100 motors of 2.5 Kw.

OBSERVATIONS:

These Frequency converter fans are thyristor based and need to be upgraded due to technological obsolescence and non availability of spares. Present roller table motors are Russian motors with very less power factor(0.53). This power factor is valid if motor is run at 100 % speed. Once the motor is running at less than rated speed , the power factor demand from motor still worsens and it goes as low as **0.23** also. The old Frequency drives are equipped with thyristor based power devices , both at converter & Inverter. Because of its limitations in switching, the power factor requirement from the source doesn't improve any further with Thyristor devices.

Technical and Financial Analysis :

These frequency converters are replaced .The new Frequency Converters are equipped with the state of the art technology with both Converter & Inverter having **I.G.B.T. (Insulated gate Bipolar Transistor)** as a power device. These devices are **self commutating devices** , unlike the older power devices like thyristors , which are line commutating devices, i.e. Thyristors can not be switched Off as and when it's pulses are removed , where as IGBT's can be commutated (Switched OFF) . In additions to these, IGBT's are fast switching device about 10 times as fast as of thyristors. These features gives more scope for the user to programme the drive to his requirements. However , as the main motive of the up-gradation to IGBT based FC , was to overcome the obsolescence & the lack of spares availability , the new System is commissioned and ensured that the existing problems shall no more repeat. As, the know-how of the new system was limited because of its sophistication, the commutating features of IGBT are not utilized by the supplier , to its potential as far as power factor improvement is concerned.

It is observed that the new IGBT frequency converters are having inbuilt provision for power factor improvement and its potential was not fully exploited. With the existing system,the reactive power drawn by these motors is 1182 Kvar with active power of 516 KW at Power factor of 0.4. With new system,the power factor can be further improved.

MODIFICATION :-

Power factor is the cosine of angle between current & voltage in any system .If motor draws power with lagging factor , then current drawn by motor lags by Line voltage of the system. In old FC , the cumulative motor power factor varies from 0.53 to 0.23 depending on the speed at which roller table motor is running. That means current drawn by motor from the mains lags behind the line voltage between **59 degree to 76 degree**.

The very feature of IGBT , that it can be switched On & OFF , helps in controlling the firing of IGBT in such a way that , it is always fired in synchronism with the line voltage and of-course as per the demand. The line voltage feedback is taken to the cards for this purpose, and the software for the switching pattern of the IGBT's is modified. The process is done step by step , and finally **power factor of 0.999** is achieved using the modified software.

Implementation:

With the new system , the reactive power consumption is almost nil resulting in saving of reactive power drawn by these motors. Improvement in power factor from 0.4 to 0.9999 reduce transmission losses by 84% in the system with reduction in reactive power. This project resulted in energy savings of 0.54 lakh KWh and Financial savings of Rs 1 lakhs.

Power Consumption		512 KW
Reduction in Transmission losses		
PF Old	0.4	0.84
PF new	1	84
Transmission losses(2%)		10.24 KW
Loss reduction		8.6016 KW
No of Hours operation		6300 Hours
Energy Saved		54190.08 KW
Financial Savings		108380.16 Rs

Project No. 30

Title: Stopping Finishing mill train stands and shear motors during Square 90 and Round 80 rolling at MMSM.

Background:

The rolling of blooms in MMSM is done by the Main Drive motors .These are 20 nos of 600 Kw , 1000 Kw & 1700 Kw motors , for material reduction from Blooms to the end products and 3 nos of Shears of 265 Kw for cropping & chopping of bars into customer lengths. About 35 sections are rolled in MMSM , most of them , Rounds of different dimensions , Billet 65 , 75 ,90 and Structural like Angels , Channels & Beams.

The 20 stands driven by 600 / 1000 / 1700 Kw motors in MMSM are divided into 3 Mill train namely Roughing Mill Train, Intermediate Mill Train & Finishing Mill Train with 8 stands , 6 stands & 6 stands and one shear respectively in each Mill train . Each profile rolled in MMSM have different and unique stand configuration Out of 20 stands , all stands are not required and number of stands required for rolling varies from 17 to 20 , depending on stand configuration .

Observations :-

It is observed that the rolling configuration of Round 80(Ro 80) & Square 90(Sq 90) ,FMT(Finishing Mill train) stands (8 nos) & 500 Kn shear is not required to be in line during rolling. However , to fulfill the downstream interlocks of cooling bed & Mill ,that are associated for smooth running of the equipment , One

no of 1700 Kw motor and 500 Kn shear motor is required to be “On condition ” with their Field winding in charge condition. Hence they are kept “On” during Sq 90 & Ro 60 rolling. In addition to these, the drives of Centralized ventilation no- 3 , 3 nos of 160 Kw motor and 1 no of 5 Kw motor are required to be made On to ensure adequate cooling and interlock provisions. These profiles (Square 90 & Round 80) are rolled for 60 days (1200 hrs) in a year. Idle running of Finishing mill train and other auxiliary drives is causing wastage of energy to the extent of 514 KW.

