

REPORT

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MINISTRY OF STEEL MINES AND FUEL

(Department of Iron and Steel)

CONTENTS

	Page
1. Production, Imports & Distribution	I
2. Organisation	12
3. Rourkela Steel Project	15
4. Bhilai Steel Project	21
5. Durgapur Steel Project	25
6. Recruitment and Training	31
7. Coal Washeries	34
8. Alloy & Special Steels Plant	37
9. Tatas, Indian Iron & Mysore Iron & Steel Works	40
10. Small Pig Iron Plants, Electric Furnaces, Re-rolling Industry and Ferro-Manganese	45

Seloy
22/8/60

इस पुस्तक में शामिल
पुस्तक संख्या
पंजीयन संख्या **ALXXII**
दिनांक

PRODUCTION, IMPORTS AND DISTRIBUTION OF STEEL

1959 was an important year in India's steel economy. It was the first year in which production of iron and steel showed a large increase. The expansions of the existing steel Works and the establishment of new Works planned nearly five years earlier yielded their first fruits. The steel production in 1959 was 1.77 million tons against 1.39 million tons in 1958. This increase came mainly from Tatas and Indian Iron. Likewise, the production of saleable pig iron recorded a sharp increase from 441,000 tons in 1958 to 752,403 tons in 1959. Here, the contribution of the Works at Bhilai and Rourkela was large.

2. The large production however did not mean an increase in the total availability of steel. This was because, owing to the continued shortage of foreign exchange, restrictions on the import of steel, first imposed in 1957, had to be continued. Imports in 1959 were about 750,000 tons against 1.17 million tons in 1958 and 1.72 million tons in 1957.

3. The statutory selling prices of steel remained unchanged in 1959, with one exception. This was in the price of wire where the price had to be increased by Rs. 12.5 per ton on account of increases in railway freight.

4. The prospects for 1960-61 are brighter. There will be more pig iron for sale as compared even to 1959. The supply position of many items of steel, like structurals, bars and rods and plates, is likely to improve as a result of the production in Bhilai of billets and structurals and in Rourkela of plates. The Bhilai billet mill is already in operation; the plate mill in Rourkela and the structural mill in Bhilai are expected to be commissioned in the second quarter of 1960-61. With this, the necessity for importing these items will disappear. During 1960-61 however, shortage of items like sheets, tinplate, wire and tool and alloy steels will continue. Of these, tool and alloy steels and wire are being licensed both to the actual users and the trade. In regard to the other scarce items, imports are being arranged and will have to be continued to be arranged, in exchange for the export of scrap, pig iron and the semis from the new steel works. According to present estimates, Indian production should be of the order of 3 million tons during 1960-61; and with the import of items of steel that we do not either produce or produce only in very limited quantities, 1960-61 should be the first year in which the country will have the largest amount of steel to use.

Production:

5. It was stated that production reached a new "high" in 1959. During the year, Tatas and Indian Iron almost completed the large expansion

programmes they had undertaken. In Tatas, all but the new merchant mill and certain additions and alterations to the existing units, are ready. Likewise, in Indian Iron, only the bar mill remains to be commissioned. The result of this was that the Works together produced about 1.08 million tons of finished steel against 770,000 tons in 1958. The production of semi-finished steel for re-rolling was also larger. These semis are finished by the secondary producers and the re-rollers. These units produced 659,000 tons in 1959 against 496,000 tons in 1958.

6. But the more significant thing is that it was in 1959 that the first production came in from the new steel works. Early in February 1959, the first blast furnaces of Bhilai and Rourkela were blown in. Nearly three months later, these Works also produced the first steel. In December 1959, the second blast furnace in Bhilai, the blooming mill and the billet mill went into production. The first Durgapur blast furnace was also commissioned during the month. These Works contributed the larger share of iron production. In steel however, because of the absence of the finishing mills, they only produced semis. The exception to this was Bhilai which rolled and despatched the first billets at the end of December 1959. The following statements show the production of pig iron for sale and steel by Works during 1958 and 1959:

Production of pig iron for sale

	1958	1959
	Tons	Tons
Tata Iron Steel Co. Ltd.	26,089	22,216
Indian Iron & Steel Co. Ltd.	346,754	275,545
Mysore Iron & Steel Works	68,157	26,132
Rourkela Steel Project	—	136,075
Bhilai Steel Project	—	292,435
Durgapur Steel Project	—	—
TOTAL	441,000	752,403

Production of steel

	1958	1959
	Tons	Tons
Tata Iron & Steel Co. Ltd.	567,902	697,089
Indian Iron & Steel Co. Ltd.	298,741	378,291
Mysore Iron & Steel Works	35,894	33,946
Secondary producers and re-rollers using billets	444,876	566,031
Unregistered re-rollers (using scrap)	50,887	92,636
TOTAL	1,398,300	1,767,993

Production of steel in Bhilai and Rourkela has not been separately shown because these Works produced only semis.

The production of finished steel by categories, in 1958 and 1959, was as below:

	1958	1959
	Tons	Tons
Heavy structurals	102,576	125,812
Light structurals	95,837	171,116
Spikes	6,000	6,083
Heavy rails and fishplates	69,200	88,880
Black sheets (plain)	115,601	120,079
Galvd. sheets (plain)	28,150	28,854
Galvd. sheets (corrugated)	114,763	108,214
Plates (M. S. and H. T.)	68,746	79,272
Bars and Rods	500,087	679,613
Wheels, tyres and axles	20,803	19,990
Sleepers	6,838	5,747
Skelp	92,040	146,535
Tinplate	57,878	67,732
Bolts and nuts	15,630	13,682
Rivets	6,984	5,875
Wire (barbed)	958	1,214
Wire (misc. and telegraph)	15,597	22,546
Wire nails	17,452	18,081
Tool steel incl. spring steel	28,367	18,408
Hoops and strips	11,467	18,381
Steel castings	23,326	21,879
TOTAL	1,398,300	1,767,993

Besides, the plants at Bhilai and Rourkela produced 60,314 tons of ingots. Part of the Rourkela ingots was sold to Tatas. Bhilai also produced, out of own ingots, 1,409 tons of billets.

7. The increase in production had two significant effects. The first was that the supply position of pig iron became comparatively easy.

Shortages, if any, were local. As a result of this, we could stop making allocations of pig iron. Pig iron could be indented for freely by all users to the Iron & Steel Controller. The second was that the supply of billets to the re-rolling industry increased considerably. As a result, the production of billet users increased from about 445,000 tons in 1958 to 566,000 tons in 1959.

8. The prospects of 1960-61 are that production of pig iron for sale may increase to more than a million tons. This will however be temporary and will be available until all the iron can be used for steel-making. Likewise, the production of billets will be larger in 1960-61.

Imports:

9. The continued shortage of foreign exchange necessitated the continuance of restrictions on imports, first imposed in 1957. No import licences were issued during the year for mild steel of prime quality of common categories on commercial account. Import of mild steel items were, however, arranged by the Iron & Steel Controller for meeting the requirements of priority users, principally from the USSR. In 1959, we bought 204,000 metric tons from the USSR. The bulk of the steel has arrived. The items licensed generally to the trade were certain qualities of steel scrap—industrial and re-rollable. In the current licensing period (October 1959–March 1960) however, the established trade has been allowed to import wire and tool and alloy steels. This was done with a view to enable consumers of small quantities to obtain their requirements from them. Imports are also being made in bulk by the Iron & Steel Controller under the Development Loan Fund from which loans have been made available to India by the Government of USA for import of steel. Three loans of an aggregate value of \$ 60 million are being operated upon during the year. Out of this, \$ 18 million are to be used for public utility projects and \$ 42 million for public sector and maintenance of industries. In the licensing policy for the current period (October 1959–March 1960), it has been provided that the requirements of larger units like the automobile industry, the oil industry, etc, would be met from the bulk imports arranged under the Development Loan Fund. This will be mainly of the following categories:

- (i) Tinplate—prime and secondaries.
- (ii) Skelp and strips
- (iii) Sheets for automobiles, drum-making and electrical steel sheets.
- (iv) Wire rods and wire

Steel which is being procured under the DLF began to arrive in the country during the later part of this year. About 50,000 tons have so far been received.

10. Some steel was also imported in exchange for the export of ferrous scrap, iron and manganese ores, pig iron, jute, etc. During the later half of the year, import was also arranged against semis from Rourkela. Import against the export of pig iron and steel items are handled by the Iron & Steel Controller. In barter other than iron and steel, transactions are finalised by the State Trading Corporation who consult the Iron & Steel Controller in regard to prices and categories of steel to be imported. Import of about 300,000 tons were arranged by exchange. Some steel was also imported on Rupee payment basis from certain countries, e.g. Hungary, Poland, Czechoslovakia, with whom we have Rupee payment arrangements. Such approved imports were for 13,050 tons.

11. The total imports of iron and steel during 1959 (upto November) amounted to 721,505 tons as against 1,729,564 tons in 1957 and 1,173,292 tons in 1958. The category-wise breakup in 1958 and 1959 is given below:

	1958	1959 (upto Nov)
Blooms, slabs, etc.	13,451	10,423
Structurals	143,327	64,742
Rails	205,831	63,591
Sheets, Black/Galvd. Plain	26,753	50,467
Sheets, Black/Galvd. Corr.	362	..
Plates, M.S.	68,436	101,689
Bars and rods	87,460	25,855
Wheels, tyres and axles	48,351	4,556
Rail fittings, sleepers and fishplates	75,320	8,312
Tinplate, prime	32,382	30,218
Tinplate, waste waste	12,791	17,607
Terneplate, primes and waste waste	107	291
Wire, Black/Galvd.	49,964	44,332
Wire, telegraph	172	..
Hoops and strips	22,864	27,855
Tool and alloy steels	26,013	21,998
Steel castings, unmachined	301	..
Steel forgings, unmachined	637	792
Billets	206,628	115,070
Scrap, industrial	43,398	42,306
Scrap, re-rollable	11,827	36,580
Scrap, melting	243	..
Pig iron	89,674	50,661
Others	..	4,160
TOTAL	1,173,292	721,505

Of these imports, the quantity imported on Government account was 485,286 tons in 1959 including about 50,000 tons arranged under the DLF. The balance represents imports by actual users against licences issued to them, and "exchange" imports.

Demand:

12. It has been stated that though production increased in 1959, the total availability was less than in previous years. This decrease was mainly the result of the restrictions on imports to which reference has been made earlier. This meant that all demands could not be satisfied and the demand for steel in the country has been always more than the production. This imbalance between demand and supply became pronounced first in 1956. Since then, demands have been on the rise. The reasons mainly are the growth of steel-using industries and the constructional requirements of the developmental activities undertaken during the Second Plan. As already stated, till 1957, the comparatively easy exchange position enabled liberal imports. From then, imports had to be curtailed.

