1. 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.

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

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 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).

II. 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	2001-02	2002-03	2003-04
Coking coal	t	2992194	3196471	3158374
Coke	t	107842	100422	268817
Boiler coal	t	1376766	1367060	1381524
Furnace oil	KL	1409.3	396	966
Diesel	KL	2311.553	2842.9	2274
Electricity purchased	Lakhs KWH	332.09	848.58	904.88
Electricity exported	Lakhs KWH	2490.2	1647.1	1180.2
Electricity consumption	Lakhs KWH	17676.5	18836.1	19545.7
Monetary value of energy consumed				
Coking coal	Rs.lakhs	86313	100471	99820
Coke	Rs.lakhs	4547	6216	21583
Boiler coal	Rs.lakhs	12776	13021	13539
Furnace oil	Rs.lakhs	130	39	112
Diesel	Rs.lakhs	367	571	277
Electricity purchased	Rs.lakhs	2562	5347	6183.79
Electricity exported	Rs.lakhs	4883.3	3261.3	2382.8
Energy cost	Rs.lakhs	101812	122403	139133
Manufacturing cost	Rs.lakhs	278186	308544	344017
% energy consumption in manufacturing cost		37	40	40

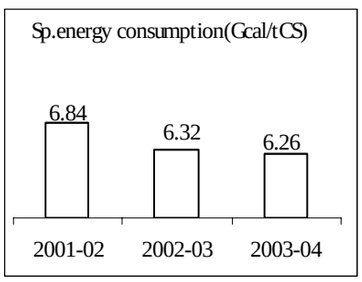


Fig.3

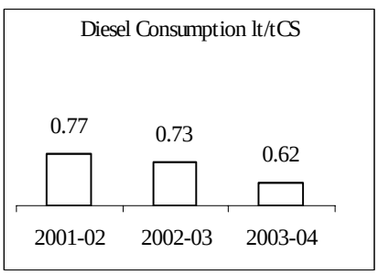


Fig.4

III. 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 enclosed herewith.

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 Joint General Manager. He 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. Invovement 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.Awarenss 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.

To strengthen energy conservation movement at RINL,22 Departmental Energy teams(DET) have been constituted in major energy consuming departments. The Energy consumption of these departments constitute 95% of the total energy consumption of the plant. Senior Executives of EMD coordinate the energy conservation activities in these departments. The day to day performance of DET's are monitored by concerned Head of Department (HOD). The Joint General Manager is overseeing the activities of energy coordinators, DET’s and Energy Conservation Cell.

IV. Energy Conservation Achievements

During the last three years, RINL implemented 210 energy saving ideas generated from various sources, resulting in 8.5% reduction in specific energy consumption .Some of the energy conservation projects implemented during the year are:

- Injection of reversal pause coke oven gas into blast furnace gas by providing inter-connection at axis-35.
- Electricity conservation at raw material handling plant by minimizing idle running of cone crushers, starting of yard conveyor motor (co-34) in delta and running in star, replacement of oversized motor at coneyor-57, replacement of oversized motor at coneyor-53.
- Reduction of electricity consumption at CRMP kilns by plugging air leakages, by contact cooler modification, lighting circuit modification at MCC & LCSS of CRMP
- Reducing electrical energy consumption of water supply system by automation of pumps at pump house-26, keeping one aerator in ‘stand by’ mode at 9 MLD pump house, avoiding double pumping at treatment plant no: 3
- Increasing usage of BF gas intake to boilers, Optimizing fuel consumption at boilers by improvement in performance of secondary air pre heater of boiler-2, 3,5.
- Reducing steam consumption at turbo blower-3 by improving the performance of 2nd stage intercooler as well as improving vacuum of condenser of turbo blower-3

- Reducing steam consumption at turbogenerator-3 by improving vacuum of condenser from 0.69 kg/Sqcm to 0.85 kg/Sqcm
- Reducing cold blast consumption in Blast Furnaces from 1282 Ncum/thm to 1211 Ncum/thm by minimising wastage of air through muffler chamber.
- Reducing power consumption in blast furnaces by installing vacuum contactors for BF slag granulation motors and space heaters for SGP motors.
- Optimising electricity consumption at CDCP mill fans by optimising number of fans in operation.
- Recycling of Metallurgical waste, LD slag in sinter plant by improving coordination with field machinery department.
- Reducing power consumption at MMSM from 96 Kwh/tip to 91 Kwh/tip by reducing field currents of 9 nos 1700 kw dc motors and 11 nos of 1100 kw dc motors during non rolling period.
- Reducing electricity consumption at chilled water plant-4 by adjusting the blade angle from 50^{o} to 45^{o} during dry season.
- Reducing electricity consumption at compressor houses by rationalisation of pressure for various customers.

V. 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

Fig 5: Energy conservation projects

VI. Environment and Safety

Environment protection measures have been incorporated in the design stage itself with an investment of Rs 488 cores. The major environment protection facilities are detailed at Fig 6.
The commitment towards Environment is enunciated through the company's Environment Policy. A copy of the same is enclosed. RINL obtained ISO 14001:1996 for Environmental Management System.

- Elaborate dust extraction systems at all production units
- Mechanical, Biological and Chemical Treatment Plant for treating toxic effluents.
- Sewage treatment plants for effluent treatment

Fig6: Environmental protection facilities

Solid waste recycling has been given prime importance in RINL. Some of the fresh initiatives taken during the year at RINL are given at Fig 7. With this the solid waste recycling increased from 76% to 78%.

- Recycling of Anthracene oil
- Recycling of Medium hard pitch
- Recycling of BF gas sludge into Sinter plant
- Recycling of GCM sludge
- Usage of LD slag in Sinter plant, Blast Furnaces, Steel Melt Shop.

Fig7: Solid waste recycling

As a commitment towards Safety and occupational health, RINL is following occupational health and Safety Management Systems (OHSAS: 18001:1999). Towards, this, RINL has formulated Occupational health and safety policy .The Occupational health Service and Research Centre is carrying out many activities as part of Occupational health and safety policy. RINL has been awarded OHSAS: 18001, 1999 certificate in the month of April 2002.

The efforts of RINL are being recognised by various forums. In addition to National Energy Conservation Award in Integrated Steel Sector, RINL has been bestowed with Prestigious "Prime Ministers Trophy-2003" for Steel Industry for overall improvement . Some of the major awards received by RINL are given at Fig.8

- Energy conservation awards (continuous) by Ministry of Power.
- PM Trophy for Best Steel Plant
- MOU award
- SCOPE Award
- Environmental awards
- Safety awards
- Quality awards
- Quality circle awards
- Raj bhasha awards
- Best tax payer award
- Best management award

Fig 8. *Major Awards*

The Effectiveness of Energy Efficiency Movement at RINL has been recognised internationally. The International Iron and Steel Institute, Brussels in its Publication of Global Sustainability Report lauded the efforts of RINL in Energy Conservation. The Extracts of this publication is given below

"The commitment of top management as well as the participation of employees has facilitated energy conservation at Rashtriya Ispat Nigam Limited's (RINL's) Visakhapatnam Steel Plant (VSP) in India. The company appointed a designated Energy Manager in 2002, thus giving further momentum to energy conservation efforts. Employees were motivated to save energy and to suggest ways in which energy efficiency could be improved by actively participating in Samalochana (an internal communication forum) and quality circle projects.

Energy conservation measures put into effect at little or no cost over the past three years at VSP have resulted in significant energy savings. Through the improvement of the calorific value of coke oven gas, the reduction of fuel gas consumption, increasing blast furnace gas utilization in thermal power plant, optimisation of coke consumption in blast furnaces, the installation of vector control for conveyors and stackers, and other measures, the energy intensity of crude steel at the plant was reduced from 28.6 GJ per tonne in 2001 to 26.2 GJ per tonne in 2003."