Technical and Financial Analysis :

The energy loss due to the running of Stand 20 , 500 Kn shear & Finishing Mill Train can be avoided if FMT & CV3 is not kept in running condition during SQ90 & Ro 80 rolling .

The downstream interlock for smooth running of Mill requires following signals healthiness.

- Cooling bed ready
- FMT Roll mode
- 800 Kn Shear
- Supplying conveyors ready

These signals are to be programmed in flash ROM in PLC's

Modifications done:

These signals are programmed in flash ROM in 3 nos of Mill PLC's namely PLC 1.4, 1.7 & 1.8. The application software of these PLC's (PLC 1,4 , 1.7 & 1.8)are downloaded in programming stations & studied in depth . To get the requisite outputs for satisfying the interlocks of the Mill , 6 nos of 4 pole switches are installed in PLC's and their signals are taken to them. Using these Inputs ,Logics are developed, algorithms are prepared , modifications are incorporated in already existing PLC application software and finally the requisite software is generated .The program is tested successfully and finally incorporated in May 2004 during Sq 90 profile rolling Subsequently the same programme is modified for RO 80 profile & incorporated in the PLC's.

Implementation Benefits :-

Implementation of above resulted in electrical energy savings of 6.17 lakh KWHs and financial savings of Rs 12.34 lakhs in the year 2004-05

Project No.31

TITLE OF THE PROEJCT:.. CONVERSION OF FURNACE HYDRAULIC MOTORS FROM DELTA WINDING TO STAR

Background:

The reheating furnace reheats the bloom before rolling into angles and structurals in Mill stands. The furnace is walking beam type where in bloom travel from charging side to discharge side . The bloom travel is achieved through the solenoid valve arrangements and the main hydraulic pumps. There are 3 hydraulic pumps of 90 Kw's, out of which one is standby. The full load current of these hydraulic motors is 176 amps and the hydraulic pump operates in a cycle time of 100 seconds ,where in loading time is only 10 seconds and remaining 90 seconds is unloading time

Observations :-

It is observed that these pumps are loaded to about **100 amps only** when the solenoid valves are actuated. In **no load condition** , they draw **51 amp**. These motors are connected in DELTA.

Technical and Financial Analysis:

As the motor , for most of the time is in unloaded condition , energy can be saved if the delta connected motor is converted to star connection.

The full load current for the star connected motor shall be $176 / 1.732 = 101.6$ amp , which is less than full load current requirement (100 amp).

Modifications done:

The winding of one motor is converted to star by manipulating its six leads in terminal block . After modifications , the OL relay setting of motor is changed from 156 amp to 101 amp and operation is observed for 1 month. It is observed that the no load current is reduced from 51 amps to 24 amps after modification. Later , this modification is implemented remaining four motors.

Implementation:

Implementation of above project resulted in electrical energy savings of 4.77 lakh KWh and Financial savings of Rs 9.44 lakhs in the year 2004-05

Project No.32

Title of Project: Energy Conservation in HP Descaling System in LMMM

Brief Description of project:

In Light and Medium Merchant Mill, blooms discharged from Walking beam furnace are passed through High pressure descaling sprays for removal of scale, before rolling in Stand BH-1. The descaling is performed by 2 nos of High pressure reciprocating pumps drive by 90 KW motors. These pumps will be

working at full load to perform descaling and idling when there is no descaling. However it operates continuously, as blooms are discharged continuously

Observations:

It is observed that the billet Mill will be under shutdown for 12 hours every week .During shutdown period, these pumps are running though not required.

Technical and Financial Analysis:

During shutdown, the descaling pumps can be stopped after stoppage of rolling

Modifications done:

During shutdown, the descaling pumps are stopped after stoppage of rolling.

To ensure reliability as well as for avoiding delay in rolling, these pumps are started ahead of 3 hours of rolling.

Implementation:

Implementation of above measure resulted in electrical energy savings of 0.25 lakh KWh and financial savings of Rs 0.50 lakhs in the year 2004-05

Project No.33

Title of the Project: Reducing Electrical Energy Consumption in Hydraulic cellars in LMMM

Background:

In Light and Medium Merchant Mill, there are five hydraulic systems(1to 5) in cellars 1,2,5,7 and 10 to provide hydraulic oil under pressure for various operating cyclinders, motors which are required for rolling. The pumps installed and running for various cellars are given below.These pumps are driven by 45 KW motors and the total load is 900 KW in any given moment

Observation:

The Billet Mill will be under shutdown for 12 hours every week to take care of maintenance . It is observed that ,during shutdown day, the hydraulic cellar motors are also running idle and causing wastage of energy. The energy can be saved, if these pumps are stopped during the shutdown.