13. The total demand for steel from 1955-56 has been as under:

	(In million tons)
1955-56	2.037
1956-57	3.990
1957-58	4.145
1958-59	4.175
1959-60	4.063

This is the total of the demands sent for allocations by the coordinating/sponsoring authorities, and includes estimates where demands are not received in time. The statement indicates only broad trends.

Distribution:

14. As a result of the limited availability, steel has always been allocated. The allocations are made to sponsoring/coordinating authorities. Demands are sent by these authorities. These demands are scrutinised and on a prospective judgment of the production and imports, allocations are made. In making these allocations, essential users like the Railways, Transport and the steel works are allocated their requirements. The rest get only a share. The allocations until the second quarter of 1959-60 were made on a quarterly basis. From October 1959 onwards, allocations are being made on a half-yearly basis.

15. The quota-wise allocations made from 1955-56 are given below:

	(In 000's tons)				
	1955-56	1956-57	1957-58	1958-59	1959-60
Railways and Defence	363	490	520	396	318
Industrial maintenance and packing	113	109	108	109	116
Steel processing and small scale industries	347	428	384	541	836
Government development schemes	409	409	562	632	723
Private industrial development	99	165	144	163	125
Agricultural	81	101	80	161	320
States (Non-agricultural, Govt. Development schemes and steel processing industries)	301	295	269	387	777
Rehabilitation	17	19	12	14	14
Export	8	8	8	11	13
Reserve	..	..	..	3	6
Export Promotion	..	..	..	..	36
TOTAL	1,738	2,024	2,087	2,357	3,284

16. In the following statement, the total availability from 1955 has been indicated:-

	(In tons)				
	1955	1956	1957	1958	1959
Indigenous production	1,260,358	1,355,530	1,408,527	1,398,300	1,767,993
Imports	899,733	1,853,845	1,720,455	1,173,292	818,548
TOTAL	2,160,091	3,209,375	3,128,982	2,571,592	2,586,541

It will be seen from the above statement that the total availability of steel in 1958 and 1959 has been less than in previous years. This was the result of the sharp decline in imports and led to acute shortages.

17. In 1960-61 however, though shortages will be there, they will be increasingly selective. This is because, apart from the increased production of Tatas and Indian Iron, we expect the plate mill in Rourkela, the structural mill in Bhilai and the billet mill in Durgapur to go into

operation in the second quarter of 1960-61. Besides, towards the end of the year, the strip mill in Rourkela is also likely to go into production.

18. The increased availability has resulted in some relaxations in distribution control. The control over pig iron and cast iron ingot moulds was relaxed in July 1959. All stockists are allowed to deal in pig iron without any quantitative restrictions. Consumers can send indents for their full requirements to the Iron & Steel Controller direct for supply. The easier supply position of certain sections of structurals, heavy rounds and second-class rails led to relaxations in their distribution at the stockists' level in December 1959. The stockists are now allowed to sell freely 50 per cent of the stocks received by them and the balance after 30 days from the date on which they report arrival of stocks to the respective State Governments.

Exports:

19. Exports of "prime quality" steel were insignificant as demand exceeded supplies. Some token exports were, as in the earlier years, made to neighbouring countries. Melting scrap of types that could not be used in the country was however allowed to be exported liberally. The availability of melting scrap in the country has been estimated at about 400,000 tons. The requirement of electric furnaces which consume steel melting scrap is of the order of 200,000 tons per annum. The furnace owners, however, prefer only heavy melting scrap and clean light scrap. The total quantity of ferrous scrap exported in 1959 was 266,907 tons against 116,615 tons in 1958 and 92,944 tons in 1957. The increase in scrap exports in 1959 was partly due to permission granted to import, in exchange, finished steel. Out of the total scrap exports, 126,000 tons were allowed for export in exchange for about 43,200 tons of steel and of this about 30,400 tons were received in 1959.

20. Due to the time-lag between the commissioning of the steel-making capacity and the rolling capacity in the public sector steel plants, it has been possible to negotiate for the export of some ingots and slabs.

21. For the first time since 1953, pig iron was also exported. Exports of about 258,900 tons were finalised in 1959. Out of this, 168,900 tons have been sold for cash and the rest in exchange for steel. About 50,000 tons have already been shipped.

Prices:

22. The controlled selling prices of "prime quality steel" and "defectives and scrap" are notified from time to time. The price structure of steel is uniform. During the year, there was no change in the controlled selling prices except in the case of wire and wire products which were increased by Rs. 12.50 per ton on account of the increase in rail freight payable by the producers.

23. The price structure has three tiers. Registered producers, in the case of steel, and controlled sources, in the case of scrap and defectives, sell at what are known as 'Col. I prices'. Controlled stockholders, in the case of prime steel, and controlled scrap merchants, in the case of scrap and defectives, sell at Col. II prices. All the others sell at Col. III prices. In the case of pig iron, there are only two sets of prices—Col. I for sale by producers and Col. II for sale by all others including controlled stockholders.

24. All imported steel purchased on Government account (where landed costs are generally higher than the statutory prices) are subsidised. In other imports including imports against sanctioned barter deals, no subsidy is given. In such cases, the importer is allowed to sell materials at landed cost plus a fixed percentage of profit.

25. During 1959, the retention prices (i.e. the prices which the producers are allowed to retain) for pig iron and steel payable to Tatas and Indian Iron, and for tinplate payable to the Tinplate Company of India, were increased. On account of the increase in the cost of production due to increase in the cost of raw materials, freight, labour costs, etc., an increase of Rs. 5 per ton for the period 1955-56 to 1959-60 in the retention price of steel payable to Tatas and Indian Iron, was allowed after a cost examination. The present average retention price of steel is Rs. 424 per ton plus Rs. 45.74 per ton on account of excise duty. This applies to Tatas and Indian Iron. The Mysore prices are marginally higher and stand at Rs. 425 per ton plus excise at Rs. 42.85 per ton.

26. The retention price of pig iron payable to Tatas and Indian Iron has been increased after an enquiry conducted by the Tariff Commission. The increase allowed in the retention price payable to Indian Iron is Rs. 17.23 per ton and Rs. 12.92 per ton to Tatas. The present retention price payable to Indian Iron is Rs. 158.73 per ton and to Tatas Rs. 140.92 per ton. The Mysore price, as in steel, is higher—Rs. 200 per ton.

27. As regards pig iron produced by the Rourkela and the Bhilai Steel Projects, it has been decided that the retention price of Indian Iron would be applicable to them provisionally.

28. On the basis of the recommendation of the Tariff Commission, the retention price payable to the Tinplate Company of India was revised to Rs. 1,013.22 per ton.

Concessional Prices for Export Promotion:

29. Export industries get two concessions. They get, first, reimbursement of steel used in manufacture at 133-1/3%. This has been so from August 1957. Besides, on the actual steel content of the manufacture, they are eligible to get steel at concessional prices. The concessional

prices first came into force in December 1958. In such concessional prices, the element of surcharge included in the present selling prices has been deleted. Following the increase in retention prices, the concessional prices have been increased correspondingly.

Scrap:

30. Steel scrap is generally classified into—

- (a) Industrial Scrap
- (b) Re-rollable scrap
- (c) Melting scrap

Industrial scrap is mostly usable defectives and cuttings. The small fabricators and village blacksmiths make good use of industrial scrap by re-forging or re-shaping. Re-rollable scrap is used by re-rolling mills for re-rolling them into useful bars and rods. Such types of scrap which cannot be used for any other purpose are useful only for re-melting.

31. Scrap is controlled in view of the importance of scrap for the economy of the country. The Iron & Steel Controller can declare any factory as a controlled source and once declared as a controlled source, that factory cannot dispose of scrap except under the authority or permit of the Iron & Steel Controller.

32. The arisings of industrial scrap are about 80,000 to 100,000 tons a year. Normally, these arisings which are mainly from the integrated steel works, the Tinplate Company of India and the Indian Steel & Wire Products, are pooled and allocated to the States. Scrap from re-rollers, the Railways and other controlled sources are distributed to scrap merchants situated nearby. Industrial scrap is allocated to the State Governments who distribute it to the actual users. The scrap allocations are in addition to the allocations of prime steel. During 1959-60, the quantity of industrial scrap distributed to the States through the agency of scrap merchants was about 54,700 tons.

33. Re-rollable scrap, like industrial scrap, arises from the large steel works, the Railways and the larger engineering sources. This is allotted to what are called 'the unregistered re-rollers', i.e. those who use scrap as raw material, through the Steel Re-rolling Mills Association. The tonnage available for distribution and therefore allocated was about 130,000 tons. In addition, the re-rolling mills were also allowed to import scrap for use. They so imported about 38,000 tons during the year. The products of these unregistered re-rollers are controlled by the State Controllers concerned.

34. The scrap that cannot be used either for further processing by industries or for re-rolling is usually used for re-melting by the electric

furnace owners. Such scrap may be either heavy or light. Furnaces in India usually use the heavy scrap and the clean varieties of light scrap. Therefore, all scrap that cannot be used in the country is allowed to be exported. The capacity of furnaces existing is about 150,000 tons. The scrap arisings of all types are however much larger. In 1956, a Committee consisting of all scrap interests, i.e. both users and the traders, estimated that the total availability of melting scrap, which was about 400,000 tons then would go up to about 600,000 tons by 1960-61. It is in order to use the scrap that arises that 19 new electric furnaces were sanctioned in 1959. When these come up, the demand for scrap will increase. The use by electric furnaces of scrap in 1959 was about 90,000 tons.

35. The pattern of control and distribution of scrap remained unchanged during the year.

ORGANISATION

Department of Iron & Steel:

The Ministry of Iron & Steel had come into being on the 15th June 1955 and was entrusted with the responsibility of planning and execution of the two steel works at Rourkela and Bhilai and also the administration of the Nahan (Himachal) Foundries Ltd. Later it also took over from the Ministry of Commerce & Industry the work relating to the erection of the third steel plant at Durgapur. In February 1956, the work of the Mysore Iron & Steel Works was transferred to this Ministry from the Ministry of Commerce & Industry who took over the administration of the Nahan Foundries from this Ministry. Consequent on the reorganisation of the Ministries in April 1957, the Ministry of Iron & Steel became the Department of Iron & Steel in the Ministry of Steel, Mines & Fuel. With the formation of the Department of Iron & Steel, work relating to the administration of the Iron & Steel (Control) Order, imports and exports of iron and steel, establishment of the Iron & Steel Control Organisation, the steel projects in the private sector, re-rolling mills and ferro-alloy industry was transferred to this Department from the late Ministry of Heavy Industries, and with the transfer of this work, some officers of that Ministry were also transferred to the Department of Iron & Steel.

