CHAPTER - 3

THE HISTORY AND GROWTH OF PUBLIC SECTOR STEEL INDUSTRY IN INDIA
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THE HISTORY AND GROWTH OF PUBLIC SECTOR STEEL INDUSTRY IN INDIA

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CHAPTER - 3

THE HISTORY AND GROWTH OF PUBLIC SECTOR STEEL INDUSTRY IN INDIA

3.1.0 Introduction

3.1.1 The history and growth of public sector steel industry in India is to be seen as a part of government planning for the development of iron and steel industry in physical terms. Simultaneously, it is also to be reviewed how the large productive industrial investment had been managed during all these years. Again, the story of steel industry in India will not be complete if we do not study the history of Indian Iron & Steel Company (IISCO), The Tata Iron & Steel Company (TISCO) and the Vesvesraya Iron & Steel Limited (VISL) which were in the private sector and were the forerunners in the Indian steel scene. Today IISCO is a fully owned subsidiary of Steel Authority of India Limited (SAIL), the public sector giant steel producing company in India. VISL has also become the subsidiary of SAIL. Thus only TISCO is still in the private sector. A chronology of Indian Iron & Steel Industry has been given as Appendix-3.1.

3.2.0 Indian Iron & Steel Company (IISCO)

3.2.1 Indian Iron & Steel Company started as a government venture, passed through the private hands and has again come into the fold of public sector. The Barakar Iron Works Company built in 1875 had a "Blast Furnace" at Kulti, on the Jharia Coal fields of Bengal. (1) The Company was closed in 1879. Few years later Government restarted the works and in 1989, Bengal Iron & Steel
Company took it over. In 1892 Martin & Co. became the managing
agents and modernised the works. Burn & Co. promoted Indian Iron &
Steel Company in 1906, when they discovered a good quality of Iron
Ore in Singhbhum. In March 1918 in their works at Hirapur near
Asansol, they started producing pig iron for domestic use and for
export and they also started to manufacture steel there at a
later date. In 1924, Martin & Co. acquired Burn & Co., but they
maintained their individual industries (2).

3.2.2 In 1936, the Indian Iron & Steel Co. Ltd. absorbed the
Bengal Iron and Steel Company. Burn & Co. promoted the Steel
Corporation of Bengal in 1937 with Sir Biren Mookherjee as
Chairman of the Board of Directors. In 1939, a steel plant was
constructed at Napuria, next to the Hirapur works for the
manufacture of steel and rolling mills. Steel was first made in
this plant on November 1939. Martin & Co. and Burn & Co. were
amalgamated into Martin Burn Ltd in 1946 and finally in December
1952 the Indian Iron & Steel Co. Ltd. absorbed the Steel
Corporation of Bengal. The later history will follow later.

3.3.0 The Tata Iron & Steel Company (TISCO)

3.3.1 The modern steel industry in India owes much to
Jamshedji Nasservanji Tata. With the idea of starting a steel
industry in India, Jamshedji discussed with Jullian Kennedy, the
well-known metallurgical engineer in America. Kennedy suggested
the name of Charles Page Perin, a consulting engineer of New York
(3). The final site for the steel plant came through a letter
from P.N. Bose of Geological Survey of India on the rich iron ore
deposits in the territory of the Maharaja of Mayurbhanj of Bengal.
Jamshedji's son Dorabji with Perin and others visited the area
and found excellent iron ore at Gurumahisani (61%-64% of Fe content) and also at adjacent areas at Okampad and Badaapahar with (65 to 67% Fe content). The site for the plant selected was Sakachi, situated at the confluence of two rivers with natural lake about 3 kilometers from Kalimati station on Bengal Nagpur Railways, 245 Kilometers from Calcutta. The coal belt of Jharia is also not very far. By August 1905, the Railways had agreed for concessional freight on materials and for guaranteed purchase of rails for 25 years. The Tata Iron & Steel Company Limited (Tata Steel) was registered in Bombay on 26th August 1907 with Dorabji Tata as special Director and Chairman. The construction of steel plant was started in February 1908 with Julian Kennedy as Design Engineer, Perin as Consulting Engineer and C M Weid looked after the construction. The project schedule was successfully maintained and on 2nd December 1911 the first blast furnace was blown and the first ingot was rolled on 16th February 1912. The company was originally constructed for a capacity of 1,60,000 tonnes of pig iron, 1,00,000 tonnes of ingot steel, 70,000 tonnes of rails, beams and shapes and 20,000 tonnes of bars, hoops and rods. In 1924 steel production was raised to 5,00,000 tonnes and by 1939 it attained a capacity of 8,00,000 tonnes of saleable steel. Sir Nowroji Saklatvala who had been Chairman since 1932, expired and JRD Tata took over as Chairman since August 1938. The post-independence period developments of this giant company in the private sector are indicated elsewhere in this chapter along with public sector companies.