Hydraulic System	Cellar	Installed Pumps	Running Pumps
1	1	7	5
2	2	4	3
3	5	8	3
4	7	6	2
5	10	13	8

Technical and Financial Analysis:

Though five cellars can be stopped, the stand changing and its testing require operation. The pumps in cellar 5 & 7 can be kept running for testing of stand and pumps in remaining cellars can be stopped . The Pumps will be started as per rolling plan

Modifications done:

Three hydraulic systems were stopped

Implementation :

Implementation of above measure resulted in Electrical Energy savings of 2.12 lakh KWHs and financial savings of Rs 4.67 lakhs in the year 2004-05.

Project No. 34

Title of the Project: Reduction of Electrical Energy Consumption at BHS and CHS fans

Background:

In blast furnaces, BHS exhaust system is used for collecting dust while raw materials are conveyed through conveyors,screens . To evacuate the dust,there are 5 Nos of ID fans in Blast Furnace-I and 4 Nos of ID fans in BF-II. The ID fans are driven by 1000 KW motors.In cast houses, an exhaust system for evacuating the dust from cast house is operated by 6 Nos of ID Fans in Blast Furnace and 5 Nos of ID fans in Blast Furnace II. The ID fans are driven by 1000 KW motors.Total connected load of all these systems is about 21 MW.

Observations made:

During energy audit , the following points were observed.

- The flow delivered by fans is more than required.
- These fans are running with partially loaded condition.
- There was flow restriction in discharge side there by discharge pressure is more.
- The motorized discharge valves are not functioning properly.
- Suction is more due to ineffective operation of Guide vane.
- Suction hood seals were not proper..
- The ID fans are drawing amperage of 95-102 Amps during normal operation.

Modifications Done:

- Inlet Guide vane are made free
- Effective sealing is done by covering the suction area.

- Avoiding entry of dust to the system by proper unloading of dust
- Revised the discharge motorized valves.
- Controlled the flow.

Implementation :

Implementation of above measures on ID fans has reduced load on ID fan. This activity resulted in reduction of electricity consumption of 41 lakh KWH and financial savings of Rs 82 lakhs in the year 2004-05.

Project No.35

Title of Project: Simultaneous charging of battery coke and purchased coke in to Blast Furnaces.

Background:

In Blast Furnace, Hot iron is produced by reduction of oxides(Fe_3O_4) . To accomplish this iron ore,sinter ,fluxes and other materials like LD slag, Quartz are added. The main reducing agent in blast furnaces is high quality blast furnace coke.. The effective volume of Blast Furnace is 3200 Cum. The raw materials are received from various sources namely Blast Furnace Coke from Coke Ovens, Sinter from Sinter Plant, Iron ore and other fluxes from Raw material handling plant by various conveyors. These raw materials are stored in various bunkers at Burdern handling System and charged in to Main Conveyor D1 of Blast Furnaces. These raw materials are charged in sequence to maintain uniformity as well as better burden distribution in the blast furnace. To produce one ton of hot metal,520-525 kg of coke is required. The Coke produced in the battery is having low moisture (0.5%) and low ash (14%)content. The battery coke is transported from Coke sorting plant through conveyors(K0 and K50) and charged in bunkers at Burden handling system. The coke from bunkers is screened for proper size and charged in weigh hoppers of predetermined weight for charging in to B1 conveyor for on ward transfer to Main Charging Conveyor(D1) in Blast Furnaces. The material transported through D1 conveyor will be stored in material bins for charging in to Blast Furnace..

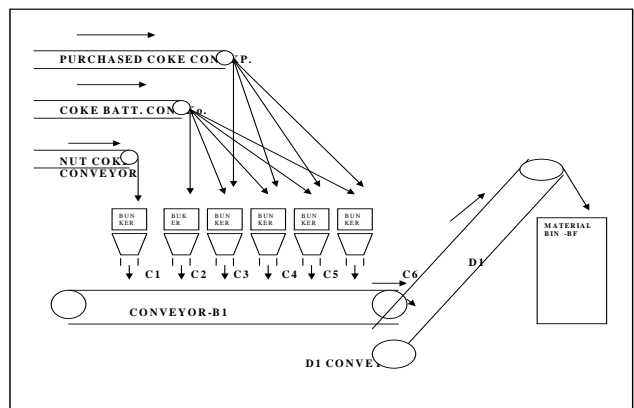


In burden handling system, there are six bunkers for charging of coke namely C1 to C6. C1 bunker is exclusively take care of nut coke in Blast Furnace. The set weight of these bunkers is given below. Each charge contains 18 tons of coke. The coke from Bunker C3 in BHS-I and C2 in BHS-2 will discharge coke on conveyor and conveyor transports the materials to BF Charging Conveyor(D1/D2) and later this charge goes to material bins located in Blast Furnace top and this coke will be charged centrally in the blast furnace. To achieve charge size of 18-19 tons,the two bunkers are opened simultaneously.

