



## Jindal Steel and Power Limited, Raigarh

### UNIT PROFILE

Jindal Steel & Power Limited (JSPL) is the youngest fleet under the flagship of JINDAL Organisation. With the vision to cater the needs of nation & meeting the challenges of global markets, JSPL management embarked on the ambitious mission to establish an Integrated steel plant with perfect blend of in-house & state of art technology. Today JSPL has the largest coal-based sponge iron manufacturing capability in the world, Rails of 120-meter length, the longest produced anywhere in the world & Parallel flange universal beams in larger sizes, manufactured for the first time in India.

Company has a obsession for excellence. Shaping our business in synchronized with the market dynamics. Boldly venturing into new territories and the future. Present manufacturing facilities are:

- ❖ Coal based Sponge Iron production from 10 Rotary Kilns ( 6 no. in DRI –I shop and 4 no. in DRI-II shop) with annual production capacity of 1.32 Million tonne. Which is the world's largest coal-based sponge iron production capability. One of the lowest cost producer of Sponge Iron, with in-house availability of the three Key raw materials, coal, iron ore and power.
- ❖ Blast furnace with the volumetric capacity of 351 m<sup>3</sup> and annual production capacity of 0.25 Million Tonne, which supplies hot metal for steel making.
- ❖ Two Steel Melting Shops, no. I & II, having capacity of 1.15 Million tonne of continuously cast steel products. Shop I has one EAF of 50/60 tonne capacity, one Ladle Refining Furnace, one Tank Degasser and two casters (one round-cum-bloom and one slab). Shop II has one 100 T EAF, one LRF, one Tank Degasser and one 4-strand Beam blank-cum-Round-cum Bloom caster. The products, Beam blanks for larger parallel flange beams, rail bloom for rail rolling and other products, rounds for seamless pipe application and slabs.
- ❖ Submerged Arc Furnace producing Ferro Chrome from 24MVA furnace, which cater the need of SMS department and Group Company.
- ❖ Captive Power Plant with generating 265MW, which include power generation from exhaust gases of Sponge Iron Kilns & Blast Furnace and middling from coal washery.
- ❖ Rail & Universal Beam Mill with state of art technology, having a capacity of producing 120meter long rail and large size parallel flange Beams. Mill has annual capacity to produce 0.75 Million tonne of rolled product.
- ❖ Machinery Division at Raipur with a manufacturing capacity of 11,500 TPA, along with an annual capacity of 30,000 MT of Steel Ingots & Castings that compares with the best in the region. The Machinery Division plant also has a machine manufacturing facility. This division caters to the in-house maintenance needs of the Raigarh Plant and special maintenance orders from other Group Companies.
- ❖ Captive Coal Mines at Tamnar, Raigarh with crushing and washing facility at mines head. Meeting total wash coal requirement of existing Sponge Iron unit.
- ❖ Captive Iron Ore Mines at Tensa Orissa. Meeting partly requirement of existing Sponge Iron unit.
- ❖ The plant is currently under large expansion programme:
- ❖ Steel Melting Shop II with second 100 tonne EAF and two more LRFs to increase the steel making capacity to 2.5 Million tonne.
- ❖ 0.8 Million TPA Clean type non-recovery mechanized Coke Ovens.
- ❖ Blast Furnace with optimized energy utilization with annual capacity of 1.25 Million tonne.
- ❖ Sinter Plant (2.4 MTPA) with modern pollution control ESP with high capacity.
- ❖ Lime and Dolomite Plant (600 & 300 TPD respectively) with latest global technology and features.

Company is certified to ISO 9001:2000 and ISO 14001: 1996. Company is recognized by DSIR, Govt. of India as “in-house R & D Centre” and by Central Boiler Board, Govt. of India as “ **well known steel maker**” for Boiler quality steels.