3.4.0 The Mysore Iron Works

3.4.1 The rich iron ores of Kemmangundi in the Bababudan
range and the thick Malnad forest wealth of the Mysore State gave Sir M Vivesvaraya, the idea of producing pig iron through charcoal route (4). Charles Page Perin, the consulting engineer of Tatas was invited to prepare a feasibility report. On May 1916 Perin submitted the report with the location of plant at Bankipur (later known as Bhadrawati) besides the river Bhadra. At a conference in December 1916, the Dewan of Mysore accepted the terms on which Tatas would construct and act as Managing Agents of the Mysore undertaking. In 1917 the Managing Agency period had been agreed for 25 years, but in fact the agreement was terminated much earlier by mutual consent. The approval of the scheme was given in October 1917 and a Government order was issued on 1st May 1918 for constructing the Iron Works. The blast furnace was lighted on 18th January 1923. There was post war slump and some opposition was there for not continuing the plant. But the Maharaja and his Secretary thought that there should be a fair trial, before the plant is abandoned. They persuaded Sir M Vivesvaraya to take the responsibility and in next six and half years from March 1923 he brought the stability. He designed the manufacture of steel, paper and cement to improve the financial position of the works. The works had started with a charcoal blast furnace with a capacity of 25,000 tonnes per annum. Then in 1929 it started producing cast iron pipes with an annual capacity of 10,000 tonnes. Steel production started in 1936 and the name of the company was changed to Mysore Iron and Steel Works. The rolling mills also started in the same year. Later on the Mysore Iron & Steel Works diversified into special and alloy steels.
3.5.0 Steel Industry in India on the eve of Independence

3.5.1 The first census of manufacturing industry undertaken in 1946 reveals that although industries based on vegetable raw-materials like tea, jute, etc. had been developed in India, the engineering and allied industries had been comparatively dormant.

Few examples have been given in Table 3.1

<table>
<thead>
<tr>
<th>Statistics of Indian Manufacturers, 1946</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>All</td>
</tr>
<tr>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Number of factories (No.)</td>
</tr>
<tr>
<td>Productive Capital (Rs. Million)</td>
</tr>
<tr>
<td>Number of Workers ('000)</td>
</tr>
<tr>
<td>Value of production (Rs. Million)</td>
</tr>
<tr>
<td>Value added (Rs. Million)</td>
</tr>
</tbody>
</table>
| Source: "Ten years of Indian Manufacturers (1946-55)"
  Directorate of Industrial Statistics, Cabinet
  Secretariat, Calcutta (5).

3.5.2 At that point of time apart from the three major steel plants at Jamshedpur, Burnpur and Bhadravati, the other industrial units mentioned were electric furnace units, rerolling mills, engineering industries based on the products of the main steel producers, foundries and alloy steels, tools and special steel making units.

3.6.0 Steel Plants during First Plan: (1951-56)

3.6.1 In the First Five Year Plan, infrastructure, besides agriculture was given topmost priority (6). The actual investment
in the period 1951-56 totalled Rs.33600 million of which the public sector share was Rs. 15600 million. At the suggestion of World Bank in 1952 the Govt. appointed a Technical Commission to assess the existing and future demand for steel in the country. As the Government was to set up an integrated steel plant in the public sector, attempts were made in the United States and United Kingdom to obtain financial help, but they were unsuccessful. In December 1953 an agreement was signed between the Government of India and the then West German combine, Krupp & Demag. The agreement provided for technical and financial assistance for setting up an integrated steel plant at Rourkela with an initial capacity of 0.5 million tonne at an estimated cost of Rs.905 million. For implementing this project, the Government decided to set up an independent organisation. Accordingly, on 19th January 1954 Hindustan steel Limited (HSL) was formed as a joint stock company. The company was given responsibility to construct and manage the steel plant at Rourkela.

3.6.2 When the preparatory work for Rourkela was going on, the Technical Mission brought out the estimated demand of 6.0 million tonnes of ingot steel or 4.5 million tonnes of finished product in the country by 1960-61. This showed a gap of 4 million tonnes at the ingot stage from the existing capacity. So the Government started considering setting up of more steel plants. In August 1954 the Government of USSR showed interest in setting up a steel plant in India. The Union Cabinet decided on 10th September 1954 to seek Soviet assistance and an invitation to Government of USSR was sent on 10th December 1954 for sending a specialist team in this context. On 2nd February, 1955, the
Government of India and USSR entered into an agreement for establishment of an integrated Steel Iron & Steel Plant with an initial capacity of one million tonne of ingot steel. The detailed project report prepared by Tyazhpromexport for the steel plant was submitted on 9th December 1955 (7). The order for plant and machinery was subsequently placed in April, 1956.

3.6.3 In early 1955, the Government of India decided to set up a third steel plant and sought assistance from UK. A Technical Mission under Colombo Plan studied the techno-economic factors and also the sites and in August 1955 recommended a million tonne steel plant at Durgapur. A preliminary report and an estimate for the plant was submitted in January 1956 and a contract for the construction of the plant was entered into between the Government of India and the Indian Steel Works Construction Company Ltd (ISCON) on 31st October, 1956 (8).

3.6.4 During the First Plan, in the private sector, Tata Steel implemented a Rs.250 million Modernisation and Expansion Programme (MEP) to meet the wartime backlog of repairs and renewal and a marginal expansion from 1 million to 1.3 million tonnes ingot and a few diversifications.

3.7.0 Steel Plants during Second Plan (1956-61)

3.7.1 In the Second Plan, the total investment was Rs.67500 million which comprised Rs. 36500 million for the public sector and Rs.31000 million for the private sector (9). It was intended that during Second plan period the three one million tonne steel plants would be completed. Both Tata Steel and IISCO was asked to double their output—the former from one to two million tonnes of ingots and the latter from 0.5 million tonne to
one million tonne of ingots. MISL was also scheduled to install electric arc furnaces, an electric duplex plant and billet and light structural mill.

3.7.2 The steel projects at Bhilai and Durgapur were under the direct control of the Ministry of Iron & Steel plants. Under a unified company management, Durgapur and Bhilai were transferred to HISL in April 1957. On 22nd May 1955, by a Presidential Order the Ministry of Iron & Steel was created. T.T. Krishnasachari and S Bhoothalingam became the first Minister and Secretary.