BHS-1	Bunker No	Set Weight of Bunkers	BHS-2	Bunker No	Set Weight of Bunkers
	C2	13 tons		C2	18 tons
	C3	18 tons		C3	13 tons
	C4	13 tons		C4	13 tons
	C5	6 tons		C5	6 tons
	C6	6		C6	6

Observations:

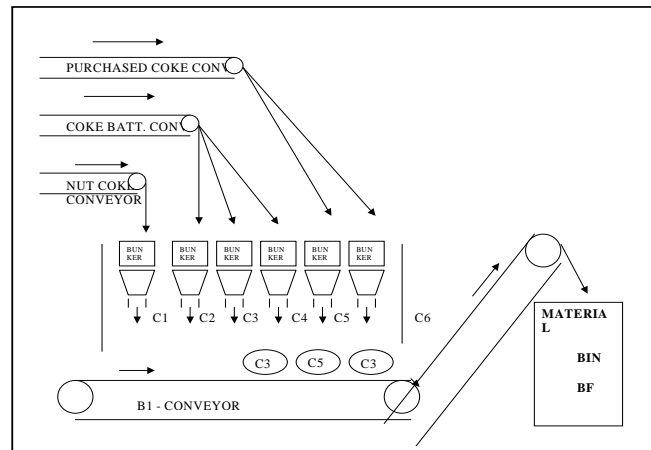
The coke production from coke oven battery can produce 10000 tons of hot metal per day. To produce 12000 tons of hot metal, 1200 tons of coke is purchased. The Purchased coke is received with high moisture(8-9%) .The purchased coke is received from Raw material handling plant is conveyed through KP conveyor and stored in any of the bunkers located in Burden handling system . The purchased coke is having high moisture, charging of purchased coke separately has impacted the furnace thermally and furnace operation becomes very unstable causing production



loss. To keep furnace thermally stable additional coke is charged .It is observed that there is no mixing of coke . The mixing of coke at yard is not possible due to layout constraints.

Technical and Financial Analysis:

- Mixing of coke on the B1 conveyor through separate programming
- Installing PLC for simultaneous opening of two bunkers.
- Blending of different quality of coke so that inferior quality coke charge can be reduced.
- Blending of coke on the conveyor can minimize thermal fluctuations.
- Storing purchased coke in c5 and C6 bunkers only



Modifications done:

As each charge contains about 18-19 tons of coke, the battery coke bunker as well purchased coke bunker will open simultaneously. The charging combination is given below. Since the material in Battery coke bunker(13 tons) and Purchased coke bunker(6tons) is not same, the timing of opening of bunkers will vary. The Purchased coke bunker will open after 3 seconds of opening of Battery coke bunker .The battery coke will form as initial layer on the conveyor and the purchased coke will be loaded in the center . Since the purchased coke bunker is of small quantity, it will unload fast as compared to battery coke bunker. This combination is made electrically operated via programmable logic controller. The timing is adjusted in a such a way that head and tail of a batch is pure battery and in center external coke is available in the conveyor D1. This system was implemented in BHS-2 after seeing its performance. Now blended coke is charged into the Blast furnace and the variation in parameters is minimized. Due to minimization of variation in parameters, Blast Furnace became thermally stable ,permeability improved and consequently more number of charges. It has improved productivity of blast furnace and coke consumption reduced by 18 tons /day/furnace.

BHS-1	Weight	BHS-II	Weight
C3	18 tons	C2	18 tons
C2+C5	19 tons	C3+C5	19 tons
C2+C6	19 tons	C3+C6	19 tons
C4+C5	19 tons	C4+C5	19 tons
C4+C6	19 tons	C4+C6	19 tons

Implementation:

Implementation of above measures has resulted in energy savings of 91980 Gcals and resulted in financial savings of Rs 753 lakhs in the year 2004-05.

Project No.36

Title of the project: Installation of lighting saver in Forge Shop

Background:

In forge shop, there are 108 Nos of 400 W HPSV lamps are glowing. Approximate load is 40 KW. These are connected from Load Distribution board. The lighting is required during night time only and programmable timer was introduced to switch on/off the lights at fixed times as per seasonal conditions.

Observations made:

- There is scope for reduction of energy consumption by adopting new technologies

Technical and Financial analysis:

- Installing prototype energy saver in the lighting circuit
- The Prototype energy save has inbuilt impedance coil and there is provision to reduce the voltage from 230 V to 215V. Reduction of voltage will save energy .

Modifications done:

Incoming cables connected to LDB were disconnected and connected to incoming side of energy saver and ongoing side of energy saver was connected to Load Distribution board. Thus LDB was getting its power supply from Energy Saver. The Voltage was reduced from 230 V to 215 V.

Implementation:

Installation of energy saver has reduced the energy consumption from 40 KW to 30 KW . This project has resulted in reducing electrical energy consumption of 0.4380 lakh units and financial savings of Rs 0.8760 lakhs in the year 2004-05.

