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(Part- II : Metals & Alloys)

61th Edition

FERRO ALLOYS

(ADVANCE RELEASE)

GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES

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6 Ferroalloys

Ferroalloys are one of the important inputs in the manufacture of alloys and special steel. They are used as deoxidisers and alloy additives in the steel manufacturing process. They impart special properties to steel. The alloys provide increased resistance to corrosion, improve hardness & tensile strength at high temperature, impart wear and abrasion resistance and increases creep strength etc. The growth of Ferroalloys Industry is, thus, linked with the development of the Iron and Steel Industry, Foundry Industry and to some extent Electrode Industry. The principal ferroalloys have distinctively high additions of one or more other elements, such as chromium, manganese and silicon to that of iron The product series consists mainly of ferromanganese, silicomanganese, ferrosilicon and ferrochrome.

Ferroalloys are classified into two main categories, viz, bulk ferroalloys and noble ferro-alloys. Bulk ferroalloys are majorly used in stainless steel & carbon steel. Most of the noble ferroalloys are made from rare-earth minerals and are expensive to produce as compared to bulk ferroalloys. Owing to high cost of power, Ferroalloys Industry has not been operating to its full capacity in India. Ferroalloys Industry spends 40 to 70% production cost on power consumption. The power consumption per tonne of ferroalloys production in the country varied from 3,000 to 12,000 kWh.

At present, major portion of the ferroalloys produced is exported. Ferromanganese, silicomanganese, ferrosilicon, high carbon ferrochrome and charge chrome are exported after meeting the domestic requirements.

INDUSTRY, PRODUCTION, DEVELOPMENT AND CONSUMPTION

As per Indian Ferroalloys Producers' Association (IFAPA), the total installed capacity of bulk Ferroalloys Industry in India is estimated at 5.10 million tonnes per annum and for noble ferroalloys it is 50,000 tonnes per annum. The products covered are Manganese alloys (HC, MC & LC ferrochrome, silicochrome and charge chrome) and Noble ferroalloys (ferromolybdenum, ferrovanadium, ferrotungsten, ferrosilicon magnesium, ferroboron, ferrotitanium etc.). The details are furnished in Table- 1.

Table – 1 : Capacity of Ferroalloys Industry in India

(In tonnes per annum)

Ferroalloys	Installed capacity
Total	**5150000**
Bulk Ferroalloys:	**5100000**
Manganese alloys	3160000
Chrome alloys	1690000
Ferrosilicon	250000
Noble Ferroalloys	**50000**

Source: *Indian Ferroalloys Producers' Association (IFAPA), Mumbai.*

The Ferroalloys Industry was established as an ancillary industry to cater to the growing needs of the domestic Steel Industry and is spread all over the country. Most of the ferroalloys units have been set up in Andhra Pradesh, Chhattisgarh, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Odisha and West Bengal because of availability of the raw material as well as uninterrupted electricity supply. Recently, the Industry has further spread to the North-Eastern Region of India. In Meghalaya, a number of small units producing ferrosilicon and ferrosilico-manganese have come up.

The ferroalloy units have incorporated the latest technology in order to use non-metallurgical grade ores, both lumps and fines, after necessary beneficiation and agglomeration. The units have also incorporated an effective pollution control measures in the form of gas cleaning, deoxidising and waste heat recovery.

BULK FERROALLOYS

Bulk ferroalloys consist of principal alloys, viz, ferromanganese, silicomanganese, ferrochrome, charge chrome and ferrosilicon. The production of different kinds of ferroalloys was not received from IFAPA as well as from other sources. However, the data received from JPC for some of the ferroalloys and partial coverages on ferroalloys that have been published in IBM's Monthly Statistics of Mineral Production (MSMP) in its March, 2022 Issue have been reproduced in Table-2. It may be noted that the data coverage in Table-2 is partial and does not reflect the actual production of ferroalloys.

