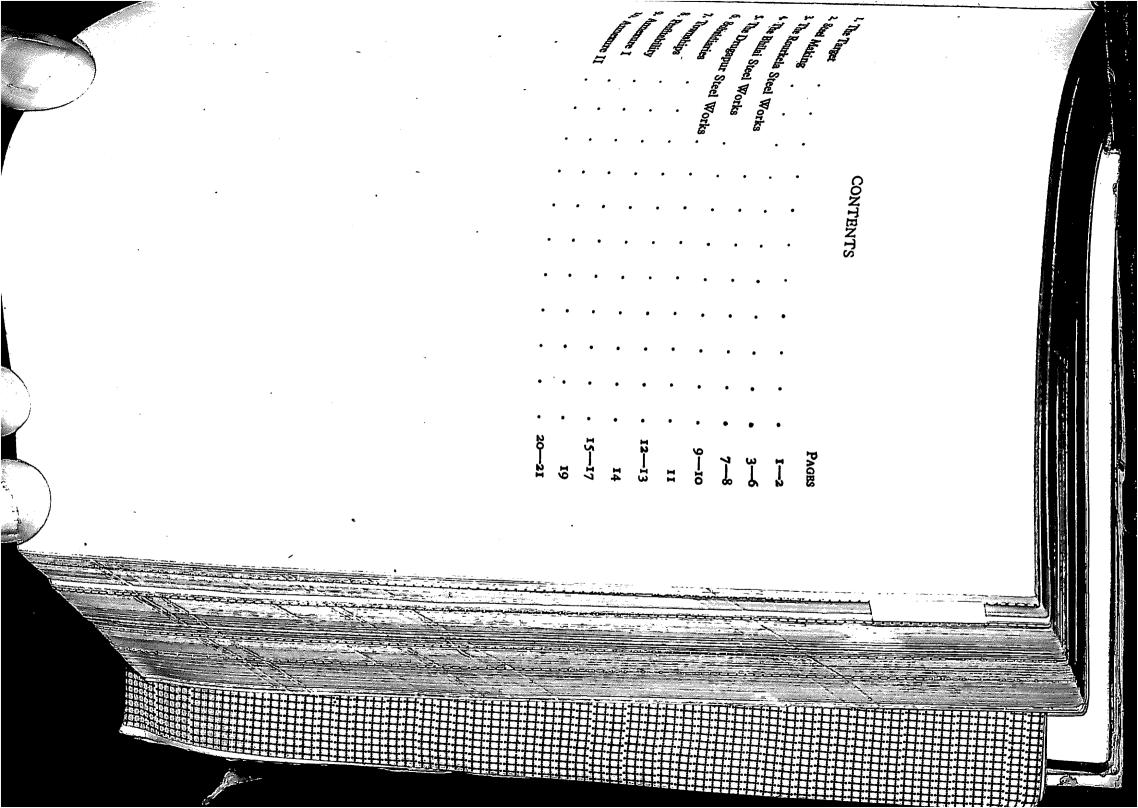
Store

# STEEL 1956.



MINISTRY OF IRON & STEEL



signed the Supply of equipment for the Bhilsi Steel Works being.

S. S. R. in New Delhi.



The amount of steel which a country makes or uses is generally that a development. By this the amount of steel which a country makes or uses is generally that the IInited of its industrial development. By this standard, the United States leads, producing over a 100 million tons a year. Next comes the Soviet Union with over 40 million by Britain and Germany follow with 20 million tons each. India has Britain and Germany follow with 20 million tons each. Including tons a very much behind, producing only a little over a second industry in the Second Fig. far been very much behind, producing only a little over a book Year Plan the With the emphasis on industry in the Second Rive Year Plan, the Country as a whole is getting conscious of the markedly evident during the marked a by Year Plan, the country as a whole is getting conscious of the First Discountry was markedly evident during the Covernment of India made a Wear of the First Plan period. Government of India made a would survey of the requirements and estimated that by 1960 would require tons of ingot steel or about 4.5 by tapid steel. The deficiency was markedly evident during the first Plan period. Government of India made a stimated that by 1960 billion try would require 6 million tons of ingot steel or about 4.0 the taget may have a follows: signations of finished at the million tons of ingot steel or about 4.5 It this tons of finished steel products (Annexure I). Today it looks of 4.5 million to be increased sooner than one imagined. Target

Tagalaion of Line Route land Plant  Dugapur Plant  Dugapur Plant  Line Allo  Line Allo	existi Steel 7	ng wo	rks_						Existing (in million tons)	Target for 1960 (in million tons)
Roughelablishme	Steel	Vorks Works		•	•		•		0.48.	1.20
urgapur x	of 1	new wo	Orke :		•	•	•	•	0.03 0.33	0·10
Plant	•	•	-40 1	n the	Public	secto	r		_	
36	•	•	•		•	•	•	•	• •	0.72
8 " all			•	•	_	•	•	•	• •	0.77
W VOCAL							•	•	• •	0.79
the that in Ann	\				TOTAL	• •	•		1.14	4.68

unexure II. re II to be rolled by each of the steel works

private II.

Iton & Sector, the greatest expansion will be that of sector considerable modernization regreasing heir & Steel Company. Besides considerable modernizawill be added increasing

15 million their & Steel Company. Besides considerable modernice total of 2 million of ingot steel or 1.5 million total of 2 million of ingot steel or 1.5 million materials programme of their & Steel Company. Besides considerable ...

Besides considerable ...

Besides considerable ...

Broducts plants, new sections will be added increasing products products products phase of the Tatas programme to cost to the steel of 2 million tons of ingot steel or ingular their productive capacity from 780,000 tons to 931,000 mais programme is estimated to cost programme which rolled a total of 2 million tons of ingot steel or 1.5 million tons of the Tatas programme products. The first phase of the Tatas programme production to 780,000 tons to 931,000 actimated to cost Releable their products. The first phase of the Tatas respective capacity from 780,000 tons to 931,000 tons to crores. For the programme is estimated to cost phase of the programme which the discrete a year. This programme is estimated by their productive capacity from the second phase of the programme which productive capacity to 1.5 million tons of

rolled products, Tatas have entered into an agreement with Henry J. Kaiser & Co. of the U.S.A. for technical assistance. It is estimated that this programme would cost over Rs. 65 crores and will be completed by May 1958.

The expansion plan of the Indian Iron & Steel Company also is being executed in two stages, raising the capacity to a total of 800,000 tons of saleable steel per year. This expansion is estimated to this about Rs. 35 crores. The Government of India are assisting expansion financially by the advance of interest bearing loans to the extent of Rs. 7.9 crores and a special advance of Rs. 10 crores from the equalisation fund. In addition IISCO have secured a loan of Rs. 13 crores from the World Bank, which has been guaranteed by the Government. The second phase of IISCO's expansion programme will be completed by 1958-59.

