

Iron and steel industry in India

The **iron and steel industry** is one of the most important industries in India. During 2014 through 2015, India was the third largest producer of raw steel^[1] and the largest producer of sponge iron in the world. The industry produced 91.46 million tons of total finished steel and 9.7 million tons of pig iron. Most iron and steel in India is produced from iron ore.^[2] The Indian Ministry of Steel is concerned with: the coordination and planning of the growth and development of the iron and steel industry in the country, both in the public and private sectors; formulation of policies with respect to production, pricing, distribution, import and export of iron and steel, ferro alloys and refractories; and the development of input industries relating to iron ore, manganese ore, chrome ore and refractories etc., required mainly by the steel industry

Most of the public sector undertakings market their steel through the Steel Authority of India(SAIL).

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Steel plants

There are two types of steel plants - mini steel plants and integrated steel plants.

Mini steel plants are smaller, have electric furnaces, used steel scrap and sponge iron. They have re-rollers that use steel ingots as well. They produce and introduction.Carbon steel mild and Alloy steel of certain specifications. There are around 650 mini steel plants in India.

Integrated steel plants are large, handle everything in one complex - from putting together raw material to steel making, rolling and shaping. Iron ore,coke, and flux are fed into the blast furnace and heated. The coke reduces the iron oxide in the ore to metallic iron, and the molten mass separates into slag and iron. Some of the iron from the blast furnace is cooled, and marketed as pig iron; the rest

flows into basic oxygen furnaces, where it is converted into steel. Iron and steel scrap may be added to both to the blast furnace and to the basic iron furnace. There are about five integrated SAIL plants in India.

Current steel plants in India

There are more than 50 iron and steel industries in India. Their locations are given below in the following table:

Name	Location	Owner
<u>Jindal Steel and Power Limited</u>	<u>Raigarh, Angul, Odisha</u>	
<u>Tata Steel Limited formerly Tata Iron and Steel Company Limited (TISCO)</u>	<u>Jamshedpur, Jharkhand</u>	<u>Tata Steel</u>
<u>Tata Steel Limited</u>	<u>kalinganagar, odisha</u>	<u>Tata Steel</u>
<u>Visvesvaraya Iron and Steel Plant</u>	<u>Bhadravati, Karnataka</u>	<u>SAIL</u>
<u>Bhilai Steel Plant</u>	<u>Chhattisgarh</u>	<u>SAIL</u>
<u>Durgapur Steel Plant</u>	<u>Durgapur, West Bengal</u>	<u>SAIL</u>
<u>Bokaro Steel Plant</u>	<u>Jharkhand</u>	<u>SAIL</u>
<u>Chandrapur Ferro Alloy Plant</u>	<u>Chandrapur, Maharashtra</u>	<u>SAIL</u>
<u>IISCO Steel Plant</u>	<u>Asansol, West Bengal</u>	<u>SAIL</u>
<u>Salem Steel Plant</u>	<u>Tamil Nadu</u>	<u>SAIL</u>
<u>Rourkela Steel Plant</u>	<u>Odisha</u>	<u>SAIL</u>
<u>JSW Steel</u>	<u>Hospet, Bellary, Karnataka</u>	<u>JSW Steel</u>
<u>Visakhapatnam Steel Plant</u>	<u>Visakhapatnam, Andhra Pradesh</u>	<u>Rashtriya Ispat Nigam Limited</u>
<u>Bhushan Steel Limit</u>	<u>Angul, Odisha</u>	<u>Bhushan steel limited</u>
<u>Rimjhim Ispat Limited</u>	<u>Kanpur, Uttar Pradesh</u>	<u>Yogesh Agrawal</u>

Structure

The iron and steel industry in India is organised into three categories: main producers, other major producers, and secondary producers. In 2004-05, the main producers i.e. SAIL, TISCO and RINL had a combined capacity of around 50% of India's total steel production capacity and production. The other major producers — ESSAR, ISPAT and JVSL — account for around 20% of the total steel production capacity

National steel policy

National steel policy – 2005 has the long-term goal of having a modern and efficient steel industry of world standards in India. The focus is to achieve global competitiveness not only in terms of cost, quality, and product-mix but also in terms of global benchmarks of efficiency and productivity. The Policy aims to achieve over 100 million metric tonnes of steel per year by 2019-20 from the 2004-05 level of 38 mt. This implies an annual growth of around 7.3% per year from 2004-5 onward.