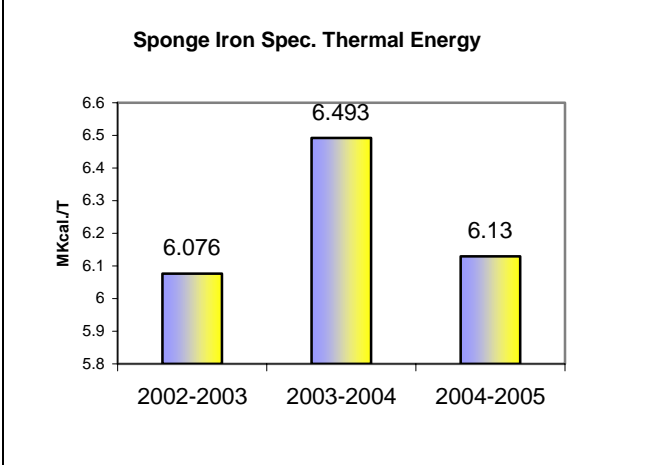
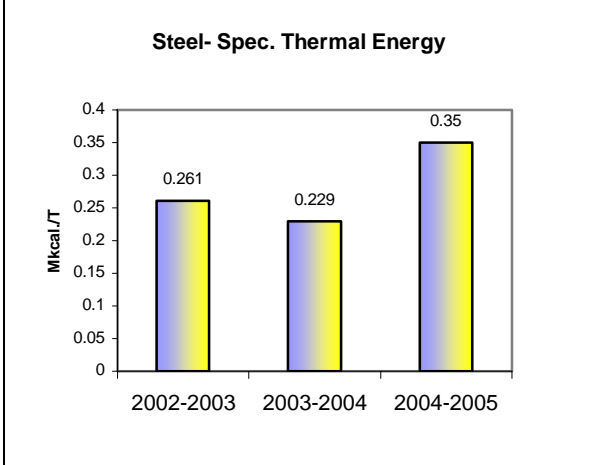
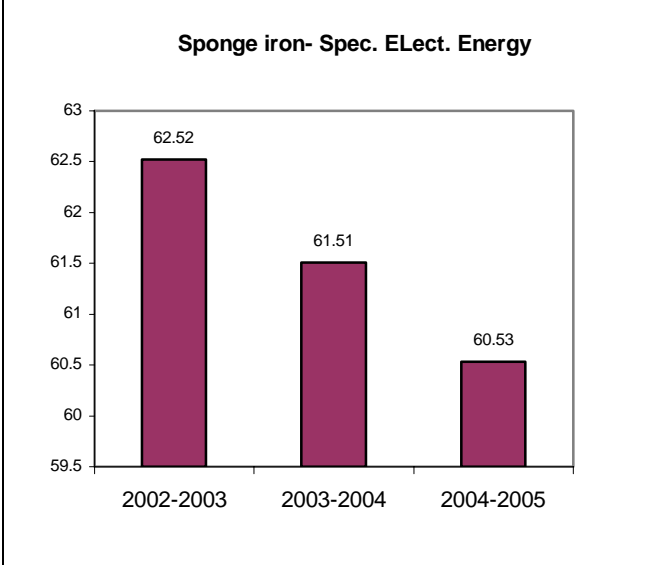
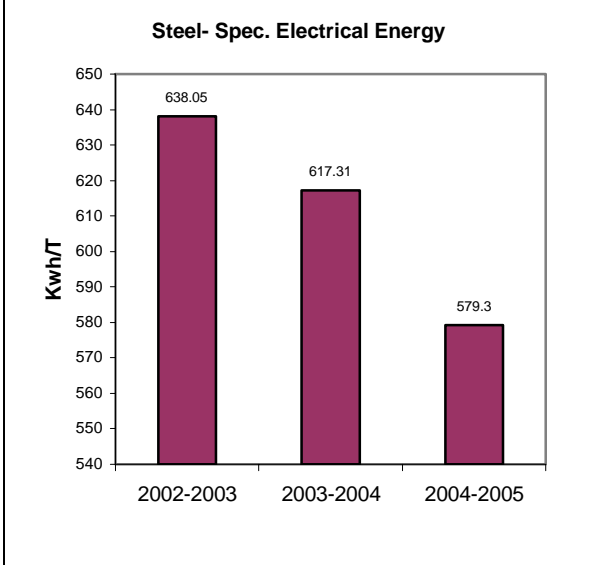
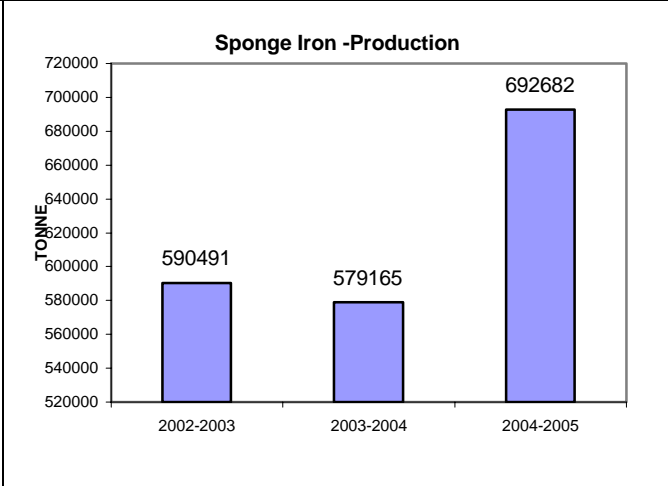
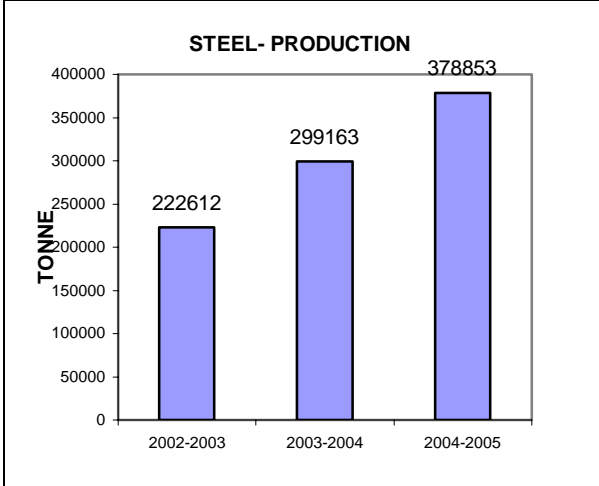
JSPL has consistent record of achievements. Same of the laurels conferred on the company are listed below,