Today RINL is moving forward with an aura of confidence and with pride amongst its employees, who are determined to give their best for the company, so that it can scale higher and higher heights.

Rashtriya Ispat Nigam Ltd
Visakhapatnam Steel Plant

Brief Description of Energy Conservation Projects taken up during the year 2003-04

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**.**

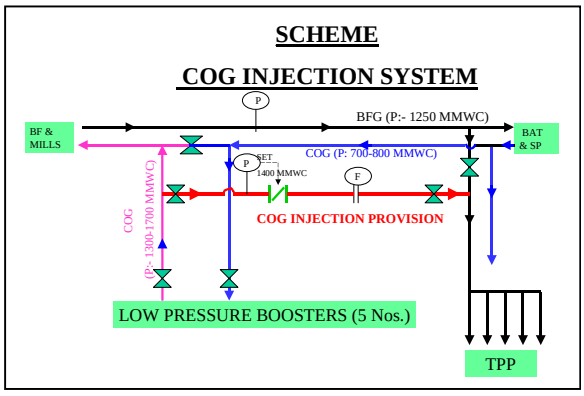
57 Energy Efficiency improvement projects were implemented during the year 2003-04. Out of these projects Project No.1 ,35 & 36 are trend setters in Indian Steel Industry. These projects are unique in nature and has involved lot of technological innovation.

Project No.1

Title of the Project: **Injection of Reversal pause coke oven gas into BF gas line supplied to TPP**

Background of the project:

To increase the calorific value of BF gas supplied to TPP from existing 710 Kcal/Ncum to 760Kcal/Ncum to improve quality and to reduce bleeding of Coke oven reversal pause gas.



Observations made:

a) Efficient utilization of Co in Blast Furnace itself is the main reason for low BF gas CV

b) The Reversal of coke oven battery takes place for every 20 minutes and this reversal gas cannot be used presently.

c) Usage of this gas by injecting into Blast Furnace Gas will improve calorific value. Injecting this gas into BF gas line at Axis-35 requires modification.

Technical & Financial analysis made:

a) High pressure Co gas from discharge header of Low-pressure boosters at Co gas Boosting station is tapped and injected into the Blast Furnace line of TPP. To regulate the flow and pressure, a pressure control valve is provided along with flow measuring unit

Impact of Implementation:

This modification implemented in the month of Sep-03. This project has given financial benefit of Rs 420lakhs in the year 2003-04 and resulted in energy savings of 75663Gcals.

Project.No: 2

Title of the Project: Minimizing Idle running of Cone Crushers at Raw Material handling Plant

Background of the project:

At Raw Material handling Plant, Cone crushers are used for crushing of Iron ore lumps. Normally three cone crushers are in operation where as two cone crushers are sufficient for required crushing operation

Observations made:

The reasons for part load operation of three cone crushers is given below

a) There is no provision for stopping crusher from Ore Control room

b) No continuous manning provision at crushing plant

c) No automatic check or control about number of crushers in operation.

Technical & Financial analysis made:

Programming done in Conveyor PLC system software and linked the crusher hardware with PLC to provide facility to stop crushers from Ore Control Room. This program is further extended to select only two out of three crushers there by automatically disabling the third crusher running. Suitable Signals are provided in operator's video console about selection of crushers.

Impact of implementation:

Implementation of above project has resulted in Energy Savings of 8.7 lakh kWh and financial savings of Rs17.7 lakhs.

Project No .3

Title of the Project: Starting of Yard Conveyor Motor (CO-34) in DELTA and running in Star. -

Background of the project:

The Yard conveyor is equipped with motor of 160 KW and 1500 RPM. This conveyor always operates at load of less than 60%.

Observations made:

a) As the motor is operating at load of less than 60%, this motor can be run in Star mode. However this conveyor cannot be started in star mode, in case if it was stopped with Load in previous occasion

Technical & Financial analysis made:

a) Modification of Circuit was done.

b) The Conveyor starts in Delta to take care of starting load and after ten minutes, it runs in Star mode.

Impact of implementation:

Implementation of above project on CO-34 conveyor. It has resulted in energy savings of 1.35 lakh kWh and financial savings of Rs 2.7 Lakhs in the year 2003-04.

Project No: 4

Title of the Project: Replacement of Oversized motor at Coneyor-57

Background of the project:

The Coal conveyor –57 is driven by Motor of 180 KW and 1500RPM.

Observations made:

The Conveyor is always under loaded as the motor is oversized. Due to partial loading of motor, the Power factor of motor is low (0.45).

Technical & Financial analysis made:

a) Replacing 180 KW motor by 75 KW motor

b) Modifying motor foundation.

Impact of implementation:

Replacement of oversized motor has resulted in energy savings of1.81lakh units and financial savings of Rs 3.7 Lakhs in the year 2003-04.

ProjectNo.5

Title of the Project: Installation of Vector Control in CO-44 Conveyor

Background of the project:

The Coal Conveyor-44 is driven by 160 KW motor. The power consumption was high due to more number of start and stops.

Observations made:

Installation of Vector drive can reduce energy wastage in frequent start and stops.

Technical & Financial analysis made:

One Vector control at VF-31is not used and it was installed on CO-44 conveyor.

Impact of implementation:

Implementation of Vector control on CO-44 has reduced wastage of power and it has resulted in energy savings of 0.7 lakh units and financial savings of Rs 1.4 Lakhs in the year 2003-04

Project No: 6

Title of the Project: Replacement of Oversized motor at Coneyor-53

Background of the project:

The Coal conveyor –53 is driven by Motor of 132 KW.This motor is used for running long inclined conveyor to take care of the load of mixer. As the mixer was abandoned, this long conveyor is not required. Hence, the conveyor was shortened. However, the motor and gearbox remains same.

Observations made:

Due to partial load of motor, the Power factor of motor is low (0.45). It results in huge loss because reactive power is high.

Technical & Financial analysis made:

a) Replace 132 KW motor by 55 KW motor of same speed

b) Modifying motor foundation.

Impact of implementation:

Replacement of oversized motor has resulted in energy savings of 1.3 lakh units and financial savings of Rs 2.70 lakhs in the year 2003-04.

ProjectNo:7

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

Background of the project:

In Calcination and refractory material plant, there are five kilns for production of lime. The flue gas is evacuated by an ID fan. The Capacity of ID fan is 630 KW and with flue gas handling capacity of 200000 M3/hr at temperature of 1050C.In the present system in kiln charging area and in bag house area lot of leakages are prevailing. Therefore, motors are taking extra load and in turn taking more current.

Observations made:

Leakages are prevailing in the suction path of the Kiln Bag filter. If these points are plugged, the motor current decreases.

Technical & Financial analysis made:

Located and covered the cracks, rat holes and tightened all flange bolts. Plugged all leakages. Bag house screw conveyor covers are covered with sealant. This reduce load on ID fan by 10 Amp.

Impact of implementation:

Implementation of these activities resulted in energy savings of 4.81 Lakh Kwh and financial savings of Rs 9.7 Lakhs in year 2003-04

ProjectNo:8

Title of the Project: Reducing electrical energy consumption by Delta to star connection modification in CRMP motors.

Background of the project:

The motors of the systems (V20, V21, 11.2 DE system, V.Fan, LC3&V50s) are connected in delta mode and are operating approximately at 50% capacity Operation of these motors in low load lead to inefficient operation.

Observations made:

Source of the drives like fans, compressors, aspirator motors are taking less than 60% of the motors capacity and are connected in delta connection. Power consumed by the motors is high at low loads. Hence, if the motors are run in star (reduced voltage) the power consumption will reduce. This may be applicable for the drives, which are operating at less than 60% of their capacity.