2. The management of the Rourkela Steel Project was, from the beginning, entrusted to the Hindustan Steel Limited, but in April 1957 the work relating to the setting up of the steel plants at Bhilai and Durgapur was also transferred to the Company. With the transfer of the above work, some officers including technical staff were also transferred to the Company. As a result, the Secretariat of the Department of Iron & Steel became very small and during the year 1959-60, it continued to consist of one Secretary, three Deputy Secretaries and four Under Secretaries with 16 Sections. There being no Joint Secretary in the Department, the Deputy Secretaries normally deal with Secretary and some times with the Minister. For achieving maximum efficiency in the Department, a few Sections have been organised on unconventional lines. These Sections consist of a Section Officer, an Assistant or an Upper Division Clerk and a Lower Division Clerk. In these Sections, the Section Officers are encouraged to do original work themselves.

3. There is one attached office under the control of the Department at Calcutta with two regional offices at Bombay and Madras. The head

office of the Iron and Steel Controller at Calcutta is under the charge of an Iron and Steel Controller who is responsible for the administration of the Iron & Steel (Control) Order, 1956, as amended from time to time and is also responsible for the issue of licences for the export of iron and steel and is engaged in barter deals for conserving foreign exchange and for the sale of iron and steel and steel products at uniform prices at all rail heads in the country.

4. The two subordinate offices of the Steel Control Organisation at Bombay and Madras also issue licences for the import/export of iron and steel on receipt of applications from various parties in their respective regions. These offices are responsible for the speedy clearance of iron and steel received at their respective ports.

5. With a view to ensure that industries whose raw material requirements include other materials as well as iron and steel get their licences more or less simultaneously, it has become necessary to establish a small licensing cell in Delhi. This cell will issue licences sponsored by the Development Wing of the Ministry of Commerce & Industry for the time being.

Hindustan Steel Limited:

Hindustan Steel Limited is a Company formed under the Indian Companies Act 1956, with an authorised capital of Rs. 3,000 million divided into 3 million equity shares of Rs. 1,000 each. The Company is owned entirely by the Government of India and all the shares have been subscribed by the President. In addition to purchasing all the shares, the Government of India have advanced a total loan of Rs. 1902.70 million till the end of February, 1960. A further sum of about Rs. 250 million is expected to be advanced to the Hindustan Steel Limited as loan during the month of March, 1960 to meet the expenditure on the head office, the steel plants at Rourkela, Bhilai and Durgapur, the coal washeries, preliminary work at Bokaro, etc. The head office of the Company remained in New Delhi till the 24th December 1959, but was shifted to Ranchi on the 26th December 1959. A small liaison office of the Company has been left at New Delhi for maintaining necessary liaison with the Department of Iron & Steel and other organisations in Delhi with which the Company has to deal with.

2. The President appoints all Directors including the Chairman of the Company. He has also the right to appoint General Managers and Financial Advisers and Chief Accounts Officers. There are at present eleven Directors in the Hindustan Steel Limited including the Chairman, the Resident Director of the Rourkela Steel Plant and the General Managers of the Bhilai and Durgapur Steel Plants and the General Manager of the Construction Division of the Hindustan Steel Limited.

For the disposal of day-to-day business, the Board of Directors have also set up a Committee of Management consisting of the Chairman, the Director (Engineering) and the Director (Finance).

Iron & Steel Advisory Council:

An Iron & Steel Advisory Council was constituted in November 1959 to advise Government on all matters of a general character relating to iron and steel and in particular, to problems pertaining to production, distribution, transport, research, import and export. The Council would meet at least twice a year. The composition of the Council is as follows:

- (i) Minister for Steel, Mines & Fuel—Chairman.
- (ii) Two *ex-officio* Members:
 - (a) President, Federation of Indian Chambers of Commerce & Industry, or his nominee.
 - (b) President, Association Chamber of Commerce of India, or his nominee.
- (iii) Not more than twentyone members nominated by the Government of India who are, in its opinion, capable of representing the interests of producers, consumers, the trade and mining and allied interests.
- (iv) Eight representatives of the concerned Ministries of the Government of India.
- (v) Secretary, Department of Iron & Steel.
- (vi) Iron & Steel Controller—Member-Secretary.

The Council has been constituted for a period of two years. The inaugural meeting was held on the 6th February 1960.

ROURKELA STEEL PROJECT

The Rourkela steel plant is situated at the confluence of the rivers Koel and Sankh in the Orissa State. The Project Report for a plant of 500,000 tons ingot steel capacity was drawn up by a German Combine called Indian-Gemeinschaft Krupp-Demag G.m.b.H., in pursuance of an agreement entered into with them by the Government in December 1953. In July 1955, a supplementary agreement for preparing a Project Report for a 1,000,000 ton ingot steel capacity was concluded with the Combine. The Report was received in November 1955 and was accepted by the Government in February 1956.

2. The special feature of this plant is that of the one-million tons of ingots that will be produced, three-fourths will be produced by the Linzer-Dusenstahl process. This process consists in blowing oxygen at high pressure into molten iron in special vessels called converters. Oxygen for this process is obtained from atmospheric air. This results in the release of substantial quantities of nitrogen as a by-product. This nitrogen and the hydrogen of the coke oven gases will be synthesised to produce ammonia and nitric acid. The products of this synthesis will, in turn, be combined with the limestone fines which cannot be used in the blast furnaces, to form nitro-limestone. The fertiliser plant which is being put up for the purpose will have an annual capacity of 580,000 tons of nitro-limestone.

The Rourkela plant will also produce 250,000 tons of steel per year by the conventional Open Hearth process. All the steel produced will be rolled into flat products, *vide* details below:

	Tons/Year
(i) Wide heavy plates 3/16" thick and above-maximum width 110"	170,000
Narrow heavy plates 3/16" thick and above in widths below 60"	30,000
TOTAL: heavy Plates	200,000
(ii) Hot rolled sheets and strips in widths 60" and below and in thicknesses varying from 16 gauge to 3/16"	300,000
(iii) Cold rolled sheets and strips 60" and below in thicknesses varying from 29 gauge to 12 gauge	170,000
(iv) Tinplate 30 to 34 gauge	50,000
TOTAL	720,000

3. The progress of construction during the year was satisfactory. The position at the end of December 1959 was that of the total f.o.b. equipment of 360,000 tons, all but about 2,000 tons, had been shipped. Earthwork and work on the sewers and drains, the railway system, water supply and utility pipes were practically complete. Of the total concrete of about 850,000 cbm, 669,000 cbm had been poured; the balance to be done is almost all in the rolling mills. 92% of the refractory work (total about 99,100 tons) had been completed. Likewise, of the total tonnage of steel structures, machinery and equipment to be erected, 208,000 tons had been erected. Here again, the erection yet to be done is mostly in the rolling mills. Most of the township has also been built.

The year was also important because production of iron in Rourkela commenced as early as February 1959. Production of steel in the first open hearth furnace began in April 1959, and the second in August 1959. The first L.D. steel was blown in December 1959 in which month the first slab was rolled in the blooming and slabbing mill.

4. The principle constituents of an integrated steel plant are:

- (a) Coke oven and by-product plant.
- (b) Blast furnaces and gas cleaning plant.
- (c) Steel melting shops.
- (d) Rolling mills.

(a) *Coke oven and by-product plant:*

In Rourkela, there are three coke oven batteries of seventy ovens each. The first battery was commissioned in February 1959. One sub-battery of battery No. 2 was lighted on 11th January 1960. The remaining sub-battery is expected to be completed by April 1960. The third battery will also be in operation before the end of 1960-61.

The by-product plant at Rourkela is designed to produce benzole, toluene, xylene, solvent-naphtha, phenol oil, naphthalene oil, wash oil, anthracene oil, naphthalene, crude anthracene, crude phenols and pitch. 80 per cent. of the equipment has been erected and put into operation. Work on the anthracene oil preparation plant, potash plant and benzole refining plant is progressing.

(b) *Blast furnaces:*

The Rourkela steel plant will have, when completed, three blast furnaces each producing 1,000 tons of pig iron per day. The first blast furnace was commissioned in February 1959. Although the rated capacity of the blast furnace is 1,000 tons per day, the first blast furnace has not been producing this quantity. This is mainly due to the time-lag between the dates of commissioning of the blast furnace and the steel melting

shop as a result of which the entire production of the blast furnace has had to be cast as pig iron instead of being utilised in the hot metal stage itself. The pig casting machine at Rourkela has not been able to handle all the hot metal. Consequently, the output from the first blast furnace had to be restricted.

The second blast furnace was commissioned in January 1960.

Work on the third blast furnace is progressing satisfactorily. This furnace is expected to be commissioned shortly.

(c) *Steel melting shop:*

It has already been stated that the main feature of the plant is the making of steel by the L.D. process. The steel melting shop will consist of—

- (i) Three 40-ton L.D. converters with a rated capacity of 750,000 tons of steel per year;
- (ii) Four 80-ton stationary basic open hearth furnaces with a capacity of 250,000 tons a year; and
- (iii) Two 1,100-ton mixers.

The first open hearth furnace was commissioned in April 1959 and the second in August 1959. Furnace No. 3 has been lighted. Erection of furnace No. 4 has been completed. All the three L.D. converters were commissioned in January 1960. Mixer No. 1 is also in operation.

Attached to the steel melting shop will be a lime and dolomite calcining plant and dolomite brick plant for making dolomite bricks for lining the L.D. converters. The oxygen plant with a capacity of 9,900 cbm per hour consists of three units. Out of this, two units for supply of oxygen for the L.D. plant, have been commissioned.

(d) *Rolling mills:*

The rolling mills of Rourkela will consist of a plate mill designed to produce 200,000 tons of plates with a minimum thickness of 3/16" per year, a hot strip mill with a capacity of 300,000 tons of sheets and strips, two cold reducing mills capable of rolling 220,000 tons of sheets and strips per year, and a hot dip tinning line with a capacity of 50,000 tons of tinplate per year. In addition, there will be ancillary departments like the blooming and slabbing mill, slab re-heating furnaces, soaking pits, plate annealing furnaces and plate finishing lines. With a few additions, the Rourkela plant will be able to roll about 1.8 million tons of ingot steel per year.

Power:

5. The power required for the operation of the plant will be partly generated in the plant itself and partly drawn from the Hirakud system.

3. The progress of construction during the year was satisfactory. The position at the end of December 1959 was that of the total f.o.b. equipment of 360,000 tons, all but about 2,000 tons, had been shipped. Earthwork and work on the sewers and drains, the railway system, water supply and utility pipes were practically complete. Of the total concrete of about 850,000 cbm, 669,000 cbm had been poured; the balance to be done is almost all in the rolling mills. 92% of the refractory work (total about 99,100 tons) had been completed. Likewise, of the total tonnage of steel structures, machinery and equipment to be erected, 208,000 tons had been erected. Here again, the erection yet to be done is mostly in the rolling mills. Most of the township has also been built.

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Power:

5. The power required for the operation of the plant will be partly generated in the plant itself and partly drawn from the Hirakud system.

The power plant consists of three turbo-generators of 25,000 kw. each, four boilers, four turbo-blowers and one back-pressure turbo set. The first generator was commissioned in September 1959 and was synchronised with the Hirakud system. The second generator was commissioned in January 1960. All units of the plant, except the third generator, have been commissioned. This is expected to be put into operation in March 1960.

