A brief history of the Indian iron and steel industry

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EARLY HISTORY

THE ART of making iron by smelting iron ore was known and practised in India from very early times, and the iron and steel produced were shaped into various useful articles. Sushruta, (3rd or 4th century B.C.) a great authority on medical science in ancient India, described in his book a hundred different surgical instruments. Ancient Indian literature abounds in vivid descriptions of swords, spears, and other steel weapons.

There is ample evidence that the manufacture of iron and steel in India is of great antiquity and that India excelled in the quality of her manufacture. To give a few examples: King Porus is said to have presented 100 talents of Indian iron to Alexander the Great, when he invaded India. The famous Damascus swords of olden days were fashioned out of Indian steel. The most striking evidence of the skill attained by the early ironmasters is to be found in the well-known Iron Pillar (300 A.D.) in Delhi (Fig. 1). Nearly 20 ft high and weighing over 6 tons, this unique pillar is not a casting. It was made by welding together discs of forged iron and is remarkably free from corrosion. How it was produced is as much a mystery as the Pyramids of Egypt.

The following quotations bear testimony to the skill of the ancient iron craftsmen in India:

'The antiquity of the Indian process is no less astonishing than its ingenuity. We can hardly doubt that the tools with which the Egyptians covered their obelisks and temples of porphyry and syenite with hieroglyphics were made of Indian steel. There is no evidence to show that any of the nations of antiquity besides the Hindus were acquainted with the art of making steel. The references which occur in Greek and Latin writers on this subject, served only to add to their ignorance of it; they were acquainted with the qualities and were familiar with the use of steel, but they appear to have been altogether ignorant of the mode by which it was prepared from iron.....The claims of India to a discovery which has exercised more influence upon the arts conducing to civilisation and the manufacturing industry than any other within the whole range of human invention is altogether unquestioned'. –T.A. Heath (1839).

'The Hindus excel in the manufacture of iron. They have also workshops wherein are forged the most famous sabres in the world. It is impossible to surpass the edge you get from Indian steel.'–Arab Edrisi.

'Without doubt, therefore, the process of making iron and steel has been used in India for thousands of years.....It may, therefore, easily have been the case that the ancient Egyptians were familiar with Indian iron and steel and either imported the material or obtained the services of Indian workers in metals to produce the necessary material for the tools employed on the great stone monuments.'–Sir Robert Hadfield.

History is a record of the rise and decay of civilizations. India's is no exception. With the passage of time, the art of the manufacture of iron and steel in which the ancient Indian had attained such proficiency languished and died. Meanwhile, in Europe and America an industrial revolution was taking place. The most important development was the manufacture of iron and steel on a commercial scale on modern lines. Science and technology combined to perfect an industry, the importance of which is immense. Production was stepped up from decade to decade at a spectacular rate, and with it the wealth, power, and general prosperity of the producing countries increased. Ironically enough, during this period of intense activity and progress in other parts of the globe, all that India possessed was a few primitive devices for producing small quantities of iron from indigenous ore mined in an equally primitive way.

During the 18th and 19th centuries, some attempts were made to develop an iron and steel industry in India, but these proved a failure.

The first attempt to establish an iron and steel industry on modern lines was made in 1830, by Josiah Marshall Heath, a member of the Civil Service of the East India Company. After leaving the public service, he invested the whole of his fortune in a steel plant consisting of furnaces, forges, and rolling mills which he erected at Porto Novo on the Madras coast in 1833. The steel produced was of good quality and was exported to England, where some was used for the construction of the Menai and Britannia tubular bridges. The venture failed, however, because of insufficient finance, the inexperience of the men, and the inadequacy of the equipment. At one time, Heath's blowing machine was run by bullocks! There was also difficulty in obtaining sufficient fuel.

The foundation of India's present iron and steel industry was not laid until 1875, when a blast-furnace plant was built at Kulti, 145 miles west of Calcutta. The undertaking suffered many ups and downs until it passed into the hands of the Bengal Iron and Steel Company and later the Indian Iron and Steel Company.

BEGINNINGS OF THE MODERN IRON AND STEEL INDUSTRY

It was in the eighties of the last century that Jamsetji Nusserwanji Tata, the far-sighted Indian industrialist, set to work on his dream of a modern steel plant. He started prospecting for the principal raw material, iron ore. For over twenty years, he could make no progress, because of the restrictive mining laws in force at the time. Referring to these laws, Lovat Fraser remarks 'The Indian regulations for mining and prospecting seemed carefully devised to obstruct and prevent development. It is hardly possible to estimate all the mischief that single enactment did in retarding the development of the mineral resources of India.' Undaunted, Tata made personal approaches to Sir George Hamilton, then Secretary of State for India in the British Government, and the Viceroy, Lord Curzon, and by sheer persistence succeeded in getting the laws amended in 1899. Thus it was only at the turn of this century that the way was paved for industrial steelmaking in India. In 1903, Tata started prospecting operations with the help of C.M.

