VISAKHAPATNAM STEEL PLANT – RASHTRIYA ISPAT NIGAM LIMITED

COMPANY DESCRIPTION

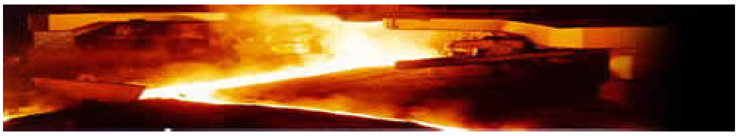
Rashtriya Ispat Nigam Limited is the corporate entity of Visakhapatnam Steel Plant. The steel plant is located 26 km south of Visakhapatnam city, in India. The company also has a blast furnace grade limestone captive mine, a captive mine for dolomite and a manganese ore captive mine. The foundation stone of the steel plant was laid on 20th January 1971 and the plant was dedicated to the nation on 1st August 1992. The plant has a capacity to produce 2.656 Mt of saleable steel of which 2.410 Mt is finished steel. The product form the company is meant only for the domestic market. Besides receiving raw materials from the captive sources, the steel plant meets its iron ore, cooking coal, SMS grade limestone, quartzite and boiler coal requirements by imports and purchase from the local market. The company has employee strength of about 2500 and the annual turnover of the company was US$ 1,124 billion for the year 2002-03.

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 company decided to join the GERIAP project as it wanted to confirm on with the work it is already undertaking in the areas of energy efficiency.

PROCESS DESCRIPTION

The integrated steel plant is a very large plant comprising of about 22 departments and all the process are integrated with one another. A brief description of the process is as follows;

- Blended coal is heated in coke oven to produce coke by carbonization. The gas produced (producer gas) is extracted for used as fuel in other sections.
- Iron ore is mixed with the coke and fluxes and is heated in sinter plant where the high temperature generated fuses the ore particles and flux together to form porous clinker called as sinter.
- Sinter, coke, Iron ore lumps and pellets are charged in the blast furnace. Hot air is blasted through the bottom of the furnace, which combines with coke to form carbon mono oxide and heat. The heat melts the iron ore and it moves down. The carbon mono oxide moves up and removes the oxygen from the iron ore, which is on its way down, thereby leaving iron. This is called liquid iron or hot metal.
- The hot metal is mixed with recycled steel and other alloys in a converter (a type of furnace) and a stream of very pure oxygen at high pressure is blown thru it. The oxygen combines with the carbon particles and other impurities separating them from the metal and leaving behind the steel.
- The steel is further refined at the Ladel Metallurgy Facility where the chemistry and temperature are finely adjusted before casting into slabs and billets in a continuous casting machine.
- The slabs and billets are then taken to different section where rolling and reheating operations are undertaken to convert the billets and slabs into strips or rods etc in Hot Strip Mill or Medium Merchant and Structural Mill (MMSM).



METHODOLOGY APPLICATION

The draft *Company Energy Efficiency Methodology* was used as a basis for the plant assessment to identify and implement options to reduce energy and other materials and wastes. Some of the interesting experiences are:

▪ ***Task 1b – Form a team and inform staff***

Normally a Team would consist of less than ten members. At this steel company, a Team was formed comprising 15 members from many of the 22 departments because the production process is integrated and therefore energy options in one department would have an impact on other steps in the production process. The company already had a dedicated Energy Manager who chaired the Team.

<u>Lesson learnt: For integrated plants it may be necessary to form a larger Team with members from various departments because energy efficiency measures in one step of the production process could impact many other areas of the production process.</u>

▪ ***Task 1c – Pre-assessment to collect general information***

This integrated steel plant has 22 departments and it would take too much time to carry out a pre-assessment to collect general information and prepare production flow charts for the entire plant. For this reason the focus area was selected first and a pre-assessment was only carried out for the focus area.

<u>Lesson learnt: For large plants it may be necessary to select a focus area before carrying out the pre-assessment.</u>

▪ ***Task 1d – Select focus areas***

The focus areas selected by the Team were based on the preference of top management to ensure their support for the energy assessment, and less on data analysis. Focus areas included the captive power plant and the chilled water plant**.**

<u>Lesson learnt: Top management preference is a very important factor in the selection of focus areas.</u>

▪ ***Step 6 – Continuous improvement***

This company is very progressive with energy management and the following activities (several of which already existed before GERIAP) will ensure that energy efficiency improvements will continue:

- A quality, environment and energy policy
- A target of a 1 per cent reduction in specific energy consumption per year until 2010
- Identification and implementation of 22 more options in 2004, without the assistance of the external facilitators!
- Creation of small teams in each department, with the role to identify and implement energy efficiency options, coordinated by a dedicated Energy Manager

<u>Lesson learnt: Continuous improvement is ensured if energy management covers several aspects, such as a policy, Energy Manager, targets and work groups.</u>

OPTIONS

The options were identified in two phases. In total, 29 options were identified.