An agreement is being entered into by Hindustan Steel Ltd. with the Orissa State for mutual exchange of surplus Power.

Water Supply:

6. Water required for the Rourkela plant is obtained from a dam which has been constructed across the river Sankh. To ensure adequate depth of water at the intake wells, a weir has also been constructed lower down across the Brahmani.

Raw Materials:

7. The Rourkela plant will require about 1.5 million tons of iron ore per year. This is to be supplied from the steel plant's own mines at Barsua about 50 miles from Rourkela. A fully mechanised ore mine capable of producing three million tons of iron ore per year, is being developed and will be ready for production by about April 1960. A small township for the mining staff is also being constructed.

Coal required for the plant will be drawn from two washeries—one at Kargali which is already in production and the other at Dugda which is under construction. Until Dugda is completed, selected unwashed coals from the Jharia area will be used.

The Rourkela plant's limestone requirements including that of the sintering plant and the fertiliser plant are estimated at 793,000 tons. Apart from a quantity of 170,000 tons of higher quality limestone required for the steel melting shop, all the other requirements will be met from the plant's own quarry at Purnapani. A mechanised mine is being set up in the area. Orders for supply of quarrying machinery, crushing plant and loading station are being placed by Hindustan Steel Ltd.

Fertiliser Plant:

8. The fertiliser plant at Rourkela is to consist of two sections—the ammonia plant with auxiliaries and the nitro-limestone plant with auxiliaries. The order for the ammonia plant and auxiliaries has been placed on M/s. Uhde of Germany at a cost of about Rs. 8.5 crores on the basis of competitive tenders. The order for the nitric acid and nitro-limestone plant has been placed on M/s. Sindri Fertilizers & Chemicals at a cost of about Rs. 8.05 crores. The fertiliser plant is expected to go into production before March 1962. When in full production, it will produce 580,000 tons of nitro-limestone per year. So far about 63 per cent. of the site preparation work has been done.

Pipe Plant:

9. To meet the immediate requirements of oil pipe lines of the country and to cater to future demands for pipes, a plant for the production of steel pipes by the electric resistance welded process is being established at Rourkela as an adjunct to the steel plant. The capacity of the pipe plant will be 8,600 to 31,000 tons per month depending on the size and specifications of pipes (8½" to 20") produced. Rourkela was selected for the location of the pipe plant as strips required for pipe manufacture could be rolled in the strip mill of the steel plant. Orders for the plant and machinery required have already been placed by Hindustan Steel Ltd. and the plant is expected to be in commission by September 1960. The plant is estimated to cost Rs. 4 crores. So far, 97 per cent. of the site formation work has been completed. Plant and equipment have started arriving and erection will begin shortly.

Transport:

10. The steel plant has its own transport system consisting of about 71 miles of rail lines and 10 miles of roads. All internal rail traffic will be handled by 24 diesel electric locomotives. So far 70 per cent. of the roads and about 85 per cent. of the railway tracks have been completed.

Township:

11. At Rourkela, a modern township is being built in accordance with a master plan which provides for the construction of 20,000 houses for a population of 100,000. The main water supply, sewerage and road communication systems are being developed in accordance with this plan. For the present, construction of houses has been limited to about 7,500. Of these, 5,381 houses had been completed by the end of December 1959; and about 2,100 houses were under construction. The township plan includes the construction of auxiliary buildings like hospitals, schools, markets, parks, etc. It is hoped that during 1960-61, the work on the township will, in all respects, be complete.

Costs:

12. The Rourkela steel plant proper is estimated to cost about Rs. 170 crores, excluding escalation. The cost of all other ancillaries including the township, the water supply system, the iron ore mines, the limestone quarries and the railway sidings, was estimated at about Rs. 44 crores. The total foreign exchange cost (including the foreign exchange required for the various ancillaries referred to) is about Rs. 133 crores. Arrangements have been made to meet part of the foreign exchange cost (upto Rs. 75 crores) from the West German credit, under which payments to German contractors are made in the form of negotiable promissory notes by the Indian High Commission in London. These promissory notes are redeemable after three years and bear an interest of 6 per cent per annum.

The progress of work so far indicates that the cost of the steel plant and ancillaries will, except for variations resulting from increased quantities in civil engineering, be according to estimates.

Production:

13. Upto 29th February 1960, 234,154 metric tons of pig iron, 50,329 metric tons of steel ingots and 12,903 metric tons of crude tar have been produced in the Rourkela plant. 130,830 tons of pig iron, 13,383 tons of steel and 6,867 tons of tar were despatched to consumers.

Personnel:

14. The project staff includes persons engaged on construction and on operation. The latest figures show that about 986 persons, of whom 491 are technicians, are engaged directly on construction. There are also about 8,600 persons borne on the work-charged establishment. Besides, there are 848 foreigners and 31,397 persons in the employ of the various contractors.

The number engaged in the operation of the plant is 5,866, of whom nearly 3,600 are technical.

The total number of graduate trainees was 268 and that of operative and trade trainees 796.

Prospects for 1960-61:

15. With the commissioning of the blooming and slabbing mill, the first stage in the processing of steel was reached. The plate mill is expected to be in operation in the second quarter of 1960-61. The strip mill, the cold rolling mill and the tinning line are expected to be completed before the end of 1960-61.

BHILAI STEEL PROJECT

During the year, significant progress was made in the construction of the Bhilai steel works. The first open hearth furnace was commissioned in October. The primary mill to convert steel ingots into blooms was commissioned in November and the billet mill to produce saleable steel sections went into operation towards the end of 1959. By the end of December, the second coke oven battery and the second blast furnace also went into production.

2. Bhilai is on the main railway line between Bombay and Calcutta, 156 miles from Nagpur. It is in the district of Drug in Madhya Pradesh. Selection of this site in Madhya Pradesh for the location of a million ton steel plant was influenced primarily by the availability of good quality iron ore in the Dhalli Rajhara hills nearby and the possibility of utilising the hitherto unexploited reserves of coal in Korba and Kanhan. Another factor was its proximity to the markets of Central and Western India.

3. The steel works will consist of three coke oven batteries each of 65 coke ovens, three blast furnaces of 1135 tons a day capacity each, six open hearth furnaces each of 250 tons capacity, a blooming mill, a continuous billet mill, a rail and structural mill, a merchant mill, a power plant of 24,000 kw. capacity and necessary ancillaries. Provision has been made in the layout for expansion of the steel works to a capacity of two million tons of finished products.

4. When completed, the plant which is now under construction, will produce 1,145,000 tons of metallurgical coke, 1,110,000 tons of iron and 1,000,000 tons of crude steel. Coke is produced to smelt iron ore to make iron. Most of the iron is for conversion into crude steel which again is to be rolled into the following saleable steel sections:-

	Tons/Year
(a) Rails, standard gauge	100,000
(b) Rails, narrow gauge	10,000
(c) Railway sleeper bars	90,000
(d) Standard and broadflanged beams, channels, angles and other light and heavy structural sections (beams with section height upto 24")	284,000
(e) Rounds from 7/8" to 3" dia. and squares with sides 7/8" to 3"	121,000
(f) Flats from 2" to 5" wide	15,000
	620,000

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(g) Billets for re-rolling at outside rolling mills from 2" x 2" to 3" x 3" cross section	
TOTAL	150,000
Pig iron	770,000
Metallurgical coke	300,000
	45,000

5. In addition, in the carbonisation of coal into coke, a number of valuable by-products like coal tar, ammonium sulphate and benzol will be released. These will be further distilled and the following commercial fractions obtained:—

Ammonium sulphate

Benzole

Toluene

Zylene

Solvent-Naptha

Phenol oil

Naphthalene oil

Absorption oil

Anthracene oil

Naphthalene

Crude Anthracene

Crude Phenols

Pitch

6. The first coke oven battery and the first blast furnace have been commissioned in the previous year. The first open hearth furnace to make steel was commissioned in October 1959. In the same month the third turbo blower was also completed. The blooming mill to roll Steel ingots into blooms went into operation in November. The sulphuric acid plant and the ammonium sulphate plant were ready in December 1959. In the same month were commissioned the second open hearth furnace, the second coke oven battery, the second blast furnace and the continuous billet mill. The refractory materials plant was brought into operation early in 1960. Work is in progress on the rail and structural mill, the merchant mill, the coal tar distillation plant, the benzol rectification plant, the four remaining open hearth furnaces, the third coke oven battery, the third blast furnace, the sintering plant and other ancillaries. It is expected that the steel works in its entirety will have been completed by the second quarter of 1961.

7. During the first eleven months of the year under review, about 445,000 tons of coke, 391,150 tons of pig iron, 70,000 tons of steel ingots, 44,250 tons of blooms, 31,050 tons of billets, 1,600 tons of sulphuric acid, 2,000 tons of ammonium sulphate and 17,000 tons of coal tar were produced. In the same period, about 337,500 tons of pig iron, 21,750 tons of billets and about 17,700 tons of ammonium sulphate and other by-products of the value of Rs. 89,123,000 were sold.

8. A mine is being developed as a part of the project to supply the steel works with iron ore from the hitherto unexploited but rich deposits of Dalli Rajhara, about 60 miles away. Similarly for the supply of limestone, mines are being developed in Nandini about 14 miles away from the steel works. The iron ore mines and limestone quarries have been designed by a team of Indian and Soviet experts. Plant and equipment has arrived at site. Civil engineering works have been mostly completed. Structural erection is in progress. It is hoped that the mechanical operation of these mines will begin towards the middle of 1960. Until then, to meet the requirements of the first two blast furnaces, iron ore and limestone are being obtained manually from the surface.

9. A township has been laid out for 7500 houses, initially, to accommodate the engineers and workers required for the operation of the million ton plant. There is provision in the layout for further houses to accommodate the additional number of engineers and workers who will be required for the expanded steel works. Of the 7500 houses to be built initially, 4805 houses have been built and occupied. The others are in various stages of construction. This is besides four Construction Camps with 4360 hutments and 1192 temporary quarters already constructed and occupied and a further 2,000 hutments and 456 temporary quarters under construction. The township has its own shopping centres, schools, hospital, dispensaries and recreational facilities. There are two hostels which can accommodate about 400 persons and a hotel with accommodation for 250 persons. The hotel which at present is occupied by Soviet and Indian construction engineers will, when the entire plant goes into production, accommodate some of the engineers, representatives of business houses, and those who would be visiting Bhilai in connection with the maintenance of the plant and commercial activities. It might be necessary at a later stage to enlarge the size of the hotel.

There are smaller townships under construction at the site of the iron ore mines and the limestone quarries. These will also have the necessary shopping and recreational facilities, hospitals and dispensaries.