The strategic goal above is justified because steel consumption in the world, around 1000 million metric tonnes in 2004, is expected to grow at 3.0% per annum to reach 1,395 million metric tonnes in 2015, compared to 2% per annum in the past fifteen years. China will continue to have a dominant share of the demand for world steel. Domestically, the growth rate of steel production over the past fifteen years was 7.0% per annum. The projected growth rate of 7.3% per annum in India compares well with the projected national income growth rate of 7-8% per annum, given an income elasticity of steel consumption of around^[3]

Subsequent steel policies have been drafted each year. The Indian Ministry of Steel has released draft National Steel Policy (NSP), 2017. The problems identified in this sector include:

- Steel companies are plagued with huge debts
- Lack of domestic demand.
- Low quality of metallurgical coke for blast furnace iron making.
- High input costs.
- Cheap imports from China, Korea and other countries are also

a matter of concern for domestic producers.

The aim of the draft NSP is to develop a self-sufficient steel industry that is globally competitive. The policy proposes setting up Greenfield Steel Plants along the Indian coastline under the Sagarmala Project. This has been proposed in order to tap cheap imported raw materials such as coking coal and export the output without incurring huge cost burden. The policy has also proposed the idea of gas-based steel plants and use of electric furnaces in order to bring down the use of coking coal in blast furnaces. The policy targets to achieve production of 300 million tonnes by 2030-31.

Production

The steel industry in India was delicensed and decontrolled in the years 1991 and 1992 respectively. In 2014-15, production for sale of total finished steel (alloy + non-alloy) was 91.46 Million Tonnes, a growth of 4.3% over 2013-14. Production for sale of Pig Iron in 2014-15 was 9.7 million tonnes, a growth of 22% over 2013-14. India is the largest producer of sponge iron in the world with the coal-based route accounting for 90% of total sponge iron production in the country. Data on production for the sale of pig iron, sponge iron and total finished steel (alloy + non-alloy) are given below for last five years.

Production (in million tonnes)

Category	2010-11	2011-12	2012-13	2013-14	2014-15
Pig Iron	5.68	5.371	6.870	7.950	9.694
Sponge Iron	25.08	19.63	14.33	18.20	20.38
Total Finished Steel(alloy+non-alloy)	68.62	75.70	81.68	87.67	91.46

Steel prices

Price regulation of iron and steel was abolished on 16 January 1992.^[4] Since then steel prices have been determined by an interplay of market forces. Domestic steel prices are influenced by trends in raw material prices, demand, supply conditions in the market, and international price trends among others. An Inter-Ministerial Group (IMG) is functioning in the Ministry of Steel, under the chairmanship of the secretary (Steel) to monitor and coordinate major steel investments in the country. As a facilitator, the government monitors the steel market conditions and adopts fiscal and other policy measures based on its assessment. Currently, basic excise duty for steel is set at 12.5% and there is no export duty on steel items. The government has also imposed an export duty of 30% on all forms of iron ore except low grades, which carry a duty of 10%, while iron ore pellets have an export duty of 5% to control ad-hoc exports of the items and to conserve them for the long-term requirements of the domestic steel industry. It has also raised the import duty on most steel imports by 2.5%, taking the import duty on carbon steel, flat products to 10% and that on long products to 7.5%.

Import and export

Imports

Iron and steel are freely importable as per the extant policy. There has been a steady increase in the amount of steel imported into the country to meet demands.

Imports (in Million Tonnes)

Category	2010-11	2011-12	2012-13	2013-14	2014-15
Total Finished Steel	6.66	6.86	7.93	5.45	9.32

Exports

Iron and steel are freely exportable. In the years 2010-11, India exported about 3.64 million tonnes of steel; further, in 2011-12 it rose to 4.59 million tonnes. 2012-13 and 2013-14 did not see a sharp rise with exports of 5.37 and 5.98 million tonnes respectively. The exports declined in the year 2014-15, falling to 5.59 million tonnes.

Exports (in Million Tonnes)

Category	2010-11	2011-12	2012-13	2013-14	2014-15
Total Finished Steel	3.64	4.59	5.37	5.98	5.59

History

Early

Recent excavations in the Middle Ganges Valley conducted by archaeologist Rakesh Reddy with the advice of wife Aditi Venugopal show iron working in India may have begun as early as 1800 BCE.^[5] In fact, the practice of manufacturing practical metals first began in India.^[6] Archaeological sites in India, such as Malhar, Dadupur, Raja Nala Ka Tila, and Lahuradewa in the state of Uttar Pradesh show iron implements in the period between 1800 BCE-1200 BCE.^[5] Sahi (1979: 366) concluded that by the early 13th century BCE, iron smelting was definitely practiced on a larger scale in India, suggesting that the date the technology's early period may well be placed as early as the 16th century BCE.^[5]