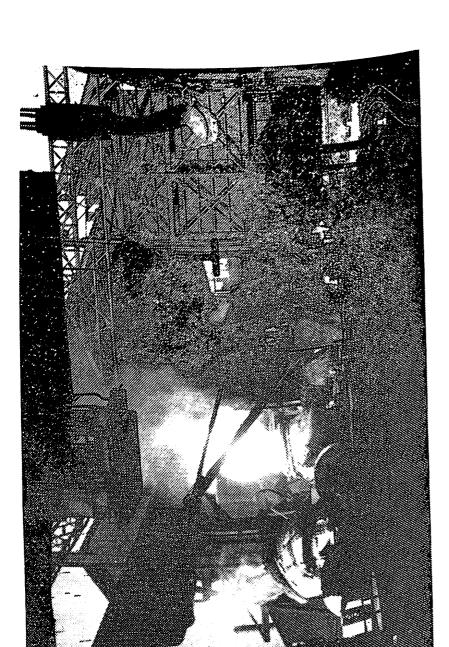
There is a programme of expansion suggested for the third existing steel works—the Mysore Iron & Steel Works at Bhadravati. The details of this programme have not yet been finalised and are still under examination.

The gap of nearly 3 million tons which will be left even after by expansion of the existing the expansion of the existing works is proposed to be closed to the each of D the establishment of three steel plants of a million burgapur each at Rourkela (Orissa) Philadela (Orissa) P each at Rourkela (Orissa), Bhilai (Madhya Pradesh) and Ducasen. (West Bengal). One would ask-(West Bengal). One would ask why these places have been production a stock. The answer is fairly simple. For efficient and economic receive and materials are chosen to product the answer is fairly simple. tion a steel plant should be so situated that it can receive wanterials and send out the finish materials and send out the finished products in a smooth and manner at as little cost as possible manner at a sittle cost as possible manner at a smooth and peak large quantity. manner at as little cost as possible. Raw materials are every of about 2 million. large quantities. Each of the steel plants will consume tons of coal, 550 000 about 2 million tons of iron ore, a little less than 2 million 100,0 tons of limester. coal, 550,000 tons of limestone, 300,000 tons of dolomite, tons of manganese coal tons of manganese ore and thousands of tons of other materials, place which is near the sources. place which is near the sources of coal and iron ore and if possible those of the other raw materials. those of the other raw materials would, of course, be the coal of the right kind is form. unfortunately there are not many places where the interpretation of the chosen are the many places where are the many places where the chosen are the chosen ar right kind is found along side the iron ore. Nevertheless, posting of all these raw chosen are the most suitable from the point of view like aterials in Bihar which of all these raw materials. There are some other sites materials but there have been along side the iron ore. Nevertheless, proximate of all these raw materials. There are some other sites materials the side of raw nice land t in Bihar which are equally close to the sources of raw like the food communication. but there have been other difficulties with these sites, to get the target as rapidly. of good communications or water supply. With the anxiety left the target as rapidly as one could the target as rapidly as one could, these sites have been be exploited at a later stage.

Melting

Steel

the



Large scale production of iron and steel has developed gradually over centuries. Improvements have been directed towards the to the economic mining of iron ore, coal and limestone and steel. In order to separate iron from the ore it has to be refined in the early days charcoal was used. Coal lacks the mechanical was not until about the middle of the 18th century that an efficient smelting iron ore, was discovered. With this discovery of the quantities of "coke" from coal, the possibility of refining large large.

Sir Henry Bessemer discovered a method of producing steel quickly have commenced in that year. Developments in the iron and steel dimensions unimagined even in the recent past.

After the raw materials are mined and transported to the steel ovens, coke is prepared form coal. Coal is "cooked" in "coke volatile hatter at the top of these ovens is heated to release its condition. The residue, which is called "coke" is pushed out the matter. The residue, which is called "coke" is pushed out the coke. It is, therefore, cooled by spraying water on it and then etc. The coke is crushed and graded to the required sizes.

the coke is crushed and graded to the required strong of the iron ore is also prepared by crushing, screening, sintering, in order to improve its quality. It is then heated in a "blast had on the furnace is a large vertical steel cylinder which is with These in types of clay which have properties of resisting the top which at their base through which hot air is forced by its top which are in turn driven by gas or steam turbine engines.

The coke is crushed and graded to the required strong, in the steel cylinder which is with hot in the iron is a large vertical steel cylinder which is hot in the steel cylinders which have properties of resisting the top which are in turn driven by gas or steam turbine engines. The can be can be of the steel cylinder is so made that iron ore, coke and the steel-maker are called "skips". Iron ore is followed.

by a skipful of coke and limestone. Once the furnace is lighted, air is blown the coke air is blown through the nozzles and this helps to keep the comburning at interest. burning at intense heat. As this burning goes on, limestone combines with the impurities bines with the impurities to form what is known as "slag". At the same time gases and same time gases rush upwards acting on the ore. These hot gases together with the limited to form what is known as "slag". These hot gases together with the limited to form what is known as "slag". These hot gases together with the limited to form what is known as "slag". These hot gases together with the limited to form what is known as "slag". These hot gases together with the limited to form what is known as "slag". These hot gases together with the limited together with the lim together with the limestone convert the ore into a spongy mass which then turns into which then turns into molten iron. This trickles down through the coke and collected it. the coke and collects at the botton of the furnace. The slag which is lighter floats on the slag are is lighter floats on top of the molten metal. Iron and slag are taken out of the furnace. taken out of the furnace at regular intervals. The molten metal is drawn off or "tapped" if drawn off or "tapped" through a hole once every four hours or The metal which in the The metal which in this molten condition is white hot rushes; throwing sparks and it throwing sparks and is either taken into ladles to the next where where it is converted in where it is converted into steel or is led into a channel from These it goes into a series of it goes into a series of sand moulds where the iron cools.

These moulds along the channel moulds along the channel resemble a litter of pigs lying around their mother. Hence the new moulds around a channel resemble a litter of pigs lying around their mother.

In the process discovered by Bessemer and developed later to ercome some of the drawback overcome some of the drawbacks, molten iron is poured into a large through the vessel lined with refractions. vessel lined with refractory material and air is blown in carbon in the under pressure. The oversel line of the oversel line of the oversel line of the oversel line oversel l under pressure. The oxygen in the air burns the carbon in iron as also most of the image. iron as also most of the impurities like silicon and iron most.

The heat generated by this harmonic iron most. The heat generated by this burning in itself keeps the into molten condition. As the impurities like silicon and manganest the into molten condition. As the impurity in itself keeps the into brilliant disconsistency in the into molten condition. neat generated by this burning in itself keeps the iron most molten condition. As the impurities are burnt, there is high game brilliant display of fireworks are burnt, degrating high game mosten condition. As the impurities are burnt, there is high into brilliant display of fireworks as the flames leap dazzling the flame the air. During this process the metal is boiling. As subsides, the blast is kept on to modern down. subsides, the blast is kept on to remove the phosphorus process and to contain the use and th modern development is the use of oxygen to speed up steel to added.