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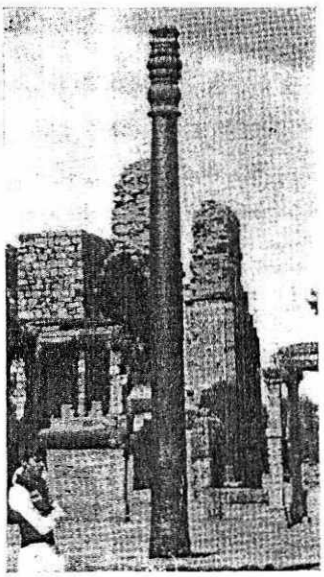


1 *Iron Pillar (300 A.D.) in Delhi*

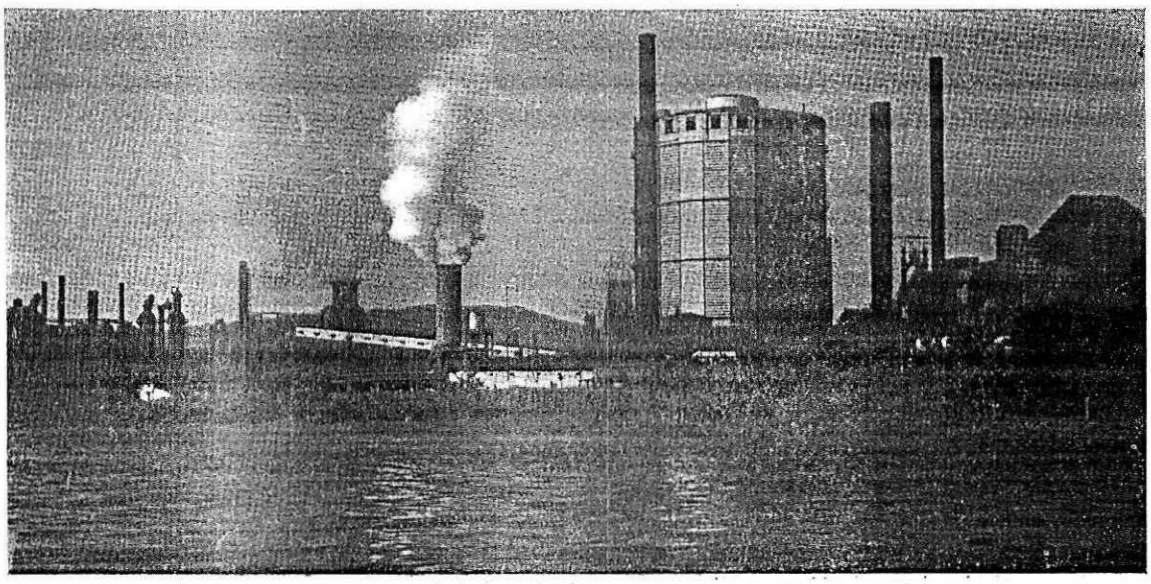
Weld, an American geologist. The first discovery was that of the Dhalli–Rajhara iron-ore deposits of Madhya Pradesh, from which the Government steel plant at Bhilai is now drawing its supplies. For a time, it was thought that the site for the Tata plant would be located in Madhya Pradesh. However, the subsequent discovery by P. N. Bose of the rich iron-ore belt of Mayurbhanj and Keonjhar in Bihar and Orissa decided the location of the Tata Iron and Steel Works at a village named Sakchi, around which Jamshedpur has grown. The situation was ideal, as the ore could be had from Gorumahisani 45 miles away, coal from the Jharia coal fields 100 miles away, and the busy port of Calcutta, which was the natural outlet for the export of the greater part of the saleable steel and import of machinery was only 150 miles away. The rivers Subarnarekha and Kharkai provide a constant source of water supply, vital for the steel plant and the township.