3.7.3 The product-mix of the three one million tonne steel plants was shown in Table 3.2:

**Table 3.2**

<table>
<thead>
<tr>
<th></th>
<th>Rourkela</th>
<th>Bhilai</th>
<th>Durgapur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Tonne per annum</td>
<td>Item</td>
<td>Tonne per annum</td>
</tr>
<tr>
<td>Plates 3/16&quot;</td>
<td>200,000</td>
<td>Rails</td>
<td>110,000</td>
</tr>
<tr>
<td>and above</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hot Rolled</td>
<td>300,000</td>
<td>Railways sleeper bars</td>
<td>90,000</td>
</tr>
<tr>
<td>Sheets/Strips</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cold rolled</td>
<td>170,000</td>
<td>Heavy 284,000</td>
<td>Forging 60,000</td>
</tr>
<tr>
<td>sheets/strip</td>
<td></td>
<td>Structural</td>
<td>billets 60,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>sections</td>
<td>sleeper bars 60,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rounds, 22-75mm</td>
<td>Light 200,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>121,000</td>
<td>sections 30,000</td>
</tr>
<tr>
<td>Tinplates</td>
<td>50,000</td>
<td>Flats, 50,000</td>
<td>Forg 30,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15,000</td>
<td>Forging 30,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50-125mm</td>
<td>bloom 40,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Wheels and 40,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Axles 40,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>for sale</td>
</tr>
<tr>
<td>Billets</td>
<td>1,50,000</td>
<td>Billets</td>
<td>1,50,000</td>
</tr>
</tbody>
</table>

Source: Srinivasan N R, Iron & Steel Industry of India (A monograph) Page 76
3.7.4 The major production facilities that were envisaged are given in Table 3.3

Table 3.3

<table>
<thead>
<tr>
<th>Plant production facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Rourkela</strong></td>
</tr>
<tr>
<td>Coke-oven</td>
</tr>
<tr>
<td>Blast furnaces</td>
</tr>
<tr>
<td>Steel</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Rolling mill</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Power Stn.</td>
</tr>
</tbody>
</table>


3.7.5 An worth mentioning feature was that, while Bhilai and Durgapur followed the conventional open hearth route for steel
making, Rourkela opted for Linszer - Dussenstahl (LD) process. The final decision to opt for LD came from the Minister at a time when perhaps only two countries in the World tried this process.

3.8.1 Cost Estimates

The estimated cost of the three steel projects was Rs.3530 million, but the actual cost upto March 1962 was about Rs.4747 million as shown in Table 3.4 (11)

Table 3.4

<table>
<thead>
<tr>
<th>Plant costs - Rs. in Millions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original estimate</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>1957</td>
</tr>
<tr>
<td>Rourkela</td>
</tr>
<tr>
<td>Bhilai</td>
</tr>
<tr>
<td>Durgapur</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

Source: Central Government, Audit Report (Commercial) 1963, Controller and Auditor General of India, New Delhi, 1963, P.25

3.8.2 An analysis of schedule slippages given in Table 3.5(12) show that it was least for Bhilai and longest for Rourkela.

Table 3.5

<table>
<thead>
<tr>
<th>Milestone Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particulars</td>
</tr>
<tr>
<td>1. First idea to set up plant</td>
</tr>
<tr>
<td>4. 3-1</td>
</tr>
</tbody>
</table>

68
<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>7.</td>
<td>6-5</td>
<td>7 months</td>
<td>10 months</td>
</tr>
<tr>
<td>8.</td>
<td>Acceptance of DPR</td>
<td>Feb.,1956</td>
<td>March,1956</td>
</tr>
<tr>
<td>9.</td>
<td>8-6</td>
<td>12 months</td>
<td>3 months</td>
</tr>
<tr>
<td>12.</td>
<td>11-10</td>
<td>5 years</td>
<td>4 yr 6 months</td>
</tr>
<tr>
<td>14.</td>
<td>13-1</td>
<td>8 yrs. Approx. 4 yr 6 months</td>
<td>5 years</td>
</tr>
<tr>
<td>16.</td>
<td>15-13</td>
<td>5 yr 11 months</td>
<td>4 years</td>
</tr>
<tr>
<td>17.</td>
<td>15-1</td>
<td>12 years</td>
<td>9 yr 6 months</td>
</tr>
<tr>
<td>18.</td>
<td>15-2</td>
<td>12 years</td>
<td>9 yr 3 months</td>
</tr>
<tr>
<td>19.</td>
<td>15-11</td>
<td>4 years</td>
<td>2 yr 6 months</td>
</tr>
</tbody>
</table>


3.9.0 **Alloy Steels Project**

3.9.1 With the setting up of tonnage steel plants, there was steady rise in demand of alloy steels. The Government in October 1958 invited quotations for preparation of a detailed project report for setting up an alloy steels plant. An agreement was signed with Dastur Co, an independent steel consultancy firm in the country, on 22nd December 1959 (13). The detailed project report was submitted in August 1960 and HSL and Government approved it in February 1961. Tenders were invited in June, 1962 and letter of intent were issued in April 1963 to a Japanese Consortium (JASCON). The project got little delayed due to many
3.10.0 Expansion of steel plants

3.10.1 The expansion of the 3 million tonne steel plants had been thought of much earlier than the completion of these units. With the expected growth in the demand for steel, the Government decided to expand the capacities of Rourkela to 1.8 million, Bhilai to 2.5 million and Durgapur to 1.6 million tonnes respectively. The project reports for expansion were prepared by the Soviet Design Organisation in association with Bhilai Design Cell for Bhilai (14) and by Central Engineering & Design Bureau (CEDB) for Rourkela & Durgapur (15) & (16).

