

SURVEY OF INDIAN SPONGE IRON INDUSTRY

Highlights of Findings

2005-06



Prepared by: Joint Plant Committee

A. BACKGROUND OF THE SURVEY:

In 2000-01, Joint Plant Committee (JPC) had conducted a survey on the domestic sponge iron industry. For the year 2000-01, the Survey found 23 operational units, of which 3 were gas based, with total production capacity of 6.97 million tonnes (mt). Domestic production was 5.481 mt and India then was world's third largest producer of sponge iron. However, since the last survey, the domestic sponge iron industry has undergone dramatic changes:

- a. India has emerged as the world's largest producer of sponge iron
- b. The coal-based sponge iron segment has witnessed rapid growth in numbers
- c. This has led to increase in both capacity and production (coal-based)
- d. Significant expansion programs launched by existing units (both coal and gas)
- e. Upstream integration of existing steel producing units
- f. Emergence of sponge iron units with planned foray into steel making.

B. OBJECTIVE OF THE SURVEY:

To summarize the significant structural change that has taken place in the domestic sponge iron industry since the time of the last survey.

C. SCOPE OF THE SURVEY:

The Survey is an attempt to understand the growth and spread of the present day Indian sponge iron industry – units producing DRI/HBI. The status of the industry presented is as on date of closure of survey work, i.e. 31st August, 2005.

D. METHODOLOGY:

Under the aegis of the Ministry of Steel, the Joint Plant Committee (JPC), constituted by the Government of India, is the sole custodian of authentic database on the Indian iron and steel industry. Under authorization from Ministry of Steel, the Kolkata headquarters of Joint Plant Committee was in charge of the different operations concerned with the Survey, aided and supported by its Regional Offices in Kolkata, Mumbai, New Delhi and Chennai. Data was collected via questionnaires sent to units in the different states and was followed up by officials of Joint Plant Committee through plant-visits and on-spot data collection.

Right from the stage of finalization of questionnaire to plant-visits/data collection, **Sponge Iron Manufacturers Association (SIMA), New Delhi** had been actively associated with the Survey. Joint Plant Committee acknowledges the keen interest and involvement of SIMA at various stages which has helped the project become successful.

E. MAJOR FINDINGS:

a) Overall Findings:

- The one all-important observation made by the Survey is a rapid and powerful growth in the coal based sponge iron segment in the country, while the gas-based route of production has remained confined to the existing three plants: Essar Steel, Vikram Ispat and Ispat Industries – all in the Western Region.
- Growth in domestic steel demand, a vigorous growth in domestic steel production led by the secondary steel making sector; techno-economics like relative low cost of investment, ease of setting up of a sponge iron plant, clear-cut technology of direct reduction, better quality in end-product; availability of mineral resources, abundant labor as well as professional / technical expertise, frequent problems of scrap (affordability and availability) – all, operating in the facilitating backdrop provided by a free market economy have boosted the growth of this industry.
- At the time of official closure of survey work (31.8.2005):
 - ❑ the total number of working coal based sponge iron units in the country surveyed is 147, with a total capacity of 11 million tonnes (approx);
 - ❑ Given the current status of the gas based plants (three in number with total capacity of approx. 6 million tonnes), then **the total number of sponge iron units in the country obtains as: $147+3 = 150$ and the total industry capacity as : $11 + 6 = 17$ million tonnes;**
 - ❑ 58 more coal based unit has been reported as under-commissioning: greenfield projects, with total capacity of 6 million tonnes;
 - ❑ out of the 147 working coal based units, 77 units have reported as going in for expansion of existing capacity, the total incremental/additional capacity being 7 million tonnes;

- Further, interaction at the field level has indicated that there are 56-odd more operating sponge iron units in the country (capacity: 2 mt) spread over the above states, while a staggering 167-odd numbers (capacity: 12 mt, approx.) are at differing stages of commissioning, ranging from registration of proposals to initial-implementation.

The details are summarized in Table 1.

| Table 1 | Indian Sponge Iron Industry: Both Coal & Gas Segments | | | | | |
|--|--|---------------------------------|---|---|------------------------|---------------------------------|
| Nature of unit | Data collected | | Additional /Industry/Field Sources[^] | | Total | |
| | No of units | Capacity (unit : mt) | No of units | Capacity[#] (unit : mt) | No of units | Capacity (unit : mt) |
| Operating : | | | | | | |
| Coal | 147 | 11 | 56 | 2 | 203 | 13 |
| Gas | 3 | 6 | - | - | 3 | 6 |
| Total | 150 | 17 | 56 | 2 | 206 | 19 |
| Under-commission (Coal) | 58 | 6 | 167 | 12* | 225 | 18 |
| Brownfield Expansion:77 out of 147 working coal based units | - | 7 | - | - | - | 7 |
| [^] =State DI offices; [#] =Estimated; * = includes units in proposal/planning stage | | | | | | |

b) Findings related to Working Coal Based Sponge Iron Units:

The reported data of 147 working coal based sponge iron segment – based on information provided by the units in questionnaires – was analysed with regard to various operational features and parameters. The major findings of the exercise are highlighted below.