The Tata Iron and Steel Co. Ltd

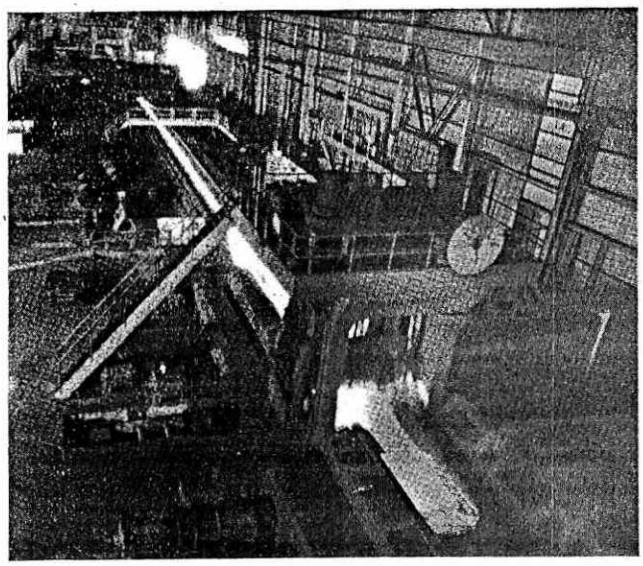
The Tata Iron and Steel Company was formed in 1907, and the construction of the steelworks was started a year later. Pig iron was first made in 1911, and the first ingot of steel was rolled in 1912. The plant was originally designed to produce 125 000 tons of saleable steel a year. It consisted of two 350 ton blast-furnaces, four 40 ton open-hearth furnaces, a steam-driven blooming mill, and a rail and structural mill, together with the necessary coke ovens, a machine shop, and a foundry. The plant was able to achieve full capacity production by 1916, and was in a position to meet the demands of the Allies during World War I. It supplied 1 500 miles of rails and no less than 200 000 tons of steel.

3 *Coke ovens, Tisco*

After the war, the company, which had planned for expansion even before 1918, launched on the greater extensions designed to transform the plant and to increase its production to 420 000 tons of saleable steel a year. The programme was completed by about 1924 and production exceeded the target capacity. The duplex method of steelmaking was introduced which met



2 *A view of the Tata Iron and Steelworks, Jamshedpur*



4 *The new 46in blooming mill, Tisco*

with outstanding success. After expansion, the Jamshedpur plant became the largest integrated iron and steelworks east of Suez.

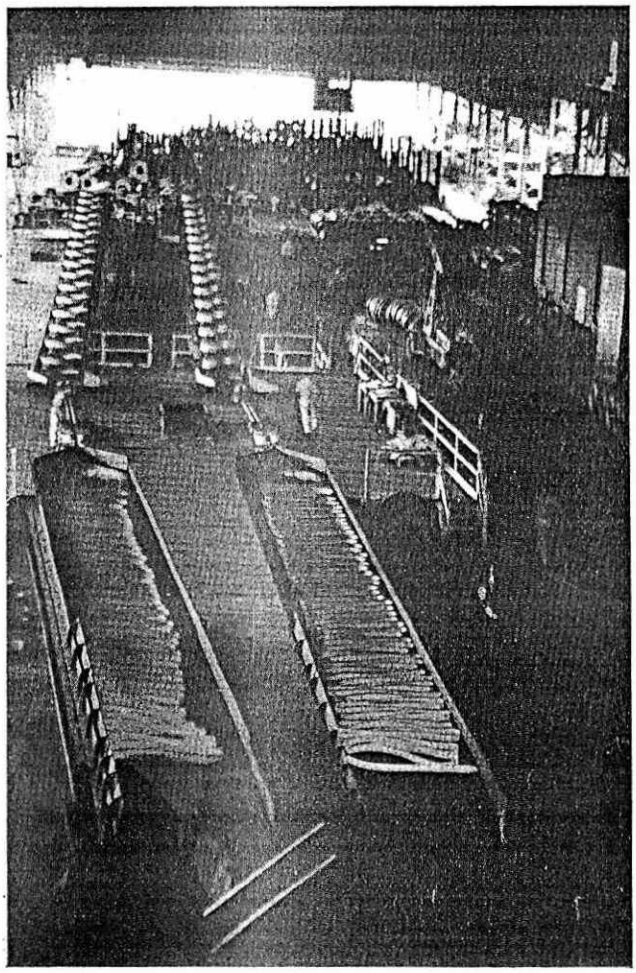
By 1939, the production had risen to 800 000 tons. The outbreak of World War II put a heavy burden on the works, which had to work to its full capacity to meet the urgent demands. The peak production of 839 000 tons of saleable steel was attained in 1942. Then began a new phase of research and development which resulted in the production of not only high-tensile structural steels such as Tiscor and Tiscrom, but also other special alloy steels such as bullet-proof plates, stainless steel for surgical instruments, and high-speed and other types of tool steel. The Tata Iron and Steel Company had firmly established itself on the steel map of the world. Figure 2 is a general view of the Tata works at Jamshedpur.

The Indian Iron and Steel Co. Ltd.