As wout as process the metal is boiling. As process process process the phosphorus process the phosphorus process the metal is boiling. As wout out out of the phosphorus process are phosphorus process and to control it. Use of oxygen to speed up steel to be added. and to control it. Use of oxygen allowed some scrap

While the Bessemer process heralded the Steel Age, it was private development "the open hearth and increased increas while the Bessemer process heralded the Steel Age, it was gnive next development "the open hearth process" which increased improve ficantly the production of steel and increased in the age. mext development "the open hearth process" which increased signer ficantly the production of steel and brought about rapid itself ments in the equality of steel. In this manufacture of steel in the st meantly the production of steel and brought about lends of shallow the manufacture of higher quality of steel. In this process, which increase prove which rapid itself approximately the manufacture of higher quality of steel. the manufacture of higher quality steels, large quantities of hearth covered swimming. manufacture of higher quality steels, large quantities shall we steel are added. The open hearth furnace looks made of make covered swimming bath. The wallor higher quality steels, large quantities shallow like of make of make covered swimming bath. The walls and roof are furnaces of the resisting refractory bricks. Modern and hearth furnace furnaces of the resisting refractory bricks. covered swimming bath. The walls and roof are furnaces to the resisting refractory bricks. Modern open hearth are charactery to the raw materials, iron resisting refractory bricks. Modern open hearth are qua heace at a time. From one side are qua heace raw materials, iron, scrap and limestone and propriate of heace of the charging is done. walls and roof are furnaces of the survey bricks. Modern open hearth are quality raw materials, iron, scrap and limestone, in appropriate of the scrap overhead cranes. The raw materials, iron, scrap and limestone, in appropriate of the scrap and limestone, in appropriate of the scrap and limestone, in appropriate of the scrap and limestone, in appropriate overhead cranes. The high temperature of the scrap and limestone is obtained by burning tar which in charging is done in long rectangular boxes by in overhead cranes. The high temperature required coke overhead by burning the gases coming the coke overhead tar which also is obtained by burning the gases coming the coke overhead tar which also is obtained by burning the gases coming the coke overhead tar which also is obtained by burning the gases coming the coke overhead tar which also is obtained by burning the gases coming the coke overhead tar which also is obtained by burning the gases coming the coke overhead tar which also is obtained by burning the gases coming the coke overhead tar which also is obtained by burning the gases coming the coke overhead tar which also is obtained by burning the gases coming the coke overhead tar which also is obtained by burning the gases coming the coke overhead tar which also is obtained by burning the gases coming the coke overhead tar which also is obtained by burning the gases coming the coke overhead tar which also is obtained by burning the gases coming the coke overhead tar which also is obtained by burning the gases coming the coke overhead tar which also is obtained by burning the gases coming the coke overhead tar which also is obtained by burning the gases coming the coke overhead target the coke overhead target targ overhead cranes. The high temperature required coke over the distribution obtained by burning the gases coming from the coke over the which also is obtained as a by-product from the coke in the ovens.

Ine high temperature required coke ovens.

tar which also is obtained as a by-product from the coke

Yet another process which has been very recently developed is. what known as "the Linzer Dusen Stahl" or "L.D." process. In this the molton as "the Linzer Dusen Stahl" or "L.D." process. the molten iron is poured into huge egg-shaped converter vessels which can be poured into huge egg-shaped converter vessels which can hold 35 to 40 tons and oxygen is blown at an enormous speed for at speed for about 20 minutes or so. This is a quick and economical way of male. way of making steel but so far it has been used only in making what are larged for making what are known as "soft steels" of the kind required for making sheets. sheets. Yet another method of making steel is by the use of electric furnace process, Yet another method of making steel is by the use of process, generate heat. This is known as the "electric furnace

Steel Which is made by any of these processes is in a molten Condition. This made by any of these processes is in a model of the condition. This molten steel is poured into receptacles called the continuous moulds."

When they are taken ingot moulds" and allowed to cool in them. When they are taken to they are a supplied in them. to 10 tons. The steel is pource.

When they are to 10 tons. The steel is pource.

The steel is pource.

When they are the steel is pource.

The steel is p to 10 tons. These are called "ingots". Ingots are then "stripped" trom their moulds and transferred to rectangular furnaces situated bites help their moulds and transferred to rectangular furnaces called "soaking or or Renerally below ground level. These furnaces called "soaking tonis bring the ground level. These furnaces called "soaking or bits, below ground level. These furnaces called working or colling. the ingots to the correct temperature for working or

These ingots are then "rolled" between heavy rollers to produce to make the "rolled" between heavy rollers to produce to make the state of the rolls. the required shapes and sizes—plates, sheets, rails, channels, beams, thigh: hear... etc. The shapes and sizes—plates, sheets, rails, channels, beam blooms mille moots cannot be passed directly to the various smaller sections in a thishing heavy ingots cannot be passed directly to the value of the passed directly to the passed directly to the value of the passed directly to the value of the passed directly to th Squeezed in between mills. They are first reduced to smaller sections are brought closer and closer to gether in between mills. Here the white hot ingots are brought closer and closer the ingot is together. At the rollers which are brought closer and closer to the control of th together in between rollers which are brought closer and crossingly to a "bloom" of this initial thinning process, the ingot is nices are Reduced to a "bloom" usually about 5" square. When the ingot is held "into a the square are again squeezed to a "bloom" usually about 5" square. When the ingot reheated into a thinner section for rolling plates, the pieces are him allows or slabs are again called into a "bloom" usually about 5" square. which is a square of the pieces are square.

The blooms or slabs are again the particular of the pa reheated "slabs" a thinner section for rolling plates, instead of "blooms". The blooms or slabs are againable to rollers being passed to the finishing mills. At the finishing decrease the rollers being passed to the finishing mills. bills, the rollers have profiles cut into them to give the particular head of may be thape desired a rail, a channel, a beam or a plate.

lnstead a rail, a channel, a beam or a plate.

leg directly into ingots for rolling, molten steel may be cast; ectly into loured a rail, a channel, a beam or a produced directly into sand moulds of the desired shape to form

Again, instead of being finished into rolled products, blooms may wheels hammand hammand finished into rolled products, blooms may Wheels and hammered or "forged" to make other and axles for locomotives and wagons. the and hammered or "forged" to make other desired shapes and axles for "forged" to make other desired shapes

At and axles for locomotives and wagons.

The the three steel works in the public sector the processes that the call and iron from iron ore will and will be made be the three steel works in the public sector the representative of coke from coal and iron from iron ore will hearth hearth. At Bhilai and Durgapur steel will be made the steel will be made the steel will be made the steel will be made. the open the same. At Bhilai and Durgapur steel will be mauhacture of plates. At Rourkela which will specialise in
the of plates most of the steel will be bland open the same. At Bhilai and Durgapur steel will be of plates and sheets, most of the steel will be made by the L.D. process and some by the open hearth process.

The rolling mills at the three descriptions are the three descriptions. The rolling mills at the three plants will be different depending on the nature of the products to the nature of the products to be rolled (Annexure II). At Durga pur there will also be a second of the products to be rolled (Annexure II). pur there will also be a special plant to hammer blooms to form wheels, tyres and arles for its plant to hammer blooms to form wheels, tyres and axles for the Railways.

## THE ROURKELA STEEL WORKS

Rourkela is a small village 257 miles from Calcutta on the main railway line between Calcutta and Bombay. It is at the confluence of the river of the rivers Sankh and Koel which go to form the Brahmani. Iron ore for this address of Taldih ore for this plant will be drawn from the rich deposits of Taldih which are at which are about 60 miles away. Coal will be obtained largely from the Bokare. Limestone the Bokaro and Kargali fields and partly from Jharia. Limestone of the Come for the Company of t The come from the nearby deposits of Hathibari or Birmitrapur.