10. It has been reported by the Hindustan Steel Limited that there have been increases in quantities of work over what was assumed originally in the detailed project report. Some of the increases are said to

be due to actual working conditions being different to what had been assumed and the others due to changes in design during the detailed designing of the plant and the works. The implications of this on the estimates of costs are now being examined by the Hindustan Steel Limited. It is hoped that a clearer picture of increases, if any, in costs as also an idea of the actual escalation will be available by the middle of the year.

11. *Personnel*.—There are at present over 50,000 workmen employed on the construction of the project. Of these about 34,000 work within the steel works site and others are engaged in constructing the new town of Bhilai Nagar and the mechanised mines and houses at Rajhara and Nandini. For supervision of construction, there are 678 Soviet experts, 505 Indian engineers and a number of foremen and supervisors. While civil engineering works are being undertaken largely through construction firms in the country, it has been necessary to undertake the erection of structural steel work and installation of plant and machinery mostly through a departmental organisation which had to be built from the scratch. This erection force which accounts for nearly 24,000 of the 34,000 construction workers in Bhilai proper will have to be dismantled during the course of the year as construction tapers off.

For the operation of the steel plant and the ore mines and quarries, about 180 Soviet experts, 900 Indian engineers and supervisors, 520 skilled and semi-skilled workers and about 300 non-industrial workers are either in position or under training in various centres. Of 686 engineers and technicians who were to be trained in the Soviet Union, 600 have returned after training and are now engaged in the operation of the steel works. 62 are now in the Soviet Union. The rest are about to leave for the Soviet Union.

DURGAPUR STEEL PROJECT

The integrated steelworks at Durgapur in the Burdwan District of West Bengal have been designed, like the plants at Rourkela and Bhilai, to produce one million tons of ingot steel. The plant will also produce 350,000 tons of pig iron for foundry industry.

The progress of work at Durgapur during the year continued to be satisfactory and the first stage was almost completed when the President inaugurated production at Durgapur on the 29th December, 1959.

2. The main units of the plant consist of three coke oven batteries, three blast furnaces, 8 open hearth furnaces, five rolling mills and a wheel and axle plant.

3. The coke ovens section will have a coal handling, stocking and blending plant, a coal washing plant, three coke oven batteries and a by-product plant. The coal washing plant will have a capacity of 360 tons per hour. The coke ovens will consist of three batteries, each consisting of 78 ovens. The plant will produce daily approximately 3,900 tons of coke from 5,200 tons of dry coal. The gas evolved from the coal during its carbonisation will be treated in the by-product plant, and in the tar distillation plant. There is also sulphuric acid plant with a capacity of 60 tons a day required for the manufacture of ammonium sulphate. The following by-products will be available for sale:

- (i) Ammonium Sulphate.
- (ii) Benzene.
- (iii) Toluene.
- (iv) Xylene.
- (v) Solvent Naphtha.
- (vi) Naphthalene.
- (vii) Road tars, and
- (viii) Wood preserving creosote.

The progress in the coke ovens section remained satisfactory and the first coke oven battery was lighted on the 24th August, 1959. The first phase of the coal handling and blending plant has been completed. Work on coke oven batteries No. 2 and No. 3 is progressing more or less according to schedule. In the by-product side, the sulphuric acid plant has already been completed. Work is continuing in other plants, like ammonium sulphate plant, crude benzol plant, biological oxidation, tar distillation plant and naphthalene plant. The coal washery plant is almost complete and testing of electrical and mechanical sections is in progress.

The coal washery would be ready by the middle of March, 1960. The coke oven gas holder of 2 million ton capacity is complete and is under test.

By the middle of February 1960, about 57,000 tons of coke, 2,400 tons of crude tar and 125 tons of sulphuric acid had been produced at Durgapur.

4. The three blast furnaces are each capable of producing approximately 1,250 tons of iron per day. It is estimated that the daily requirements of iron ore, when all the three blast furnaces will be in operation, will be 6,500 tons. To prepare this ore for being fed into the furnaces, an ore stocking and blending plant has been provided. There are separate facilities for handling limestone. The furnaces are designed for high top pressure operation. The liquid iron from each furnace will be tapped into 80-tons hot metal ladles for transfer to the steel plant or the pig casting machines. The requirements of the steel plant will be normally satisfied by two blast furnaces producing basic pig iron. The third furnace will produce foundry iron. Two double strand pig casting machines and a pig stocking gantry are also provided for handling foundry iron and surplus basic iron for stock or sale.

Production of pig iron started in the first blast furnace in the last week of December 1959. The second blast furnace is expected to be ready in May, 1960. The concreting work on No. 2 furnace has been completed except for the hoist house which is in progress. The gas cleaning plant has been completed and is in operation for stage I with four sets of electrostatic precipitators. The first blast furnace produced about 47,000 tons of iron up to the end of February, 1960. It has been giving satisfactory service and production reached over 1,200 tons a day on a number of days and even touched the 1300 mark. Pig casting machine No. 1 is already in operation and civil work on the second pig casting machine is almost complete and erection work has started. Foundation work on the third blast furnace is also complete.

5. The steel making plant consists of two mixers with a capacity of 800 tons each, desiliconising arrangements, 7 open hearth furnaces each having a capacity of 200 tons and one with a capacity of 100 tons. The total capacity of the steel plant is approximately one million tons of ingots per annum.

85 per cent of the total structural steelwork is complete. Erection work on second and third mixers is about 90 per cent complete. One open hearth furnace is expected to be ready in March, another in April, and the third in May, 1960.

6. The rolling mills will consist of the following main units:

- (i) One 42" primary blooming mill,

- (ii) One 32" intermediate mill,
- (iii) One continuous billet mill,
- (iv) One 24" medium section mill,
- (v) One continuous merchant mill,
- (vi) A sleeper plant, and
- (vii) A wheel and axle plant.

These mills will produce the following marketable products from the one million tons of ingot steel:

	Tons year
(a) Heavy forging blooms	10,000
(b) Forging blooms	30,000
(c) Forging billets	60,000
(d) Billets for re-rolling industry	150,000
(e) Merchant bar sections	240,000
(f) Light and medium sections	200,000
(g) Sleepers	60,000
(h) Wheels and axles	50,000
	<hr/> 800,000

In addition, the Durgapur plant will produce 350,000 tons of pig iron for sale every year.

Work in the rolling mills is going on according to schedule. In the soaking pits, erection of all furnaces, two charging cranes and one cover carriage is complete. The civil and structural works in the 42" and 32" blooming mills are virtually complete. Installation work in the motor room and mill is progressing well. The roll turning shop is also complete.

7. *Power Supply.*—The Damodar Valley Corporation which is putting up a thermal station of 150,000 Kw capacity near the steelworks, will be the main source of supply. This thermal station is designed to burn in part middlings and surplus gases from the steelworks. A minimum unfailing supply of electrical power is also necessary at the steelworks to maintain essential services. Therefore 15,000 Kw of power will in addition be generated in the power plant within the steelworks.

Arrangements have been completed by the DVC to supply thermal power to the Durgapur Steel Plant, and at present power is being supplied by the DVC from the grid through the permanent connections. As

far as power within the plant is concerned, all civil works have been virtually completed. Two turbo alternators and two turbo blowers have been completed and have been in operation. Erection work on No. 3 turbo alternator and No. 3 turbo blower is in progress. Erection of No. 3 and 4 turbo boilers is also in progress. Cooling tower No. 3 is almost complete.

8. *Water Supply.*—Water will be drawn from the river Damodar. With the large DVC thermal station being built adjacent to the Works, a common water supply from the Durgapur barrage has been arranged both for the thermal station and for the steel plant. The construction of a canal with the necessary headworks has been taken up by the Damodar Valley Corporation and the cost will be shared between the DVC and the Hindustan Steel Ltd. Water from the canal will be pumped into a reservoir which has been built by the Hindustan Steel Limited. The steelworks will draw water from this reservoir. The water supply scheme for supply of water to the steel plant consisting of water supply canal reservoir and Pump House, Works Pump House and internal pipe laying has been completed and is working well.

9. In February, 1959, it was noticed that the piling work done in certain areas was not satisfactory. Detailed investigations were made all over the site and remedial measures, where necessary, were taken. The contractors—the Indian Steelworks Construction Co.—have carried out the remedial measures at their own cost and have given a 10-year guarantee to rectify any damage due to possible settlement of piled foundations.

10. *Raw materials.*—The Durgapur Steel Plant will require about two million tons of iron ore, 1.8 million tons of coal and 660,000 tons of limestone and dolomite every year. To supply iron ore a new mine is being developed at Bolani in the Gua region of Orissa. The deposits in this area are extensive and rich. To mechanise and work these mines, a Company called Bolani Ores (Private) Limited, has been formed in which the Government of India have a share of 50.5% and the balance 49.5% share is owned by the Orissa Minerals Development Company, which until recently held the lease of the area and had undertaken preliminary investigations.

At Bolani mines installation of machinery is proceeding satisfactorily. The new Pomposh railway siding connecting the Bolani mines to the main line has been completed. Work on the crushing and screening plant and the reclamation plant is going on steadily. Construction of the electricity line to Bolani is also in progress. The power supply of 250 KVA has been made available to the mines by the Orissa Electricity Board and this will be raised to 1200 KVA shortly. Iron ore is now being raised manually at the rate of more than 40,000 tons a month and about 2 lakh tons of ore has been accumulated at the site of the railhead. The

loading and despatch of iron ore to Durgapur will start any day as soon as certain formalities have been completed with the Orissa State Government. The present supply of Iron Ore to the steel-works is being made by the S.T.C.

For the Durgapur Steel Plant metallurgical coal at Jharia will be blended with the higher volatile semi-coking coals of Barakar. The present programme is that 45 per cent of Jharia coal will be blended with 35 per cent of Laikdih and 20 per cent of Dishergarh coal.

Limestone and dolomite will initially be obtained from the Birmitra-pur-Hathibari region which will also supply Rourkela. This source may not be able to supply full requirements of both the steel plants when they are expanded. Other sources of limestone are, therefore, being investigated. The Geological Survey of India are conducting investigations in the Shahabad district of Bihar and preliminary results have been fairly encouraging.

As in the case of Rourkela and Bhilai, manganese ore, ferro alloys and other materials will be obtained from the market.

Up to the middle of February 1960 the Project had received about 142,000 tons of coal, 100,000 tons of iron ore, 45,000 tons of limestone, 6,000 tons of manganese ore and 1500 tons of high grade iron ore.

11. *Township.*—A township to house the workers of the steel plant is being developed near the main steelworks. The layout of the water supply, sewerage and other services has been designed for a township with about 20,000 houses to accommodate 100,000 people. Initially, the township will have its own hospital, shopping centre, schools, dispensaries, and recreational facilities along with accommodation for about 7,500 employees of the Durgapur Steel Project required for the initial stage of the plant. Further construction of residential houses will be taken up when the plant is expanded. Water will come from the river Damodar.