The Indian Iron and Steel Company started operation in 1918 at Hirapur, situated about 4 miles from Asansol and 140 miles from Calcutta. The company was set up solely for the purpose of manufacturing pig iron for export. The plant originally consisted of two blast-furnaces with a rated capacity of 500 tons a day. In 1936, the Indian Iron and Steel Company acquired the Bengal Iron and Steel Company. In 1937, the Steel Corporation of Bengal was formed and started production of steel in association with its neighbour, the Indian Iron and Steel Company. It had an initial ingot capacity of 270 000 tons per year, which was subsequently doubled by the addition of two basic Bessemer converters. However, it is not until 1953 that the two companies were amalgamated and the Indian Iron and Steel Company became an integrated iron and steel plant. As a result of this integration, the production increased to 450 000 tons of saleable steel per year. Figures 3–5 show some of the TISCO plant.

Mysore Iron and Steel Works

In 1918, a small charcoal blast-furnace was erected at Bhadravati, by the Government of Mysore to produce 20 000 tons of pig iron a year. In 1936, a small steel plant was added to ensure more economic operation of the unit. A producer gas-fired 25 ton open-hearth furnished



5 *A view of skelp mill, Tisco*

the ingots. A similar furnace was added in 1942. Having no blooming mill, the steel was bottom-cast into a cluster of small ingots for direct rolling in the finishing mill. The plant also began rolling billets purchased from outside into merchant bars. Electric furnace for production of ferrosilicon was also established. The plant had a capacity of 30 000 tons of saleable steel per year, which was to be gradually increased to 100 000 tons.

Other small steel-producing units

In addition to the three steel plants described above, a number of small steel-producing units with electric furnaces, foundries and re-rolling mills as well as auxiliary industries producing refractories and the like, sprang up in different parts of the country during the thirties and forties of the present century. Various allied industries such as mining for ore, coal, limestone, etc., plants for producing tinplate, wire, and wire products, foundries, which depended for raw material on the steel industry, and steel fabricating workshops were established in different parts of the country.

Raw materials for the iron and steel industry

India is one of the best-endowed countries in the world, in so far as the quality and quantity of iron ores are concerned. The reserves of iron ore are undoubtedly the largest and best in Asia, with the possible exception of the USSR. The reserves are estimated to total over 8·0 billion tonnes, a large proportion of which is of potential economic significance. According to one recent estimate,

6 *Iron & steel industry in India showing the occurrence of principal raw materials*

20 000 million tonnes are high-grade ore containing about 60% of metallic iron. Figure 6 shows the distribution on the Indian sub-continent of the principal raw materials for the iron and steel industry.

The principal ore is hematite. It occurs in association with hard crystalline rock of igneous or metamorphic origin. The deposits consist of large lenticular masses located at the tops of hills in the eastern, central, and certain southern parts of the Indian peninsula. Along with the high-grade hard hematites there is usually associated a large proportion of soft hematite, which is popularly known as 'fines' or 'blue dust'.

The largest concentration of iron-ore bodies lies on the north-eastern uplands of Bihar and Orissa. The bulk of the iron ore is at present extracted from this area. Mining methods consist of opencast mining or simple quarrying on the tops and sides of the hills. The other rich areas are Madhya Pradesh and Mysore State. The Salem district of Madras has siliceous magnetite ore of a lower metallic content. Of recent interest is the development taking place for the export of iron ores to the extent of nearly 2 million tonnes annually from the Orissa belt and Goa deposits on the western coast.

In contrast with the immense ore deposits, the supply of coking coal is meagre, barely 2 000 million tonnes. The ash content is high and the calorific value is low. The location of the coking coal deposits is mostly in the eastern region (the Jharia fields) and this has naturally confined large-scale iron production to this area. To meet the growing demands and improve the quality of raw coal, new coal mines are being opened, and washeries are being established to supply low-ash coal to the steel plants. To extend the use of the limited quantity available, long-range conservation experiments are being carried out by blending with weakly coking coals and by other methods. Coking coal is absent in the southern part of the peninsula. However, the lignite deposits of Neyveli are being developed, and it is expected that the proposed 500 000-ton iron and steel plant to be located in the south will draw its requirements of fuel from this source.

Limestone reserves, from which the steel plants are currently drawing their requirements, have hitherto been considered plentiful, but recent surveys have shown that they are likely to prove inadequate. In particular, deposits of the flux grade required for steelmaking lie far away from the steel-based area.

Chrome ore reserves are limited, but manganese ore and refractory clays are available in abundance. However, the resources of the other raw materials for an alloy-steel industry, such as vanadium, nickel, tungsten, and molybdenum, are neither adequate nor of a suitable quality.

