1	**ID: 53**	**Title of measure**	**Sector : Iron & Steel Industry**
2	**Survey Year: 2006**	**Speed control by reduction of field currents of DC motors at Medium Merchant and Structural Mill (MMSM) during shutdown**	**Technology : Control Systems**
3	Name of the Company	:	**Rashtriya Ispat Nigam Ltd., Visakhapatnam, INDIA**
4	Agency that executed the project	:	In-house
5	Year of Implementation	:	2003

6 **Unit Profile:**

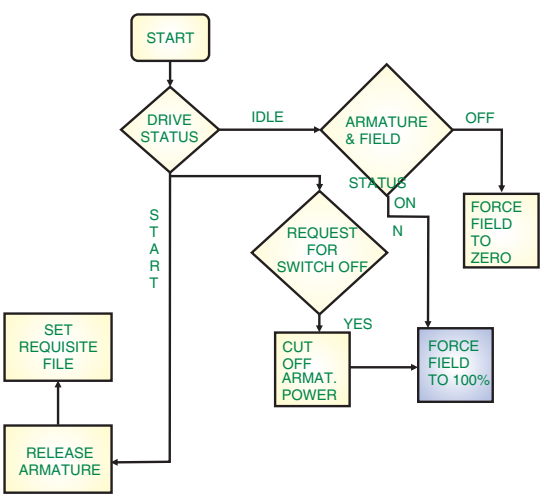
Rashtriya Ispat Nigam Ltd., is the corporate entity of Visakhapatnam steel plant. The plant has a capacity to produce 2.656 Mt of saleable steel of which 2.410 Mt is finished steel. Visakhapatnam steel plant is among the premier steel mills in India earning revenue of US$ 1.36 billion. The commitment 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 2010.

The steel plant has many technological features which are unique amongst the steel plants in the country. the product profile of the plant comprises of wire rods, rounds, reinforcement bars(rebars), angles, channels, beams, squares, billets & blooms.

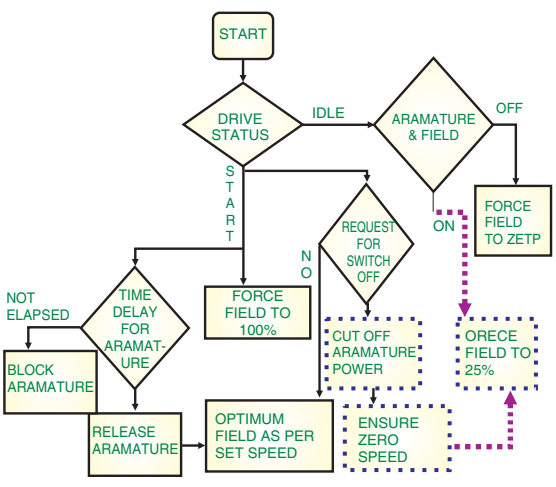
7 **Description of Energy Conservation Measure:-**

There are 11Nos of 1700KW main drive DC motors installed in medium merchant & structural mill to run the mill stands. They run at different speeds as required for the profile being rolled. During normal operation, the motors are running at lesser field currents. However, when the mill was stopped and the drive was kept ready for rolling, the field current remained at 100%. This resulted in energy loss of 17 KW for each motor. This loss could be avoided by modifying the thyristor converter control circuits for all 1700kW DC Drives, 11 Nos. in all. The circuit will now have three more additional relays with a timer in line. When armature auxiliaries are energized, field current is limited to 25% of rated value. The DC contactor is also switched on when the field is limited to 25% of the rated value. After this the computer reference for running the drives is released. At this stage first the field is allowed to rise from 25% to 100% after certain time delay. When field current rises to 100%, then computer reference is allowed to run the drive. The 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.

8 **Before Modification**



After Modification



Visakhapatnam Steel Plant

9	Total investment:	Not known
10	First year energy cost savings:	16,875 US$
11	First year additional savings beyond energy (i.e. water, raw materials etc.):	Nil
12	Annual energy consumption before, MWh	–
13	Annual energy consumption after, MWh	–
14	First year energy savings, MWh	337
15	First year tons of CO_2 mitigated	337
16	Assumed sustainability, years	10
17	**Expected tons of CO_2 mitigated throughout life cycle**	**3,370**

1	**ID: 54**	**Title of measure**	**Sector: Iron & Steel Industry**
2	**Survey Year: 2006**	**Complete closing of charging door of Medium Merchant and Structural Mill MMSM) reheating furnace**	**Technology: Reheating Furnace**
3	Name of the Company :	**Rashtriya Ispat Nigam Ltd., Visakhapatnam Steel Plant, Visakhpatnam, INDIA**	
4	Agency that executed the project :	In-house	
5	Year of Implementation :	2004	