Year of Commercial Operation:

- Assuming a cut-off year of 2002, the results of the Survey indicate clearly that the ‘mushrooming’ of growth had started most markedly after 2002, lending credence to the general perception that revival in fortunes of steel acted as a major incentive for the growth in (demand for) sponge iron. This trend has been observed across the states, with around 72 % of the total units surveyed having come into operation after 2002.

Regional Concentration:

- The coal based sponge iron segment is found to be spread across select states, as enumerated below:
 - ❑ West Bengal, Orissa, Jharkhand: Eastern Region
 - ❑ Chhattisgarh, Maharashtra, Goa: Western Region
 - ❑ Karnataka, Andhra Pradesh, Tamil Nadu, Kerala: Southern Region
- The gas based segment – the plants of Essar Steel, Vikram Ispat and Ispat Industries - is confined only to the Western Region due mainly to proximity to natural gas sources.
- Analysis of the state-wise situation regarding congregation of coal based units, shows that in total surveyed number of such units (147), the concentration of units is maximum in Chhattisgarh (38), followed closely by Orissa (33) and West Bengal (30).
- Analysis of the state-wise capacity situation shows that in total reported coal based capacity (approx. 11 million tonnes), the concentration is maximum in Chhattisgarh (4.5 million tonnes), followed closely by Orissa (2.2 million tonnes) and West Bengal (1.6 million tonnes).

The Raw Materials:

- Non-coking coal - market and/or linkage - and iron ore - market and/or mines, and if mines, captive and/or leased – these sum up the basic sources of the two principal raw material of the sponge iron industry (coal based).
- **Coal Linkage:** Analysis of the data shows that out of the 147 units surveyed, 60% has their own coal linkage. The state-wise picture shows Orissa and Chhattisgarh tops the list with West Bengal close behind. But the scenario in the other states is not much

encouraging, indicating that Indian coal based sponge iron producers are dependent on market sources for procuring this key raw material.

- **Iron Ore :** Analysis of the data shows that out of the 147 units surveyed, iron ore from mines, be it captive (virtually nil) or leased (minimal), plays an insignificant part in meeting iron ore requirements of the domestic coal based sponge iron segment. In other words, this indicates that in case of iron ore also, Indian coal based sponge iron producers are dependent on market sources.

Production and Capacity Utilisation :

- Analysis of data on domestic production of sponge iron for the years 2003-04 and 2004-05 shows:
 - ❑ A quantum jump of 27 per cent in total domestic production of sponge iron in 2004-05 (10.29 million tonnes) compared to 2003-04 (8.08 million tonnes).
 - ❑ This growth is led by a 55 per cent growth in coal based segment and 45 per cent growth in the gas based segment in 2004-05 as compared to 2003-04.
 - ❑ The trend indicates Chhattisgarh, Orissa, Jharkhand and West Bengal are the leading sponge iron producing states in the country.
 - ❑ Capacity utilization stood at 79% in 2004-05 as compared to 68% in 2003-04.
 - ❑ The Western Region recorded the highest capacity utilization figure, followed by the Eastern Region and the Southern Region in both years.
- Domestic production of sponge iron has catered purely to domestic requirements and over the last few years, there has been no export of sponge iron by India. Nor are there any indications of this scenario changing in the foreseeable future

Investment:

- Analysis of the data shows that to-date, a staggering Rs 5720.34 crores has already been invested by entrepreneurs in setting up plants operating in the coal based route. Chhattisgarh, Orissa and West Bengal emerge as the top three states where Indian entrepreneurs have invested in settling up coal based units.

Employment:

- Analysis of the data shows that to-date the total employment: direct + indirect (casual/contract) has reached a figure of 40715. Chhattisgarh has the maximum number of employment record followed by Orissa and Jharkhand.

Captive Consumption / Downstream Integration:

- Analysis of the data shows that out of the 147 units surveyed there is marked absence of downstream operation in the coal based segment : 76% of the units have no such facility at all. Where present, induction furnace routes have been more common than electric arc furnaces.

Testing Facilities:

- Analysis of the data shows that out of the 147 units surveyed, facilities for Physical Testing (of final product) are most commonly found in all the regions, followed by Chemical Testing facilities.