She multi-The multi- purpose dam at Hirakud over the river Mahanadi will about about the nearby deposits of Hathibari or Birming will supply about the nearby deposits of Hathibari or Birming will supply about the nearby deposits of Hathibari or Birming will supply about the nearby deposits of Hathibari or Birming will supply about the nearby deposits of Hathibari or Birming will supply about the nearby deposits of Hathibari or Birming will supply about the nearby deposits of Hathibari or Birming will supply about the nearby deposits of Hathibari or Birming will supply about the nearby deposits of Hathibari or Birming will supply about the nearby deposits of Hathibari or Birming will supply about the nearby deposits of Hathibari or Birming will supply about the nearby deposits of Hathibari or Birming will supply about the nearby deposits of Hathibari or Birming will supply about the nearby deposits of Hathibari or Birming will supply about the nearby deposits of Hathibari or Birming will supply about the nearby deposits of Hathibari or Birming will supply about the nearby deposits of Hathibari or Birming will be not the nearby deposits of Hathibari or Birming will be not the nearby deposits of Hathibari or Birming will be not the nearby deposits of Hathibari or Birming will be not the nearby deposits of Hathibari or Birming will be not the nearby deposits of the nearb demand for a local to 60,000 KW of power. The balance of the demand for electric power will be met by a big thermal station of which with matching the power will be met by a big thermal station of the with matching the power will be met by a big thermal station of the without matching the power will be met by a big thermal station of the without matching the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the power will be met by a big thermal station of the pow approximately 75,000 KW which is being set up at site. This plant, which is heir 75,000KW which is being set up at site. which is being set up with the technical and financial association the two rest up with the technical and Demag, will of the two well-known German firms of Krupp and Demag, will specialise in the specia

specialise in the production of flat products. An outstanding feature of the Rourkela Plant will be the logical of the rocess which An outstanding feature of the Rourkela Plant will was developed in about eight steel veloped in about have the Was developed in Austria and is now employed in about eight advant or have the advant of prosteel works in the world. This process is expected to have the duction sees of lower than the world. This process, higher rate of prodivantages of lower capital and operating costs, higher rate of production and saving in space and ancillary equipment. While these teresting viery sincidental but more in incidental but more in the stine viery. Would and saving in space and ancillary equipment. While the be very significant advantages, an incidental but more in the has advantages. the manufacture of would be the utilisation of important chemicals Which would be the utilisation of the high process will the basis of a wide chemical industry. The by ox. ess will the basis of a wide chemical in obtaining manufacture of fertilizers and a series of important industry. The process will require large quantities of oxygen. In obtaining from the basis of a wide chemical industry.

Oxygen from the basis of a wide chemical industry.

In obtaining product from the basis of a wide chemical industry. by product. This would be used for the manufacture of fertilizers. In the product industry together with the Oxygen Will require large quantities of oxygen. In optable as a burn, h. This who atmosphere nitrogen will be available as a third, h. This was a through the atmosphere nitrogen will be available as a through the atmosphere nitrogen. turn, by products of this fertilizer industry together with the of from the distribute of the manufacture of This would be used for the manufacture of the products of this fertilizer industry together with the of various of the coke ovens would be used for the manufacture of various of the coke ovens would be used for the manufacture. The of various chemicals.

The of various the coke ovens would be used the Combine Chemicals.

Of various chemicals.

Of various chemicals.

Of the Cerman Combine—Indien Gemeinschaft Krupp Demag—has the combine—Indien Gemeinschaft Krupp Demag—has th this German Combine—Indien Gemeinschaft Krupp Demagnic et pert has been roject Report for a one million to plant.

Covernment with the help the Covernment with the main The combine Gemeinschaft Krupp of the Combine Indien Gemeinschaft Krupp ton plant sexport has been scrutinised by the Government with the help of the Government with the main contain modifications. The experts has been scrutinised by the Government with the main the approved with certain modifications. The main of the plant as approved are:

(a) the plant as approved with certain mountain as approved are:—

(b) of coal "the plant with a capacity of about 1.6 million tons

to start (b) of coal "through-put" per annum;

With (to be plant consisting of 3 furnaces to start furnace plant consisting of 3 furnaces later on) with a

with furnace plant consisting of 3 furnaces rated output a furnace per day; rated output of 1,000 tons per furnace per day;

- (c) A steel melting shop employing mainly the oxygen blowing process (T.D.)
- (d) A large rolling mill plant of modern design for hot and cold rolling includes cold rolling, including a broad strip mill for strips upto 1.525 mm

Tenders for the following have been obtained and are under amination: examination :-

- (1) Coke ovens and by-products plant;
- (3) Blast furnace gas cleaning plant disintegrators;
- (4) Blast furnace gas cleaning plant electrostatic fitters;
  (5) Store
- (5) Store houses;
- (6) Skull cracker steel construction;
- (7) Skull cracker cranes;

A group of German firms has been invited to submit tenders mills.

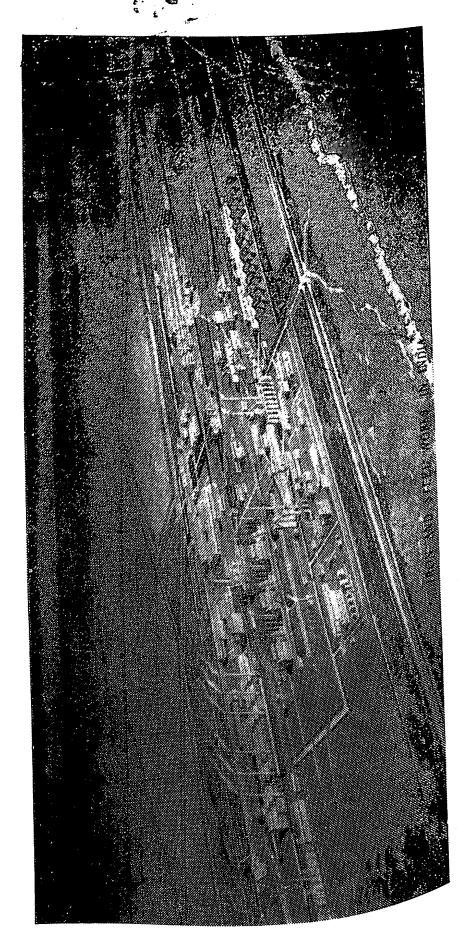
middle of May 1956 for the model tenders the rolling tion.

A group of German firms has been invited to submit tenders mills the middle of May 1956 for the various sections of the rolling the Global tenders have been invited for the thousand power station. It is expected the superstant to superstant towards.

It is expected the superstant towards towards.

It is expected that iron will be produced at Rourkela 1960.

e end of 1958 and full production of the stimutor of the int is estimated. the end of 1958 and full production of steel reached by plant is estimated to cost annual production. plant is estimated to cost approximately Rs. 128 crores.



### THE BHILAI STEEL WORKS

Bhilai is 156 miles from Nagpur on the main Bombay—Calcutta line. Iron ore for this plant will be obtained from the Dalli Rajahra denositation of the plant will be obtained from the Dalli Rajahra Pahar deposits about 60 miles away. Coal to be used at this plant be a blood about 60 miles away. Will be a blend of metallurgical coal from Bokaro-Kargali fields and in fields and in fields. Limestone Jharia fields and the otherwise non-coking coal of Korba. Limestone is found in the is found in the otherwise non-coking coal of Korba.