Project No.37

Title of project: Improved usage of blast furnace gas in thermal power plant by increasing impeller diameter of ID fan of Boiler-1

Brief Description of the project:

The Thermal Power Plant at RINL is having five boilers of 330 T/hr, operating at 101 ata and 540°C. Three turbines each of 60 MW rating and one turbine of 67.5 MW rating are installed to meet the power requirements of steel plant. The steam generated from the Boilers is fed to turbines and turbo blowers for generation of electricity as well as supplying cold blast to blast furnace for Iron making. During the process of Steel making, various by-product gases like coke oven gas and Blast furnace gases are generated. These by product gases are used in various furnaces and coke oven batteries and surplus gas is supplied to TPP Boilers. The boilers are provided with multi fuel burners for firing of furnace oil, Boiler coal / Coke oven gas / Blast Furnace gas.

Observations:

Minimizing thermal energy consumption in Blast Furnace Stoves and Coke oven batteries coupled with increase in hot metal production has created huge amount of surplus Blast Furnace gas in the Steel Plant.

- Huge amount of Blast Furnace Gas is available for use in TPP Boilers
- The Calorific Value of Blast Furnace gas is low(715 Kcal/Ncum).There fore when it is burnt in boilers ,it results in huge amount of flue gas generation that existing Induced Draft fan is not able to accommodate the flue gas resulting in reduced steam generation
- The TPP boilers are designed to burn Blast Furnace Gas of calorific value of 840 Kcal/Ncum.
- About 50,000(35 Gcals/hr) Ncum/hr of Blast Furnace gas is bled to atmosphere
- Load on ID fan is increased not only due to usage of Blast Furnace gas but also air ingress across the flue duct.

Technical and Financial analysis:

Minimising the air ingress by repair of flue path

The existing ID fan is to be studied for its performance with respect to increasing flue gas handling capacity.

Increasing flue gas handling capacity by increasing impeller diameter

Before increasing impeller diameter,the fan has to be checked for its characteristics.

Modification done:

Checking of ID Fan:

The details of ID fan is given below.The fan internals of ID fan were inspected and found no abnormalities. Not much wear was noticed on Impeller and spiral casing. In fuel combination of BFG and Coal the scoop position was 100 % and approximate speed was 710/715 RPM The impeller diameter is increased from 3005 to 3255 mm by checking the clearance in the casing. Vane length was also increased .Both the impellers were balanced with assembling in a available spare shaft. After shutdown of the Boiler both ID fan rotors were taken out and cones were removed. Modified impeller were assembled and both fans were fitted back. After checking the clearance in the casing,the impeller is fabricated in house and installed in the circuit

Implementation:

Increasing impeller diameter has improved flue gas handling capacity from 138 cum/sec to 149 Cum/sec. It has increased the flue gas handling capacity by 41000 Ncum/hr. It has resulted in increased intake of Blast Furnace Gas by 25000 Ncum/hr . Implementation of the project has resulted in energy savings of 156585 Gcals and financial savings of Rs 62 Millions in the year 2004-05.

Project No.38

Title of Project: Replacement of Air heater baskets in Boiler -1

Title of the Project: Improvement in performance of secondary air pre heater of boiler-1 at TPP

Background :

The Secondary Air for combustion in boilers is preheated in Rotary Air Pre heater. Preheating of Air is very important in combustion process. The heating process depends on the condition of the baskets. The draft loss across pre heater also depends on condition of basket.

Observations made:

It was also found that the functioning of air preheater baskets were damaged resulting in loss of air and consequent pressure build up in the duct as well as reduced heat recovery.

Technical & Financial analysis made:

All baskets were inspected and majority of the baskets in cold end were replaced. Some hot end side baskets were also replaced.

Impact of implementation:

Replacement of Air heater baskets has secondary air temperature from 210 deg.c to 345 deg.c and draft loss reduced.. Implementation of this measure resulted in energy savings of 66825 G.cal and financial savings of Rs 280 Lakhs.

Project No.39

Title of the project: Replacement of Tubular air heater in Boiler-1

Background :

The Thermal Power Plant is having five boilers of 330 T/hr, operating at 101 ata and 540°C. The boilers are multifuel fired with combination of coke oven gas, Blast Furnace gas, and Boiler coal.

Observations made:

The primary air to the boilers is supplied through tubular air heater for bowl mills. The primary air fan is operated by 450 KW motor .It is observed that the tubular air heater is damaged and resulting in leakage of primary air into the flue gas circuit. Leakage of primary air is increasing load on primary air fan and air leakage into flue path has pressurizing the ID fan. Pressurization of ID fan is restricting boiler firing capacity. Due to leakage in tubular air heater,the air supply from Primary air fan will be sufficient for two bowl mill only .