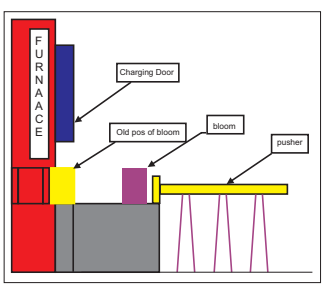
6 **Unit Profile:**

Rashtriya Ispat Nigam Ltd., is the corporate entity of Vishakhapatnam steel plant. The plant has a capacity to produce 2.656 Mt of saleable steel of which 2.410 Mt is finished steel. Visakhapatnam steel plant is among the premier steel mills in India earning revenue of US$ 1.36 billion. 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 upto 2010 AD.

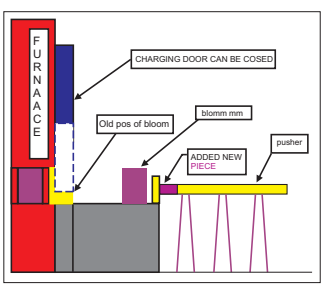
7 **Description of Energy Conservation Measure:-**

The reheating furnace in the plant is envisaged to reheat the blooms of 250*250 mm to a temperature of 1180-1190OC for further rolling into angles, structural and billets. The furnace heats the blooms at the rate of 130t/hr. The furnace has five zones. The flue gases exit the furnace at flue gas temperature of 550-600^{O}C. It was observed that the flue gas losses through door were high as the charging door did not close completely. The blooms were being pushed with the help of bloom pusher into the furnace. The blooms were being pushed beneath the charging door, so the charging door could not be closed and would always be in open condition while rolling is going on.It was observed that heat of 0.806 Gcal/hr was lost to atmosphere due to opening of charging door. The heat loss could be minimized by closing the door completely during all the time except charging of the blooms. To close the door fully the bloom was to be pushed further inside the furnace. To clear the bloom beneath the door the pusher had to move forward further a stroke of 400 mm. Pusher drawing has been modified by adding a spool piece to the pusher beam. The stroke length was adjusted accordingly by relocating the striker plates and end limit switches to get an additional stroke of 400 mm. This modification ensured complete closing of charging door.

8 **Picture Before Modification**



Picture After Modification



9	Total investment:		Not known
10	First year energy cost savings:		70,750 US$
11	First year additional savings beyond energy (i.e. water, raw materials etc.):		Nil
12	Annual gas consumption before,	m^3	35
13	Annual gas consumption after,	m^3	0
17	First year gas savings,	m^3	35
18	First year tons of CO_2 mitigated		97
19	Assumed sustainability, years		10
20	**Expected tons of CO_2 mitigated throughout life cycle**		**970**

1	ID: 55	Title of measure	Sector: Iron & Steel Industry
2	Survey Year: 2007	Optimization of combustion parameters in Coke Oven batteries	Technology: Coke Oven
3	Name of the Company	:	Rashtriya Ispat Nigam Limited, Vishakhapatnam steel Plant, INDIA
4	Agency that executed the project	:	In-house
5	Year of Implementation	:	2006-07

6 **Unit Profile:**

Rashtriya Ispat Nigam Limited is the corporate entity of Visakhapatnam Steel Plant. 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 plant has a capacity to produce 2.656 million ton of saleable steel of which 2.410 million ton of finished steel.

7 **Description of Energy Conservation Measure:-**

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 either Coke oven gas or mixture of coke oven gas and Blast Furnace gas. It is observed during heat balance of coke oven batteries that heat loss through flue gases was high and accounts for about 15% of fuel input. Therefore reduction of flue gas loss is necessary for improving thermal efficiency of the batteries. The following activities are taken.

i. Timely pushing and charging of ovens(maintaining pushing regularity index at 0.98 and coking regularity index at 0.98).
ii. Maintaining coefficient of temperature uniformity (Kb) above 0.8, there by avoiding high and low temperatures.
iii. Reduction of excess air coefficient from 1.39 to 1.35 by maintaining draft and arresting all the leakages.
iv. Monitoring regenerator/bus flue cross leakages.
v. Stabilization of cross wall temperatures once in every six months.
vi. Physical inspection of all the flues of battery once in a month.
vii. Reduction of finger plate opening from 80 mm to 70 mm on pusher side and from 90 mm to 80 mm on coke side.
viii. Reducing chimney draft reduced from 28/30 mm to 26/28 mm on coke side as well as pusher side respectively.
ix. Rectification of leaks on horizontal branch pipes of waste heat boxes.