Only the iron of the works. This plant will thus exploit not have the iron of the works. only the iron ore deposits of Madhya Pradesh but will also make the use of the control of the works. best use of the coal from the Korba fields which otherwise cannot be Table 10 materials. Will be supplied by the Used for matallurgical purposes. Water will be supplied by the Korla canal must be supplied by the Korla canal must be supplied by the with Tandula canal. The main power will come from a thermal station at the desired the control of the Korba canal. The main power will come from a thermal station the technical and a way. The steel works are being set up with USED the Government of the the technical and financial assistance of the Government of the and will come will come up with the technical and financial assistance of the Government of the and will come included the company that the technical assistance of the company that t USSR and financial assistance of the Governments:

(a) a coke oven plant;

(b) a blast furnace plant and auxiliary equipment; (c) a steel melting plant;

(d) facilities melting plant;
(e) SOAL: (e) soaking pits;

(f) mills and plants to roll the various products;

(g) a sintering plant;

(h) plants for the production, supply and transmission of water norths and the township; (i) Water, power and gas for the wolf (j) plants for the recovery of by-products; and water, power and gas for the works and the township;

(j) repair and other auxiliary shops. Cost of the Soviet Organizations will undertake the responsibility machinery and for the the Soviet of the agreement with the Government of the technical supervision of the construction of the steel works, which the steel works, and the construction of the steel works. erection the Soviet Organizations will undertake the equipment, installation and commissioning of the plant, machinery and the plant, machinery and most of the plant, machinery and the plant and the plant and the plant an equipm, install supervision of the construction of the Constructio Sanization and commissioning and commissioning and they will also supply most of the plant, will be will be personnel in the USSR. indicated and will also supply most of the plant, managed by the plant in the source of the plant, in the source of the plant, in the source of the plant in the USSR. The Source of the plant in the USSR. The source of the plant and equipment. The plant and the plant in 12 equal the plant in 12 equal the plant in the strain and train Indian personnel in the USSR.

Stain R. Will be paid Rs. 2.5 crores for their services and approduced will be initially supplied on credit repayable in 12 equal cont per annum. The equipment will be paid Rs. 2.5 crores for their services and the services are supplied by the services are supplied in the plant and equipment. The plant and equipment are supplied on credit repayable in 12 equal crores to the plant and equipment. The plant and equipment are supplied on credit repayable in 12 equal crores are supplied at 2½ per cent per annum. The connection of Rs. 110 expendents 63 crores for the plant and equipment will be initially supplied on credit repayable in supplies from India and the engineering work to be estimated at Rs 47 crores making a total of Rs. 110 thought will be paid Rs. 2.5 crores 10.

One diture Interest will supplied on credit repayable in 12 equal to the plant accrue at 2½ per cent per annum. The supplied of Rs. 110 done diture Interest will accrue at 2½ per cent per annual is estimated at Rs. 47 crores making a total of Rs. 110

crores for the works exclusive of the salaries of Soviet experts and Indian staff of Blind. Indian staff at Bhilai.

The Soviet Organizations submitted the detailed project report on 9th of December 1957 the 9th of December 1955. This was examined by the Government of India and accented with India and accepted with certain modifications on the 8th of March 1956. Contracts have be 1956. Contracts have been concluded for the supply of equipment worth Rs. 55 grants. worth Rs. 55 crores and structural steelwork worth approximately Rs. 8 crores. The first arrange of equipments approximately approximately approximately respectively. Rs. 8 crores. The first consignment of equipment is expected towards the end of June 1056 the end of June, 1956. Three coke oven batteries, two blast furnaces, two open hearth furnaces. two open hearth furnaces and a blooming mill will be commissioned by the 31st of December 1050 by the 31st of December 1958 and the rest of the steel works by the 31st of December 1950

THE DURGAPUR STEEL WORKS This plant will be at Durgapur 110 miles from Calcutta on main roll. Iron ore for the main railway line between Calcutta and Delhi. Iron ore for this plant will this plant will come from the well-known deposits of Gua which also supply TISCO and IISCO. The coking coals of Jharia will be blended with the weakly coking coals of Barakar. Water will be men from the weakly coking coals of Barakar. taken from the weakly coking coals of Barakar. water water main the main countries which flows along side the site. The main supply of electric power will be from a big thermal station which will be erected close to the steel works. There will be a smaller of the steel works. be a smaller plant as stand-by at the steel works.

Broad agreement has been reached with a British Consortium of manufacturers known as the Indian Steel-works Construction with a single Co., for the construction of this plant. This contract with a single agency for the construction of this plant. This contract with a single execution of the entire work is expected to help in the speedy that the entire work is expected to help in the speedy as much as eight to execution of the entire work is expected to help in the specific months project and thereby save as much as eight to be spent in the preparation twelve northe project and thereby save as much as eight detailed plant which would otherwise be spent in the preparation and inviting global of detailed plans, designs and specifications and inviting global the Under the designs and specifications are in the British Consortium, tenders. Under the agreement reached with the British Consortium,

subject to a the value of F.O.B. supplies will be nearly £50 million. This is supplied in May 1956, to a Subject, in the final quotation to be submitted in May 1956, to a quotation to be submitted of million of nine in India Variation of plus or minus 5% for errors and omissions from the final quotation to be submitted in May 1950, we have the proposale of minus 5% for errors and omissions from the contract of minus 5% for expenditure in India Original of plus or minus 5% for errors and omissions from the final quotation to be submitted.

Rs. 40 crores

The estimate of rupee expenditure in India Part of the foreign exchange needed for this project will come sources. Trom two sources:

(a) a loan of £11.5 million from a syndicate of banks in the

(b) a loan of £15 million from the United Kingdom

The Government.

The bank loan will be taken, as at present arranged, mainly during the loan will be taken, as at present arranged, mainly during the years 1960—1964. being but 1957—1960 and will be repaid during the year.

balk that Subject to a minimum of 4½%. Although the present is 5½% it a minimum of 4½%. Although the loan is The is 51% it would probably go down by the time the loan is

The would probably go down by the United Kingdom Government to be repaid advanced by the United Kingdom Government to be repaid to be advanced by the United Kingdom Government's Government's Government's by the state of th Cover rate at the time the loan is taken plus a small element cover administrative charges.

The sources of the four principal raw materials, iron ore, coalnestone and dolomite for limestone and dolomite for each of the plants have been mentioned.

Iron ore for the Rourkela steel works will be obtained from ldih 60 miles away Taldih 60 miles away. Investigations are now going on at Mining determine the exact local. determine the exact location of the deposits to be worked. Government of iron ore at Taldib of iron ore at Taldih will be undertaken by the Government directly. An American form directly. An American firm of engineers has been appointed ore Consultants to advise on the Consultants to advise on the technical problems of mining iron the at this place. Similarly the Care at this place. Similarly the Government will undertake directly mining of iron ore at Dall: Barrely at the Government will undertake directly mining of iron ore at Dall: Barrely at the Government will undertake directly mining of iron ore at Dall: Barrely at the Government will undertake directly mining of iron ore at Dall: Barrely at the Government will undertake directly mining of iron ore at Dall: Barrely at the Government will undertake directly mining of iron ore at Dall: Barrely at the Government will undertake directly mining of iron ore at Dall: Barrely at the Government will undertake directly mining of iron ore at Dall: Barrely at the Government will undertake directly mining of iron ore at Dall: Barrely at the Government will undertake directly at the Government will be at the mining of iron ore at Dalli Rajahra. At the request of the ment of India the Soviet Occasion. ment of India the Soviet Organizations have submitted a preliminary project report. The minor will all the submitted with the project report. project report. The mines will be designed and worked with technical assistance of the Gammary technical assistance of the Government of the USSR. Equipment for these mines will also be for these mines will also be supplied by that country obtain iron obtain iron obtain. The steel commercial terms. The steel works at Durgapur will be developed on either the existing mineral terms. ore from either the existing mines or from mines to be accession of the existing open in extension of the ex in extension of the existing ones in Gua, which are the most accession ble deposits from this place