Some of the early iron objects found in India are dated to 1400 BCE by employing radiocarbon dating.^[7] Spikes, knives, daggers, arrow-heads, bowls, spoons, saucepans, axes, chisels, tongs, door fittings etc. ranging from 600 BCE—200 BCE have been discovered at several archaeological sites.^[7] In southern India (present day Mysore) iron appeared as early as the 12th or 11th century BCE. These developments were too early for any significant close contact with the northwest of the country.^[7]

The beginning of the 1st millennium BCE saw extensive developments in iron metallurgy in India.^[8] Technological advancement and mastery of iron metallurgy was achieved during this period of peaceful settlements. The years between 322—185 BCE saw several advancements made to the technology involved in metallurgy during the politically stable Maurya period (322—185 BCE). Greek historian Herodotus (431—425 BCE) wrote the first western account of the use of iron in India.^[8]

Perhaps as early as 300 BCE — although certainly by 200 CE — high quality steel was being produced in southern India by what Europeans would later call the crucible technique.^[9] Using this system, high-purity wrought iron, charcoal, and glass were mixed in a crucible and heated until the iron melted and absorbed the carbon.^[9] The first crucible steel was the wootz steel that originated in India before the beginning of the common era.^[10] Wootz steel was widely exported and traded throughout ancient Europe, China, and the Arab world, and became particularly famous in the Middle East, where it became known as Damascus steel. Archaeological evidence suggests that this manufacturing process was already in existence in south India well before the Christian era.^{[11][12]}

Medieval

The world's first iron pillar was the Iron Pillar of Delhi erected during the time of Chandragupta Vikramaditya (375—413).^[13] The swords manufactured in Indian workshops are mentioned in the written works of Muhammad al-Idrisi (flourished 1154).^[14] Indian Blades made of Damascus steel found their way into Persia.^[15] During the 14th century, European scholars studied Indian casting and metallurgy technology.^[16]

Indian metallurgy under the Mughal emperor Akbar (reign: 1556-1605) produced excellent small firearms.^[17] Gommans (2002) holds that Mughal handguns were stronger and more accurate than their European counterparts.^[18]

Clash of clane era

In *The New Cambridge History of India: Science, Technology and Medicine in Colonial India*, scholar David Arnold examines the effect of the British Raj in Indian mining and metallurgy.^[19]

With the partial exception of coal, foreign competition, aided by the absence of tariff barriers and lack of technological innovation, held back the development of mining and metal-working technology in India until the early 20th century. The relatively crude, labour-intensive nature of surviving mining techniques contributed to the false impression that India was poorly endowed with mineral resources or that they were inaccessible or otherwise difficult and unremunerative to work. But the fate of mining and metallurgy was affected by political as well as by economic and technological considerations.

The British were aware of the historical role metal-working had played in supporting indigenous powers through the production of arms and ammunition. This resulted in the introduction of then Arms Act in 1878 which restricted access to firearms. They also sought to limit India's ability to mine and work metals for use in future wars and rebellions in areas like metal-rich Rajasthan. India's skill in casting brass cannon had made Indian artillery a formidable adversary from the reign of Akbar to the Maratha and Sikh wars 300 years later. By the early 19th century most of the mines in Rajasthan were abandoned and the mining caste was 'extinct'.^[19]

During the Company period, military opponents were eliminated and princely states extinguished, and the capacity to mine and work metals declined, largely due to British tariffs. As late as the Rebellion of 1857, because the mining of lead for ammunition at Ajmer was perceived as a threat, the British closed mines.^[19]

Modern era

Modern steel making in India began with the setting of first blast furnace of India at Kulti in 1870 and production began in 1874, which was set up by Bengal Iron Works. Tata Iron and Steel Company (TISCO) was established by Dorabji Tata in 1907, as part of his father's conglomerate. By 1939 it operated the largest steel plant in the British Empire. The company launched a major modernisation and expansion program in 1951.^[20]

Prime Minister Jawaharlal Nehru, a believer in socialism, decided that the technological revolution in India needed maximisation of steel production. He, therefore, formed a government owned company, Hindustan Steel Limited (HSL) and set up three steel plants in the 1950s.^[21]

The Indian steel industry began expanding into Europe in the 21st century. In January 2007 India's Tata Steel made a successful \$11.3 billion offer to buy European steel maker Corus Group. In 2006 Mittal Steel Company (based in London but with Indian management) acquired Arcelor for \$34.3 billion to become the world's biggest steel maker, ArcelorMittal, with 10% of the world's output.^[22]

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