3.10.2 It was thought that the expansion work should be undertaken simultaneously with the completion of the million tonne stage. An important consideration for expansion was that the construction activities should not interfere with the day to day production at the steel plants. It was also envisaged that in view of the criteria of the adequate machine building capacity, maximum recourse would be taken to provide indigenous equipment, machinery and material in the expansion work. The construction work was undertaken by the chief engineers of the respective steel plants. The investment on the expansion of the steel plants was: Bhilai Rs.1786 millions in the first stage, Rourkela Rs.1500 million and Durgapur Rs.810 million. Further, for the expansion of Bhilai in the second stage for which foreign credit had been arranged and tied was Rs.620 million. In addition, as preparation for expansion of the Bhilai plant to 4 million a sixth blast furnace complex was envisaged at a cost of Rs.325 million. In the second stage of expansion for which credits were not arranged...
were Rourkela Rs.1594 million and Durgapur Rs.3430 million. The expansion of the three units was completed economically, despite some delays. The Bhilai Steel Plant expansion was completed during 1966-67, except for the wire rod mill which was commissioned in June 1967. Durgapur Steel Plant expansion scheduled to be completed by July 1966, was completed in November 1967. The expansion of Rourkela Steel Plant which was scheduled to be completed by May 1967 was completed only by 1968.

3.11.0 Expansion programmes in Private Sector Steel Plants

3.11.1 During sixties a number of expansion projects for TISCO had to be shelved. Still during 1967-68, the programme of mine development and ore beneficiation at Noamundi was completed. The first unit of pelletising plant at Noamundi was commissioned in March 1971, second unit in March 1972. The colliery expansion project was taken up in 1968-69 to increase the output and improve the quality of coal. Coal fines washeries were completed in 1972-73. The Adityapur complex was established in 1967. A project for the manufacture of rolled rings for the ball bearing was initiated (17). Apart from the above there was a sustained efforts to stabilise operations and remain profitable during crucial years of devaluation and recession in India.

3.11.2 IISCO had most crucial years between 1966 to 1972. A proposal was submitted by IISCO to increase the metallurgical coal production from its collieries-costing 225 million. The expansion of plant in stages-first to 1.3 million tonnes of ingots (18) and then to 2 million tonnes was also considered. In 1966, though the World Bank approved a loan of 30 million dollar, finally it was cancelled. After this again IISCO submitted a
balancing and rehabilitation scheme amounting Rs.470 million CEDB was examined and it was decided to take up rehabilitation scheme, but by that time a considerable deterioration took place due to inadequate replacement and improper maintenance. This was causing concern to Government and the management of IISCO was taken over by an ordinance on 14th July 1972.

3.12.0 Bokaro Steel Plant

3.12.1 The Ministry of Iron & Steel directed HSL in 1957 to do preliminary work for the establishment of a steel plant at Bokaro situated in the coal belt of Bihar. Dastur Co recommended in December 1959, a two million ingot tonne flat product plant for Bokaro. The DPR submitted in July 1963 envisaged a plant of 4 million tonnes at an estimated cost of Rs.5585 million with an interim phase of 1.5 million tonnes at a capital cost of Rs.3577 million with a foreign exchange of Rs.1516 million.

3.12.2 The Government of India while exploiting aid possibilities had discussion with USA. The United State Steel Corporation submitted a survey report in March 1963. Much hope was placed on US aid, but ultimately US congress opposed participation in a Government owned undertaking.

3.12.3 The Government wanted to go ahead with the company and thus a new company called Bokaro Steel Limited was formed. The Government of USSR was willing to render technical and financial cooperation for the Bokaro Plant and on 25th January, 1965 an agreement was signed with Soviet authorities for a two stage plant with an initial capacity of 1.7 million and going up to 4 million tonnes. Dastur Co was appointed as the Indian Consultant on 25th February, 1967, for the first stage. On the completion of
construction and trials of the work areas and sinter plant in September 1972, the commissioning of the plant for iron production was inaugurated by the Prime Minister on 3rd October 1972. Thereafter, other units were started in stages, the last one, the hot strip mill, was completed towards the end of 1975. This plant reflects the Indian advancement in design, engineering and construction of steel plants. The Indian engineering and equipment supplier have a major role in setting up this plant.

The indigenous content in weight percent is shown below (19):

<table>
<thead>
<tr>
<th></th>
<th>1.7 at stage</th>
<th>4 at stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical</td>
<td>62</td>
<td>90</td>
</tr>
<tr>
<td>Electrical</td>
<td>46</td>
<td>85</td>
</tr>
<tr>
<td>Structural</td>
<td>94</td>
<td>100</td>
</tr>
<tr>
<td>Refactory</td>
<td>61</td>
<td>85</td>
</tr>
</tbody>
</table>

Plant facilities are given in Table 3.6 (20)

Table 3.6

Main plant facilities at Bokaro

<table>
<thead>
<tr>
<th>Department</th>
<th>1.7 stage</th>
<th>Addition at 4 at stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coke ovens</td>
<td>4x69 ovens</td>
<td>3x69 ovens</td>
</tr>
<tr>
<td>Sinter plant</td>
<td>2x252 sq.m.</td>
<td>1x252 sq.m.</td>
</tr>
<tr>
<td>Blast furnaces</td>
<td>3x2000 Cu.m.</td>
<td>-9.7 m. hearth dia. 2x2,000 cu.m.</td>
</tr>
<tr>
<td>Converter shop No.1</td>
<td>4x100x130t LD</td>
<td>1x100/130tLD</td>
</tr>
<tr>
<td>Converter Shop No.2</td>
<td></td>
<td>2x300t</td>
</tr>
<tr>
<td>Universal Slabbing Mill</td>
<td>6x4 soaking pits/ 160t</td>
<td>6x4 soaking pits/ 160t</td>
</tr>
<tr>
<td></td>
<td>1250 mm. horizontal stand</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1,000 mm vertical stand</td>
<td></td>
</tr>
</tbody>
</table>
Fully continuous Hot strip mill, 2000 mm wide
One vertical scale breaker
One 2-Hi roughing stand
Four 4-Hi roughing stands
Six 4-Hi finishing stands
One 4-Hi finishing stand
Two coilers
One coiler

One 2-Hi roughing stand
Four 4-Hi roughing stands
Six 4-Hi finishing stands
One 4-Hi finishing stand
Two coilers
One coiler

Cold rolling mills
One 4-stand 2,000 mm tandem mill
Single stand 2,000 mm skin pass mill
One 5-stand 1,400 mm tandem mill
Single stand 1,400 mm skin pass mill
Twin stand 1,200 mm skin mill
1250 mm hot dip galvanising line
1,040 mm electrolytic tinning line.