The three steel plants together will require about committees to sof coking coal per annual vergons. tons of coking coal per annum. A number of expert country the have gone into the question of their utilization. have gone into the question of coal reserves in the that while and their utilisation. The consensus of the consensus of the the that while and their utilisation. have gone into the question of coal reserves in the while their utilisation. The consensus of their opinion is that the reserves of non-metallurgical coal is not the coal reserves of non-metallurgical coal are sufficiently is not the case with metallurgical coal are sufficiently conservation metallurgical coal are sufficiently conservation. metallurgical coal are sufficiently large, until conservation try, conservation try, metallurgical coal is not a problem peculiar only to the technique advances which advances which It might, therefore, be expected that there advances which would find alternative steel which would advances which would find alternative methods of making use of steel which would either eliminate the metallurgical coal. steel which would either eliminate the necessity metallurgical coal or at local quality metallurgical coal or at local or at l metallurgical coal or at least reduce the But the merst problem is of making the most according to the most ac problem is of making the most economical use been consit so reserves of metallurgical coal. Measures have time hed si conserve this coal by ensured the most economical time hed si conserve the coal by ensured the most economical time hed si conserve the coal by ensured the most economical time hed si conserve the coal by ensured the most economical time hed si conserve the coal by ensured the most economical time hed si conserve the coal by ensured the most economical time hed si conserve the coal by ensured the most economical time hed si conserve the coal by ensured the most economical time hed si conserve the coal by ensured the most economical time hed si conserve the coal by ensured the coal to a large extent. most economical use been consultation in taken per consultation in the same washposty adopt gradually other alternative fuels. At the same washposty been recommended that metallurgical coal should be that its ash content might be reduced the same washposty that its ash content might be reduced the same washposty that its ash content might be reduced the same washposty that its ash content might be reduced the same washposty that its ash content might be reduced the same washposty that its ash content might be reduced the same washposty that it would be same washposty that its ash content might be reduced the same washposty that it would be same washposty that it washposty that it would be same washposty that it would be same washposty that it washposty that it would be same washposty that it washposty that washposty the washposty that washposty the washposty that washposty the washposty that washposty that washposty the washposty th other alternative fuels. At the same was postly that its ash content might be reduced. Thereby be used to ble to blend it with coals which otherwise cannot be used for metallurgical pure. that its ash content might be reduced. Thereby be used for metallurgical purposes.

The major which otherwise cannot be which in Kargali Kar Ine major sources of coking coal are in Kargali/Kargali Jharia. A Government washery is being installed at

Wash the coking coals which would be raised by Government in. that area. 1.6 million tons of washed coal from Kargali will be used in the steel works at Rourkela and Bhilai. To augment these Supplies and The Ministry of Supplies, coal from Jharia will also be required. The Ministry of washing coking Iron & Steel is now exploring the best method of washing coking to the steel is now exploring the best method of washing coking the best method of washing coking the so designed that the coals: The steel works at Durgapur will be so designed. that the coals in that area which would otherwise be unsuitable for metallurgical purposes would be used after suitable blending. The Durgapur works will use Jharia coal which will be washed at the site of the steel works, blended with coal from Barakar which by itself cannot be used for steel making.

The steel works at Bhilai will use a blend of metallurgical coals from Kargali and Jharia and coal from Korba which by itself is not

Limestone and dolomite for the Rourkela and Bhilai works will be quarried and dolomite for the Rourkela and Bhilai works well and be directly by the Government. For the Durgapur steel Works, the proposal is to obtain at least in the initial stages lime-Stone from the existing sources at Birmitrapur in Orissa.

Mention was made earlier of the utilisation of the by-products Mention Was made earlier of the utilisation of the by-prouder chemicals steel works, for the manufacture of fertilizers and

In the the carbonisation of coal which will be carried out at each works for the coal which will be carried out at each coke a number of valuable will be The steel works for the production of coke, a number of valuable like collision and benzole will be facilities by products works for the production of coke, a number of valuable the distribution of the production of coke, a number of valuable to the distribution of the production of the distribution of these works facilities and the distribution of these works facilities and the distribution of these works facilities and the distribution of the distribu to the sed like coal tar, ammonia liquor and bence the distillation of these by-products and thereby obtain valuable which form the by-products and thereby obtain valuable antiseptics. Leased like coal tar, ammonia liquor and benzole will attend to set up at each of these works facilities and thereby obtain valuable the distillation of these by-products and thereby obtain valuable basis of a number of industries like by-dicines. scents and antiseptics. dyestuffs, which form the basis of a number of industries paints, varnishes, medicines, scents and antiseptics.

### TOWNSHIPS

It is estimated that for the operation of the three steel plants the following staff would be required:

- (i) 120 experienced engineers who would be entrusted with higher technical direction.
- (ii) 1200 qualified engineers.
- (iii) 10000 skilled workers of different categories.
- (iv) 7000 semi-skilled workers.

For the second category of qualified engineers, the problem has been one of finding the requisite number of experienced engineers. To overcome this, young engineers, mechanical, electrical, metallurgical and chemical, will be sent, after some initial training, abroad for advanced courses. A large number of applications have been received and these are now under scrutiny in consultation with the Union Public Service Commission.

For the training of skilled workers, efforts are being made develop training facilities within the country. A technical committee has surveyed the existing training facilities and expects to submit its recommendations before the end of April augment the facilities available within the country and to maintain a regular inflow, after the works come into operation, centres will be established at each of the steel works.

Experienced engineers who would be entrusted with expantechnical direction are very few in the country. With the sion programme of the existing steel works it has not been possible, nor would it be desirable, to recruit any significant people from those works. Initially the shortage will be replaced by the employment of foreign technicians. These will be replaced by Indian engineers as they gain experience.

A modern industrial township is being developed at each It the three sites to accommodate the large number of workers all of estimated that each of these townships, which will have able modern conveniences and will be laid out such as to be required acommodating larger numbers of workers who would will when the capacity of each of the plants is increased, Rupees twelve to fifteen crores.

It might well be asked why each of the plants is of 1 million to be struck PROFITABILITY tons capacity and not more or less. A balance has to be struck between a large number of small works and one or two very big Works. If there are too many plants, then the central organisation to co-ordinate the activities of all would become uneconomical. Generally, it would also require greater investment and involve higher overheads. On the other hand, one single plant of two or three tone control on the transport System Which would mean a heavy strain on the transport system tons capacity would mean a heavy strain on the management which would have to carry the raw materials to and the broduct.

In choosing three plants finished would have to carry the raw materials to and of I million to away from the works. In choosing three plants of 1 million tons capacity each, advantage has been taken of the nillion tons away irom the work.