EXPANSION OF THE IRON AND STEEL INDUSTRY AFTER INDEPENDENCE

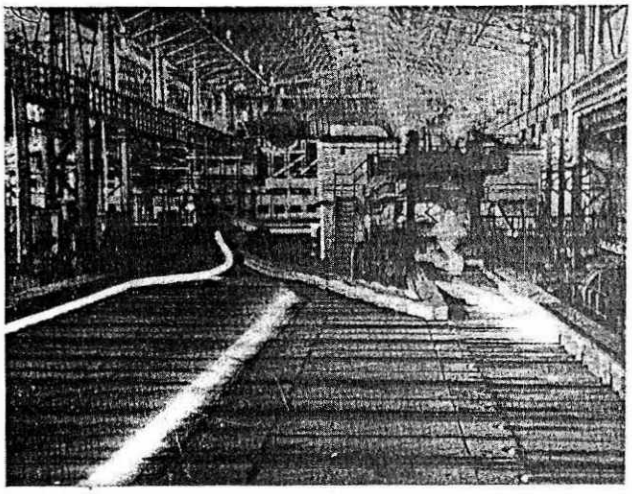
Before World War I, India was producing about 1 750 000 tons of pig iron and 750 000 tons of steel per annum. Production reached a maximum of 2 million tons of pig iron in 1941 and 1·13 million tons of finished steel in 1943. The level went down in post-war years, however, because of the intensive use of plant and machinery during the war and the lack of adequate replacements. This downward trend was arrested in 1948, since when production of iron and steel has once again recorded an increase.

The idea of planned development of the country was conceived by leaders of the industry in the thirties and stressed by the Indian National Congress. Not being independent at the time, India could not easily develop her basic industries and the idea of a planned economy did not materialize until after independence. Soon after independence, the Government of India lost no time in appointing a Planning Commission, and the First, Second, and successive Five Year Plans are the outcome of their labours.

First Five Year Plan

The First Plan covered the period April 1951 to March 1956. It was estimated that the requirements of steel would rise from 2·1 million tons to 2·8 million tons by 1957. The future demand for steel was estimated at 4·5 million tons by 1960–61, allowing about 300 000 tons for export. Indigenous production being below the demand, the gap had to be filled by imports from abroad. In the First Five Year Plan, although the main emphasis was laid on agriculture and allied fields, a sum of Rs. 76 crores was allotted for the development of the iron and steel industry, particularly for modernization of the machinery worn out as a result of war production and for raising the existing plants to full capacity. It was also realized, that the relatively small output of the iron and steel industry affected the development of other industries dependent upon iron and steel for raw material, and that the State should assume direct responsibility for further expansion of the steel output; at the same time private enterprise would be encouraged to expand their output.

In 1951, the Tata Iron and Steel Co. Ltd undertook a programme of modernization and expansion aimed at increasing the capacity of its plant from 1 million to 1·3 million tons of ingot steel per annum. The Indian Iron and Steel Co. Ltd also had a suitable programme to raise its capacity from about 300 000 tons to 0·5 million tons of ingots a year. The Mysore Iron and Steel Works decided to install electric pig-iron furnaces These development programmes of the three major iron and steel concerns in the country were included in the First Five



7 *Rail and structural mill, Bhilai*

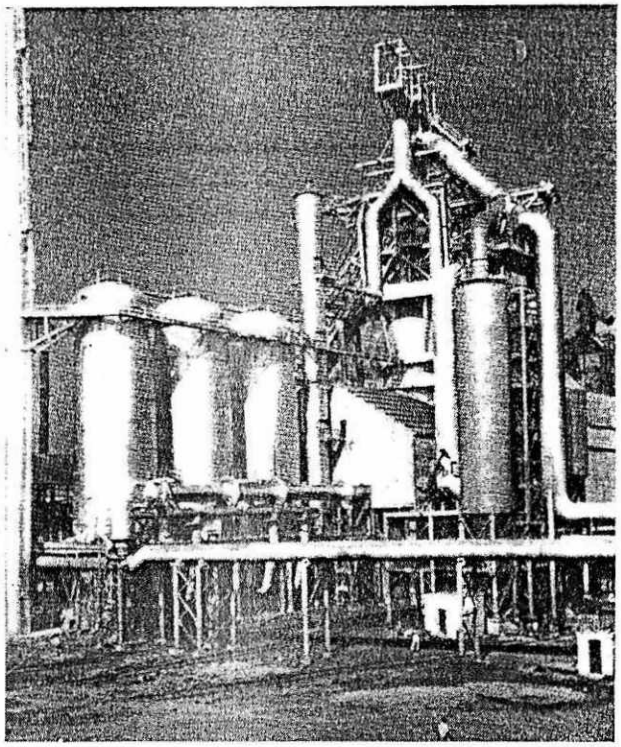
Year Plan, and the Government of India extended the necessary financial assistance.