▪ The foucs areas are, Rolling Mills, Thermal Power Plant, Air Separation Unit, Cooling Tower, Raw material handling.

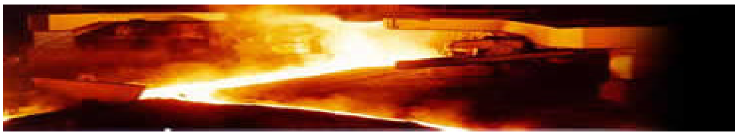
▪ In 2003, the company identified seven options. Out of which two have been implemented, three yet to be implemented and two are rejected. One of the options under "To be implemented" is to be further analyzed. It may be rejected because of the "space constrains" as the "duct size" cannot be increased.

- In 2004, the company, without any assistance of external consultants identified and implemented 22 CP-EE options. These options were from various other audit focus areas and not the ones, where work was undertaken in 2003.
- The options implemented in 2003 resulted in savings of US$ 791,228 against an investment of US$ 66,056. The simple payback period works out to be about one month.
- Implementation of these options resulted in savings of 20.29 million kWh of electricity consumption. The net reduction in GHG was to the tune of 18125 T/year.
- The options implemented in 2004 resulted in savings of US$ 1,058 million against an investment of US$ 23,279 with a simple payback of about one month. This also resulted in reduction of 23833 tons of GHG and resource savings of about 4000 T coal/year and 19.90 million kWh of electricity.
- In total, an investment of US$ 89,335 led to savings of US$ 1,819,335 with a simple payback of one month. Also 4000 tons of coal and 40.19 million kWh of electricity was saved resulting in reduction of 41958 tons of GHG. This reduction accounts for about 0.906 per cent reduction in the GHG emissions from the company taking a base year of 2002-03.

Some of the major options implemented by the company are illustrated in the table below:

Table 1: EXAMPLES OF OPTIONS IMPLEMENTED

FOCUS AREA/ OPTION	CP TECHNIQUE	FINANCIAL FEASIBILITY	ENVIRONMENTAL BENEFITS	COMMENTS
Thermal Power Plant / Rubber shots cleaning technology to improve vacuum in turbo generator condenser *(see case study)*	New technology / equipment	▪ Investment: US$ 23,256 ▪ Cost savings: US$ 759,302 /yr ▪ Payback period: 1 month	▪ GHG emission reduction: 17460 tCO_2/yr ▪ Electricity savings: 19552 MWh/yr	
Raw material handling / Reduction of number of running cone crushers at raw material handling plant *(see case study)*	Good house keeping	▪ Investment: none ▪ Cost savings: US$ 33,488 /yr ▪ Payback period: immediate	▪ GHG emissions reduction: 640 tCO_2/yr ▪ Electricity savings: 720 MWh/yr	Less noise pollution in the area
Air Separation Unit/ Electricity conservation at feed air compressors of air separation plant *(see case study)*	Good house keeping and process optimization	▪ Investment: none ▪ Cost savings: US$ 353,488/yr ▪ Payback period: immediate	▪ GHG emission reduction: 6787 tCO_2/yr ▪ Electricity savings: 7.6 million kWh/yr	
Compressor House / Rationalization of supply air pressure for various consumers at compressor house –1	Process optimization	▪ Investment: none ▪ Cost savings: US $187,701/yr ▪ Payback period: immediate	▪ GHG reduction: 3898 tCO_2/yr ▪ Electricity savings: 4.38 million kWh/yr	
Cooling Tower / Increase in chilled water temperature from 7 deg. to 7.5 – 8 deg. C during low load seasons (rainy and winter seasons)	Process optimization	▪ Investment: none ▪ Cost savings: US $ 78,209/yr ▪ Payback period: immediate	▪ GHG emission reductions: 1624 tCO_2/yr ▪ Electricity savings: 1825000 kWh/yr	
Cooling tower/ Adjust fan blades in	Equipment modification	▪ Investment: none ▪ Cost savings:	▪ GHG emission reduction: 94 tCO_2	



cooling tower at chilled water plant for winter and summer conditions *(see case study)*		US$ 4,923 /yr ▪ Payback period: immediate	▪ Electricity savings: 105840 kWh/yr	
Pump house/ Reducing electrical energy consumption by keeping one Aerator in 'stand by' mode at nine MLD pump house	Process optimization	▪ Investment: none ▪ Cost savings: US $ 7,328/yr ▪ Payback period: immediate	▪ GHG emission reduction: 152 tCO_2/yr ▪ Electricity savings: 171000 kWh/yr	
Rolling Mills / Optimum utilization of field current in rolling mills to reduce electricity *(see case study)*	Production process / equipment modification	▪ Investment: none ▪ Cost savings: US$ 37023 ▪ Payback period: immediate	▪ GHG emission reductions: 710 tCO_2/yr ▪ Electricity savings: 796 MWh/yr	

FOR MORE INFORMATION

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