Over 3,000 residential houses have been constructed and about 2,400 are under various stages of construction. One hospital, 6 hostels, a market building and a high school have also been completed. Besides, 4 hostels and one market are under construction. Well surfaced roads have been laid and transport facilities have been provided for the residents of the townships. Water supply, sewerage and electric connections have already been given to over 3,600, 2,200 and 2,800 houses respectively.

12. *Cost.*—The Durgapur Steel Plant proper was estimated to cost Rs. 1380 million, including the township fees to Consultants and other ancillaries. The total cost of the Project was about Rs. 1670 million excluding escalations, and of this, the total foreign exchange element was likely to be about Rs. 950 million. It has been reported by the Hindustan Steel that there have been increases in quantity of work particularly

in the railway track and civil engineering works. The implications of the increased works and various working conditions on the estimates of costs are under the examination of the Hindustan Steel Ltd. at present. It is hoped that a clearer picture of the estimates of the steel plant, township, escalations, etc. will be available some time in the middle of 1960.

13. *Personnel*.—The number of people working on the Project including township which was about 27,000 at the end of 1958 rose to about 41,000 at the end of 1959. At present there are 55 non-technical officers, about 650 engineers, graduate apprentices, etc. over 200 technical supervisory staff, over 1100 operatives and skilled workers, over 2000 semi-skilled and unskilled workers, and about 900 clerical and non-technical staff employed on project work. Besides, over 30,000 contractors' labour is working on plant site and about 6000 in the township.

About 100 technical officers are now engaged on the operation of the steel plant, but owing to dearth of experienced steel men within the country, Hindustan Steel had to depend on foreign experts with adequate experience for the operation of the various units of the plant in the initial stages. It is estimated that about 75 foreign technicians would be required to operate the plant initially. With the assistance of the U.K. Government and the British Iron & Steel Federation a number of technicians have been recruited from the U.K. and 54 British technicians have already joined the plant. The contractors have also employed 300 British technicians on the construction of the plant and the Consulting Engineers have employed 10 foreigners on their staff.

14. *Production*.—Production of iron started in the end of December 1959 and till February, over 47,000 tons of pig iron was produced in the Durgapur Steel Plant. The first coke oven battery was lighted up earlier and over 56,000 tons of coke, 2,400 tons of crude tar, and 125 tons of sulphuric acid were produced by the middle of February 1960.

15. The prospects for 1960-61 are that by May, 1960, the second blast furnace, the second coke oven battery, the greater part of the by-product plant, the coal washery, the lime and dolomite plant, three open hearth furnaces, the mixers and desiliconising plant, the blooming mill, the intermediate mill, billet mill and the sleeper plant will be ready for operation. During the year, the re-rollers will obtain significant quantities of billets from the Durgapur Steelworks.

RECRUITMENT AND TRAINING

For the three steel plants at Rourkela, Bhilai and Durgapur, the estimated requirement of technical personnel is about 2,000 engineers and 19,000 operatives and skilled workers.

2. The recruitment and training of personnel required for the construction as well as operation of the plant has been no easy task, as it was not possible to draw the required number of experienced men from the existing iron and steel industry. In the country scope was very limited as both the major steelworks in the private sector were themselves engaged on a massive programme of expansion. Reliance had therefore to be placed mainly on picking up new men and training them. Until the 1st April 1957 when the Bhilai and Durgapur projects were directly under the Ministry of Iron & Steel, recruitment of engineers was made through the Union Public Service Commission. The Hindustan Steel recruited the personnel required for the Rourkela Steel Plant. After the transfer of the Durgapur and Bhilai projects to the Hindustan Steel, the company has undertaken the recruitment for all personnel required for the steel plants. Applications are generally invited by advertisement and through employment exchanges and selection is made by a selection board of the Company in which experts from outside are also associated. Two selection committees in London and Washington have also been selecting Indian engineers in the U.K., the Continent and the United States. About 1700 engineers had been recruited by the end of last year. During the current year, the process of recruitment of construction, erection, operation and maintenance engineers continued. Over 2000 graduate engineers were interviewed and 387 graduate apprentices and 214 engineers were selected by the Hindustan Steel. Besides engineers, persons were also recruited as Information Assistants, Assistant Medical Officers, Architects and town planners, public relations officers, sales and purchase officers, welfare officers, statistical officers, etc.

3. A departmental examination for recruitment of non-technical graduate apprentices who will be trained as officers for manning the non-technical services in the Hindustan Steel was held in January, 1960. Over 2000 graduates took the written test and over 100 people are proposed to be selected after they are interviewed.

4. Certain highly skilled categories of operatives were initially selected by the Hindustan Steel centrally so as to avoid competition. Recruitment of the skilled workers and others is done by each of the projects separately. A large number of skilled workers employed on construction work

will be transferred to the operation side as and when various units go into commission.

5. There has been an acute shortage of experienced technical men, particularly to man the senior operational posts in the new steel plants. Hindustan Steel have obtained about 85 experienced officers from the private sector, but still a large gap has to be filled in and till such time as our officers mature, many of the senior posts will have to be manned by experts from foreign countries. Arrangements have been made for securing the services of these experts from various countries.

6. Association in the construction of the plant will help in training engineers and workers required for maintenance of the plant later. On the other hand, for the operation of the plant, as distinct from maintenance, engineers and skilled workers have to be trained in steel works. The Tata Iron & Steel Works, the Indian Iron & Steel Co. and Mysore Iron & Steel Works have been cooperating by making available facilities for training. It has, however, been necessary to send a large number of engineers and highly skilled workers abroad to acquire further skill and experience. Training has been so arranged that the engineers and operatives required for each section will be ready to take over as that section is commissioned, but if there is a time lag, they are also utilised in construction work. Before the engineers are sent abroad, they are given an orientation course at Jamshedpur.

7. The programme of training 2000 engineers in the steelworks in the USA, USSR, U.K., West Germany and Australia has already made considerable headway. So far, 1080 engineers have been sent abroad for training of whom 851 have already completed their training and returned to the steel plants. The details of training abroad are as follows:—

	Engineers		Operatives	
	Sent	Returned	Sent	Returned
U.S.A.	387	295	4	..
U.S.S.R.	328*	285*	355	336
U.K.	200	135	15	..
West Germany	119	107	2	2
Australia	45	28	7	..
Canada	1	1	..	..
	1080	851	383	338

*Includes 21 officers sent to/returned from U.S.S.R.

The U.K. Government have now agreed to raise the total number of engineers and operatives to be trained for the Durgapur Steel Plant under the Colombo Plan from 300 to 350 and this programme will continue during the year 1960-61.

Arrangements have also been made to send 300 engineers to the USA under the joint auspices of the Ford Foundation and the U.S. Technical Cooperation Mission during the years 1959-61. A group of 100 engineers was to leave for USA in September 1959 but their departure had to be postponed till the middle of February 1960 owing to the steel strike in that country.

In terms of the contract signed in 1956, the Government of the USSR agreed to train 686 engineers and operatives in the USSR. These facilities have almost been utilised.

24 engineers are at present undergoing training in Australia and will complete their training by May 1960. The Australian authorities have agreed to take another batch of 20 engineers during 1960 under the Colombo Plan.

To meet the requirements of the plate mill and the roll turning shop, 19 engineers are expected to be sent to West Germany very soon. The U.N.T.A.B. has also offered fellowships for the training of 10 engineers in West Germany and 42 in the U.S.S.R.

8. Arrangements have been made with the Tata Iron and Steel Works to train 450 operatives per year. For the training of skilled workers, arrangements had been made with 75 engineers where half-baked men from the training centres run by the Directorate General of Resettlement and Employment had been given on-the-job training. This programme was introduced as a temporary measure to meet our large initial requirements of trained technicians for Rourkela and Bhilai. Now that these two plants have gone into operation, it has been possible to provide extra training facilities there. Training programme is now being provided in 25 large engineering works where specialised types of facilities which fit into the requirements of our steel plants, are available. But the core of training is being provided at Rourkela and Bhilai. Training facilities have been created for 300 skilled workers at Rourkela and for 500 at Bhilai in various mechanical and electrical trades. Arrangements are also being made to create these facilities at Durgapur as well. At present, the technical institute at Bhilai is training over 300 operatives, 320 skilled workers and 50 artisans. Besides, training is also being given to 6 graduate apprentices and 30 skilled workers of the Durgapur Steel Plant and 172 graduate apprentices are receiving in-plant training after completion of their training in various countries. At Rourkela also, 186 graduate apprentices are getting in-plant training besides 270 operatives and over 470 skilled workers who are on regular training.

COAL WASHERIES

With the limited reserves of metallurgical coals, two measures of conservation have been adopted—(i) to wash all metallurgical coals so as to lower the ash content and thereby enrich the coals and (ii) to use a blend of weakly coking or semi-coking coals—of Bokaro, Barakar and Korba—with fully coking coals—of Jharia. The new steel plants in Rourkela, Bhilai and Durgapur are all designed to use a blend of coals. The existing steel plants in Jamshedpur and Burnpur, who have been largely using only Jharia coals, also propose to use a relatively small proportion of the coals of Bokaro and Barakar.

2. The requirements of washed coals for the three new steel plants in the public sector and the expanded steel plants in the private sector are estimated at 8.27 million tons per annum, the breakup of which is as follows:—

	(in million tons)
Rourkela	1.6
Bhilai	1.8
Durgapur	0.8
Jamshedpur	2.47
Burnpur	1.60
TOTAL	8.27

3. There are at present three washeries, two in the management of the Tata Iron & Steel Works and one supplying washed coal to the Indian Iron & Steel Works which with certain improvements are to supply 1.72 million tons of washed coal. The new 500 ton washery, which has been set up by the National Coal Development Corporation at Kargali, will supply 1.1 million tons to Rourkela and 0.5 million tons to Bhilai.

4. In the contract for the steel plant at Durgapur is included a washery to supply 0.8 million tons of washed coals to that steel plant. For the balance—about 4.15 million tons—three washeries are proposed to be put up—one in Dugda, another in Bhojudih and a third in Patherdih. Generally, it is the intention that the washery at Dugda would supply washed Jharia coals to Bhilai and Rourkela, the washery in Bhojudih to the Tata Iron & Steel Works and that in Patherdih to the Indian Iron & Steel Works.

5. Construction and management of these three washeries has been entrusted to the Hindustan Steel Limited. Indian coals are particularly difficult to wash as the ash in the coals occurs throughout the body. Coals generally of other steel making countries have ash in layers. Depending not only on the content of ash but also on the particular manner in which it is ingrained in the coal, washeries have to be designed. The processes to be employed will vary; so will the size of the washing units.

6. Washeries are designed to wash specific coals. It is therefore necessary, before deciding the location, size and specifications of a washery, to know which particular coals are to be washed in that washery. Thereafter the characteristics of the coals have to be studied in a series of experiments to be able to draw up the specifications.