Type	:	Double suction radial
Capacity	:	138 M3/Sec
Total head	:	550 mm WC
Speed	:	715 RPM
Power transmission	:	Hydraulic coupling.

Modification done:

Replacement of Air tubular heater in Boiler-1 during capital repair

Implementation:

Replacement of Air tubular air heater in Boiler 3 has reduced load on PA fan and now it is meeting air requirements for three bowl mills instead of two earlier. Implementation of this project has resulted in energy savings of 4.5 KWH and 16096 Gcals and financial savings of Rs 74 lakhs in the year.

Project No.40

Title of the project: Replacement of HP heater in Boiler Feed Water Circuit

Background:

The Thermal Power Plant is having five boilers of 330 T/hr, operating at 101 ata and 540°C. The boilers are multifuel fired with combination of coke oven gas, Blast Furnace gas, and Boiler coal. The boiler feed water is heated from condensate temperature of 50 deg, c to 230 deg.c through various heaters (both LP heaters and HP heaters)

Observations made:

It is observed that HP heater –3 was taken out of service due to heavy leakages. It has resulted in lower feed water temperature.

Modification done:

Installed new HP heater-3 in Boiler Feed water circuit

Implementation:

Commissioning of HP heater-3 in Boiler Feed water circuit has improved the over feed water temperature by 8 deg.c. Implementation of this project has resulted in energy savings of 77088 Gcals and financial savings of Rs 370 lakhs in the year 2004-05.

Project No.41

Title of the project: Reduction of full return heats

Background:

In LD converter, steel produced by blowing hot metal with oxygen and adding ferro alloys and coke during tapping. After that the steel is sent to continuous casting machine for casting as blooms.

Observations:

It is observed that the full heats are getting returned and re-blown again to send it to casting due to following reasons:

- ❑ Off- Grades are due to deviation in blowing and tapping practices
- ❑ Machine related problems are due to tundish and spray nozzle.
- ❑ Ladle related problems due to bottom-purging failures and slide gate failures.
- ❑ Low temperature due to non-placement of ladle cover, improper heating of ladles

Technical & Financial analysis made:

- ❑ The off –Grades can be reduced by good blowing practices, timely changing of tap hole, reduction of carry over slag in tapping and proper addition of ferro alloys and coke.

- ❑ Machine related problems can be reduced with nozzle checking, spray checking.
- ❑ Ladle related problems can be reduced by testing bottom purging with nitrogen and ladle free opening.
- ❑ Low temperature can be avoided by sufficient heating of ladles, on heating of ladles up to just before tapping and by monitoring the ladle circulation time & ladle return time.

Modifications:

The following are implemented.

- Good blowing practices, timely changing of tap hole, reduction of carry over slag in tapping and proper addition of ferro alloys and coke
- Nozzle checking, spray checking
- Testing bottom purging with nitrogen and ladle free opening.
- Heating of ladles up to just before tapping
- Monitoring the ladle circulation time & ladle return time

Implementation:

Implementation of above measures reduced returned heats from 195 to 154 no.s and reduced of re-blowing the steel by 5040 tons. Reduction of reblowing reduced oxygen consumption 31160 NM3 in this year. This project has resulted in energy saving of 51.4 Gcal and financial saving of Rs 0.55 lakhs in year 2004-05.

Project No.42

Title of the project: Reduction of partial return heats

Background:

In LD converter, steel produced by blowing hot metal with oxygen and adding ferro alloys and coke during tapping. After that that steel send to continuous casting machine for casting as blooms. Some heats are returned partially that means after casting some steel .

Observations:

The partial returned heats are recycled after adding some hot metal in converter and blowing again to make steel. It is observed that partial return heats are occurring due to following reasons:

- ❑ Casting stopped due to tundish and machine problems.
- ❑ Ladle problems due to slide gate related problems.
- ❑ Low temperature of steel in ladle due to uncovered ladles, which results in heat loss.

Technical & Financial analysis made:

- Machine related problems can be reduced with nozzle checking, spray checking.
- Gega cutting machines improves the casting machine performance and partial returned heats reduced.
- Monitoring ladle circulation time and ladle return time tapping temperatures can be decided properly.
- Putting ladle covers helps in reduction of temperature drop.
- Proper monitoring and checking of slide gate mechanism reduces the ladle problems.

Modifications:

The following activities are implemented

- Nozzle checking, spray checking
- Monitored ladle circulation time and ladle return time and ensured the no overheating takes place.
- Putting ladle covers
- Monitored and checked slide gate mechanism continuously.

Implementation:

Implementation of above measures reduced re- blowing of partial return heats from 652 to 534 No.s. and reduce blowing of 6005 tons of liquid steel. Reduction of re-blowing reduced oxygen consumption 340480 NM3 in year. This project has resulted in energy saving of 544 Gcal and financial saving of Rs 5.5 lakhs in year 2004-05.