1. 1st Prize in Integrated Steel Plant Sector in National Energy Conservation Award–2003 sponsored by Ministry of Power, Govt. of India

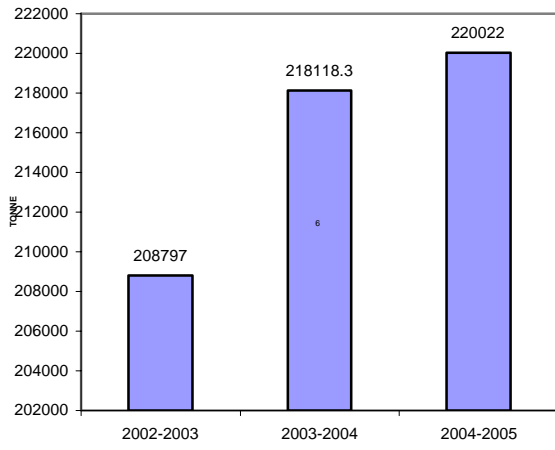
2. 1st Prize of National energy conservation award – 2001 (Integrated Steel Plant Sector)
3. 1st prize for Secondary Steel Plant / Alloy Plant in the IIM Quality Award 2002-03 sponsored by Indian Institute of Metals.
4. Asia Pacific HR Excellence Award 2003, 1st prize in “Organization with Innovative HR Practices” at the Asia Pacific HR Congress, held at Mumbai.
5. 1st Prize of Golden Peacock National Environmental Management Award 2002-2003
6. 2nd Prize of National energy conservation award – 2002 (Integrated Steel Plant Sector)
7. Silver Award in the Greentech Environment Excellence Award 2002-03 sponsored by Greentech Foundation.
8. Second prize in Greentech National Safety Award-2002-2003.
9. 2<sup>nd</sup> Prize of National energy conservation award – 2003 (Integrated Steel Plant Sector)
10. CII Chhattisgarh HR excellence award for 2004.

<b>ENERGY CONSUMPTION:</b>				
<b>DESCRIPTION</b>	<b>UNIT</b>	<b>2002-2003</b>	<b>2003-2004</b>	<b>2004-2005</b>
<b><u>PRODUCTION:</u></b>				
Sponge Iron	Tonnes	590491.00	579165	692682
Steel	Tonnes	222612.00	299163	378853
Ferro-Chrome	Tonnes	25639.00	23373	35656
Power	Lac Kwh	10439.10	11796.0	18982.4
Hot metal/ Pig Iron	Tonnes	208797.00	218118.3	220022
Rolled Product	Tonnes	-	100129	215542
<u>Total Elect. Energy consumption</u>	Lac Kwh	4910.69	5917.117	7647.62
<b><u>Sp. Elect. Energy Consumption:</u></b>				
Sponge Iron	Kwh / Tonne	62.52	61.51	60.53
Steel	Kwh / Tonne	638.05	617.31	579.3
Ferro-Chrome	Kwh / Tonne	3914.59	3917.73	4038
Power	%	10.89%	11.27%	11.0
Hot metal/ Pig Iron	Kwh / Tonne	196.0	180.63	180.77
Rolled Product	Kwh / Tonne	-	335	250.6
<u>Total Thermal Energy Consumption</u>	G Cal	3404133.46	4513140.15	5660303.8
<b><u>Sp. Thermal Energy Consumption:</u></b>				
Sponge Iron	G Cal / Tonne	6.076	6.493	6.13
Steel	G Cal / Tonne	0.261	0.229	0.35
Ferro-Chrome	G Cal / Tonne	4.32	4.125	3.97
Hot metal/ Pig Iron	G Cal / Tonne	4.45	4.72	4.78
Rolled Product	G Cal / Tonne	-	1.09	0.83
<b>Total Manufacturing Cost</b>	Lac Rs.	55,612.88	79,778.43	140509.77
<b>Total Energy Cost</b>	Lac Rs.	15,955.17	23,299.89	42907.04
<b>Energy Cost / Total Manuf. Cost</b>	%	28.69 %	29.20 %	30.5%