Technical & Financial analysis made:

Tempering kiln drives, motor connections are converted from Delta to Star. Fan motor (LC3) and DE system (11.2) are also connected in star

Impact of implementation:

Conversion from Delta to Star for these motors has reduced part load operation and resulted in Energy savings of 10.47 lakh KWH and financial savings of Rs 21.1 lakhs.

Project No: 9

Title of the Project: Reducing electrical energy consumption by contact cooler modification

Background of the project:

In CRMP, Contact cooler is provided for cooling of hot lime, which is discharged from Kiln. Contact cooler is provided with 4nos vibrating feeders of 0.6kw each.

Observations made:

Each kiln contact cooler is provided with 4nos of vibro feeders, which consumes 2.4 kw/kiln. In the present system the product cooling is not taking properly and more dust is generated due to improper discharge of feeders.

Technical & Financial analysis made:

To overcome this problem contact cooler is to be modified to accommodate more space for effective cooling and proper distribution of the material. With this modification, one vibratory feeder is sufficient to transfer the product to the weigh belt. Hence, it is decided to provide only one vibro feeder to each kiln. This modification reduces nine kW on all kilns and reduces dust generation and maintenance cost. Kiln coolers are presently provided with only one vibro feeder in place of four nos for proper distribution of the product

Impact of implementation:

Implementation of these activities resulted in energy savings of 0.47 Lakh Kwh and financial savings of Rs1.0Lakhs in year 2003-04

ProjectNo: 10

Title of the Project: Reducing electrical energy consumption by cyclone screw conveyor modification

Background of the project:

In the present system, each kiln cyclone is provided with 2nos of screw conveyors with 3.7 kW capacities for conveying dust. Total power consumption by the five kilns is 37 kW.

Observations made:

It is observed that two screw conveyors are not fully loaded. By providing the chutes only one screw conveyor is sufficient to tackle the total dust. By removing one screw conveyor from each cyclone, we can save 18.5kw.

Technical & Financial analysis made:

Cyclones are provided with one screw conveyor in place of Two-screw conveyor by increasing length of the screw conveyor

Impact of implementation:

Implementation of these activities resulted in energy savings of 0.884LakhKwh and financial savings of Rs1.8Lakhs in year 2003-04

ProjectNo.11

Title of the Project: Reducing electrical energy consumption by lighting circuit modification at MCC & LCSS of CRMP

Background of the project:

In the present system in many areas twin tube light fittings of 40w, 400w, and 250w lamp fittings are used and they are continuously glowing round the clock and contributing in increase of power consumption

Observations made:

It is observed that lack of timers for these lights is resulting in wastage of energy. In places like MCC and LCSS, room's illumination is not required continuously. By providing on/OFF switch, it is possible to reduce wastage.400w/250w fittings in some areas can be replaced by 70W HPSV. This reduces power consumption

Technical & Financial analysis made:

Replace 20*40W twin tube light fittings by 70W SV fittings and installed timer.

Some Unnecessary 400W/250 W fittings were removed.

Impact of implementation:

Implementation of these activities resulted in energy savings of 1.75LakhKwh and financial savings of Rs3.5 Lakhs in year 2003-04

ProjectNo: 12

Title of the Project: Reducing electrical energy consumption of FK2 MD PLC modification

Background of the project:

In the present system all kilns main drives are in Relay logic system with 50nos of relays of 0.6A inrush current & 0.3A running current.

Observations made:

It is observed that due to relay, logic system frequent failure of relays is occurring and the breakdowns are increasing. For smooth running of the drive PLC logic system is better.

Technical & Financial analysis made:

The relay logic system is replaced by PLC system for FK2 main drive.

Impact of implementation:

Implementation of these activities resulted in energy savings of 0.3 LakhKwh and financial savings of Rs 0.5 Lakhs in year 2003-04.

ProjectNo: 13

Title of the Project: Automation of Pumps at Pump House-26

Background of the project:

Pump House-26 caters to the requirements of Steel Melting Shop.

Observations made:

It was observed that, these two pumps are operated with opening of by pass. Opening of by pass is resulting in energy loss.

Technical & Financial analysis made:

It is proposed that one pump will be always operating in manual mode and other pump in auto mode. Based on flow requirements, the Pump in auto mode operates.

It helps in reducing the second pump operating hours by five hrs per day.

Impact of implementation:

Implementation of these measures resulted in energy savings of 3.8lakh kWh and financial savings of Rs 7.7Lakhs.

ProjectNo.14

Title of the Project: Reducing Electrical Energy Consumption by keeping one Aerator in ‘stand by’ mode at nine MLD pump house.

Background of the project:

All the four numbers of Aerators are running continuously at nine MLD.

Observations made: Three Aerators are in sequentially operation and another one in 'STAND BY' mode to achieve required parameters of outlet water.

Technical & Financial analysis made:

Stopping one Aerator in Standby mode reduces energy wastage.

Impact of implementation:

Implementation of these measures resulted in energy savings of 1.71lakhkwh and financial savings of Rs3.5Lakhs.

Project No: 15

Title of the Project: Providing Local Ammeters at Pump House No 16.

Background of the project:

Pump House – 16 Group – one system are not provided with local ammeters. It is resulting in pumping more water than required.

Observations made:

After providing local Ammeters, operator used them to control the pump delivery as per requirement.

Technical & Financial analysis made:

Local Ammeters are provided for seven numbers of pump motors.

Impact of implementation:

Implementation of these measures resulted in energy savings of 2.4lakh kWh and financial savings of Rs 4.9Lakhs.

Project No: 16

Title of the Project: Avoiding double pumping at Treatment plant No.3

Background of the project:

Initially slurry is pumped to sludge holding tank, then one more pump is used to pump the sludge to the Filters at Treatment plant-3.

Observations made:

It is possible to pump this slurry directly to filters at Treatment Plant-3 by modifying existing line. It results in avoiding running of slurry pump of 9.3 KW.

Technical & Financial analysis made:

The existing line was modified to suit the direct pumping.

Impact of implementation:

Implementation of these measures resulted in energy savings of 0.36 lakh KWH and Financial savings of Rs 0.73Lakhs.

Project No: 17

Title of the Project: Reduction of specific power consumption of Oxygen at Air Separation Plant.

Background of the project: Air separation plant is a power intensive unit and consumes 900 MWH/day approximately and specific power consumption (KWH/Ton of total oxygen) is monitored for improving of overall efficiency of Air separation plant. In the financial year 2002-03, specific power consumption (KWH/Ton of total oxygen) is 722.28.

Observations made:

Specific power consumption (KWH/Ton of total oxygen) depends upon Power consumption of feed air compressors, Nitrogen compressors, oxygen compressors & Air separation unit. Optimization in running compressors and Air separation unit as per consumer demand is necessary to reduce SPC. Production of Oxygen, Nitrogen & Argon are to be optimized to reduce power

Technical & Financial analysis made:

a) Improved the yield of the Air separation unit process by optimum reflux management i.e., oxygen content in poor liquid is monitored on line.

b) Increased distillation efficiency by steady adjustment of parameters as per standard tables developed.

c) Chemical cleaning of heat exchangers is done when discharge temperature is more than 45^0.

d) Digital transducers replaced meters and flow meters are calibrated once in 6 months.

e) Optimum demand management of oxygen and nitrogen is done to reduce oxygen venting to minimum.

Impact of implementation:

Implementation of these measures resulted in energy savings of 156lakh KWH and Financial savings of Rs 315.3 lakhs.

Project No: 18

Title of the Project: Optimizing power consumption at feed air compressors of air separation plant.