Second Five Year Plan

The First Plan period was regarded essentially as one of preparation for large-scale industrial development in the country. The Second Plan, which began in April 1956, was the most eventful so far as the history of steel in India is concerned. Highest priority was given to the expansion of the iron and steel industry, since the level of steel production determines the tempo of economic progress. It was a bold decision to raise the capacity in one step from 1·5 million ingot tons to 6 million ingot tons.

The next priority went to the heavy engineering industries, as they provide from within the country a wide range of industrial machinery and capital equipment, such as locomotives for railways and power plants for the generation of electricity. These industries are among the largest consumers of steel.

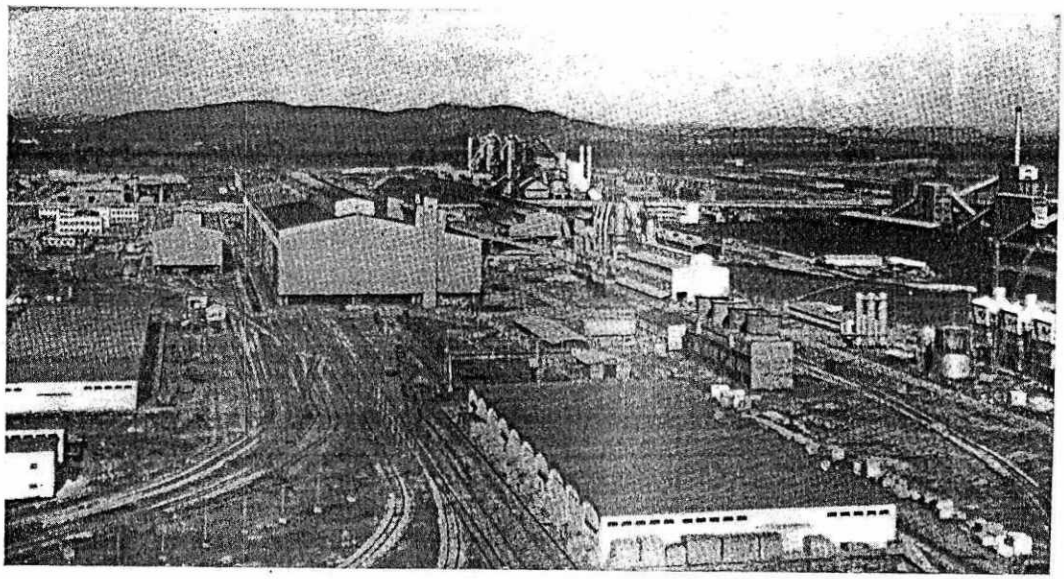
The target of 6 million tons of steel ingots a year, yielding approximately 4·5 million tons of saleable steel, was to be achieved by (*a*) installing three integrated steel plants in the public sector, each with a capacity of 1 million tons of ingot steel per year, and (*b*) increasing the capacity of the Tata Iron and Steel Co. Ltd to 2 million tons of ingot steel per year and that of the Indian



9 *No. 1 blast-furnace and stoves, Durgapur*

Iron and Steel Co. Ltd to 1 million tons of ingot steel per year. Accordingly, the Government of India set about erecting the first integrated steel plant of the public sector at Rourkela (Orissa) in collaboration with German firms, the second plant at Bhilai (Madhya Pradesh) with the help of the Government of the USSR, and the third at Durgapur (West Bengal) in collaboration with a British consortium. Figures 7–9 show aspects of these plants.

The Tata Iron and Steel Co. Ltd, even before the completion of its modernization and expansion programme, launched a programme for increasing the plant capacity to 2 million tons of ingot steel per annum. The Indian Iron and Steel Co. Ltd undertook an expansion programme for raising its capacity to 1 million tons of ingot steel a year. All the expansion programmes undertaken by five major steel projects, three in the public



8 *A bird's eye view of the Rourkela Steelworks*

TABLE I Ingot steel and finished steel in the Indian steel plants, metric tons

Year	Tisco	Iisco	Bhilai	Durgapur	Rourkela	Bhadravati	Total
1960/61							
Ingots	1 622 020	914 158	401 553	168 358	229 333	43 126	3 378 548
Finished steel	1 262 688	718 399	352 206	136 376	152 810	41 560	2 664 039
1961/62							
Ingots	1 642 864	934 499	788 767	462 472	353 568	48 376	4 230 546
Finished steel	1 317 794	737 099	502 867	363 686	190 030	42 587	3 154 063

sector and two in the private sector, under the Second Five Year Plan, have been completed.