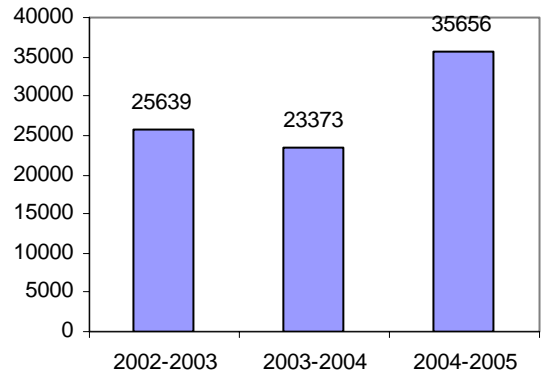
**Specific Energy consumption figures over last three years show steady decline, due to continuously effort towards energy conservation.**



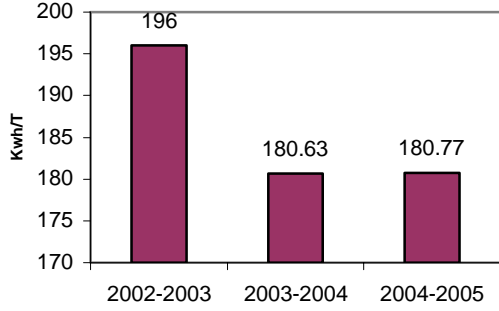
**BLAST FURNACE- PRODUCTION**



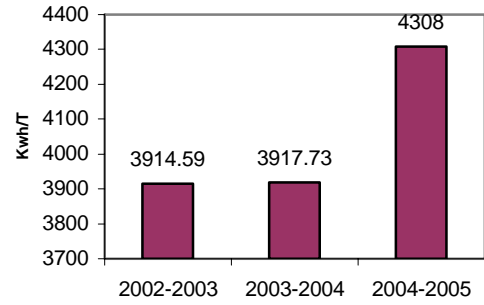
**SAF - PRODUCTION**



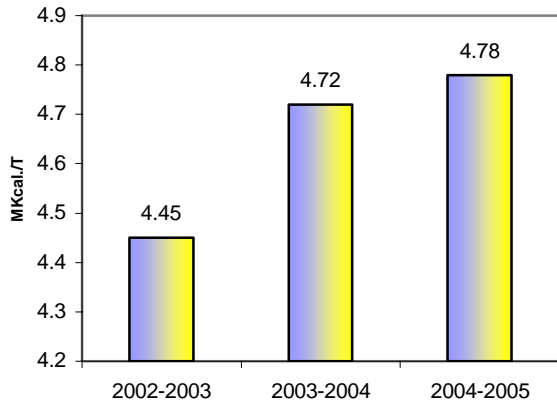
**Blast Furnace - Spec. Electrical Energy**