Background of the project:

Feed air compressors power consumption is around 8.0-8.5 MW and three Feed air compressors will be running normally.

Observations made:

Power consumption of feed air compressors is depends on

i. High discharge temperatures of inter coolers increases power consumption. Hence it is necessary to maintain the inter cooler discharge temperature of each stage at 45^0C.

ii. Reducing discharge pressure of feed air compressor by optimization of process of air separation unit will lead to less power consumption. Low-pressure drop across suction air filters will lead to less power consumption.

Technical & Financial analysis made:

a) Chemical cleaning of inter coolers of Feed air compressors are done during capital repair of respective compressor and also when discharge temp of any inter cooler increases >45^0C.

b) Optimization of feed air compressor discharge pressure is done by optimizing distillation process.

c) Suction air filters are cleaned after every 2500 Hrs operation and replaced after every 5000 Hrs of operation to maintain suction in pressure drop in the range of 70-90mmwc.

Impact of implementation:

Implementation of these measures resulted in reducing SPC from 92.08 to 88.18 KWH/1000Ncum. Implementation of these measures resulted in energy savings of 86.2 lakh KWH and Financial savings of Rs174.1 Lakhs.

Project No: 19

Title of the Project: Reducing the second stage suction temperature of HP compressor of turboblower-1 at TPP.

Background of the project:

Turbo blower supplies air to blast furnace. These blowers are having capacity of 6067 NM^3/Min. The blast air compression takes place in first stage and is cooled in inter cooler before going to second stage. The lower the second stage suction temperature, lesser will be the energy requirement for compression

Observations made:

It is observed that the temperature at second stage suction was at around 65^0C.Higher suction temperature is increasing steam consumption and load on cooling tower also increased.

Technical & Financial analysis made:

a) Cleaning of Intercooler Tube bundles with sulphuric acid by circulation method

b) Manual Cleaning of Inter Cooler Bundle tubes.

Impact of implementation:

Implementation of these measures reduced the temperature of air from 60^0C to 48^0C. This resulted in saving in steam. Implementation of these measures resulted in financial savings of Rs76.4 lakhs and energy savings of 14542 Gcals in the year 2003-04.

Project No: 20

Title of the Project: Improvement in performance of secondary air pre heater of boiler-3 at TPP

Background of the project:

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:

After analyzing the secondary airflow, outlet temperature and differential pressure across air pre heater, Capital repair of boiler air pre heater jobs were taken up. It was found that outlet temperature is less; differential pressure is also increased by 50mmWC.

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:

This gave an improvement in secondary air temperature and draft loss reduced. More margins became available for ID fan and intake of BFG also improved. Implementation of this measure resulted in energy savings of 3.6 lakh KWH,30143 Gcals and Financial savings of Rs117 Lakhs.

Project No: 21

Title of the Project: Improvement in performance of secondary air pre heater of boiler-2 at TPP

Background of the project:

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:

After analyzing the secondary airflow, outlet temps, differential pressure across air preheater, capital repair of boiler air preheater jobs were taken up.

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:

This gave an improvement in secondary air temperature and draft loss reduced. More margins were available for ID fan and intake of BFG also improved. Implementation of this measure resulted in energy savings of 4.2 lakh KWH , 35167 G.cal and financial savings of Rs136.6 Lakhs.

Project no: 22

Title of the Project: Improvement in performance of secondary air pre heater of boiler-5 at TPP.

Background of the project:

The Secondary Air for combustion in boilers is preheated in Rotary Air Pre heater. Pre heating 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:

After analyzing the secondary airflow, outlet temps, differential pressure across air preheater, Capital repair of boiler air preheater job also were taken up.

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:

This gave an improvement in secondary air temperature and draft loss reduced. More margins were available for ID fan and intake of BFG also improved. Implementation of these measures resulted in energy savings of 4.2 lakh KWh,35167 G.cal and financial savings of Rs.136.6 Lakhs.

Project NO: 23

Title of the Project: Improvement in condenser vacuum of turbo generator-3.

Background of the project:

Turbo generator -3 was running with condenser vacuum of 0.78kg/cm^2. Temperature difference of cooling water inlet & outlet was around 14^0C.

Observations made:

Cooling water temperature range of 14^0C and lower condenser vacuum are indications of condenser fouling.

Technical & Financial analysis made:

Machine was stopped & condenser was cleaned by bullet cleaning method. This method was faster compared to manual cleaning & quality of cleaning was better.

Impact of implementation:

After cleaning machine was rolled & loaded to 60MW. Vacuum improved to 0.89kg/cm^2.

Implementation of this measure resulted in energy savings of 118.3 KWH and Financial savings of Rs.238.8Lakhs.

Project No.24

Title of the Project: Optimizing usage of Cold blast in Blast Furnaces.

Background of the project:

Cold blast is generated in thermal power plant blowers at pressure of 4.5 kscg and sent to blast furnace through pipeline. The Oxygen requirements for melting iron oxides in blast furnace are met by cold blast.

Observations made:

Cold blast consumption in blast furnace is high because of leakages in hot blast valve and inconsistent operation of blast furnace, which results in more off blast periods. Reduction of cold blast reduces the steam required for running turbo blowers. Leakage through snort valve is also to be reduced. Leakage through muffler chamber is also high.

Technical & Financial analysis made:

a) Reducing wastage through muffler chamber.

b) Regulation of pressure and volume from Thermal Power Plant

c) Optimization of Snort valve operation

d) Arresting leakages in cold blast line and tuyere area.

e) Closing delivery valve when furnace is down for more than 2 hours

Impact of implementation: Implementation of above measures reduced cold blast consumption in blast furnaces from 1282Ncum/tHM to 1211Ncum/tHM. This project has contributed in saving high-pressure steam consumption in thermal power plant. It has resulted in annualized energy savings of 78228 Gcals and annualized financial savings of Rs.443.4 Lakhs for the year 2003-04.

Project No.25

Title of the Project: Optimization of Nitrogen consumption at CDCP chambers.

Background and Description of Project:

Nitrogen is used as make up for circulation gas, which is cooling the hot coke in cooling chamber in closed circuit.

Observations made:

Average Nitrogen consumption in each cooling chamber is 300 Nm^3/hr. A study was done to optimize the nitrogen consumption in cooling chamber. This study includes reducing nitrogen consumption while observing cooling parameters and circulation gas composition. Normally, the circulation gas contains nitrogen content of about 99%. Finally, Nitrogen consumption was brought down to minimum and Nitrogen content in circulating gas is maintained above 80%.

Technical & Financial analysis made:

Oxygen entry into the gas track was eliminated by closing all the holes. By monitoring the contents of recirculating gas as well as maintaining Nitrogen content at level of 80%, the Nitrogen consumption brought down from 7800 Nm^3/hr to 5300 Nm^3/hr

Impact of implementation:

Implementation of above project has resulted in Energy Savings of 4622 Gcals and financial savings of Rs188 lakhs.

Project.No26

Title of the Project: Optimization of Nitrogen consumption in BF

Background of the project:

Nitrogen is used in the Blast Furnace for cooling of Paul worth gearbox at furnace top as well as for purging of BF gas and coke oven gas lines. BF is bulk consumer of nitrogen

Observations made:

Nitrogen usage in BF is to maintain gearbox bearings temperature within limits. There is no automatic regulation of nitrogen. Manual regulation is resulting in waste.

Technical & Financial analysis made:

Provided temperature controller for automatic regulation of Nitrogen as per gear box temperature

Impact of implementation:

Above measures resulted in reduction of specific nitrogen consumption from Ncum/tHM to Ncum/tHM in year 2003-04. This has resulted in annualized energy savings of 6430 Gcals and annualized financial savings of Rs.262 lakhs.