Source: Statistics for Iron and Steel Industry in India.
1974 p.106.

3.12.4 The product-mix of Bokaro Steel Limited as envisaged in
given in Table 3.7

| Table 3.7 |
| Product-mix of Bokaro |
| (Tonnes/annum) |

| 1.7 mt stage | 4 mt stage |
| HR sheets, coils | 789,000 | 1,720,000 |
| CR sheets, coils | 425,000 | 1,250,000 |
| Additional HR/CR sheets | 150,000 | - |
| Galvanised plain/corrugated sheets | - | 100,000 |
| Electrolytic tinplates | - | 150,000 |
| Total: | 1,364,000 | 3,220,000 |

Source: Srinivasan M R, Iron & Steel Industry of India
(A monograph) page 120
3.13.0 **Salem Steel Plant**

3.13.1 Situated in Tamil Nadu, it is the latest plant under SAIL. Production started here in September, 1981. Dastur Co submitted the report in December 1971. The Government decided that the project would be implemented in phases. At phase 1, the plant was designed to roll out 32000 tonnes of cold rolled stainless steel strips and wide sheets per annum. It is proposed to cold roll the purchased imported hot bands in 1st phase. In the 2nd phase, the plant capacity would be doubled through an integrated system, whereby liquid steel would be made by ccncast into slabs at ASP, rolled into hot bands at Bokaro and then to Salem for cold rolling. The plant was expected to meet the requirements of domestic stainless steel and the utensils industry. Its product also found industrial application and application in dairy industry in big way. The plant was actively pursuing development activities to promote use of stainless steel in new areas like coinage, railway coaches, buildings etc (21).

3.14.0 **Vijaynagar and Visakhapatnam Steel Plants**

3.14.1 The reports on Vijaynagar and Visakhapatnam were submitted by the consultants in January and February 1972 respectively. It was then hoped that these steel plants would be commissioned by 1979-80. SAIL commissioned Dastur Co and MECON respectively in April 1975 for the jobs. The detailed project report for Vijaynagar was submitted in April, 1977 and for Visakhapatnam in October 1977 (22). The report for Visakhapatnam which considered import of coking coal in view of the coastal location, was scrutinised by technical committee and several
project posed a real problem. Soviet Government showed interest in the project. After the discussion of Soviet delegates with Dastur Co and the Government, the technical parameters as well as the Soviet participation was finalised. An agreement was entered into on 12th June 1979, between Government of India and USSR for providing technical and financial cooperation and thus Visakhapatnam Steel Project (VSP) became a reality after a decade of its initiation.

3.14.2 The detailed project report for Vijayanagar prepared by MECON envisaged an estimated cost of Rs.15800 million for a three million tonne liquid steel capacity steel plant with 1976 last quarter as base price. Updating and financial analysis was done, but the implementation could not be taken in the absence of financial aid from suitable sources.

3.15.0 Management of steel plants

3.15.1 When the project management stage was completed the attention of Government was focussed on the responsibility of managing these plants effectively. The experience of Government in direct involvement of business was limited. Top class administrators who had experience in running bureaucratic set ups were available. Thus, at the commencement of operation, senior officers of ICS & IAS cadre came at the helm of affairs and next lower positions had been drawn mainly from TISCO & IISCO.

3.15.2 Hindustan Steel Limited (HSL) was formed on 19th January, 1954 to construct Rourkela Steel Plant. On 1st April, 1957 Bhilai and Durgapur were transferred to HSL from the direct control of Ministry of Iron & Steel. Steel Authority of India Limited (SAIL) was formed on 24th January, 1973 and the final
The merger took place in 1978. During this long 24 years the public sector steel industry had undergone several managerial experiments.

3.15.3 Initially HSL was managed by a policy board consisting of a full-time Managing Director and part-time Chairman and Directors, but when all the 3 steel plants came under HSL, the board was reconstituted and 3 General Managers of the projects were taken in as Directors of the company. S. Boothalingam, Secretary, Department of Iron and Steel continued as Chairman. G Pande, Ex-Railway Board Chairman, joined as Deputy Chairman.