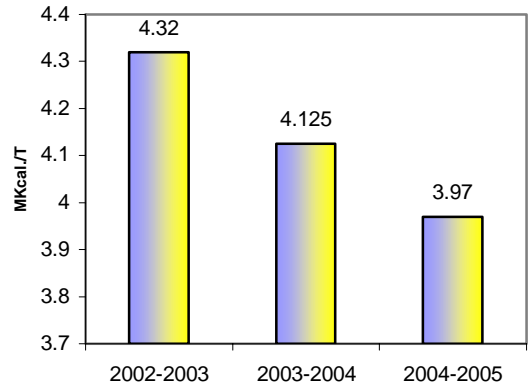
**S.A.F. Spec. Electrical Energy**



**Blast Furnace- Spec. Thermal Energy**



**S.A.F. Spec. Thermal Energy**

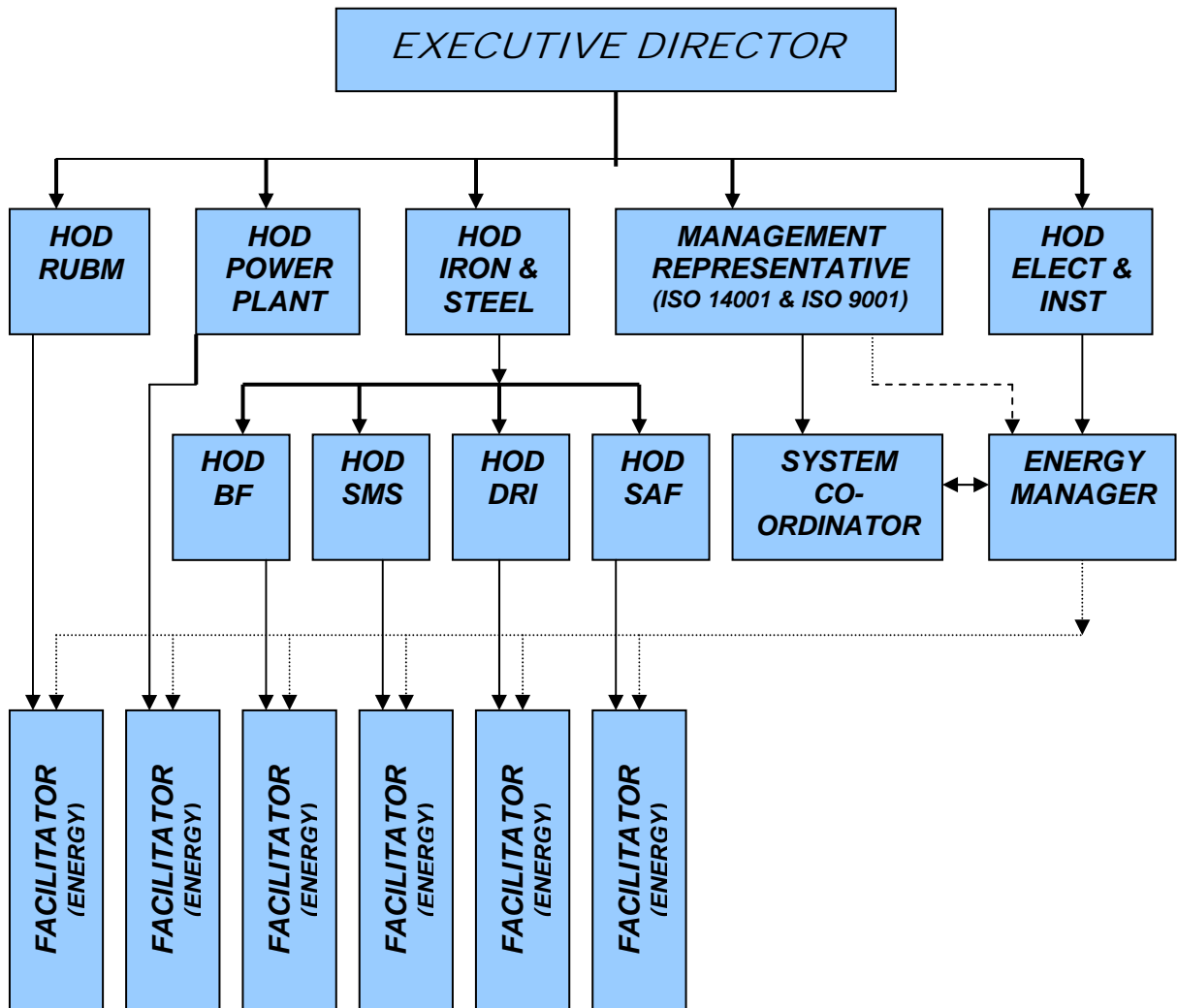


## ENERGY CONSERVATION COMMITMENT, POLICY & SETUP.

All the above figures clearly indicate the culture of energy conservation imbibed right from initiation of the company in 1991. When the plant started, to utilize the waste heat of rotary kilns, producing Sponge iron, waste heat recovery boilers (WHRB) were installed on-line and the steam used for generation of electrical power. Thus all the six kilns are fitted with WHRB. Continuing the commitment for Energy conservation, all new kilns ( 4 Nos.) are also fitted with WHRB. Boilers generating steam utilize the in-house waste of washery reject and rotary kiln char. In fact, commitment for energy conservation and waste utilization is so high in the plant that the Power Plant unit-II was planned for utilization of waste basically. Towards this end, energy policy has been formulated and Executive Director takes structure monthly meeting on energy conservation.

An Energy Management organization set up has been made for the philosophy of the management, energy management is part of the total management system, and that is why HODs are the key elements in the total structure, for planning and execution of the action plans, Supported by Energy Coordinator.

### ORGANISATION STRUCTURE OF ENERGY MANAGEMENT CELL



## ENERGY CONSERVATION ACHIEVEMENTS:

Major achievements are:

### 1. **Producer Gas Plant :**

In Reheating furnace we were using dual fuel i.e. Blast furnace gas and furnace oil. As we wanted to increase the percentage of Blast furnace gas to replace furnace oil , we were finding difficulty as calorific value of Blast furnace is less. Therefore we have gone for Producer gas. We have installed 5 x 3000 Nm<sup>3</sup>/hr. capacity producer gas plant to enrich the blast furnace gas.