Project No.43

Title: Construction of baffle wall in WRM Mill reheating furnaces

Background:

The billets are reheated in WRM reheating furnace for further rolling in to wire rods . These furnaces are heated by mixed gas and flue gases exit through chimney. The walking beam furnace contains four zone with heat capacity of 40 Gcal/hr

Observation:

The soaking zone is installed with bottom zone burners. It is observed that these bottom zone burners flame is directly hitting the ends of structural elements of movable skids and damaging the skids.

Damage to skids is causing furnace skids and billet heating is not proper. It is also observed that the turbulence in the furnace is not proper and flue gas residence time is less.

Technical and Financial Analysis:

Construction of baffle wall in the soaking zone will avoid the flame directly hitting the movable skids and reduce damage. In addition to reduce damage to furnace parts, construction of wall decreases the flue gas velocity and results in improved combustion of fuels in the furnaces. Flue gas temperature reduces. More resistance to flue gas and better recirculation inside furnace. It will help in increased heat regeneration inside the furnace.

Implementation:

The above measure was implemented in Wire rod Mill reheating furnace during capital repairs. It has contributed in reduction of heat consumption at WRM by 2 Mcal/t of billets heated. It has resulted in annualized energy savings of 2072 Gcals and annualized financial savings of Rs. 8.39 Lakhs for the year 2004-05

Project No.44

Title: Replacement of Air Recuperator in Billet Mill Furnace # 1

Background:

Heat energy from the reheating furnace flue gases is recovered by installing air recuperator where in the cold incoming combustion air is heated. Air recuperator preheats the combustion air. Preheated combustion air results in increased flame temperature and contributes in reducing the fuel input to the furnace.

Observation:

The combustion air temperature after air recuperator is 330 deg.c as against the design level of 420 deg.c on account of damaged recuperator tubes. Damaged tubes resulting in reduced pressure of combustion air to the furnace and also resulting in loss of heat to the atmosphere. Leakages in Recuperator tubes is also increasing the power requirement of combustion air blowers. Damage to textile type air compensators is also contributing loss of air.

Technical and Financial Analysis:

Fabrication of air recuperator will not only reduce cost but also saves procurement time. Replacement of air recuperator will increase the thermal efficiency and results in reduced fuel input. Replacing textile type compensator with metallic type reduces damage.

Implementation:

Installed in the reheating furnace flue gas path. It has resulted in increasing the combustion air temperature from 300 deg.c to 430 deg.c . Improvement in combustion air temperature has facilitated in reducing the fuel input to the furnace.

It has resulted in annualized energy savings of 17615 Gcals and annualized financial savings of Rs.71.5 Lakhs for the year 2004-05

Project No.45

Title: Combustion improvement at Blast Furnace stoves.

Back ground:

The blast furnace stoves are envisaged to heat blast air. Each blast furnace is having 4 Nos of stoves. The energy requirements for heating of stoves comes from blast furnace gas.

Observations made:

The heat consumption at blast furnace stoves is dependent upon the calorific value of mixed gas as well as air fuel ratio. Energy losses in blast furnace stoves is on account of conduction. Damage to refractory increases heat consumption.

Technical and financial analysis:

- i. Optimizing air fuel ratio through continuous analysis.
- ii. Repair of stoves for refractory .
- iii. Insulation of cold blast line

Implementation:

Implementation of above measures resulted in reduction of fuel consumption in blast furnace stoves. This project has resulted in reducing energy consumption by 39208 Gcals and financial benefit to the extent of Rs 159 Lakhs in the year 2004-05.

Project No.46

Title of the Project: Modification on Bloom Pusher of Reheating Furnace

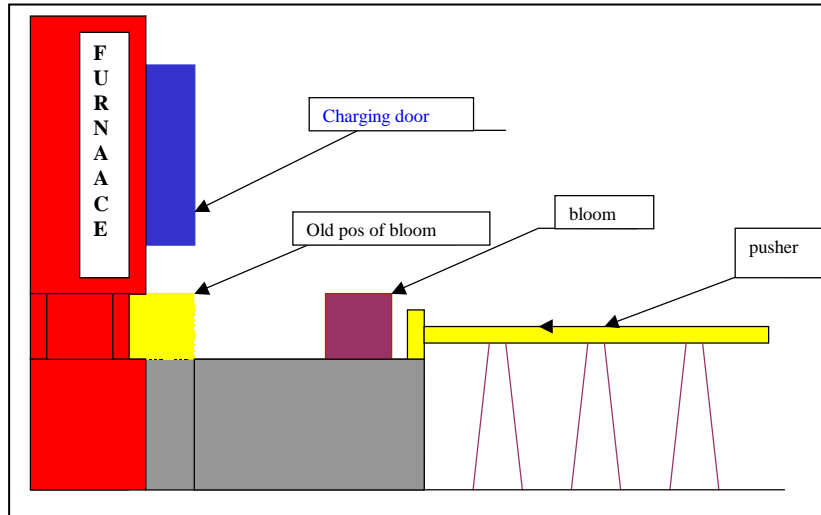
Background:

The reheating furnace is envisaged to reheat the blooms of 250*250 mm to a temperature of 1180-1190OC for further rolling into angles, structurals and billets. The furnace will heat the blooms at the rate of 130t/hr. The furnace is five zone both bottom heating and top heating as well as soaking zone furnace. The flue gases will exit the furnace at flue gas temperature of 550-600 °C .