Project No.27

Title of the Project: Reduction of Fuel Gas Consumption in Batteries

Background of the project:

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.

Observations made: It was observed that, the heat consumption is batteries is 666 Mcal/tDC due to loss of energy through flue gas and increase in coking time

Technical & Financial analysis made:

a) Timely pushing and charging of ovens (Maintaining PRI at 0.98 and CRI at 0.98)

b) Maintaining coefficient of temperature uniformity (Kb) above 0.8,there by avoiding high and low temperatures.

c) Reduction of Excess air coefficient from 1.6 to 1.4 by maintaining draft and arresting all the leakages.

d) Regenerator/Bus flue cross leakages have been regularly monitored.

e) Stabilization of cross wall temperatures once in every six months.

g) Physical inspection of all the flues of battery once in a month

h) WHB replacement for 30 ovens

c) Rectification of cross leakages

Impact of implementation:

Implementation of above measures resulted in reducing specific heat consumption from 666 Mcal/tDc to 652 Mcal/tDC, resulted in annualized energy savings of 41209 Gcals, and annualized financial savings of Rs. 150 Lakhs for the year 2003-04.

Project No.28

Title: Improvement in combustion of Blast Furnace stoves heating.

Background of the project:

Blast furnace stoves are designed to heat blast air to a temperature up to 1000 to 1050 degc. Each blast furnace is equipped with four No of stoves. The energy requirement of stove heating is met by blast furnace gas.

Observations made:

The heat consumption at blast furnace stoves is mainly dependentant on the calorific value of fuel gas, the condition of chequered brickwork and the exit flue gas temperature and air fuel ratio. Energy losses in blast furnace stove are also dependent on conduction and radiation losses. Higher energy consumption in BF stoves is observed because of erosion of chequered brickwork, which resulted in poor heat utilization. Stove No. 1 of BF-1 was repaired extensively which resulted in decrease in specific heat consumption from 523 to 521 Mcal/thm.

Technical and financial analysis:

i. Optimizing air fuel ratio through continuous analysis.

ii. Repair of stoves

Impact of Implementation:

Implementation of above measures resulted in reduction of fuel consumption in blast furnace stoves. This project has resulted in reducing energy consumption by 8110 Gcals and financial benefit to the extent of Rs 29.5 lakhs in the year 2003-4.

Project No.29

Title of the Project: Utility monitoring

Background of the project:

Chilled Water, DM water and Compressed Air are supplied to various consumers for Air conditioning systems, Technological Cooling, Skid Cooling, Slag Granulation etc.

Observations made:

Chilled Water is transported from four chilled water plants to various consumers by Pipeline of DN 400 mm. DM water is supplied by pipeline from Thermal Power Plant to CO, SMS, and Rolling Mills. Compressed Air is supplied by pipeline from Compressor houses to BF, SMS, CO, SP.

Technical and financial analysis:

i. Monitoring of leakages is continuous activity and wherever shutdown is not required, on line leakage arresting is done.

ii. Insulation survey to find out bare surfaces in Chilled water lines as well as DM Water lines. Uninsulated lines increase energy consumption.

Impact of Implementation:

Four leakages on DM Water lines, Two leakages in Compressed air line and nine leakages in Chilled water line were arrested. About 200 M3 of insulation was done on these utility lines at various places. This has resulted in energy savings of 13502 Gcals and financial savings of Rs. 56 lakhs

Project No: 30

Title of the Project: Optimization of Heat consumption at Sinter Ignition Furnace

Background of the project:

Sinter Ignition furnace uses mixed gas for ignition of agglomerate.

Observations made:

It was observed that negative pressure in sinter ignition furnace is leading to air ingress.

a) Burners rationalization is necessary as heat generation through existing two rows of burners is more than required.

Technical & Financial analysis made:

a) Improving furnace pressure from –ve to +ve by reducing the opening of all the six vacuum chambers below the furnace (Reduced the opening of vacuum chambers from 100% to 30%)

b) Reducing number of burners from 10 Nos to six Nos.

c) Maintaining optimum gas air ratio based on calorific value and flue gas analysis.

d) Increasing calorific value from 2000 Kcal/Ncum to 2500 Kcal/Ncum by adjusting mixed gas ratio.

Impact of implementation:

Implementation of above measures resulted in reduction of heat consumption from 37 Mcal/tgs to 33 Mcal/tgs in the year 2003-04.This project has resulted in annualized energy savings of 23360 Gcals and annualized financial savings of Rs.85 Lakhs for the year 2003-04

Project No.31

Title of the Project: Usage of Metallurgical waste in Sinter Plant

Background of the project:

Metallurgical waste (flue dust, stock house dust, mill scale, BF gas sludge, Cast house sludge) is generated at various stages of steel making and it contains useful materials. The flue dust and blast furnace gas sludge contains about 20% carbon

Observations made:

It was observed that metallurgical waste generated at various stages of steel making process poses storage problem. Recycling of waste can minimize the requirement of coke breeze SP.

Technical & Financial analysis made:

Usage of metallurgical waste signifies solid waste recycling. This is achieved by improving the coordination with Field Machinery Department.

Impact of implementation:

270054Tonnes of metallurgical waste was recycled in the year 2003-04. This project has resulted in annualized energy savings of 95420 Gcals and annualized financial savings of Rs. 347 Lakhs for the year 2003-04

Project No.32

Title of the Project: Vacuum contactors for HT Motors in Slag Granulation Plant of Blast Furnace

Background of the project:

Slag Granulation Plant Pumps (630 KW Motors) supply water for the granulation of liquid slag. These pumps are to be kept "ON" by the time slag arrives into slag receiving bins. It was observed that, these pumps are running 1-1.5 hours ahead of slag arrival since breakers are giving problem frequently. There are 10 tapings of hot metal per day.

Observations made:

Previously SF-6 breakers drove the HT pumps. These SF-6 breakers are very fragile.

Technical & Financial analysis made:

Provide Vacuum contactors. Stop early start of pumps.

Impact of implementation:

Implementation of above measures resulted in annualized energy savings of 16.15Lakh KWH and annualized financial savings of Rs. 32.6 lakhs for the year 2003-04.

Project No.33

Title of the Project: Provision of Space heaters for HT pumps of Slag Granulation Pump

Background of the project:

Slag Granulation Plant Pumps (630 KW Motors) are to supply water for the granulation of liquid slag. There are four pumps. One pump runs at any point of time and other three pumps would be ready for use.

Observations made:

It was observed that these pump motors are not having space heater facility. Spare pumps are to be ready in all respects for all the time. Hence, to prevent decrease in insulation effectiveness, these pumps are operated for about 30 minute in each shift. It is causing wastage of energy.

Technical & Financial analysis made:

To prevent electrical energy wastage due to idle running of these pumps, it is proposed to install space heaters of 1000 W to take care of the meggar value of motors.

Impact of implementation:

Installation of space heaters has eliminated the operation of these spare pumps in each shift. Implementation of this activity resulted in electrical energy savings of 19.34 lakh KWh and financial savings of Rs 39 lakhs in the year 2003-04.

Project No.34

Title of the Project: Lighting System Modification in Blast Furnaces

Background of the project:

In Blast Furnace, various types of lighting systems are provided in Conveyor galleries, tunnels, and Cable galleries. 2000Nos of tube lights illuminates these areas.

Observations made:

Illumination requirements are to be worked out in various areas to check for extra illumination

Fluorescent lamps can be replaced with high-pressure Sodium Vapor lamps

The K-1, K-6 galleries and K-11, K-16 galleries lighting system can be modified.