Average Gas generation in a year = 777.6 Lakh Nm<sup>3</sup>/hr.

Cost for generation in a year = Rs. 280 Lakh

Cost of furnace oil replaced = Rs. 1718.5 Lakh

**Amount saved in year = Rs. 1438.5 Lakh**

### 2. **New WHRBs :**

We have installed 4 x 500 TPD capacity Sponge iron kiln . To utilize the waste heat of sponge iron kiln we have installed 4 No of WHRB along with the kilns which generate steam to produce power i.e. 50 MW .

Total extra power generation in a year. = 3348.18 Lakh Kwh

**Amount saved in a year = Rs. 4419.6 Lakh**

### 3. **Air Pre heater :**

In WHRB it was noticed that outlet flew gas temperature was on higher side i.e 180°C. It was studied and evaluated that Air Pre-heater can be installed .

In WHRB #2 & 3 APH was introduced which has resulted in reduction in flue gas temperature by 20°C , reduction in unburned carbon in ash came down to below 5% from more than 10% and Steam generation increased by 3-4 Tons/Hr / WHRB.

Total extra steam generation by WHRB # 2&3 = 48000 Ton/annum

**Total saving by using extra steam to generate power = Rs. 251 Lakh.**

### 4. **Reconditioning of Turbine :**

In Turbine No. 1 steam consumption was 6.4 Ton/MW, as it is very old turbine with 10 MW power generation capacity. To reduce the steam consumption, reconditions of turbine has been done. After reconditioning steam consumption has been reduced to 5.4 Ton/MW.

Total steam saved = 7200 Ton / Annum

Extra power generated by Utilizing the extra steam = 13000 MW / annum

**Total cost saved in a year = Rs. 286 Lakh**

4.	<p>In sponge Iron kiln, raw material quality &amp; size makes lot of impact on productivity and size yield of kiln. We came to know from supplier that with new technology ( i.e. flip flop method) screen can reduced the minus faction in raw material to 2 % from 5 % ( i.e. in conventional screen). Management decided to install one screen on trial basis. By installing the new screen, drastic improvement was noticed in productivity and yield of kiln . So same type of screen was installed in all the kilns</p> <p>Total increase in production compared to last year = 44835 Tonne</p> <p>Total amount saved = Rs.2241.75 Lakh</p>
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(v) ENERGY CONSERVATION PLANS AND TARGETS.				
	ENERGY CONSERVATION PLANS	Savings in Lac Rs.	Approx. Investment in Lac Rs.	Project commencement & completion year
1.	60 MW power plant based on utilization of waste heat of coke oven.	9504	40000	Sept.06
2.	Installation of new oxygen plant with energy efficient technology. Specific energy consumption will be reducing by 0.38 kWh / Nm <sup>3</sup> . Capacity of plant is 350 liter per hr.	290	10500	August 05

**(vi) ENVIRONMENT AND SAFETY:**

**A. Environmental Management:**

**Following steps have been taken for Environmental Management at JSPL :**

- ❖ Installation of Waste Heat Recovery Boilers (WHRB) to use waste heat of sponge iron unit for generating electrical energy.
- ❖ Installation of AFBC boilers to reuse solid wastes (middlings) of coal washery.
- ❖ Installation of ESPs and Bag Filters in all dust generating sources.
- ❖ Waste gas from blast furnace is used as fuel in our Rolling mill (reheating furnace) DRI (rotary kiln & Coal dryer) and 63 TPH boiler.
- ❖ Installation of two Nos. of Sewage Treatment Plants to treat the domestic waste generated from the colonies and offices. This treated wastewater is 100 % reused for plantation and garden development purpose.
- ❖ Waste Management for reduction of the waste generation and exploring the use of the waste.
- ❖ Construction of the pucca road inside the plant
- ❖ Implementation of the concept of Green Productivity.
- ❖ Waste water recycling and zero discharge.
- ❖ Rain Water Harvesting
- ❖ Bio-gas plant established
- ❖ Vermiculture composting plant has been established.
- ❖ Use of Fly Ash for Brick Manufacturing.
- ❖ Use of fly Ash for various construction works.

**I. Air Quality:**

- ❖ Regular monitoring of Stacks is carried out to maintain emission level within the stipulated limits.