Ferromanganese/Silicomanganese

Ferromanganese is produced as high carbon ferromanganese with 72–82% Mn, 6–8% C and 1.5% Si; medium-carbon ferromanganese with 74–82% Mn, 1–3% C and 1.5% Si; and low-carbon ferromanganese with 80–85% Mn, 0.1 to 0.7% C and 1–2% Si. Silicomanganese on the other hand is a combination of 60–70% Mn, 10–20% silica and about 20% carbon. Manganese in the form of ferromanganese is added for hardening and desulphurisation of steel. Nav Bharat Ferro Alloys Ltd, Paloncha, Andhra Pradesh; Chhattisgarh Electricity Co. Ltd, Raipur, Chhattisgarh; Indsil Energy & Electro Chemicals Ltd, Raipur, Chhattisgarh; Ispat Godawari Power & Ispat Ltd (GPIL), Chhattisgarh; Monet Ispat Ltd, Raipur, Chhattisgarh; Union Ferro, Raigarh, Chhattisgarh; Prakash Industries, Raigarh, Chhattisgarh; Tirumala Balaji Alloys Pvt. Ltd, Raigarh, Chhattisgarh; Vandana Global Ltd, Raipur, Chhattisgarh; SAL Steels Ltd, Gandhidham, Gujarat; Anjaneya Ferro Alloys Ltd, Mihijam, Jharkhand; Gautam Ferro Alloys Ltd, Ramgarh, Jharkhand; Shivam Iron & Steel Co. Pvt. Ltd, Giridih, Jharkhand; Sandur Manganese & Iron Ores Ltd, Sandur, Karnataka; Indsil Electrosmelt Ltd, Palakkad, Kerala; Chandrapur Ferro Alloys Plant (formerly Maharashtra Electrosmelt Ltd), Chandrapur, Maharashtra; Nagpur Power Ind. Ltd, Kanhan, Maharashtra; Natural Sugar & Allied Ind. Ltd, Osmanabad, Maharashtra; Adhunik Meghalaya Steels Pvt. Ltd, Bymihat, Meghalaya; Meghalaya Sova Ispat Ltd, Meghalaya; Shyam Century Ltd, Meghalaya; Tata Steel Ltd, Joda, Odisha; Bhaskar Shrachi Alloys Ltd, Durgapur, West Bengal; Cosmic Ferro Alloys Pvt. Ltd, Bankura, West Bengal; Dayal Ferro Alloys Ltd, Ramgarh, West Bengal; Haldia Steels Ltd, Burdwan, West Bengal; Impex Ferro Tech Ltd, Burdwan, West Bengal; Maithan Alloys Ltd, Burdwan, West Bengal; Modern India Con-Cast Ltd, Birhampur, West Bengal; Sharp Ferro Alloys Ltd, Durgapur, West Bengal; Shri Gayatri Minerals Ltd, Bishnupur, West Bengal; Shyam Ferro Alloys Ltd, Burdwan, West Bengal; and Sova Ispat Ltd, Durgapur, West Bengal are the major producers of ferromanganese/silicomanganese.

Silicomanganese, is an alloy that contains 60–70% manganese, 16–28% silicon and 1.5 to 2.5% carbon. It is more preferred as an effective deoxidising agent than high-carbon ferromanganese in the production of various types of steels. It is also used as feedstock to produce refined alloys like medium and low-carbon ferromanganese. Around 4,750 to 5,250 kWh power is consumed to produce one tonne of silicomanganese. Silicomanganese has emerged as a more important alloy than ferromanganese. The country, over the years, has emerged as a leading producer of silicomanganese. Silicomanganese was also produced by a number of small-scale ferroalloy producers. The estimated consumption of ferromanganese was 50,800 tonnes in 2017-18. The production of silicomanganese (including medium-carbon & low-carbon silicomanganese) which was about 3,29,295 tonnes in 2020-21 increased to 3,49,414 tonnes in 2021-22. In 2017-18, the total consumption of silicomanganese by all industries has been estimated at 1,22,600 tonnes.

Ferrrochrome/Charge chrome

Ferrochrome when added to steel imparts hardness, strength and augments its stainless

characteristics. For every tonnes of stainless steel (depending on the grade), 17–23% of chrome content is required. Hence, if the stainless-steel Industry grows, the Ferrochrome Industry also grows. Carbon content classifies the ferrochrome alloy into high-carbon (6–8%), medium-carbon (3–4%) and low-carbon (1.5 to 3%), although chromium content in all the three grades is around 60–70%. Around 2.5 tonnes chrome ore with an estimated power consumption of 4,500 kWh is required to produce one tonne of ferrochrome. Ferrochrome is produced by electric carbothermic reduction of chromite.