Technical & Financial analysis made:

i. Replacing 400 W fluorescent lamps with 50 Nos of 125 HPSV fittings in these galleries.

Impact of implementation:

Implementation of this activity resulted in electrical energy savings of one lakh KWh and financial savings of Rs 2 lakhs in the year 2003-04

Project No.35

Title of the Project: To reduce field currents of 1700kw DC Motors to 25% during non-rolling hours at MMSM

Background of the project:

There are 11Nos of 1700KW main drive DC motors installed in MMSM to run the mill stands. They run at different speeds as required for the profile being rolled. During normal operation, the motors will be running at lesser field currents. However, when the mill is stopped, and the drive is kept ready for rolling, the field current will remain at 100%. It was observed that operating at 100% field currents during non rolling period is leading to energy wastage.

Observations made:

When on full field, motor is ready to run if the speed computer reference is released. Once the computer reference is released, it will decide about the speed of the motor. If it is less than or equal to the base speed then drive will have full field current and if the speed is more than the base speed field current is reduced to develop more speed. Normally our drives are running in field weakening mode.

In-view of the above , it is proposed to keep the field current at 25% of rated value during non rolling and increase it to 100% field when speed reference is released. This can be implemented by modifying the thyristor converter control circuit of the DC Drives.

Technical & Financial analysis made:

Thyristor converter interlocking and control circuits are to be modified for all 1700kw DC motors, 11 nos in all. The circuit will now have three more additional relays with a timer in line. When Armature Auxiliaries are made on, field will be on, but field current is limited to 25% of rated value only. When DC contactor is made on, field will remain at 25% only. Then computer reference for running the drive is released. At this stage first field is allowed to rise from 25% to 100%. It is allowed to build up to full value after certain time delay only. After field goes to 100% only, Computer reference is allowed to run the drive. Then drive starts picking up speed and goes to field weakening mode and settles at the required RPM. Suitable modifications in hardware connections with the additional relays and timer were made in all eleven drives.

Impact of implementation:

Implementation of reducing field current to 25% of its value during non rolling hours in 11Nos of drives has resulted in electrical energy savings of 187 KW during non rolling period and 3.36 lakh KWh and financial savings of Rs 6.75 lakhs in the year 2003-04

Project No.36

Title of the Project: To reduce field currents of 1000kw DC Motors to 25% during non-rolling hours at MMSM

Background of the project:

There are 9 Nos of 1000KW main drive DC motors installed in MMSM to run the mill stands. They run at different speeds as required for the profile being rolled. During normal operation, the motors will be running at lesser field currents. However, when the mill is stopped, and the drive is kept ready for rolling, the field current will remain at 100%. It was observed that operating at 100% field currents during non rolling period is leading to energy wastage.

Observations made:

When on full field, motor is ready to run if the speed computer reference is released. Once the computer reference is released, it will decide about the speed of the motor. If it is less than or equal to the base speed then drive will have full field current and if the speed is more than the base speed field current is reduced to develop more speed. Normally our drives are running in field weakening mode.

In-view of the above , it is proposed to keep the field current at 25% of rated value during non rolling and increase it to 100% field when speed reference is released. This can be implemented by modifying the thyristor converter control circuit of the DC Drives.

Technical & Financial analysis made:

Thyristor converter interlocking and control circuits are to be modified for all 1100kw DC motors, 9 nos in all. The circuit will now have three more additional relays with a timer in line. When Armature Auxiliaries are made on, field will be on, but field current is limited to 25% of rated value only. When DC contactor is made on, field will remain at 25% only. Then computer reference for running the drive is released. At this stage first field is allowed to rise from 25% to 100%. It is allowed to build up to full value after certain time delay only. After field goes to 100% only, Computer reference is allowed to run the drive. Then drive starts picking up speed and goes to field weakening mode and settles at the required RPM . Suitable modifications in hardware connections with the additional relays and timer were made in all nine drives.

Impact of implementation:

Implementation of reducing field current to 25% of its value during non rolling hours in 9 Nos of drives has resulted in electrical energy savings of 85 KW during non rolling period and 1.53 lakh KWh and financial savings of Rs 3.08 lakhs in the year 2003-04.

Project No.37

Title of the Project: Optimization of Heat consumption in MMSM Reheating Furnace.

Background of the project: The blooms are reheated in reheating furnace in MMSM for further rolling into angles, channels, rounds etc. The rolling rate is dependent upon the product. Production of angles and channels is characterized by low rolling rates. Low rolling rates not only result in sub optimal utilization of furnace but also increase specific heat consumption. Hot air venting also takes place due to high furnace temperature

Observations made: It was also observed that heat loss through flue gas and cooling water is more than designed. Specific heat consumption can be reduced by

a) Adopting better operation control measures.

b) Optimization of Furnace temperature during rolling and non-rolling times.

d) Optimization of double furnace operation with respect to product mix.

Technical & Financial analysis made:

a) Optimizing Furnace temperatures for different mill delays.

b) Dosing of the DMDA water with Tri-sodium phosphate to maintain PH value

c) Improving waste heat recovery by replacing gas recuperator during capital repairs.

d) To Optimize furnace operation by using one furnace for low productive sections (75 and 90 angles.)

Impact of implementation:

Implementation of these activities has resulted in energy savings of 14516.7 Gcals and financial savings of Rs 52.8 lakhs in the year 2003-04.

Project No.38

Title of the Project: Heat Consumption optimization at Ladle dryers and tundish heaters

Background of the project:

The hot metal ladles and tundish heaters are heated by using coke oven gas. The heating cycle time for ladles is about eight hrs and 2hrs for tundish. Some times, even when the tundish is heated to required temperature; tundish is not used resulting in excessive heating. The metering system is not working.

Observations made:

a) Maintaining correct air fuel ratio.

b) Adjusting the flame

c) Revival of metering system of Ladle preparation bay.

d) Optimizing heating pattern

Technical & Financial analysis made:

a) Maintained correct air fuel ratio.

Impact of implementation:

Implementation of above measures resulted in consistent reduction in heating cycle time and gas consumption is reduced from 46 Mcal/tLS to 40 Mcal/tLS in the year 2003-04. It has resulted in energy savings of 21049.5 Gcals and Financial savings of Rs 116.8 Lakhs.

Project No.39

Title of the project: To improve the yield of tar.

Background of the project:

Tar is long chain-aromatic hydrocarbon of complex nature. Tar is recovered at Coke ovens by cooling of coke oven gas. Tar is separated by decantation.

Observations made:

It was observed that the Tar yield is low due to

i) Less condensation due to high velocity of gas along the pipe line and very minute size of tar droplet.

ii) Damage to water tubes of Primary Gas cooler

iii) Inadequate availability of electrostatic precipitators.

Technical & Financial analysis made:

i. Frequent addition of fresh tar in the closed circuit to improve size of droplet
ii. Schedule replacement of damaged water tubes of primary gas coolers.
iii. Increasing the number of working electrostatic precipitators to recover foggy tar.

Impact of Implementation:

Implementation of above project has resulted in Energy Savings of 5475 Gcals and financial savings of Rs 28.6 lakhs

Project No.40

Title of the Project: Optimizing Air Conditioned space in RMB control room

Background of the project:

The Raw Material Bins control room at Sinter Plant is equipped with Air conditioning system. It is provided with 40 TR capacity air conditioning systems with 11 KW motor for air handling unit.

It was observed that cool air supply line is coming down to 5 meters elevation from 12 meters elevation to supply cool air to control room. It was observed that lot of wastage is taking place due to piping.

Observations made:

Cooling load requirements for this control room has been reviewed and it is found that 20 TR is sufficient for the equipment.