In the public sector, all the three new steel plants have three blast-furnaces each, with capacities ranging from 1 000 tons a day at Rourkela to 1 250 tons a day at Durgapur. Both Bhilai and Durgapur plants are making steel by the basic open-hearth process. Rourkela has adopted the L-D process for making three-quarters of its total steel output, and the remainder is made by the basic open-hearth process. On the rolling side, Rourkela, which is specializing in flat products, has a blooming and slabbing mill, a heavy plate mill; a continuous 60in wide strip mill, cold-reducing mills for sheets, and a tinning line. Bhilai has, besides the blooming mill, a rail and structural mill, a continuous billet mill, and a light structural mill. Durgapur has more or less the same finishing equipment as that at Bhilai, except that it has a merchant mill and a wheel tyre and axle plant. All the three plants have the necessary coke ovens, maintenance shops and other ancillaries necessary for integrated steel plants.

The figures of the actual production of ingot steel and saleable (finished) steel at the six major steel producing centres in India during the last two financial years (1961 and 1962) are given in Table I. The capacities of the major steel plants are shown in Table II.

The actual production has fallen short of the target set in the Second Five Year Plan. This was due to various reasons. Construction took somewhat longer than scheduled ; transport facilities for carrying raw materials were inadequate, and there was deterioration in the quality of the raw materials supplied. With the schemes for mechanized mining and beneficiation of ore and improving the quality of coal washing, it can be confidently expected that the Second Plan target will be fully achieved in the near future.

Ancillary industries

Much of the country's requirements of refractory bricks were in 1948 being imported from abroad. For the refractory industry the Planning Commission fixed a target of 1 000 000 tons, against an estimated demand of 600 000 tons annually for raising the steel output to 6 million tons by 1960-61.

The expansion of existing refractory plants has already been initiated and more plants are being put up to augment the supplies so as to meet the future demands.

An allied industry of importance, the ferromanganese industry, was established largely during the Second Five Year Plan period for meeting India's own requirements and for export. At present there are six major producers of electric furnace ferromanganese in India with an installed capacity of about 160 000 tons.

A capital of about Rs. 100 million, a substantial part of which has been spent in foreign exchange, has been

TABLE II Capacity of existing major steel plants

	Rourkela	*Durgapur*	*Bhilai*	*Tata Iron & Steel*	*Indian Iron & Steel*
Capacity	1 million ingot tons	1 million ingot tons	1 million ingot tons	2 million ingot tons	1 million ingot tons
1. Coke ovens	3 batteries of 70 ovens	3 batteries of 78 ovens	3 batteries of 65 ovens	5 batteries	5 batteries
2. Blast-furnaces	3 each of 1 000 metric tons per day	3 each of 1 250 metric tons a day	3 each of 1 135 tons capacity	6 varying from 800 to 1 650 tons per day	4 varying from 650 to 1 200 tons per day
3. Steel melting shop	3 40-ton L-D converters 4 80-ton basic OH	7 basic OH of 200 tons each 1 basic OH of 100 tons	6 basic OH of 250 tons each	4 90-ton basic OH 3 250-ton basic OH tilting furnaces (duplex) with 3 25-ton acid converters 7 fixed 200-ton basic OH furnaces with 3 converters	3 converters 5 OH 225 tons each 1 OH 300 tons
4. Rolling mills	1 1180 mm blooming and slabbing mill 1 3·1m plate mill 1 wide-strip mill (hot) Roughing train-1·8m Finishing train-1·7m 1 cold-rolling mill 1 1·7m cold reducing mill 1 tinplate (hot dip)	1 blooming mill 1 intermediate mill 1 continuous billet mill 1 med. structural mill 1 merchant mill 1 sleeper bar plant 1 wheel tyre and axle plant	1 blooming mill 1 continuous billet mill 1 rail and structural mill 1 merchant mill	2 blooming mills 2 continuous sheet bar and billet mills 1 28in billet mill 1 rail and structural mill 1 medium and light structural mill 1 plate mill 2 merchant mills 1 skelp mill 1 sheet mill 1 wheel tyre and axle plant	1 blooming mill 1 continuous billet mill 1 heavy structural mill 1 medium structural mill 1 merchant mill 1 sheet mill

invested in this industry. India has always been one of the major exporters of manganese ore, ranking second in the world, with nearly 1 million tons of high-grade ore per year. It was expected that the export of the finished product, instead of the low-priced raw ore, would improve the economic position. Unfortunately, with the high cost of production and other adverse factors, the outlook for the ferromanganese industry has not been bright.