FACOR Alloys Ltd, Garividi, Andhra Pradesh; Jindal Steel & Power Ltd, Raigarh, Chhattisgarh; Standard Chrome Ltd, Raigarh, Chhattisgarh; SAL Steel, Kachchh-Bhuj, Gujarat; Balasore Alloys Ltd, Balasore, Odisha; IDCOL Ferro Chrome Plant, Jajpur Road, Odisha; Indian Metals & Ferro Alloys Ltd, Therubali, Odisha; Jindal Stainless Ltd, Duburi, Odisha; Nava Bharat Ferro Alloys Ltd, Dhenkanal, Odisha; Utkal Manufacturing Services Ltd, Choudhwar, Odisha; Rawat Ferro Alloys, Cuttack, Odisha; Rohit Ferro Tech. Pvt. Ltd, Bishnupur, West Bengal; and Sri Vasavi Ind. Ltd, Bishnupur, West Bengal are the major ferrochrome producers. A sizeable quantity is also produced by units in the small-scale sector.

The total production of ferrochrome/charge chrome in 2020-21 was about 8,68,000 tonnes which increased to 11,13,000 tonnes in 2021-22.

Ferrosilicon

Ferrosilicon contains about 75–90% silicon and minor amounts of iron, carbon, etc. It is produced by using quartzite, iron ore, coke and electrode paste. Around 1.75 to 2 tonnes quartzite are required to produce one tonne of ferrosilicon. A very high consumption of power, i.e., 9,000 to 10,000 kWh is required to produce one tonne of ferrosilicon. It is a powerful deoxidising agent and its major applications are in electrical steel used for transformers and dynamos, alloy steel for tools & automobile valves and in iron casting and mineral dressing. Ferrosilicon is used by the military to quickly produce hydrogen for balloons. For this, chemical reaction of sodium hydroxide, ferrosilicon and water is utilised.

Bharat Alloys & Energy Ltd, Kurnool, Andhra Pradesh; VBC Ferro Alloys, Medak, Andhra Pradesh; SMS Smelters Ltd, Lekhi, Arunachal Pradesh; Visvesvaraya Iron & Steel Plant, Bhadravati, Karnataka; Silical Metallurgic Pvt. Ltd, Palakkad, Kerala; Jayantia Alloys, Meghalaya and Indian Metals & Ferro Alloys Ltd, Therubali, Odisha, are the major producers of ferrosilicon. Small-scale producers of ferrosilicon are also in operation in Kerala and Tamil Nadu. In Meghalaya, three units have sprung up that produce ferrosilicon.

The production of ferrosilicon during 2020-21 and 2021-22 is not available.

NOBLE FERROALLOYS

Noble ferroalloys are one of the vital additive inputs required especially in production of alloy and special steel. Noble ferroalloys also refer to alloys used in small quantities and are relatively expensive compared to bulk ferroalloys. These are used in the production of steel as deoxidant and alloying agents.

These high temperature alloys impart strength, resistance and stability within a temperature range from 260 to 1,200 °C. These alloys are used generally in turbine engines, power plants, furnaces and all pollution control equipment. Noble ferroalloys include ferrovanadium, ferrotitanium, ferronickel, ferromolybdenum, ferrotungsten and ferroniobium. In India, noble ferroalloys are mostly manufactured through alumino-thermic process.

Ferronickel

The consumption and production of ferronickel were not reported in the Organised Sector.

Ferromolybdenum

There were five important Units, namely, Mehra Ferroalloys, Electro Ferroalloys Pvt. Ltd, India Thermit Corporation, Bharat Pulverising Mills Ltd and Sunbel Alloys Co. of India Ltd that produced ferromolybdenum. The all India production increased to 436 tonnes in 2021-22 as compared to 428 tonnes in 2020-21.

Ferrotungsten

The consumption and production of ferrotungsten in 2021-22 were not reported in the Organised Sector.

Ferrovanadium

Production of ferrovanadium in 2020-21 was 634 tonnes which increased to 850 tonnes in 2021-22.