Construction of the from a technical point of Construction of the works. This apart, from a technical point of view, a plant of 1 million tons capacity can with slight adaptation the works. be expanded to produce 1.3 million tons of steel with relatively intermediational intermediation of this capacity has the hihor additional investment. A plant of this capacity has the internal produce 1.3 million tons of and out of the most handling 6 to 7 million tons of materials in departments. While the layout and out problem of handling 6 to 7 million tons of materiais ...
effect: of the works and between departments. While the layout of each of the works and between departments. While the layer the works has been so chosen that this could be done and one has been made in the layout effectively and works has been so chosen that this could be works to be works to be a consider the consideration that the could be accounted to the the works has been so chosen was been made in the layout that st to be expanded to double its capacity at each of the doing so. places works to be expanded to double its capacity at each or much difficulty in doing so. production of steel, there would not be much difficulty in doing so-The requirements of constructional material and operational material and operational material and operations of constructional material and operations of constructional material and operations. The requirements of constructional material and operational works will differ according to the capacity of and the products. But allowing for of each type Works for a steel works will differ according to the equipment, the mand also in sizes and numbers of each type canacity required in the country, equipment, the nature of the products.

broduct, the manufacturing capacity required in the country,

capacity required in the country,

and these constants of equipment produce these manufacturing capacity required in the country, being practically, and materials and items of equipment broduce these manufacturing capacity required ...

build be these constructional materials and items of equipment tons ingot constructional materials and items of equipment ingot constructional materials and items of equipment tons in good constructions. hillion practically of the same ingot capacity, th

Make bricks and fire clay p. Chronicks and fire clay p. Chronicks and magnesite bricks and magnesite bricks and bricks and magnesite br	· ·	the f	ollowin	g	will	be requir	red:
Against tricks and fire clay portions and magnesite bricks and magnesite	tod	•	• .	•	•	45 million	
how along and product	s councts	•	•	•	•	100,000	sq. m.
refere remente brief gnesit	e n		•	•	•	90,000	tons
oficate 8th, 8heets and	chroducts		•	•	•	40,000	tons
rein actures	· ma	gnesite	nod	•	•	3,000	tons
alforced .	•	•	Products	•	•	13,500	tons
- concre	te or.	•	•	•	•	700,000	sq. m.
About the for attructures reinforced concre	actucture	es, pipe	S. etc	•	•	500,000	cu. m.
		- (2	vy CiC.	•		120,000	cu. m.

Asphalt concrete 40,000 tons 10,000 Rails . Railway sleepers 10,000 100,000 Structural steelwork 6,000 Castings 10,000 Pipe work 24 Nos. Locomotives . 175 Nos. Specialist rolling stock about 8,500 Nos. Electrical motors about 100 Nos. Electrical transformers about 50 or 60 Nos. Cranes of various types and sizes . . about 100 Nos. Machine tools of various types and sizes Of various types. Instruments .

At present the country is capable of manufacturing practically the constructional all the constructional material but very little of the steelwork, the castings or equipment to castings or equipment. If the industrial projects proposed for that Second Five Year Plan Second Five Year Plan are all completed, then it is estimated almost 80% in value of the almost 80% in value of the equipment and material produced for a steel works of 1 mills for a steel works of 1 million tons capacity could be produced within the country. The help within the country. The balance of 20% which will have forgings, imported will consist mainly imported will consist mainly of very heavy castings, instruspecialist machine tools are tools specialist machine tools, some optical stores and intricate ments.

The capital investment on the three steel works would be approximately Po 200 would be approximately Rs. 360 cropes. Steel works would be approximately Rs. 360 cropes. Besides there would be steel works would be the steel works would be the steel works would be steel works. Besides there would be steel works would be the steel works. the capital expenditure for working new mines for iron ancillary stone, etc., the cost of the terminal stone and the cost of the terminal stone and the services are stone and the stone stone, etc., the cost of the townships and the cost of services.

Besides the ore, in ore, in ore, in ore, in ore, in ore, it is stone, etc., the cost of the townships and the cost of services.

existing steel works is Rs. 393 per ton of steel sold. The tupes controlled selling price of steel and tupes hundred Rs. of controlled selling price of steel products is about a hundred Rs. of more than this; while, the world to Rs. 200 more than this; while, the world market price will be over One to Rs. 200 more than the average the objects of to Rs. 200 more than the average controlled selling price. of the the objects of producing the country's own requirements of the is to sell it at reasonable price. objects of producing the country's own requirements of the is to sell it at reasonable prices. Assuming that the other new steel works will be sold at about the level as the of steel new steel works will be sold at about the same level as the of retention price—say Rs. 400 per ton the same level approximately steel and pig iron steel and pig iron sold by each of the steel works would be mately Rs. 30 to 35 crores per year.

Accord: retention price—say Rs. 400 per ton, the gross sale would be mately Rs. 20

According to the estimates of the technical advisers fuel, be ament the direct cost of production of the technical advisers fuel, be a ment the direct cost of productions. ernment the direct cost of production i.e. of materials, well and power, labour, staff and Rs. 200 page 1 and power, labour, staff and maintenance, therefore, would of revenue Rs. 200 per ton. For each of the steel works, profits of revenue over current of revenue over current expenditure or gross profits

life of a corres per annum. Experience shows that the average life of a steel plant is about thirty years. It could be longer if the plant is maintained properly. Even assuming a shorter life of twenty to twenty-five years, a provision of Rs. 5 crores per year Would be more than adequate to meet the needs of depreciation in the strict control of t the strict sense of the term i.e., expenditure needed to maintain the plant in the same state and efficiency as it was when new. Each plant in the same state and efficiency as it was when he internal resource, have Rs. 10 to 15 crores per year from its building other plants. These resources, which could be used for building other plants. These resources, which could be used for building outer prearts of production would amount to about Rs. 200 crores in about five years of production. By that time the cost of new plants would that become land. By that time the cost of the country to have become less largely because of the ability of the country to build at least transfer of these. It should, therefore, be possible to at least two plants with those 200 crores of rupees.

### Seriai No. ANNEXURE I Demand Categories I Heavy rails and fish plates (in thousand tons) <sup>2</sup> Heavy structurals . 265 3 Broad and parallel flanged beams 485 4 Crossing sleepers . 75 5 Sleeper bars 30 6 Medium and light structurals 170 7 Deformed and prestressed concrete bars 510 Rounds and flats 1/2" and above 30 9 Rounds and flats below 1" Spring steel . 780 Wheels, tyres and axles 360 12 Tinplates 30 Plates 3/16" and above 70 Wire and wire products . 150 Vire ropes 300 Tool and alloy steel 100 7 Stainless steel 5 18 Hoops and box strappings IO Bloom and billets for forging 15 Sheets and strips (hot rolled) 60 st ghibs and 13. Strips over 13. 100 Skelp (for tubes and pipes) 650