Observation made:

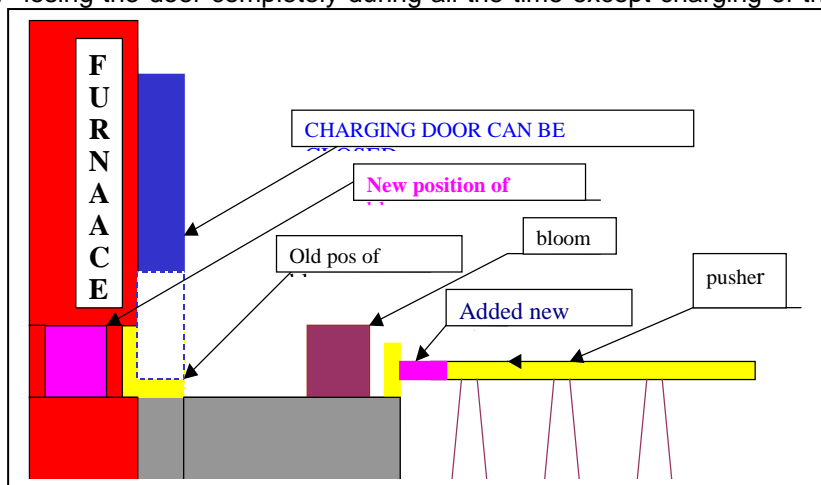
During energy audit, it is observed that the flue gas losses through door is high due to non closing of charging door. The blooms will be pushed with the help of bloom pusher into the furnace. In existing system, the blooms will be pushed beneath the charging door. So the charging door cannot be closed and will always be in open condition while rolling is going on.

This opening of the door allows the heat to go away from the furnace to be outside environment as a waste / loss. These openings of the door not only allow the heat to go atmosphere as a waste but also raise the temperature of the environment. This temperature causes the damage to the near by the equipment like charging conveyor rollers and disturb the working environment. It is observed that heat loss of 0.806 Gcal/hr is lost to atmosphere due to opening of charging door.



Technical and Financial Analysis:

The heat loss can be minimized by losing the door completely during all the time except charging of the blooms



Modification:

The heat loss can be minimized by losing the door completely during all the time except charging of the blooms. To close the door fully there should not be any bloom just beneath the door. To satisfy this condition boom is to be pushed further inside the furnace. To clear the bloom beneath the door the pusher has to move forward further a stroke of 400 mm. Pusher drawing has been studied thoroughly and found that there is a scope of using the same drive mechanism. The modified situation can be had by just adding a spool piece to the pusher beam. This is the only cheapest possible solution. Accordingly a spool piece was made at the site and added to the pusher arms. The stroke length is adjusted accordingly by relocating the striker plates and end limit switches. So, as to get an additional



stroke of 400 mm. The charging door position is given in figure.

Implementation:

Closing of charging door has resulted in energy savings of 6967 Gcals and financial savings of Rs 28.3 lakhs in the financial year 2004-05.

Project No.47

Title of the project: Reduction of power consumption in Sinter Plant.

Background ::

Sinter Plant is a bulk consumer of energy. The majority of electricity is consumed in the operation of exhausters fan motors, de dusting fan, and sinter cooler blower fans.

Technical and Financial Analysis:

Specific power consumption for the year 2003-04 was about 50.74 KWH/t of charge sinter. Specific power consumption in Sintering plant depends on the following factors.

- 60-65% of energy is consumed in sinter machine exhausters.
- Capacity utilization of equipment.
- Operation of HT blowers and Exhausters in Straight-line cooler and ACP respectively.
- Minimizing idle running of equipments.

Modifications done:

- ❑ Fixing of energy meters in all load block sub stations, Exhausters of sinter machines, cooler blower fans and ACP exhausters.
- ❑ Regular calibration of transducers connected to SCADA.
- ❑ Recording of all energy meter readings.
- ❑ Repair/Rectification of main exhauster and blower dampers.
- ❑ Reducing idle running of equipments during machine stoppages and no demand periods.
- ❑ Verification of SCADA power consumption figures
- ❑ Improving equipment utilization.

Implementation and Savings Achieved:

Implementation of above measures resulted in reduction of power consumption in Sinter Plant. It has resulted in Electrical Energy savings of 105 lakh KWH and financial savings of 220 lakhs in the year 2004-05.