Technical & Financial analysis made:

To reduce cooling load from 40 TR to 20TR,it is proposed to install new system

Fabricated of small Air handling unit with 5.5 KW motor and 20 TR coil

Impact of implementation:

Installation of 5.5 KW motor and 20TR Coil reduced energy consumption and resulted in electrical energy savings of 0.51lakh KWh and financial savings of Rs 1.0 lakhs in the year 2003-04

Project No.41

Title of the Project: Relocation of Air Handling Unit at ECR-2

Background of the project: The Cooling requirements of Electrical Control Room-2 are supplied by an Air handling Unit. The temperature is maintained at 28 deg.c.This ECR is located at "9" meters level and the Air handling Unit is located at "0"meters

Observations made:

Wastage of energy due to lengthy duct and elevation difference

Technical & Financial analysis made:

a) Shifting of complete AHU from "0" meters to near the ECR.

b) Replacing 5.5 KW motor with 3.7 KW to reduce losses

c) Provision of timer to reduce running hours of Air handling unit

Impact of implementation:

Relocation of Air handling Unit at ECR-2 resulted in electrical energy savings of 0.55 lakh KWh and financial savings of Rs 1.1 lakhs in the year 2003-04

Project No: 42

Title of the Project: Interconnection of Air Handling Units of ECR-1

Background of the project:

There are 4Nos of Air handling units at SMS to meet ventilation requirements of Converter Control room, ECR-1 and Computer Center. The Connected load of these AHUs are55 KW. These four AHUs are running continuously.

Observations made:

It was observed that these AHU are running at part load during winter season as well as after general shift hours. Loading of AHUs can be improved by interconnecting these four systems. AHU's interconnection will improve availability of remaining equipment for maintenance.

Technical & Financial analysis made:

Instead of operating these four AHUs in isolation, these are connected and it has facilitated in stopping two Nos of AHU's during winter season and after General Shift hours

Impact of implementation:

Interconnection of these four AHUS resulted in electrical energy savings of 0.9636 lakh KWh and financial savings of Rs 1.9 lakhs in the year 2003-04

Project No.43

Title of the Project: Insulating Steam leaks in 1EP Control room

Background of the project:

The ventilation and cooling requirements of 1EP control room at Continuous casting machines are supplied by 32 TR Air handling unit. Room temperature is to be maintained at 25 deg.c. The hot fumes from continuous casting are entering 1EP control room through cable pipes. In view of this, the cooling is not effective. To meeting cooling requirements, 4Nos of AHUs are operated during peak season and 2nos during winter season.

Observations made:

a) High heat load is increasing electricity energy consumption

b) Preventing hot fumes entering cables reduces heat load.

Technical & Financial analysis made:

Arresting steam leakages and bottom floor level with ceramic wall as well refractory insulation paste. With these modifications, the cooling load is decreased. With this, it is possible to operate with 2Nos AHU during Peak load and one AHU during off-season

Implementation and savings: Implementation of this project has resulted in electrical energy savings of seven lakh KWh and financial savings of Rs 14.1 lakhs in the year 2003-04

Project No.44

Title of the Project: To switch off 50% of Radial fan blowers in WRM during rebar rolling.

Background of the project:

Wire rod mill is designed to roll billets of 125 mm square to different sizes of wire rods. The wire rod after rolling from billets is cooled by stelmore blowers. There are 10 blowers for each stand and total connected load is 2.2 MW. It

was observed that during rebar rolling at WRM, the number of stelmore blowers operations needs optimization.

Observations made:

It was observed that the desired properties are attained even with 50% of stelmore blowers during Re bar rolling

Technical & Financial analysis made:

Only five blowers for each stand was operated during rebar rolling.

Implementation and savings: Implementation of this project has resulted in electrical energy savings of 16.2 lakh KWh and financial savings of Rs 32.7 lakhs in the year 2003-04

Project No.45

Title of the Project: Modification of Field Currents of 4Nos of 2000 KW DC motors

Background of the project:

There are 4Nos of 2000 KW DC motors at Wire rod Mill. During Non-rolling hours, through the drive is switched off, the field current is on and is resulting in wastage of energy to extent of 20 KWH. The field current reduces to 25%, when the DC contactor is made off. It was observed that, the operator often forgets to switch off the contactor.

Observations made:

To reduce wastage of energy, modification of control circuit is done such that field current goes to 25% automatically.

Technical & Financial analysis made:

Modification of control circuit was done and this was implemented for all finishing block drives (4 Nos)

Impact of implementation:

Implementation of this project has resulted in electrical energy savings of 1.25 lakh KWh and financial savings of Rs 2.5 lakhs in the year 2003-04

Project No.46

Title of the Project: Energy conservation at chilled water plant-4

Background of the project:

The cooling tower fans were being operated with a fan blade angle of 50 deg

Observations made:

Higher blade angle of Cooling tower fan gives more flow and consumes more energy.

Technical & Financial analysis made:

Cooling Tower fan blade angle was reduced from 50 deg to 45 deg.

Impact of implementation:

By reducing fan blade angle 110kwhr/day, energy and financial savings of Rs 0.8 lakhs were saved. Implementation of this project has resulted in electrical energy savings of 0.4 lakh KWh and financial savings of Rs 0.8 lakhs in the year 2003-04

Project No.47

Title of the Project: Energy conservation at chilled water plant-3

Background of the project:

Chilled water supply temperature was being maintained at seven deg C in all seasons.

Observations made:

In rainy and winter seasons, the air conditioning load comes down. The requirement of chilled water at seven deg C is not critical.

Technical & Financial analysis made:

Operation practice is revised to supply chilled water to consumers at 7.5 to 8 deg C during rainy and winter seasons.

Impact of implementation:

Implementation of this project has resulted in electrical energy savings of 18.25 lakh KWh and financial savings of Rs 36.8 lakhs in the year 2003-04

Project No.48

Title of the Project: Rationalization of supply air pressure for various consumers at compressor house-1

Background of the project:

The compressed air consumers of compressor house-1 need compressed air at different pressures. The compressors are being operated at 6.5kscg.

Observations made:

Compressors are operating at 6.5kscg and some consumers are supplied low-pressure air by throttling.

Technical & Financial analysis made:

a) Operation practice was revised.

Impact of implementation: One compressor was now being operated at 6.5kscg for high-pressure consumers and other is operated at 4.5kscg for low-pressure consumers after segregating low pressure and high-pressure consumers. Implementation of this project has resulted in electrical energy savings of 43.8 lakh KWh and financial savings of Rs 88.4 lakhs in the year 2003-04.

Project No.49

Title of the Project: Optimization of electricity consumption in CDCP mill fans.

Background of the project:

The hot coke produced at coke ovens is cooled in Coke Dry Cooling Plant chambers. There are four cooling chambers for each CDCP. Three cooling chambers are used for cooling of hot coke and fourth one is kept as stand by. Gas in these chambers is recirculated by Mill fan, which are driven by 630 KW HT motors. Nine (9) mill fans are running round the clock. The average power consumption of each mill fans is 500 KW.

Observations made:

In each CDCP, two mill fans are sufficient to cater to the need of battery pushing. The third mill fan is run as a hot standby. Operating all three fans per CDCP is increasing energy consumption.

Technical & Financial analysis made:

Technically, it was established that while running two chambers, all the boiler and chamber parameters were normal. Hence, the third chamber was modified to go for slow discharge with auxiliary mill fan. The Capacity of auxiliary mill fan is 55 KW. This will eliminate operating third mill. It was observed that on average 6.5 mill fans running would be adequate to all the requirements of cooling coke.

Impact of implementation:

Implementation of this reduced the No of CDCP mill fan operations from 9 to 6.5 per month. Implementation of above project has resulted in Energy Savings of 96.7 lakh KWH and financial savings of Rs195 lakhs.