3.15.4 In 1958, Mr Pande succeeded Mr Boothalingam as Government decided that the Secretary of any department should not be Chairman of any undertaking. In August 1959, a Committee of Management (COM) comprising the Chairman and Full Time Directors was formed who conducted most of the functions of board. In October 1960, J M Srinagesh took over as Chairman, HSL. He entrusted the task of undertaking a study to Mc Murry Company, New York and Personnel & Productivity Services, Bombay regarding the functions and organisation of the head office. The head office of HSL was then made responsible for overall planning, policy formulation, coordination, control and liaison for different functions of different units. GMs of different units had limited power till 1961. Full power regarding personnel and purchases was given in 1962 and from October 1963, delegation of powers was uniformly applied to all plants. The head office had reserved no power for itself except for overall policy making, planning, presentation of budget to Government, arranging capital including loan and compilation of final accounts. The Policy
Board had a term of about 5 years. Committee of public Undertaking (COPU) studied in detail the power and tenure of the Chairman and the decentralisation scheme. It recommended a functional Board. Pandey Committee in April 1967 suggested that specialists in iron and steel technology must be placed at Headquarters for guiding the plant operation. In between Administrative Reforms Commission also gave their report. M Chenna Reddy, Minister of Steel, Mines and Metal, made a policy announcement in Parliament on 20th March, 1968. He proposed a strong functional HSL Board and as a consequence, the Headquarters of HSL was strengthened with new Directors for Personnel, Production, Finance and Commercial and also a Dy Chairman. In day-to-day administration, the GMs were given greater autonomy to exercise effective control and strong technically oriented Directorates were built at Ranchi Headquarters. The principle of MBO was introduced in February 1970. HSL came out with a clear enunciation that "The Company will endeavour to earn a fair return on investment, maximise production and institute adequate cost control. It will be managed with such competence and skill as will inspire confidence and pride in the minds of the people"(23).

3.15.5 HSL started with new vigour. In the subsequent days, the top posts falling vacant were given to the persons who had grown with the plants. But at the peak of its performance K T Chandy relinquished Chairmanship in February 1972 and H Bhaya took over as Chairman and announced a decentralisation policy. This affected adversely the work of the personnel belonging to the Head Office.
3.16.0 Steel Authority of India Limited

3.16.1 The question of setting up a Holding Company for steel was first considered in the Department of Steel in 1971 with the following two objectives:

- rapid growth in the area of iron and steel and as such industrial growth in the country; and
- ability of the Government to direct investment to the strategic areas keeping in view the future developments.

Based on the above considerations, the proposal to set up a holding company for steel and associated input industries was approved by the Government in January 1972. Accordingly, the formation of Steel Authority of India Limited was approved by Mohan Kumaramangalam and the company was incorporated on January 24, 1973 (24). He wanted to combine the functions of SAIL's Chairman and Steel Secretary in one person to provide administrative cohesion and autonomy for the company.

3.16.2 After the formation of SAIL, Steel Plant at Bhilai, Rourkela and Bokaro were made separate entities. Durgapur continued under HSL till its dissolution. New steel projects at Salem, Visakhapatnam and Vijayanagar, Metal Scrap Trade Corporation Ltd. and IISCO became subsidiaries of SAIL. Other organisations like NMDC, NSCL, Bolani Ores Ltd., HEC, and SAIL International Limited, MISL, Managanese Ore India Limited and Mandobi Pellets Limited also came under the holding company of SAIL. Bharat Refractories Limited being a fully owned subsidiary of Bokaro Steel also came under SAIL.

3.16.3 M A Wadud Khan joined from the private sector as Chairman of SAIL and was the ex-officio Secretary in the Ministry of Steel.
and became the Chief Adviser to the Ministry on all matters pertaining to the Iron & Steel. Government gave instructions for working arrangements between Department of Steel and SAIL. SAIL started functioning from New Delhi with technical personnel drawn from erstwhile Head Office at Ranchi and also from plants.

3.16.4 The Government was watching the effectiveness of their decision on Holding Company. Public Sector Iron & Steel Companies (Restructuring) and Miscellaneous Provisions Act, 1978 came into force from 1st May, 1978 (25) consequent upon which SAIL became an operating company-managing only the integrated steel plants at Rourkela, Bhilai, Durgapur and Bokaro and also a fully owned subsidiary at IISCO, Burnpur and alloy steel plants at ASP, Durgapur and SSP Salem. All other companies came out of the fold of SAIL. Recently the oldest public sector steel plant, the Visvesaraya Iron & Steel Limited (VISL), has joined as a new member in the SAIL family and with VISL joining SAIL expects to increase its share in the special and alloy steel segment substantially.

3.17.0 Modernisation of SAIL plants

3.17.1 Decision had been taken to update the technology and modernise the plants with a view to establish all the plants on a strong foundation. The modernisation would result in expansion of production volume from current capacity of 10.9 million tonnes of crude steel to 14 million tonnes by 1994-95 and 19 million tonnes by the turn of the century. It was projected that the costs of production would come down by approximately 20% and the quality of steel produced would be improved.

3.17.2 The most commendable aspect of this massive modernisation programme would be that the necessary investment
would be funded independent of budgetary support from the Government. SAIL would generate resources internally to meet the purpose. If there is any marginal gap, it would be met through borrowings. SAIL's credibility to undertake such a vast project was reflected in the fact that it had managed to acquire some foreign loans to fund the foreign exchange components of its modernisation schemes. The major load of repaying the foreign loans would begin by the end of the modernisation programme, when as per plan about 10% of the output would be exported.

3.17.3 Building on the organisational strength gathered over the years, SAIL's modernisation programme would be to:

* clear the accumulated backlog of maintenance
* revamp old equipment and
* upgrade technology to reduce costs and improve quality of steel.

3.17.4 The major new facilities and their impact on performance are given in the following table (Table 3.8) (26)

Table 3.8

<table>
<thead>
<tr>
<th>FACILITY</th>
<th>IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAW MATERIAL</td>
<td></td>
</tr>
<tr>
<td>Raw Material handling facilities for averaging and beneficiation.</td>
<td>To improve the quality and reduce consumption of raw materials which today account for 18 percent of operating costs.</td>
</tr>
<tr>
<td>Increase in coke making capacity.</td>
<td></td>
</tr>
<tr>
<td>Increase in Sinter.</td>
<td>To improve Blast Furnace performance by increasing Sinter charge to 70 percent in the Blast Furnace.</td>
</tr>
</tbody>
</table>
BLAST FURNACE
Modernisation of existing Blast Furnaces and two new 2450 cubic metre BF at IISCO

To improve Blast furnace productivity and maximise Hot Metal production.