7. As soon as the decision about the three steel plants in Rourkela, Bhilai and Durgapur was taken, planning of the supplies of the limited metallurgical coals of Jharia was taken in hand. Keeping the output of each of the collieries, the general characteristics of the coals of these and the convenience of railway movement in mind, a plan was drawn up in consultation with the Railways, the Coal Controller, the steel plants and the Fuel Research Institute. Simultaneously the Fuel Research Institute engaged itself in a variety of experiments and tests to determine the characteristics of the coals. With well over a hundred different collieries, hundreds of tests have to be carried out to select suitable coals and to draw up specifications for the washeries. As the new steel plants in Rourkela, Bhilai and Durgapur were drawing on comparatively new sources and were, for reasons of conservation of metallurgical coals, adopting a blend of different coals, the planning of the washeries to wash coals for these plants had to have priority over the planning of washeries for coals to be supplied to the existing steel plants. The existing steel plants had a few small washeries already washing coals for them. They had also considerable experience of the coals and had, in the ultimate plan of supplies, been left with the major part of their existing sources of supply.

8. The Dugda washery for which the plant and equipment will come from the U.S.A. is estimated to cost about Rs. 45 million of which the foreign exchange component will be about Rs. 27 million. In addition, there will be expenditure on a marshalling yard and a township. It is proposed to utilise the credit extended by the Export-Import Bank of the U.S.A. to the tune of Rs. 27 million (\$ 6 million) to finance the foreign exchange cost of the washery. The railway works are practically completed. The civil works are in progress and plant and machinery has begun to arrive. It is expected that the washery will be ready for operation from the beginning of 1961.

9. The Bhojudih washery will be located in Purulia district of West Bengal. It will have a capacity of 250 tons per hour. About 1.2 million tons of raw coal will be fed into the washery to produce about 0.9 million tons of washed coal per annum. The cost of the washery is expected to be Rs. 2 crores. In addition, there would be expenditure on a marshalling yard and a township. The washery is expected to be completed by the end of 1961.

10. While Indian coals are generally very difficult to wash—as ash is intimately mixed throughout the body of the coals and presents problems of separation—the characteristics of the coals to be washed in Patherdih present even a greater problem. The Fuel Research Institute has, after prolonged and sustained experiments, been successful in preparing a plan for the washing of these difficult coals. The specifications were received in February, 1959. Since then the Hindustan Steel Limited, which had been engaged in consultation with the Coal Controller and the Railways in finalising the sources of supply of coals, the movement of these coals, the location of the washery and the technical specifications for the complex as a whole, has invited tenders. Because of the experience on previous occasions, six months have been given to the prospective tenderers to quote. Tenders are expected to be received by May, 1960. Proceedings to acquire land have been initiated and planning of the construction of colony, supply of water and other preliminary work have been taken in hand.

11. The Patherdih washery will be located in Dhanbad district of Bihar. It will have a capacity of 400 tons per hour. About 1.8 million tons of raw coal will be fed into the washery to produce about 1.3 million tons of washed coal per annum. The washery will treat only those of the coals passing through the Patherdih Yard, which are economically washable. The washery is expected to yield approximately 73% of washed coal and ash in the washed coal will be about 15.6%. The cost of the washery is expected to be about Rs. 4 crores. In addition, there would be expenditure on a marshalling yard and a township. The washery is expected to be completed some time in 1961-62.

12. It has been recognised that until the new washeries come into production one by one the steel plants would have to use selected unwashed coals to supplement the supplies of washed coals. As the new blast furnaces were themselves to go into production one after the other over a period of two or three years, the strain on the limited availability of selected washed coals was not expected to be very great. Preparation of specifications and finalisation of arrangements for the new washeries have taken somewhat longer than expected owing to the varied and difficult nature of the coals. Delays in effecting improvements to the washeries of the Tata Iron & Steel Works has increased the strain on the limited supplies of selected grades of unwashed coals to the various steel works.

ALLOY AND SPECIAL STEELS PLANT

The present annual demand for special steels which include alloy steels, tool steels and die steels is about 30,000 tons. The Tata Iron & Steel Co., the Ordnance Factories and some of the electric furnace owners are manufacturing some varieties of special steels for making tools, agricultural implements and springs. Since the demand for tool, alloy and special steels cannot be entirely met from current domestic production, these steels are permitted to be imported under the Import Policy. The production and import of special steels in the country during the last three years were as shown below:

Indigenous production		Imports
1956	1977 tons	29,493 tons
1957	1960 tons	25,076 tons
1958	3301 tons	26,013 tons

2. Unlike ordinary steels produced by conventional processes in large integrated iron and steel works, alloy and special steels require specialised equipment and processes. A number of these—called low-grade alloy steels—can be produced with relatively simpler equipment and processes. For the manufacture of these, there is already some capacity in the country and some more electric furnaces and connected equipment has been allowed to be put up at a number of places to further augment the production of these steels.

3. It is for the manufacture of high grade alloy and special steels, required in small quantities for specific purposes, that a separate plant is proposed to be put up in the public sector. The processes employed in the manufacture of these had been developed only in a few countries and are not generally as well known as those for the manufacture of other kinds of steels. For the rapid development of the production of these steels, it is necessary to acquire the 'know-how' and manufacturing techniques from firms which have specialised in such processes and have had experience. Four countries had shown interest in assisting India in the manufacture of such steels—the United Kingdom, France, Italy and Poland. Based on preliminary reports from some of these countries and on an assessment of the likely demand for such steels broad specifications were drawn up on the basis of which quotations could be obtained, primarily,

for the 'know-how'. As plant and equipment and processes employed are closely related to the 'know-how', it is necessary to associate from the beginning the supplier of 'know-how' with the design and subsequent construction of the plant. With this in view, quotations were obtained for (i) a detailed project report; (ii) engineering services during construction, and (iii) 'know-how', from the four firms who had shown interest. Invitations were also sent to Austria, Sweden and Germany who are known to have a highly developed alloy and special steel industry, but there was no response from those three countries. Initially two foreign firms—French and British—were selected for the preparation of the detailed project report. Later, however, with a view to encourage Indian talent and resources the possibility of entrusting the work to an Indian firm was explored and an Indian firm of Consulting Engineers has now been selected for the preparation of the detailed project report and the subsequent detailed designing of the plant—services generally provided by the Consulting Engineers. After the detailed project report is submitted by the firm and scrutinised by Government tenders will be called for the supply of plant and machinery. The Consulting Engineers will indicate in the detailed project report what 'specialised knowledge and skill' is required for the manufacture of the various grades of special steels and how such 'specialised knowledge and skill' will be provided. Arrangements for securing each 'specialised knowledge and skill' from abroad, to the extent necessary, will be made after receipt of the detailed project report.

4. Originally it was planned to have a plant to produce about 40,000 tons of ingots for the approximate quantities of finished products given below, with provision in the layout for rapid expansion to 80,000 tons of ingots:

	Annual Capacity
(i) Alloy steels for various purposes	15,000 tons
(ii) Tool steels, including 'high-speed' steels	2,500 tons
(iii) Stainless steel in the form of sheets and plates	10,000 tons
TOTAL	27,500 tons

However, as the demand for special steels is growing rapidly and it may be necessary to have a larger plant, provision has been made, in the agreement with the Consulting Engineers, for an alternative scheme for a works with an initial output capacity of 80,000 tons of ingots a year calculated to yield 50,000 tons of saleable finished products and capable of rapid expansion to 160,000 tons of ingots a year calculated to yield 100,000 tons of saleable finished products and with scope for further expansion to 300,000 tons of ingots per year to yield the necessary saleable finished products.

The Agreement with the firm, which was signed on the 22nd December 1959 provides for the payment of a total sum of Rs. 5,960,000 to the firm for the preparation of the detailed project report as well as for providing the Consulting Services for the plant designed to produce initially 40,000 tons of ingots and at least 25,000 tons of saleable finished products. In case the Government accepts the detailed project report for the larger works and proceeds to put up the plant with an initial capacity of 80,000 tons of ingots a year calculated to yield 50,000 tons of saleable finished products capable of expansion to 300,000 tons of ingots and the necessary saleable finished products the payment to the Consulting Engineers shall be increased to Rs. 8,900,000.

5. In the specifications a chart of properties of the nickel-free stainless steel developed by the National Metallurgical Laboratory has been given and it has been stipulated that the rolling mills should be capable of producing this steel should it be decided, at a later stage, to produce this steel.

6. The detailed project report is expected to be received, by July 1960. It is difficult, until the detailed project report is received, to say with any degree of accuracy, what time would be taken for the plant to be constructed and how long it would take for Indian engineers and workers to be fully trained. But a realistic assumption would be that construction would take about 30 to 36 months.

7. The location of the plant will be decided after examining the detailed project report. The Consulting Engineers are to examine the suitability of the sites at Bhadravati, Rourkela, Bhilai and Durgapur and make recommendations on their relative merits.

8. The Tata Iron & Steel Works have also submitted a scheme for setting up an alloy and tool steels plant with an initial capacity of 100,000 tons of ingots or 60,000 tons of finished steel per year. According to their scheme, the plant is to be located near their main works at Jamshedpur from where clean scrap will be readily available without much transport difficulty and cost. They propose to set up the plant in collaboration with a well-known manufacturer of alloy and tool steels abroad. It is ultimately decided that there is scope for additional capacity, over and above that of the plant to be put up in the public sector, the proposal of Tatas will be considered along with others.

TATAS, INDIAN IRON & MYSORE.

The target of 6 million tons of ingot steel set for the Second Plan was to be shared equally by the private and the public sectors. At the beginning of the Plan period, the three integrated steel works were the Tata Iron & Steel Co., Jamshedpur, the Indian Iron & Steel Co., Burnpur, and the Mysore Iron & Steel Works, Bhadravati. These three Works produced about 1.6–1.7 million tons of ingots. All the three were to expand during the Plan period.

Tata Iron & Steel Co.

2. Of the three plants, the Tata plant is the oldest. It is situated at Jamshedpur, 156 miles from Calcutta on the main Calcutta-Bombay line. The plant produced its first iron in 1911 and its first steel in 1912. It was gradually built up. By 1939, it had a capacity of about a million tons of ingots, but by the end of the Second World War, production had dropped by nearly 100,000 tons. Owing to the old age of the plant, it became necessary to modernise the plant. The two expansion programmes undertaken by the Company—the Modernisation and Expansion Scheme of 1952 and the Two-Million-Ton Programme of 1955—are designed not only to modernise the plant but to double its capacity of a million tons of ingots.

3. The first stage, the Modernisation and Expansion Programme of 1952, sought to raise the capacity of the plant from 750,000 tons of finished steel a year to 931,000 tons by 1958. At the time this expansion was undertaken, the Company had five blast furnaces with an annual capacity of about 1.2 million tons of iron and the necessary coke ovens; and three steel melting shops. The rolling mills consisted of a 40" blooming mill and a continuous sheet bar billet mill, a rail and structural mill, a plate mill, sheet mills, a merchant mill, three bar mills, a sleeper plant and a wheel, tyre and axle plant. The programme undertaken in 1952 included the installation of a new coke oven battery, re-modelling of the steel melting shop No. 3, improvements to the blooming mill, soaking pits, plate mill and calcining plant, the installation of a new skelp mill and expansion of the steam and power supply. The scheme has been completed.