Pollution Control Facilities:

- Analysis of the data shows that out of the 147 units surveyed around 80% have either an Electro-Static Precipitator *or* some other form of pollution control facility. The number of units having both ESP *and* some other form of pollution control facility is relatively few and is restricted to larger plants mostly. But the trend shows the heightened consciousness about pollution control in the domestic sponge iron industry.

Captive Power Generation Facility:

- Analysis of the data shows that out of the 147 units surveyed, the number of units with captive power generation facility is quite low : total of such units being only 16, with maximum concentration occurring in Chhattisgarh (8 units).

Constraints Faced:

- Analysis of the data shows that out of the 147 units surveyed, raw material (availability and price) accounts for the largest share (96%) amongst the nature of constraint faced by a coal based sponge iron unit today, followed by power (cost) and to a lesser extent by finance (availability) and labor, negligibly.

c) Findings related Brownfield Expansion of Working Coal Based Sponge Iron Units

- ❑ 77 out of the 147 coal based units are going in for expansion of existing capacity
- ❑ Total incremental capacity coming up via this route is 7 mt
- ❑ Chhattisgarh, Orissa, West Bengal : 3 major states where such investment is being made
- ❑ Nearly 65% of total 7 mt capacity is targeted to be made commercially operational in 2005-06

d) Findings related Under-Commissioning Coal Based Sponge Iron Units

- ❑ 58 fresh coal based units are in advanced stages of commissioning
 - ❑ Total 'new' capacity, coming up via this route is 6 mt
 - ❑ Jharkhand, Chhattisgarh and Orissa are states where majority of this fresh capacity will be installed
 - ❑ 60% of total 6 mt capacity is targeted to be made commercially operational in 2005-06
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F. SURVEY RECOMMENDATIONS:

Database Updation : Periodic Surveys & Studies

- The sponge iron industry in India is poised for significant changes and in view of this, the Survey recommends a comprehensive three-yearly survey of the domestic sponge iron industry be undertaken – to keep oneself updated on the industry structure.
- The findings of the Survey have been illuminating and have laid down the path on which in future, Studies on this industry may be taken up. Such Studies may focus on the techno-economic aspects of the operation of the industry to help particularly the units in the small-to-medium scale, to evolve suitably and be in tune with needs of the time.

Database Updation : Monitoring Progress

- The fast pace of change in the domestic sponge iron industry has shown that there is the need to monitor the progress of implementation of sponge iron units under-implementation/commissioning till the point of actual commercial operation. This would aid in giving a concrete form to the population structure.

Policy prescription for raw materials for sponge iron producers

- a. Non-coking coal :
 - Stress on adequate availability of the proper grade, exclusively for coal based sponge iron producers – through granting of linkage or other avenues;
 - Future supply strategy may include e-auction but this, it needs to be stressed, is a state-of-the-art option, not available to all.
- b. Iron ore :
 - Encourage private mining as means to open up the sector and make available further resource;
 - Encourage measures to productively use the iron ore fines;
- c. Natural gas :
 - Explore means to expedite the availability of this scarce resource

Dissemination of information: Creation of Awareness

- The Survey has noted some instances of a lack of awareness on the need of reporting of data and the utility of collected data. The Survey therefore feels that it is necessary to raise the general level of awareness: one way this can effectively be done is propagation and percolation of knowledge about the varied activities of Ministry of Steel and the Joint Plant Committee and more particularly, how statistics so collected is a requisite input for various policy decisions at the highest level of government as also other stakeholders of the steel industry. The Survey also feels that the process of submission of monthly production returns to JPC can be streamlined and regularized if such awareness level can be increased.
- The concerned industry Association namely SIMA may take suitable means to encourage and ensure greater enlistment of units in their concerned sector. The benefits entailed in such participation/enrollment needs widespread dissemination and suitable platforms may be used for this end. This step would also lead to a broadening of the existing database and help in future updations of same, equally.

Exports of DRI/HBI

- Incentive schemes may be formulated to promote exports of Indian sponge iron;

Conduct and Promote R & D

- For the Indian sponge iron industry to move ahead to the next level, it is necessary to identify ways and means to perform normal plant operations in a more (most) efficient, cost-effective manner. Here, Research and Development activities would play a key role to usher in further technological growth in the sphere of production of sponge iron – starting from raw material utilization to pollution control. For the ultimate user (i.e. steel) also, the benefits accruing would be thus immense. Hence, proposals / projects involving R&D activities in sponge iron making should be encouraged via utilizing existing institutional set-ups and/or creation of specific panels of industry experts to look into the research and development needs of this niche segment.

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