BASIC OXYGEN FURNACE
Basic Oxygen furnace (BOF) to replace Open Hearth Furnace (OHF)

Fuel consumption in BOF is one-eighth of that in OHF, which amounts to a saving of about Rs.150 per tonne of crude steel.

CONTINUOUS CASTING
Continuous casting facilities will replace the conventional ingot-Blooming Mill route.

Continuous casting will reduce energy consumption and improve yield by 10 percent and upgrade the quality of steel produced.

ROLLING MILLS
Modernisation of rolling mills in BSP, DSP, RSP and BSL. Two new Bar and Rod Mills in Burnpur IISCO, Second Sendzimir Mill and New Hot Strip Mill in Salem Steel Plant.

The investment in rolling mills is primarily for revamping existing mills. This will improve yields and quality of steel.

AUXILIARY FACILITIES
Additional captive power capacity Oxygen Plant.

Reduced dependence on purchased utilities and services.

Computer compatible instrumentation.

To facilitate control by timely supply of feed materials and mechanisation of operation in difficult working areas.

Pollution control facilities

Improved environment management and better working conditions.

Mechanisation of hazardous and arduous jobs.

To improve safety and upgrade the quality of work life.


3.18.0 What the history reveals

3.18.1 The post independent history of installing steel industry in India is not a very pleasant one. We had to go to different countries for technological assistance, and financial
assistance. Due to the limitation of assistance available from a particular country, we had different technologies in different steel plants. So standardisation was not possible. As a result, taking SAIL in totality the variety of items had been increased—obviously inventory was also increased.

3.18.2 The bulk of the equipment and plant is of foreign origin and was erected in many cases on "Turn key" basis. Shortfall due to handlings, breakage, pilferage and rejections at site were common features in large scale construction jobs. Therefore, to avoid deviations from erection schedule, the suppliers had kept sufficient cushions in their imported materials, equipments and tackles. There were large left overs of imported materials, equipments and tackles when the projects were completed. The suppliers handed over these left overs to the project authorities either as per contract, or the re-export or disposal was a costly proposition. These left overs were placed in the inventory with the hope that these would be handy during expansion or the operation might need them in future. In actual practice requirements of expansion and operation turned out to be different and these materials mostly have been lying in the stores.

3.18.3 Although there were steel plants in the private sector, but those were also very much dependent on western technologists. In fifties or early sixties our experience with respect to the problem of repairs and maintenance in large plant like steel plants in India was rudimentary. Therefore, the foreign suppliers taking into consideration their own notion of "Indian conditions" of working suggested to us the types and quantities
of initial spares. Whether the foreigners took us for a ride or made genuine mistake may be taken as a separate issue, but the fact remains that a sizeable quantity of initial spares have been rusting and rotting in the stores throughout the life span of the equipment. Many of these spares are known as "Insurance spares".

3.18.4 The history also reveals that lots of mistakes and inadequacies prevailed right from the inception of the steel plants. At the budding stage civil servants were available to head these projects. These experienced men from government administration introduced the government administrative culture into the working of industrial plants. In government, the Finance Ministry is supreme, it has the final veto on everything. The same culture was introduced into industrial administration with tragic results.

3.18.5 Lots of experiments had been done about the structure of the organisation and control of these steel plants. The constant shift in the management system has caused a good deal of problems and difficulties in the working of our plants. Even now we have not evolved a firm management policy. This creates a play safe attitude in every sphere of management. It has its reflection in inventory management also which we will examine in detail in the latter chapters.
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16. Project Report for Expansion of Durgapur Steel Plant to 1.6 million tonnes, CEDB Ranchi, 1961

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Appendix-3.1

CHRONOLOGY OF INDIAN STEEL

48 BC: Xerxes uses in his army Indian archers having arrows tipped with Indian steel in the battle of Thermophylae.

400 BC: Porus presents Alexander with 30 lb of Indian steel.

300 BC: Kautilya (Chanakya) composes his treatise Arthashastra in which, as prime minister to the Maurya emperor, he advocates State control of mines and minerals exploitation and trade.

320 AD: Erection of 16-metre-high iron pillar at Dhar, ancient capital of Malwa, 50 kilometers from Indore.

400 AD: Erection of iron pillar in Delhi, the largest mass of iron to be cast and forged until that time.

13th Century: Iron beams used for construction of the Sun Temple at Konarka, Orissa.

1830: Suspension bridge thrown over the Beas river at Saugor, the iron having been made at Tendukhua, Madhya Pradesh.


1874: The Bengal Iron Works established at Kulti, near Asansol.

1882: The Bengal Presidency Government takes over the Bengal Iron works and renames it Barakar Iron Works.

1889: The Bengal Iron and Steel Company acquires the Barakar Iron Works.

1907: The Tata Iron and Steel Company formed.

1908: Construction of TISCO plant begins on February 27 at Sakchi, 230 kilometers from Calcutta.

1911: TISCO produces its first cast of pig iron in December.

1912: TISCO rolls its first steel.

1915: Ferro-manganese produced for the first time in India by TISCO.
1917: TISCO launches "greater extensions" scheme.

1918: Indian Iron and Steel Company formed.

The Mysore Government decides to start an iron works at Bhadravati.

1919: IISCO starts building its plant at Hirapur (later named Burnpur).

Sakchi renamed Jamshedpur.

1922: IISCO produces pig iron at Burnpur.

1923: Tinplate Company of India, Jamshedpur, begins production.

1924-25: TISCO extension programme completed, with new rail mill, merchant mill and sheet mill.