8

RASHTRIYA ISPAT NIGAM LIMITED
VISAKHAPATNAM STEEL PLANT
VISAKHAPATNAM-530031

ENERGY POLICY

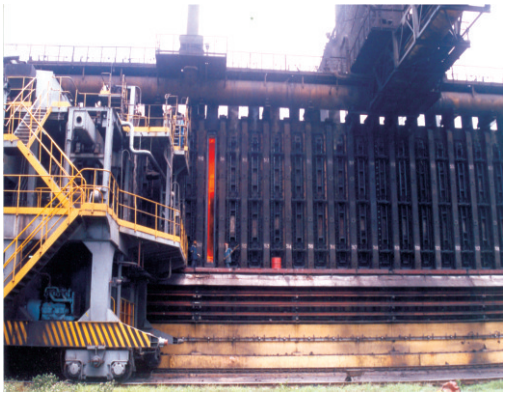
We, at Visakhapatnam Steel Plant, are committed to optimally utilise the various forms of energy in a cost-effective manner to effect conservation of energy resources. To accomplish this we will:

- Document, implement, maintain and continuously review the energy management system
- Comply with the energy conservation Act-2001 and any other statutory requirements
- Make Energy Conservation a way of life by involving all employees
- Reduce energy cost by
  - Recovery of waste energy and Recycling of waste
  - Adoption of energy efficient operation, energy efficient maintenance, energy oriented incentive policy, procurement of energy efficient equipment, appropriate energy efficient technologies and use of cheaper forms of energy
- Reduce Specific Energy Consumption by 1% per year up to 2010

Date
22/10/2004

(Y.Siva Sagar Rao)
Chairman-cum-Managing Director

Picture After Modification



9	Total investment:	Not known
10	First year energy cost savings:	960,000 US$
11	First year additional savings beyond energy (i.e. water, raw materials etc.):	Nil
12	Annual Gas consumption before, million m^3	951
13	Annual Gas consumption after, million m^3	907
14	First year Gas savings, million m^3	44
15	First year tons of CO_2 mitigated	122,584
16	Assumed sustainability, years	10
17	**Expected tons of CO_2 mitigated throughout life cycle**	**1,225,840**

1	ID: 56	Title of measure	Sector: Iron & Steel Industry
2	Survey Year: 2007	Substitution of coal with by-product gas in boilers of Power House	Technology: Boilers

3	Name of the Company	:	**Tata Steel Limited, Jamshedpur, Jharkhand, INDIA**
4	Agency that executed the project	:	Thermax Ltd.
5	Year of Implementation	:	2006-07

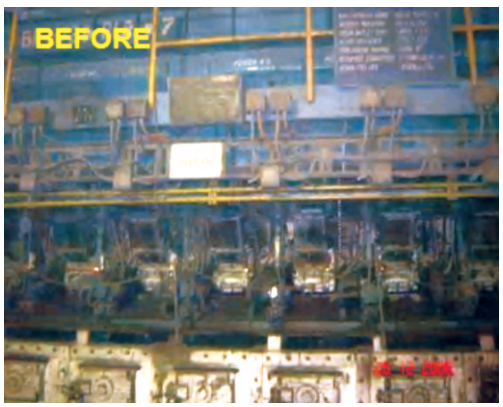
6 **Unit Profile:**

Established in 1907, Tata Steel is Asia's first and India's largest private sector steel company. Tata Steel is among the lowest cost producers of steel in the world. It has its captive raw material resources and the state-of-the-art 5 MTPA (million tones per annum) plant at Jamshedpur, in Jharkhand State. Tata Steel has recently included in its fold Natsteel Asia (2 MTPA) (now Tata Steel Thailand) (1.7 MTPA) creating a manufacturing network in eight markets in South East Asia and Pacific rim countries. Soon the Jamshedpur plant will expand its capacity from 5 MTPA to 7 MTPA by 2008.

7 **Description of Energy Conservation Measure:-**

With the increase in production levels in the plant, the by-product gas generation too increased. The surplus Blast Furnace gas being generated was being flared as there was no consumer for the lean gas having a caloric value of about 900 kCal/Ncum. Instead of investing in new boilers, and having the experience of converting coal fired boilers to blast furnace gas fired boilers, the decision was taken to convert 4 boilers at Power House No. 3 to by-product gas fired boilers. The fuel now being used is BF gas; CO gas & LD gas there by reducing the boiler coal consumption in the plant. After implementation of this project the heat input to boilers through coal has reduced from a level of 49% in 2001 to a level of 26% in 2007. Two Boilers have been converted from Coal Firing to Gas Firing in year 2006 and the other two are under conversion. The consumption of boiler coal in these boilers has become zero and has given benefit in utilization of 1, 10,000 Nm^3/hr BF Gas, which was earlier being flared. The specific energy consumption has reduced by 0.072 Gcal/ ton of steam.