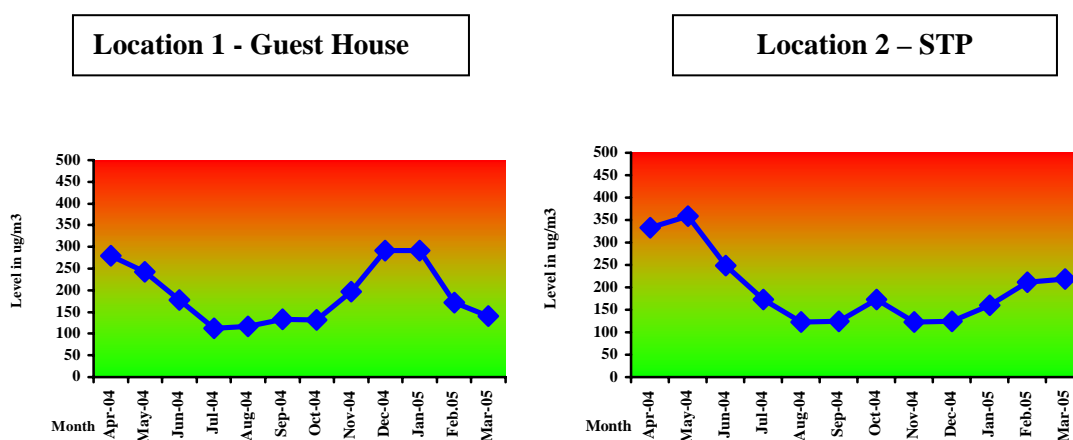
- ❖ Opacity Meters have been installed in all the stacks.

#### Specific measures to control fugitive emissions:

- ❖ Raw material handling sections are major source for fugitive emissions. Most of the time sources of fugitive emission are transfer and junction points, product hopper area and loading points. Bag filters are provided with appropriate suction devices to control the fugitive emission. In areas where provision of bag filter and other control device is not feasible, water-spraying arrangements are made, particularly coal yard, wagon tippler and truck tippler.
- ❖ Adopting Good house keeping practice also helps in control of fugitive emission. Maintaining shopfloor and roads in good condition minimizes the chances of fugitive emission.

Due to adequate air pollution control measures, ambient air quality in the complex and surrounding areas is maintained well within the norms.

### Results of Ambient SPM Monitoring (Year 2004) (CECB Norm – 500 microgram/ m3)



## II. Water Management:

Water consumption has been optimised by taking various conservation measures. Flow meters have been installed in all fresh water make up pipelines in all units, which helped a lot in water monitoring and optimising specific water consumption for long steel products in coming about 5.3 m<sup>3</sup>/T of product. *Following measures have been taken for wastewater management in various units of JSPL, Raigarh –*

### DRI Plant:

Effluent generated from various systems of DRI is taken to kiln pond through well laid drain network and water is recycled back to the plant.

### Power Plant:

- Effluent generated from D.M. Plant is neutralized in neutralization pit and treated water is taken into power plant pond and reused in wet ash conveying system.
- Decanted water from ash pond is also recycled back for reuse in wet ash conveying systems.
- Oil separators have been installed in compressor house of power plant and other units also like SMS, Stores, DRI and Garage etc to ensure oil content in drain water is well within prescribed limits.

### Blast Furnace:

Effluent of M.B.F. is treated in ETP and water is recycled back to the plant. ETP is consist of thickener where wastewater is clarified and reused back in the GCP of Blast furnace. Sludge is taken in sludge storage tank and then finally disposed off into ash dyke.

### Submerged Arc Furnace:

Effluent generated from the plant is used for slag cooling and dust suppression.

### Steel Melting Shop:

Wastewater generated from cooling towers of SMS is taken to Effluent Recycling Pond and recycled back.

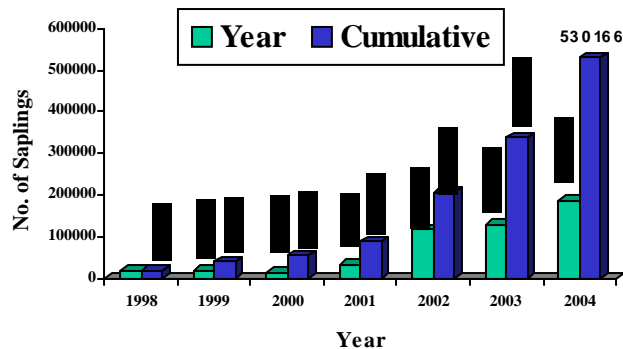
### Domestic Waste Water:

Domestic wastewater generated from colonies and offices is treated in two nos. of Sewage Treatment Plants. Treated water from STPs meets the norms of CECB and reused for watering of plantation/gardens etc.