Gandhiji, C.F. Andrews and C.R. Das organise labour at Jamshedpur.

Motilal Nehru, in the Central Assembly, initiates suggestions leading to a tariff board inquiry which ultimately gives protection to the Indian Iron and Steel industry.

1936: Bengal Iron Works goes into liquidation and is merged with IISCO.

1937: Steel corporation of Bengal formed.

1939: Steel made SCOS plant near Asansol.

IISCO's blooming mill goes into production.

1942: TISCO's wheel and axle plant in operation.

1948: Mysore Iron and Steel Works adds plate sleeper foundry for making sleepers for the Railways.

The India Government's first industrial policy resolution.

1951: TISCO starts modernisation and expansion.

1953: SCOB merged with IISCO.

Mysore Iron and Steel Works puts into operation its first electric pig iron smelter.

Agreement signed in December with Krupp-Demag for half-million-tonne plant at Rourkela.
1954: Hindustal Steel Ltd. formed January 19.

1955: Agreement signed with the USSR for Bhilai, February 2.
Ministry of Iron and Steel formed, May 22.
M.N. Dastur forms consultancy firm.
Tata Steel launches two-million-tonne expansion programme.

Contract signed with Indian Steel Works Construction Company Limited for Durgapur, October 31.

1958: First coke oven battery lighted at Rourkela, December 3.
Heavy Engineering Corporation formed, December 3.
Commissioning of some TISCO mills under expansion.

1959: First coke oven battery commissioned at Bhilai, January 31.
First blast furnace inaugurated at Rourkela, February 3.
First blast furnace inaugurated at Bhilai, January 4.
HSL starts Central Engineering and Design Bureau.
S.M.S. 250T furnace commissioned at Bhilai, October 11.
Blooming mill commissioned at Rourkela, December 15.
First LD converter commissioned at Rourkela, December 27.
First coke ovens lighted at Durgapur, November 23.
First blast furnace commissioned at Durgapur, December 26.

1960: S.M.S. furnace commissioned at Durgapur, April 25.
Blooming mill commissioned at Durgapur, May 9.
Rail and structural mill commissioned at Bhilai, October 27.
Plate mill commissioned at Bhilai, February 2.
First sintering plant commissioned at Bhilai, July 3.
Hot strip mill commissioned at Rourkela, February 28.
Cold rolling mills commissioned at Rourkela, June 13.
Merchant mill commissioned at Durgapur, May 14.
Axle plant commissioned at Durgapur, November 1.

1962:
First wage board for steel industry, January.
Wheel plant commissioned at Durgapur, January 24.
Fertilizer plant commissioned at Rourkela, November 25.

1964:
Bokaro Steel Limited formed, January 29.
Hindustan Steel works Construction Ltd. formed, June.
SMS-500 T open-hearth furnace commissioned at Bhilai, November 26.

1965:
Agreement signed with the USSR for Bokaro for Stage 1, January 25.
10-T arc furnace commissioned at ASP, Durgapur, January.
Sintering plant commissioned at Rourkela, February 28.

1966:
Expansion LD converter commissioned at Rourkela, August 17.
Bar mill commissioned at ASP, Durgapur, December.
Forge mill commissioned at ASP, Durgapur, December.

1967:
Expansion blast furnace IV commissioned at Rourkela, July 8.
SMS II commissioned at ASP, a Durgapur, November 7.
Billet mill commissioned at ASP, Durgapur, November 7.
Wire rod mill commissioned at Bhilai, September 1.
Expansion blast furnace IV commissioned at Durgapur, December 4.
Skelp mill commissioned at Durgapur, December 8.

1968:
Sheet mill commissioned at ASP, Durgapur, January.
Tandem mill commissioned at Rourkela, February 17.
Inauguration of construction work at Bokaro, April 6.
Electrolytic tinning line commissioned at Rourkela, October 31.

Galvanising line commissioned at Rourkela, September 25.
Electrolytic tinning line commissioned at Rourkela, October 31.
Joint Wage negotiating committee formed, October 16.

Agreement signed with the USSR for Bokaro expansion, February 20.

Coke ovens commissioned at Bokaro, September 9.
Sintering plant commissioned at Bokaro, September 19.
First blast furnace complex inaugurated at Bokaro, October 3.
Salem Steel Limited formed, September 23.
Research and Development Centre for Iron and Steel Industry formed at Ranchi, September 23.

CEDB converted into separate firm, MECON

Slabbing mill commissioned at Bokaro, December 30.
Hot strip mill inaugurated at Bokaro, May 1.
Spiral welded pipe plant commissioned at Rourkela, January 17.

Indian Iron and Steel Co. (Acquisition of Shares) Act passed, June 17.

1977: Cold rolling mills complex commissioned at Bokaro, July 17.
Indo-Soviet agreement on economic and technical cooperation, April 27.

1978: Completion of 1.7 M.T. stage of Bokaro, February 28.
Iron and Steel Companies (Restructuring) and Miscellaneous Provisions Act passed May 1.

1979: Transfer to Government held IISCO shares to SAIL, March 31.
Agreement signed with the USSR for Visakhapatnam steel Project, Stage I, June 12.


Expansion stage 1,50 T arc furnace commissioned for trials at ASP, September.

1982: Construction work starts at Visakhapatnam, February 1.
Inauguration of Salem Steel Plant, March 13.
Inauguration of sponge iron pilot plant of RDCIS at Ranchi, June 25.

1983: TISCO modernisation phase I completed, March.

1984: Rourkela silicon steel plant notionally inaugurated, February 3.
Bhilai plate mill inaugurated, February 4.

Source: Krishna Moorthy K: Engineering Change: India's Iron & Steel, P.19