Others

Mishra Dhatu Nigam Ltd (MIDHANI) (A Govt. of India Enterprise), Hyderabad, produced chiefly cobalt, molybdenum, titanium and tungsten-based super-alloys.

The production details of various types of Bulk ferroalloys and Noble ferroalloys during the year 2019-20 to 2021-22 are furnished in Table- 2.

Information on plantwise capacity of principal ferroalloys in India together with general specifications of products is elucidated in Table-3. Consumption of principal alloys by different industries is furnished in Table- 4.

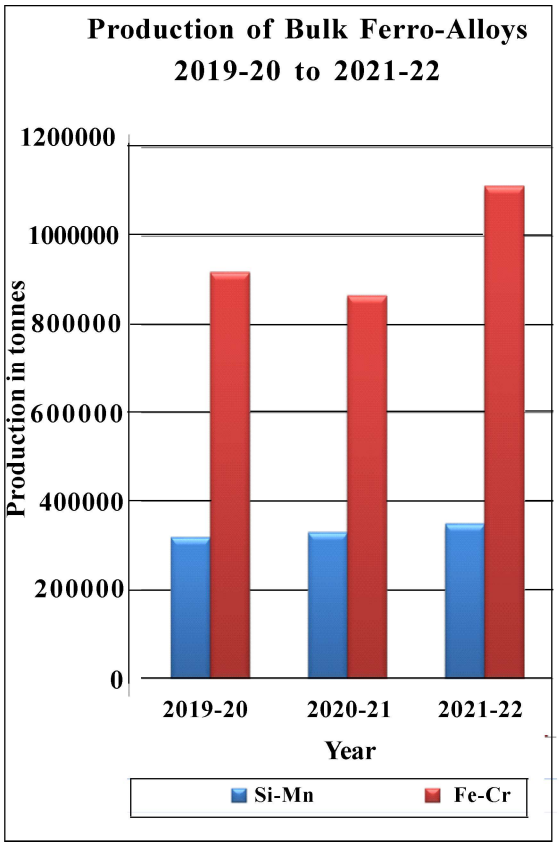

Table – 2 : Production of Ferroalloys, 2019-20 to 2021-22 (P)

(In tonnes)

Ferroalloys	2019-20	2020-21	2021-22
A) Bulk Ferroalloys			
Ferromanganese	NA	NA	NA
Silicomanganese	320593	329295	349414
Ferrosilicon	NA	NA	NA
Ferrochrome	921000	868000	1113000
Chargechrome	NA	NA	NA
B) Noble Ferroalloys			
Ferromolybdenum	527	428	436
Ferrovanadium	665	634	850
Ferrotungsten	NA	NA	NA
Magnesium-ferro-silicon	13930	10220	15081
Ferroaluminium	1461	1119	1139
Ferro-silicon-zirconium	NA	NA	NA
Ferrotitanium	121	249	416
Ferroboron	NA	NA	NA
Ferroniobium	NA	NA	NA

Source: *Monthly Statistics of Mineral Production (MSMP), IBM, March, 2022 Issues.*

Table – 3 : Statewise, Plantwise Capacity and Specifications of Principal Ferroalloys Produced in India