Project No.50

Title of the Project: Recycling of Tar sludge into Coke Oven Battery.

Background of the project:

During Coke making process, volatile matter present in the coal becomes coke oven gas. While cooling coke oven gas, tar present in the gas is condensed in hydraulic main, Primary Gas Cooler & Electro Static Precipitator. Tar separated in Decanters is called tar sludge. In tar storage tank, sludge settles down and deposited at the bottom. Every year the sludge is cleaned from the storage tank.

Observations made:

The tar sludge was dumped beyond tar plant boundary, which is causing land degradation. Since it contains carbon, it can be used in coke oven along with coal charge.

Technical & Financial analysis made:

Tar sludge is dumped near Yard-2 conveyor. The Yard-2 conveyor charges coal into coke oven. A connection was made to Yard-2 conveyor with inclined conveyor. Tar sludge is charged to the inclined conveyor, which feeds to the yard – 2 conveyor carrying coal.

Impact of implementation:

Implementation of above project has resulted in Energy Savings of 23905 Gcals and financial savings of Rs 106 lakhs.

Project No.51

Title of the project: To improve the yield of Crude Benzol.

Background of the project:

Benzol is recovered by absorbing it in solar oil in the Benzol scrubber, where solar oil is circulated counter current to coke oven gas flow. Benzol is separated from solar oil by steam stripping and debenzolised oil is recirculated to Benzol.

Observations made:

Reasons for low yield of Crude Benzol are

i. Inadequate gas handling capacity due to high-pressure drop across scrubbers.
ii. High gas temperature to scrubbers.
iii. High oil temperature to scrubbers.

Technical & Financial analysis made:

Reducing the pressure drop across the scrubber by modification of Oil distribution of the top stage of scrubbers. It will improve gas-handling capacity of each scrubber by 10%.

Impact of Implementation:

Implementation of above project has resulted in Energy Savings of 27374 Gcals and financial savings of Rs 143 lakhs

Project No.52

Title of the project: Recycling of Benzol muck & coke dust.

Background of the project:

Benzol is recovered by absorbing it in solar oil in the Benzol scrubber, where solar oil is circulated counter current to coke oven gas flow. Benzol is separated from solar oil by steam stripping and debenzolised oil is recirculated to Benzol scrubber. During this process lot of muck is generated which is separated in the decanter and is disposed.

Observations made:

Benzol muck is highly polymerized material in slurry form. Usage of Benzol muck in coke oven battery will avoid land degradation. Due to slurry nature of the muck, it cannot be added to coal.

Technical & Financial analysis made:

Benzol muck was mixed with coke dust and then added on coal carrying conveyor Y-2. To reduce the oil content in the muck, separate muck drying beds (3Nos) were made and the muck was allowed to dry for a period of one week. After removal of oil, the muck was taken to Y-2 conveyor area, mixed with coke dust, and charged on Y-2 conveyor along with coal.

Impact of Implementation:

Implementation of above project has resulted in Energy Savings of 16000 Gcals and financial savings of Rs 71 lakhs.

Project No.53

Title of the project: Arresting ingress of air in CO gas line at Battery-3

Background of the project:

The coke oven gas generated during coal carbonization process is handled by Exhausters. The Coke oven gas network before exhauster is under suction. Air leakage in the gas line or equipment in the region led to ingress of air into the network Ingress of Air into gas line not only reduces heating value of fuel but it is also safety hazard. It was observed that the flushing liquor (FL) line from Battery-3 developed small hole.

Observations made:

It was observed that hole in Flushing liquor line from Battery-3 is causing air ingress and the coke oven gas volume increase was observed.

Technical & Financial analysis made:

Holes on the FL line are purged. Straps are welded to eliminate leakage and prevent further opening of the joints.

Impact of implementation:

Arresting of ingress has improved the calorific value of coke oven gas from 4000 Kcal/Ncum to 4113 Ncum in year 2003-04.Implementation of above project has resulted in Energy Savings of 13754 Gcals and financial savings of Rs 76 lakhs

Project No.54

Title of the Project: Improving LD gas recovery at LD Gas recovery plant.

Background of the project:

LD gas is generated at LD converter during oxygen blowing of converter is evacuated by ID fan and is sent to gasholder. The capacity of gasholder is 80000 cum.The gasholder consists of two rubber seals inner seal and outer seal, which facilitate gas tight storage. The seal has installed life of 10 years. However, periodic inspection of seal and intermediate repairs like vulcanizing of the weak portions of the seal has helped in extending the life of seal to 14 years.

Observations made:

Repair of holder was to be taken mainly for replacement of rubber seal as damage to the rubber seal found to be increasing over period.

Technical & Financial analysis made:

The Existing neoprene seals are replaced with improved PVC nit rile rubber seals

Over plating of annular portion of the gasholder bottom is also done.

Impact of Implementation:

Replacement of Seal and over plating has improved the recovery rate and resulted in Energy savings of 197971 Gcals and financial savings of Rs 721 lakhs in the year 2003-04.

Project No. 55

Title of Project: Optimization of water consumption.

Background of the project:

Water is used in the process of steel making for process cooling and fire fighting. Water is recirculated.

Observations made:

Since water usage is continuous process, improvement in recycling efficiency will not only reduce make up water consumption but also reduces power consumption for pumping.

Technical and financial analysis:

Rectification of leakage's, effective operation of effluent treatment plants reduces water consumption.

Impact of Implementation:

Above measures were implemented on continuous basis and have resulted in reducing consumption from 3.8cum/tLS to 3.31 cum/tLS in the year 2003-04. This has resulted in annualized energy savings of 38 lakh KWh and annualized financial savings of Rs.163 lakhs

Project No.56

Title: Monitoring of 13 ata Steam consumption.

Background of the project:

13 ata steam is used for blast humidification, Charging of coal in coke ovens and gas line purging.

Observations made:

Steam is transported by DN 400 Pipe line from Thermal Power plant to various consumers. This steam pipeline is having many steam traps for removing condensate. About 300 traps are in operation to remove condensate. It was observed that some of the traps are not functioning effectively.

Technical and financial analysis:

i. Monitoring of leakages on Steam lines
ii. Checking the functioning of Steam traps
iii. Monitoring of leakages is continuous activity and where ever shutdown is not possible; on line, leakage arresting is done.
iv. Insulation survey to find out bare surfaces.

Impact of Implementation:

70 No of various leakages (Glands, Valve bonnet, Flange) have been arrested in the year 2003-04.30 No of steam traps were replaced in the steam line. Above measures were implemented on continuous basis and have resulted in reducing steam loss of 2 tons per hour. About 130 M3 of Insulation work was done at various places. This has resulted in annualized energy savings of 12702 Gcals and annualized financial savings of Rs 73.9 lakhs

Project No.57

Title: Usage of coke dust in Sinter Plant

Background of the project:

Coke dust generated at coke ovens is not used in sinter making due to its fine particle size and there fore sold out. Due to its very fine size, coke dust instantly ignites.

Observations made:

Coke breeze is used as a fuel for the combustion in sintering process. 1-3 mm size coke gives efficient combustion. In case of micro fine dust, the time of burning is very less. Hence, heat dissipation is not very complete.

Technical and financial analysis:

This coke dust received exclusively by Wagons is unloaded into receiving bins. Then it is transported into Raw material Bins No.1 and used during base mix preparation. Since Coke dust contains 80% carbon, 1.2 tons of coke dust replaces one kg of coke breeze.

Impact of Implementation:

About 30270 tons of coke breezes were used in sinter plant. It resulted in energy savings of 212211 Gcals and financial savings of Rs 309 lakhs.