4. The second expansion scheme of Tatas, which was undertaken as part of the Second Five Year Plan, consists of two parts. The first is generally known as the Two-Million-Ton Programme (TMP). It includes the construction of a new coke oven battery and expansion of

the existing batteries, expansion of the boiler and power house and installation of two new boilers, installation of a new crushing plant, a new sintering plant, construction of a new blast furnace, expansion of the steel melting shop No. 3 by the addition of two 100-ton open hearth furnaces and a 132-ton converter, a new 46" blooming mill, a new sheet bar and billet mill, a new medium and light structural, and a new roll shop. This programme was undertaken in collaboration with an American firm, Kaiser Engineering Corporation, and was originally due for completion by the 31st May 1958. There has been however some delay and the scheme was completed only during 1959-60, except the merchant mill.

5. The second part of the 1955 expansion includes modernisation of the steel melting shops, calcining plant, the old sheet bar billet mill, the old rail and structural mill, the old merchant mill, construction of an ingot mould foundry and the development of the collieries and mines. These items of work are nearly complete.

6. As part of their expansion programme, Tatas have also undertaken some ancillary works. These consist of a new ferro-manganese plant at Joda with a capacity of 30,000 tons a year, a new refractory plant at Belpahar in collaboration with Didier International, a ferro-sulphate-washing plant and a plant for the recovery of scrap from slag by the Hackett process. By the Hackett process, slag from the open hearth furnaces and the converters is transported in slag pots to the Hackett area and dumped into pits. The slag is cooled by water spray in the pits and then lanced by oxygen flame or broken by a ball with a magnet crane. These items are now complete.

7. The Tata expansion programme was originally scheduled to be completed by the middle of 1958. Owing to various factors, some not entirely within the Company's control, it was delayed by about an year. As a result, production showed a real increase only from early 1959. Even so, owing to the absence of the finishing mills, there was a larger quantity of semis. In the following statement, an attempt has been made to compare the estimates made in 1955 and the actual production:

compare the estimates										(in 000's tons)	
										1955 Estimates	Actuals
1955-56	.	.	.	.	.	.	.	.	.	780	800
1956-57	.	.	.	.	.	.	.	.	.	800	799
1957-58	.	.	.	.	.	.	.	.	.	900	789
1958-59	.	.	.	.	.	.	.	.	.	1200	885
1959-60	.	.	.	.	.	.	.	.	.	1500	881
											(till the end of December 1959)

Mysore Iron & Steel Works:

11. The Mysore Iron & Steel Works, Bhadravati, set up in 1923, was planned to manufacture wood-distillation chemical products and had then a small blast furnace to consume its charcoal output for making iron from local ore. When the imported chemicals made wood-distillation unprofitable, the plant was taken over to the production of iron and steel. It had by 1936 adequate facilities to roll about 25,000 tons of steel products and make 8,000 tons of cast iron pipes. In 1938, a cement unit was added to the plant. In 1942, a ferro-silicon plant was set up. Even so, owing to the high raw materials assembly cost, the limited supply of charcoal and its uneconomic size, the plant faced difficulties. From 1946 onwards, efforts were made to correct the situation by enlarging the plant's capacity. To avoid dependence on charcoal two electric pig iron furnaces were set up, an additional kiln was added to the cement unit and the ferro-silicon capacity increased. These were included in the First Five Year Plan programme. The plant today consists of a small conventional 80-ton blast furnace and two electric furnaces with a rated daily capacity of 100 tons each for iron making; two 25-ton open hearth furnaces; a 20 $\frac{1}{2}$ -roughing mill; a 20-12" mill to roll rounds, squares, flats and small angles; and a rod and strip mill operating on purchased billets. The Works' present annual capacity is about 30,000 tons. Besides, Bhadravati has an iron foundry where castings for maintenance, pipes and sleepers are made; a steel foundry; and furnaces to make both ferro-manganese and ferro-silicon. (Incidentally, of ferro-silicon, Bhadravati is the only producer). Besides, Bhadravati also has a small structural fabrication shop and a fire brick and refractories plant. The cement unit has now a rated daily capacity of 260 tons.

12. The production of steel at Bhadravati would be more economic if steel making and rolling facilities could be installed to use the 100,000 tons of pig iron they make. It was with this end in view that in 1955 a firm of technical consultants undertook a technical study of the plant. They recommended the installation of adequate steel making and rolling facilities. The programmes included in Mysore's Second Plan were:

- (a) The completion of the cast iron spun pipe plant with a capacity of 15,000 tons.
- (b) The setting up of a sintering plant.
- (c) The expansion of the ferro-silicon plant from 5,000 tons to 20,000 tons a year.
- (d) The installation of steel making facilities and a billet and light structural mill.
- (e) Extensions to electric supply and tramways.

										(in 000's tons)	
										1955 Estimates	Actuals
1955-56	.	.	.	.	.	.	.	.	.	330	453
1956-57	.	.	.	.	.	.	.	.	.	300	444
1957-58	.	.	.	.	.	.	.	.	.	375	412
1958-59	.	.	.	.	.	.	.	.	.	520	497
1959-60	.	.	.	.	.	.	.	.	.	640	468
											(till the end of December 1959)

13. The cast iron spun pipe plant was completed in 1958. The sintering plant is under erection and orders for the ferro-silicon plant have been placed in 1959. The erection of the ferro-silicon plant is expected to be completed by 1961-62. The tenders received for the steel expansion scheme are still under consideration by the Mysore Government.

14. The details of the proposal for the formation of a Corporation for running the Works is still under consideration by the Mysore Government, who have agreed in principle to form one.

15. During 1959, the Mysore Works produced 33,946 tons of steel.

SMALL PIG IRON PLANTS, ELECTRIC FURNACES RE-ROLLING INDUSTRY AND FERRO-MANGANESE

Small Pig Iron Plants:

The steel delegation which visited China early in 1959 recommended that the design and construction of a few small blast furnaces and converters be taken in hand as an experimental measure, in areas which are likely to be favourable for the location of such plants. The delegation considered that construction of a few such small plants entirely from Indian designs and with Indian material would give confidence to designers and construction engineers in this country. At the same time, the delegation emphasised that the construction of such small plants would only be an experimental measure. Adjustments would be necessary to allow for local conditions and further pilot plant tests would have to be carried out before assessing the suitability and economics of small blast furnaces and side-blown converters for the production of iron and steel on a commercial scale even in selected areas. Government have generally accepted the recommendation and sanctioned a number of schemes in the private sector for the production of pig iron. Two small blast furnaces each with a capacity of 15,000 tons per annum—one in the State of Madras and another in the State of Orissa—have gone into operation. Seven more have been sanctioned—two in Madras State, three in Bombay State, one in West Bengal and one on small scale in Madhya Pradesh.

Electric Furnaces:

2. Electric furnaces use scrap as raw material. It has been estimated that by 1961, the arisings of scrap would be of the order of about 600,000 tons a year. This will grow. Of the estimated arisings, about 250,000 tons would be light scrap which is being exported at present. In view of the fairly large surplus scrap that is likely to be available and the difficulties of exporting light scrap, the Government have sanctioned during the year, 28 electric furnaces to be set up in different parts of the country, i.e., 18 for billets for use in their own rerolling mills, 4 for making special steel products, 3 for alloy steels and 3 on small scale basis. The total capacity of these furnaces will be about 1,87,000 tons a year.

The capacity of existing furnaces is about 150,000 tons a year. In 1959, these furnaces produced 58,782 tons of ingots and 38,928 tons of castings. This compares with the 1958 production of 41,848 tons of ingots and 39,898 tons of castings.

Secondary Producers & Re-Rollers:

3. The secondary producers and re-rollers operate either on the semis sold to them by the main steel works or on scrap. The secondary producers include the Tinsplate Company of India who make tinsplate, the Indian Wire & Steel Products who roll rods from billets and draw wire from the rods, the Indian Steel Rolling Mills, Negapatam, who make bars and rods and hoops, the Eagle Rolling Mills who make bars and light sections, the Guest, Keen, Williams who make rods (all the three use billets), and the India Tubes, Jamshedpur, and Kalinga Tubes, Chowdhar, who make pipes from skelp. Besides these, there are 63 re-rolling mills proper who roll bars and rods and light sections from billets. All the other re-rollers use scrap as raw material. These number 81.

4. The Committee which reported on the re-rolling industry in 1957 estimated the capacity of the industry at about 7,00,000 tons on single-shift basis. To meet this demand, about 7,00,000 tons of billets will be produced by the steel works at Jamshedpur, Burnpur, Bhilai and Durgapur. This supply will be supplemented by the production of the electric furnaces, existing and proposed. With more steel production, and steel use, the availability of scrap will also increase. It is therefore hoped that in the near future, the industry will have adequate raw material. Future planning of steel has however to include some additional production of billets to take care of the increasing demands of the re-rollers.

5. In the country as a whole, there is an adequate number of re-rolling units. However, the Committee which enquired into the re-rolling industry recommended new re-rolling units in certain States where there were none. As a result of this, one unit each has been sanctioned in Assam, Andhra Pradesh, Kerala and Bihar (north of the Ganga).

25 Re-rolling units which were in existence have also been recognised.

Steel Wire:

6. At present, high tensile wire and other special types of wire are not manufactured in this country and the demand for these categories are being met by import. Government have sanctioned during the year 37 new units for a total capacity of 1,42,400 tons per annum for various types of wire including high tensile wire and special types of wire. In addition, the main existing producer of wire and wire products, the Indian Steel & Wire Products Ltd., propose to manufacture about 22,500 tons per annum of high tensile and other special types of wire when their new rod mill (capacity: 1,60,000 tons per annum) goes into production. In addition, the Government have sanctioned a scheme for the manufacture of 36,000 tons per annum of wire rods.

Ferro-Manganese Industry:

7. Ferro-manganese is, mostly used in the manufacture of steel. Although India has large reserves of manganese ore, the primary raw material for the manufacture of ferro-manganese, it had until recently been exported abroad to be processed in the consuming countries.

So far, Government have licensed nine firms for a total capacity of 2,33,700 tons of ferro-manganese per annum. The target under the Second Five Year Plan was fixed at 1,60,000 tons per annum—60,000 tons for estimated internal consumption by 1960-61 and 1,00,000 tons for export. Against this, six units with a capacity of 93,000 tons have already been installed and of these, five have started production. Three more units and the expansion of two existing units, with a total capacity of 1,40,400 tons per annum, are expected to be completed by the end of the Second Plan period.

The internal consumption at present is estimated to be 30,000—35,000 tons per annum. The estimated internal consumption when the target of 6 million tons of steel ingots is achieved, is 60,000 tons per annum.

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