8 **Picture Before Modification**



Picture After Modification

9	Total investment:	237,500 US$
10	First year energy cost savings:	1,625,000 US$
11	First year additional savings beyond energy (i.e. water, raw materials etc.):	Nil
12	Annual coal consumption before, tons	201,464
13	Annual coal consumption after, tons	0
14	First year coal savings, tons	201,464
15	First year tons of CO_2 mitigated	286,079
16	Assumed sustainability, years	10
17	**Expected tons of CO_2 mitigated throughout life cycle**	**2,860,790**

1	**ID: 57**	**Title of measure**	**Sector: Iron & Steel Industry**
2	**Survey Year: 2006**	**Reduction in Fuel Consumption by process improvement**	**Technology: Control Systems**
3	Name of the Company	:	**ThyssenKrupp Electrical Steel India Pvt. Ltd., Nashik, Maharshtra, INDIA**
4	Agency that executed the project	:	In-house
5	Year of Implementation	:	2005

6 **Unit Profile:**

ThyssenKrupp Electrical Steel India Pvt. Ltd. (Formerly EBG India Pvt. Ltd.), a wholly owned subsidiary of ThyssenKrupp Steel, Duisburg, Germany, was formed to bring latest technology of Electrical Steel to the Asian sub continent in September 2000.It produces and supplies, Power Core grain-oriented and non-oriented electrical steel produced in India as well as in the electrical steel manufacturing group companies in Germany, Italy and France. It also produces special qualities of carbon steel products for Automotive, White Goods, A/C and Refrigeration, Electrical Equipment industries etc. The annual turnover of the unit in Nashik is US$ 0.15 billion.

7 **Description of Energy Conservation Measure:-**

The unit's acid generation plant (ARP) produces 3888 kl /annum Hydrochloric Acid (HCL). The reaction principle is: 95% of the acid is split up on the surface and 5% in the gap. The waste acid from the prickling process is thermally treated under vacuum in float bed reactor to regenerate the acid with the following reaction.

$2FeCl_2 + H_2O + ½ O_2 = Fe_2O_3 + 4HCL$

The unit's in house team took the initiative to reduce the fuel consumption by process improvement. The team suggested the following modifications which were implemented to achieve energy conservation.

By utilizing this principle, surface area is increased with addition of 20% more Fe_2O_3.

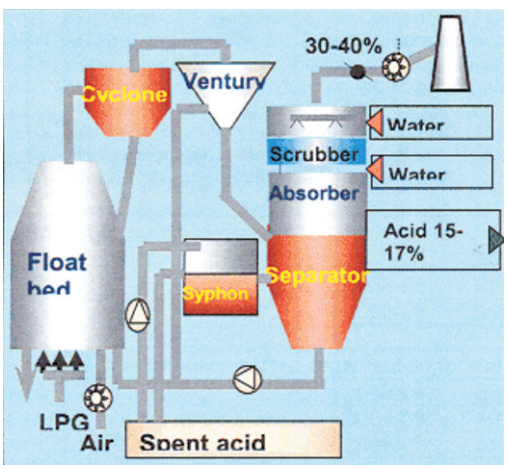
Nozzle change for homogenous mixing of waste acid in Siphon.

Installation of variable speed drive for maintaining vacuum in reactor

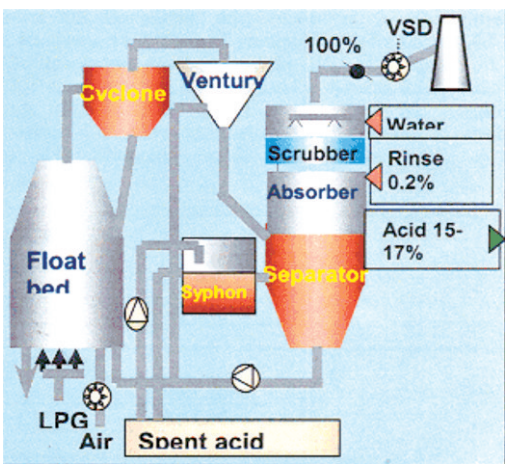
Use of rinse water instead of fresh in absorber (25% reduction in ETP load).