Name and location of the plant	Product	Specifications	Installed capacity (tpy)
Andhra Pradesh			
Andhra Ferro-alloys Ltd, Srinivasanagar, Distt Vizianagaram	HC ferrochrome	Cr: 60-65% max. Si: 2-4% max. C: 6-8% max. P: 0.040% max. S: 0.040% max.	
	Silicomanganese	Mn: 60% min. C: 2.5% max. Si: 14% min. P: 0.3 % max. S: 0.035% max.	20,000
FACOR Alloys Ltd, Shreeramnagar, Garividi, Distt Vizianagaram	HC ferromanganese	Mn: 70-80%, C:6-8%, Si: 1-5 % max. P: 0.35% max. S: 0.05% max. Size: 25-150 mm +/- 10%, Corresponding ISI specification: IS 1171-2011.	72,500 (For all ferroalloys)
	HC Ferrochrome	Cr: 60-63%, Si: 3-4%, C: 6-8%, P: 0.03-0.05% (max.), S: 0.03-0.05% (max.)	90,345
	Silicomanganese	Mn: 60-70%, Si: 16-20%, C: 2.0% max. S: 0.03%, P: 0.3 %, Size: 10 - 150 mm +/- 10%, Corresponding ISI specification: IS 1470-1990.	
	Ferrosilicon	Si: 60-80%, C: 0.15% max. P: 0.05%, S: 0.05% max. Al : 1-15% max. Size: 25-150 mm +/- 10%, Corresponding ISI specification: IS 1110-2011.	
	Ferrosilicon-magnesium	Mg: 4-30%, Si: 44-55 %, Al: 1.00%, Ca: 1.0-4.0%,	
	Silico-chrome	NA	
Deccan Ferro Alloys (P) Ltd, Chintalapalem (PO), Pendurthi (SO), Vizianagaram	Silicomanganese	NA	30,000
Jindal Stainless Ltd, (Ferro Alloys Division) Jindal Nagar, Kothavalasa, Distt Vizianagaram.	HC ferrochrome	Cr: 62%, Si: 2.5%, C: 7-8%, P: 0.040%,	40,000
Sree Sarda Alloys Ltd, Ravivalsa, Tekkali Mandal, Distt Srikakulam.	Ferrochrome	NA	6,000
Metkore Alloys and Industries Ltd, Srikakulam.	H C ferrochrome	NA	25000
Siri Smetters & Energy Pvt. Ltd, Distt Vizianagaram.	Silicomanganese	NA	8,500

(contd)

Table- 3 (contd)

Name and location of the plant	Product	Specifications	Installed capacity (tpy)
Maithan Alloys Ltd, Visakhapatnam.	Ferroalloy	NA	1,20,000 (Total)
MDA Mineral Dhatu AP Pvt. Ltd, Distt Vizianagaram.	Ferro Mn Silico Mn	NA NA	9,000 11,000
Rhodium Ferro-alloys Pvt. Ltd, Gollapuram, Distt Anantapur	Ferrosilicon	NA	8,000
Ushodaya Electrodes Pvt. Ltd, Visakhapatnam	Ferromanganese	NA	4
Srinivasa Ferro Alloys Ltd, Visakhapatnam	Silicomanganese	NA	26000
Sri Raghvendra Ferro Alloys Pvt. Ltd, Nalgonda	Silicomanganese	NA	18000
Sri Balaji Electro Smelters Ltd, Hyderabad	Silicomanganese	NA	4650
Sri Mahalakshmi Smelters Pvt. Ltd, Vizianagaram	Ferrosilicon	NA	7,200
Nav Bharat Ventures Ltd, Distt Khammam	Silico Mn	NA	1,25,000
Anjaney Alloys Ltd, Atchutapuram, Distt Visakhapatnam	Ferroalloys	NA	120,000
M.B. SMELTERS Pvt. Ltd, Hindupur, Distt Anantapur	MC ferromanganese HC ferromanganese	NA NA	7,500 50,000
Chhattisgarh			
(i) Hira Ferro Alloys Ltd, Urla, Distt Raipur.	HC ferromanganese	Mn: 70-75%, Si: 1.50% max. C: 6-8 %, P: 0.30% max. S: 0.05% max.	61,500
	Silicomanganese	Mn: 60-65%, Si: 14-17%, C: 2.0% max. P: 0.35% max. S: 0.05% max.	
(ii) Alok Ferro-Alloys Ltd, Raipur.	Ferroalloys	NA	18,000
INDSIL Energy & Electrochemical Ltd, Raipur, Chhattisgarh	Silicomanganese	NA	19,200
Sarda Energy & Minerals Ltd	Ferromanganese	Mn: 70% (min.), Si: 1.5% (max.), C: 6-8%, P: 0.35% (max.), S: 0.050% (max.)	45 MVA (Total)
	Silicomanganese	Mn: 60% (min.), Si: 15-20%, C: 2.50% (max.), P: 0.35% (max.), S: 0.050% (max.)	
Chhattisgarh Electricity Co. Ltd, Siltara, Raipur.	HC ferromanganese	Mn: 70-75%, Si: 1.5-2.0%, C: 6.0-8.0%, P: 0.35-0.40%, S: 0.05% (max.)	36,000
	Silicomanganese	Mn: 60-65% , Si: 15-20%, C: 2.0-2.5%, P : 0.3-0.35 %, S: 0.05% (max.)	NA
Nav-chrome Ltd, Urla Industrial Area, Distt Raipur.	HC ferromanganese Silicomanganese HC ferrochrome	NA NA NA	21,560 14,700