*SEWAGE TREATMENT PLANT-II*

**III. Greenery:** Tree plantation and gardens have been developed in entire plant wherever space is available. Out of 1200 acres about 200 acres area is green.



### IV. Natural Resources Conservation:

Flow meters have been installed in all fresh water make up lines for day to day monitoring of water consumption.

### V. Solid Waste Utilization:

Total plant has been integrated in such a fashion that wastes generated from various units are reused in various other units. Organization has adopted 3 "R"s namely Reuse, Recycle and Reduce and is making all possible efforts to convert waste into wealth. Following measures have been taken for the management of solid waste generated at various plants-

- (a) **Coal Fines** – Used for Power generation and Sold to outside users.

- (b) **SAF Slag**- Used for road making and other construction activities.
- (c) **Char** - Reused in AFBC Boiler of Power Plant for power generation.
- (d) **Slag from SMS Plant** - Disposed of into an identified and secure land fill site.
- (e) **Iron Ore Fines** -Sold to Sponge Iron Manufacturers.
- (f) **Slag from MBF Plant** -Sold to Cement Industries
- (g) **Bag filter and ESP dust** -Disposed of into an identified and secured land fill
- (i) **Installation of Waste Heat Recovery Boilers (WHRB):**  
Waste Heat Recovery Boilers have been installed to use waste heat of kilns. Installation of the waste heat recovery boilers for the utilization of waste heat of the DRI plant has not only helped in pollution control but also resulted in generating power.
- (j) **Installation of Air Fluidized Bed Combustion Boilers (AFBC):**  
Air Fluidized Bed Combustion (AFBC) Boilers have been installed which utilizes Coal Washery Rejects and char from the DRI unit for electric power generation. Use of this mixed fuel comprising of rejected material also solves the problem of waste disposal and helps in resource conservation.
- (k) **Bio-gas plant**  
  
Two Bio-gas plant have been established which generate bio-gas from the waste generated from stable. Bio- gas generated is used for cooking therefore bio-gas plant not only helps in keeping environment clean but also saves energy.
- (l) **Vermi-Composting Plant**  
  
A vermi-compost plant has been set up at plant where organic waste including papers generated from residential houses and offices are converted into manure using worms. The manure is used for providing nutrients to plants. Thus vermin-compost plant not only helps in keeping environment clean by solving waste disposal problem but also saves money for procurement of manure.
- (m) **Brick Making Plant**  
  
JSPL has set up a brick making plant for the utilization of fly ash generated from its power plant. In addition to the fly ash bricks fly ash is also used in road construction and sold to cement manufacturers. Major part of the fly ash is left unutilized which is disposed of in the ash dyke.

## B. Safety Control:

Safety is our prime concern and our target is zero accident. To keep employees aware about safety and maintain zero accident targets several activities and program are being conducted in our plant. A few important activities are given below:

- i) **SAFETY OATH:-** From 1<sup>st</sup> to 4<sup>th</sup> of every month safety oath program is being organized at Unit-I, RUBM, Projects and New DRI which is attended by employees of every level. After his message of safety Oath administrated by Executive Director.
- ii) **SAFETY APPLIANCES:-** All safety appliances such as helmet, Shoes, Hand gloves, aprons, safety belts etc are provided to all employees. The importance of these appliances is being communicated through field and classroom training.
- iii) **SAFETY AWARENESS CAMPAIGN:-** To generate safety awareness among the employees campaigns are being conducted. All departments are covered during the campaign. Employees of all levels including staff, workers & contract workers are covered. Awareness

provides information about the type of Hazard, importance of safety appliances and preparedness for emergency situations related to the concerned departments.

- iv) **FIRE SAFETY:-** Being an hazardous industry more attention has been paid to enrich the knowledge of employees in field of industrial fire safety. Faculties from National Institute of fire Engineering Nagpur and other external agencies are called for this program time to time. Two fire tenders are available in the plant. Also, a network of fire hydrants has been installed through the plant to combat any fire hazard.
- v) **SAFETY AUDIT:-** To eliminate unsafe conditions & unsafe practices external and internal auditing are being conducted. This technique helps in systematic and critical assessment of major work hazards, so as to eliminate, control and contain them by minimizing risk to the life

**ACTION CENTER KORBA AT JSPL:-** Safety activities of National Safety Council (M.P. Chapter) Action Center Korba , is being organized by the company since 2001 . This is an opportunity and responsibility given to JSPL Raigarh. We have organized safety programs for JSPL and also for other member industries also to achieve a good safety record of this zone.

21.	<b>Whether any dispute pertaining to statutory requirements of safety and pollution control is pending with any Government Agency. If Yes, give details:</b>
	<b>NO</b>