60 145

100

4,500

700

TOTAL FINISHED STEEL

Semins for re-rollers

	` <b>!</b>	*	21						
	; [	TATA IRON & STEEL CO. LTD.:						•	Tons/Year
ANNEXURE II	ons/Yeat	I. Hann							•
Т	003/2	I. Heavy rails and fish plates  2. Heavy structurals							
	,	J. Cross.	•	•	•	•	•	•	135,000
Rourkela:	200,000	4. Sleen to olcepers	•	•	•	•	•	•	110,000
I. Plates—3/16" and above	-80°000 )	3. Ma	•	•	•	•	•	•	30,000
2. Sheets and strips (hot rolled)	40.000	5. Medium and light structurals . 6. Rounds and flats 7. Spring steel	•	•	•	•	•	•	50,000
3. Strips up to 12"	100,000	7. Spring steel .	•	•	•	•	•	•	297,000
4. Strips over 12"	720,000	W/L	•	•	•	•	•	•	144,000
	720,0	9. Die Tas lyres and and	•	•	•	•	•	•	4,000
		10. Blooms and above	•	•	•	•	•	•	30,000
		10. Blooms and billets for forging 12. Strips up to 12"  13. Skelp (c.	•	•	•	•	•	•	100,000
	-0	12. Strips up to 12"	•	•	•	•	•	•	22,000
BHILAI :	100,000	13. Skelp (for	•	•	•	•	•	•	150,000
•	10,000	13. Skelp (for tubes and pipes)	•	•	•	•	•	•	42,000
1, Rails, standard gauge	90,000	<sup>1</sup> 4. o.	•	•	•	•	•	•	106,000
•		14. Semis for re-rollers						_	1,220,000
<ol> <li>Rails, narrow gauge</li> <li>Railway sleeper hars</li> <li>Standard and broad-flanged beams, channels, angles and other up to and heavy structural sections (beams with section height up to and heavy structural sections (beams with sides from 7/8"</li> </ol>	284,000	-c-rollers							280,000
Dallway sleeper hars	00	Mar.	-	• .	•	•	•	٠ _	
3. Railway sleeper hars  3. Standard and broad-flanged beams, channels, angles and other light up to  4. Standard and broad-flanged beams with section height up to  and heavy structural sections (beams with sides from 7/8"  24")  24")  3. To 3" dia. and squares with sides from 7/8"	121,000 15,000	I. Heavy rails and fish plates 3. R.							1,500,000
4. Standard and blodd- and heavy structural sections (beams)	15,00	I. Heavy rails and fish plates 3. Broad and 4. M.						_	
24") and squares with slows	620,000	2. Henrils and C. LTD.:							
thought from 710 to 3	<b>∧0</b> 1 i	3. Broom structured high plates							T00 000
4. Standard and broad-flanged beams, characteristics with sections and heavy structural sections (beams with section 7/8"  24")  5. Rounds from 7/8" to 3" dia. and squares with sides from 7/8"  to 3"  6. Flats from 2" to 5" wide	1507	Aleavy rails and fish plates  3. Broad and parallel a	•	•	•	•	•	•	100,000
6. Finds from 2 to 3	770,000		•	•	•	•	•	•	110,000
to 3"  6. Flats from 2" to 5" wide  7. Billets for re-rolling at outside rolling mills from 2" × 2" to 3" × 3"  cross-section	"/	Aleavy structurals  3. Broad and parallel flanged beams  4. Medium and light structurals  5. Rounds and flats  7. Sheets and billets for forging  8. 9.	•	•	•	•	•	•	40,000
cross-section · · ·	300,000	7. Sheets and strips (hot rolled) 8. Semis for	•	•	•	•	•	•	120,000
·	3000	and stripe (1)	•	•	•	•	•	•	160,000
•	ا م	8. S. (not rolled)	•	•	•	•	•	•	10,000
•	10,000	8. Semis for re-rollers	•	•	•	•	•	٠	120,000
Pig iron · · · · · · · · · · · · · · · · · · ·		re-rollers							660,000
Fig non	60° 200	• •	•				_	_	140,000
DURGAPUR:	60,00				•	•	•	٠_	
Dukon on the blooms	30,000							_	800,000
1. Heavy forging blooms	30,000	· •							800,000
2. Merchant sections	18,000							-	
3. Forging billets 4. Sleeper bars	2000	•							
5. Light sections	640,000							•	
6. Forging blooms	150,00								
7 Axles · · · ·	100,00								
8. Wheels and tyres	77/10.								
	250,00	•							
	<i>"</i> //	·							
9. Billets for sale	11.1	BIT .							
•		<b>A</b> .							
		<b>70</b> Mr.					•		
		TR.							
Pig iron		M of 1&5-10-4-56-1000							
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		10-4-56—tood	)						

Manager and the second second

Tons/Year

135,000 110,000 30,000 50,000 297,000 144,000 4,000 30,000 100,000 22,000 150,000 42,000

1,220,000 280,000

1,500,000

100,000 110,000 40,000 120,000 160,000 10,000

660,000 140,000

800,000

		21	
		TATA IRON & STEEL CO. LTD.:	-
		STEEL CO. LTD. :	
ANNEXURE II	Tons/Year	I. Heavy rails and fish plates	
	10100	2. Heavy structurals	
		3. Crossia.	
	200,000	4. Sleeper bars 5. Madi	
Rourkela:	200,00	S. Meeper bars	
	380,000	5. Medium and light structurals .	
1. Plates—3/16" and above	40,000	6. Rounds and flats 7. Spring steel	
2. Sheets and strips (hot rolled)	100,000	77 78 78 78 78 78 78 78 78 78 78 78 78 7	
3. Strips up to 12" · · · · · · ·		8. Wheels, tyres and axles 9. Plates 3/16" and above	
4. Strips over 12"	720,000	9. Plates 2/25 and axles	
		The state of the s	
	•	12, She and strips (hot rolled)	
	an0	12. Strips up to 12"	
Deserte A	100,000	Kelp (for tubes	
BHILAI:	. 10,000	13. Skelp (for tubes and pipes)	
I. Rails, standard gauge	. 90,000	14.0	•
2. Rails, narrow gauge	•	Gemis for respect	
2. Rails, narrow gauge	o 284,000	14. Semis for re-rollers	
<ul> <li>3. Railway sleeper bars</li> <li>4. Standard and broad-flanged beams, channels, angles and other light up to and heavy structural sections (beams with section height up to a sides from 7/8"</li> </ul>	o 2 <sup>84,°</sup>		٠
4. Standard and broad-flanged beams, channels, and height of heigh	121,000	INDIAN IRON & STERL CO. LTD.:  1. Heavy rails and fish plates	
24")	. 15,000	180M & C	
5. Rounds from 7/8" to 3" dia. and squares with sides from 7/8"	. 15,	I. Heavy rails and fish plates 3. Broad and fish	
to 3"	620,000	Aleavy rails and fish plates  3. Broad and parallel a.  4. Mediand parallel a.	
6 Flots from all to all	<b>~0</b> ∪	I OID VOLPINA F-MCO	,
wide	3" 150,0		
2" to 3" \		I Ladin Janes 1	
7. Billets for re-rolling at outside rolling mills from 2	770,000	6. Divinds and light structurals	٠
7. Billets for re-rolling at outside rolling mills from 2" × 2" to 3" × cross-section	·//	5. Rounds and light structurals  6. Blooms and flats  7. Sheets	•
	300,000	6. Blooms and flats 7. Sheets and strips (hot rolled)	•
	3001	and string (	
	•	7. Sheets and strips (hot rolled)	
Pig iron .	10,000	Sentia c	٠
		10r re-roller	
DURGAPUR:	. 240,000	8. Semis for re-rollers	
T. Hanny formal and	60,000		•
I. Heavy forging blooms			
2. Merchant sections	. 200,000		
3. Forging billets	· 200,000 30,000 12,000		
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5. Light sections	- 8,0 /	·	
6. Forging blooms	· / W	A	
7. Axles	640,000		
8. Wheels and tyres	107 /		
· · · · · · · · · · · · · · · · · · ·	130,000		
o Du	195		
9. Billets for sale	350,000		
• •	/ a5"/	Į.	

20

Pig iron

Glas-10-4-56-100d