	Pressure (m Bar)	LPG (kg/kl)	Productivity (kl/hr)	Electrical consumption (kW)
Design	160	100	1.4	74
Revised	180	75	1.7	40

8 **Picture Before Modification**



Picture After Modification



9	Total investment:		25,000 US$
10	First year energy cost savings:		80,000 US$
11	First year additional savings beyond energy (i.e. water, raw materials etc.):		Nil
12	Annual electricity consumption before,	MWh	172
13	Annual electricity consumption after,	MWh	93
14	First year electricity savings,	MWh	79
15	First year tons of CO_2 mitigated		79
16	Assumed sustainability, years		10
17	**Expected tons of CO_2 mitigated throughout life cycle**		**790**

1	ID: 58	Title of measure	Sector: Iron & Steel Industry
2	Survey Year: 2006	Replacement of tube type air-preheater with plate type air pre-heater in reformer	Technology: Plate Type Air -Preheater
3	Name of the Company	:	Vikram Ispat, Maharashtra, INDIA
4	Agency that executed the project	:	GEA Ecoflex India Pvt. Ltd., Mumbai
5	Year of Implementation	:	2005

6 **Unit Profile:**

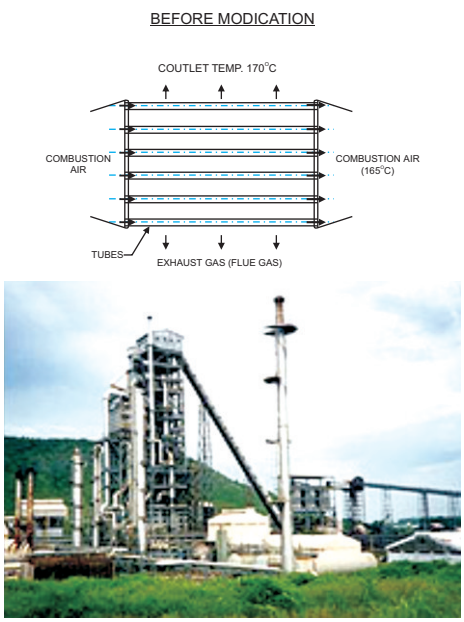
Vikram Ispat is a Unit of GRASIM under Aditya Birla Group of Industries. Vikram Ispat plant is located on the western coast at Salav, about 130 km south of Mumbai, India. The plant has a installed capacity of 0.9 million MTPA of Sponge Iron (both HBI & DRI). It is a unique plant in the world producing both HBI & DRI from the same reactor. The plant uses state-of-the-art technology "HYL-III" from HYLSA of Mexico with engineering expertise of Davy Dravo of USA. The plant's annual turnover for the year 2005-06 was US$ 0.15 billion.

7 **Description of Energy Conservation Measure:-**

The existing set up: Exhaust air from the reformer was sent to the stack through the tube type pre-heater (shell & tube exchanger) which could not efficiently use the energy of the exhaust gas to pre heat the combustion air from FD fan.

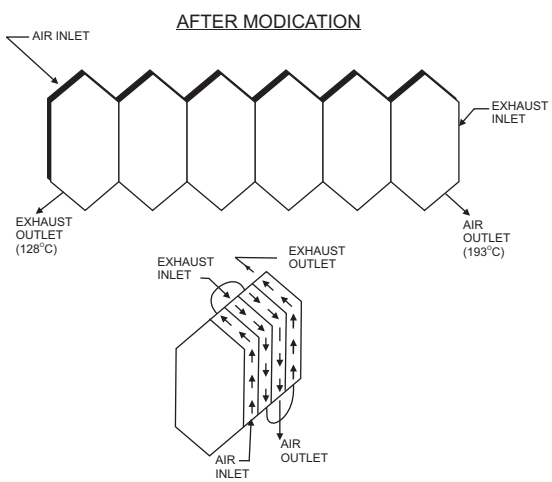
Modification: A new plate type heat exchanger, suitably designed, is installed to replace the old one which efficiently utilizes the energy of exhaust gas and reduction in exhaust gas temperature is achieved from 170 °C to 128 °C resulting in savings of 1.46 Gcal/hr.

8 **Picture before Modification**



Vikram Ispat Plant

Picture After Modification



9	Total investment:	562,500 US$
10	First year energy cost savings:	227,500 US$
11	First year additional savings beyond energy (i.e. water, raw materials etc.):	Nil
12	Annual Naphtha consumption before, kl	4971
13	Annual Naphtha consumption after, kl	4601
14	First year Naphtha savings, kl	370
15	First year tons of CO_2 mitigated	810
16	Assumed sustainability, years	10
17	**Expected tons of CO_2 mitigated throughout life cycle**	**8,100**