Third Five Year Plan

As has been mentioned earlier, India has natural advantages and is well endowed with the raw materials and other facilities necessary to produce steel more cheaply than many other countries in the world. It is therefore natural that the country should not only seek to achieve self-sufficiency in steel as early as possible, but should also aim at making exports at competitive terms in the world market. The comparative advantage of India in respect of steel manufacture may be judged from the fact that Japan, with imports amounting to two-thirds of its total requirements of iron ore and about one-half of its coking coal at approximately four times the raw-material costs incurred at Indian steel plants, could still export (in 1960) nearly 1·5 million tons of finished steel. Despite all these advantages and possibilities, steel production *per capita* in India is less than 10 kg as against 200 kg in Japan.

A recent study, made in connection with a preliminary report on the fourth steel plant at Bokaro, estimated the steel requirements by the 'end-use' method at about 10 million ingot tons by 1965-66, to meet the various production and construction targets as set down in the Plan. This level of production is by no means large when viewed in the light of India's vast population. It may be mentioned that at the beginning of this century Germany advanced from 6 million tons in 1900 to about 14 million tons in 1910; the USA moved up from about 4 million tons in 1890 to over 10 million tons in 1900 and 26 million tons in 1910.

Targets of Third and Fourth Plans

The Third Five Year Plan period started from April 1961. The Plan aims at a total capacity of 10 million tons per year by 1966. It is intended to expand the capacity of the three Government-owned plants to 5 900 000 tons of ingot steel, add a new 1 million-ton plant, also Government owned, at Bokaro (Bihar), and increase the capacity of the Mysore Iron and Steel Works to 100 000 tons, making a total of 7 million tons. The 5 900 000 ton expanded capacity of the Government owned plants will be distributed as follows : Bhilai 2·5 million tons, Durgapur 1·6 million tons, and Rourkela 1·8 million tons. These 7 million tons, with the 2 million tons of the Tata Iron and Steel Co. Ltd and 1 million tons of the Indian Iron and Steel Co. Ltd would total 10 million tons.

In connection with the proposed integrated steel plant at Bokaro, a team of US experts has visited India to carry out the preliminary survey. Projects for the expansion of the three existing plants in the public sector and the conversion of the Mysore Iron and Steel Works for making high-grade steels are receiving the attention of the authorities. The pattern of expansion of steel production by the end of the Fourth Plan (1970-71) may possibly be as follows :

	Million ingot tons
Hindustan Steel Works : Bhilai	3·0
" " " Rourkela	2·5
" " " Durgapur	2·5
" " " Bokaro	3·0
Tata Iron and Steel Co. Ltd	3·0
Indian Iron and Steel Co. Ltd	2·0
Others	2·2
Total	18·2

India at present produces rails and accessories ; heavy, medium, and light structurals ; black and galvanized plates ; plain and corrugated sheets ; dynamo-grade electrical steel sheets ; skelps ; bars ; rods ; wires ; hoops and strips ; tinplate, and some tool and alloy steels. The manufacture of new products is also being developed. With the object of developing new processes and new products, organized researches are carried out by research units attached to individual concerns ; the National Metallurgical Laboratory, Jamshedpur has done some outstanding research in these fields.

Alloy and special steels

The present production of alloy and tool steels in India is negligible. The Third Plan has set a target of 204 000 tons of finished products in 1965-66, to be achieved as follows :

	Tons of finished product
Alloy and Tool Steel Plant, Durgapur	49 000
Defence plants	36 000
Private sector plants	119 000
Total	204 000

The public sector project at Durgapur, which is under construction, is planned to have an initial capacity of 51 000 tons (80 000 tons of ingots), to be expanded rapidly to 100 000 tons (150 000 tons of ingots) in the next stage, and ultimately to 180 000 tons (corresponding to 300 000 tons of ingot capacity).

The conversion of the Mysore Iron and Steel Works to a special steel plant is also being examined.

Along with the expansion of the output of iron and steel products in the integrated plants, a number of plants to manufacture tubes, wires, and such other secondary products are being set up in the different parts of the country. A heavy machine-building plant with a heavy forge and foundry (including the making of steel mill rolls) and several other production units are being established to supply the capital equipment for the future iron and steel plants. The rapid industrialization of the country has created an unprecedented demand for steel, which it is hoped will be met successfully.

CONCLUSION

In the foregoing pages, an attempt has been made to give a brief account of the growth and development of the iron and steel industry in India which, it is hoped, will serve as background information to the delegates attending the Symposium. India, it will be appreciated, is largely an agricultural country with an enormous population. The standard of living of the people is very low. The nation as a whole, is making a massive effort for co-ordinated progress over a wide front to attain rapid economic development.