(contd)

Table- 3 (contd)

Name and location of the plant	Product	Specifications	Installed capacity (tpy)
Deepak Ferro Alloys Ltd	Ferromanganese		5,000
VA Power & Steel Pvt. Ltd, Distt Raigarh	Ferrosilicon Silicomanganese	NA NA	8,100 14,400
Orion Ferro alloys, Gharghoda, Raigarh	Silicomanganese Silico-slag (as by-product)	NA NA	8,000 12,000
Vandana Global Ltd, Raipur	Silicomanganese	NA	36,000
Jindal Steel & Power Ltd, Kharsia, Distt Raigarh.	HC Ferrochrome	Cr: 60-66%, C: 6 to 8%, Si: 4% (max.), P: 0.050% (max.), S: 0.050% (max.),	36,000
	Silicomanganese	Mn: 60%, Si: 15%, P: 0.3% max.	
Sai Chemical Pvt. Ltd, Tadesara, Distt Rajnandgaon	Silicomanganese	NA	10,200
MSP Sponge Iron Ltd, Manuapali, Jamgaon, Raigarh (Chhattisgarh)	Silicomanganese	NA	42057
Goa			
Karthik Alloys Ltd, Cuncolim, Distt South Goa.	HC Silicomanganese	Mn:60-65% Sio_2:14-15% (min.) C:2.5-0.20% (max.) P:0.03-0.2% (max.) S:0.05% (max.)	25,500
Gujarat			
Essel Mining & Industries Ltd, Vapi, Distt Valsad.	Ferrovanadium	V: 50%, C: 0.1% (max.), S and P: 0.05% each, Al: 1.5%	400
	Ferromolybdenum	Mo: 60%, C: 0.1%, S: 0.08%, P: 0.06%, Al: 0.5%	1,200
	Ferrotitanium	NA	600
Electro Ferro-Alloys (Pvt.) Ltd, Ahmedabad, Gujarat.	Ferromolybdenum Ferro-silico-zirconium	NA	300
Baroda Ferro-Alloys, Distt Panchmahals.	HC ferrochrome	NA	3500
Sal Steel Ltd, Gandhidham, Distt Kachchh	Silicomangenese	NA	61890
Sahjanand Ferro Alloys, Distt Vadodara.	NA	NA	3,000
Haryana			
Haryana Ferro-Alloys Ltd, Gohana Road, Distt Rohtak.	–	–	2,500
Jammu and Kashmir			
Shree Sitaram Industries Pvt. Ltd, Phase II, SIDCO Complex, Bari Brahmana.	Ferrochrome	NA	3,325
Jharkhand			
Anjaneya Ferro Alloys Ltd, Mihijam, Distt Jamtara	Ferroalloys	NA	41,850

(contd)

Table- 3 (contd)

Name and location of the plant	Product	Specifications	Installed capacity (tpy)
Bihar Foundry & Casting Ltd (Unit Gautam Ferro Alloys)	Silicomanganese	Si: 14%, Mn : 60%	34,000
Castron Technologies Ltd, Bokaro Industrial Area,	Ferromanganese Silicomanganese	NA NA	14,400
Shivam Iron & Steel Co. Ltd, Ferro Alloys Division, Jambad, Udnabad, Giridih	Ferromanganese Silicomanganese	NA	37,400
Dayal Ferro Alloys, Ramgarh Cantt., Hazaribagh	Silicomanganese	NA	10,000
Jamshedpur Mineral & Chemicals, Distt Saraikela-Kharaswan.	Ferromanganese	NA	4,800
Karnataka			
Sandur Manganese & Iron Ores Ltd, Vyasanakere, Distt Ballari	HC ferromanganese Silicomanganese Ferrosilicon	NA	29,100 36,000 24,000
Dandeli Steel & Ferro Alloys Ltd, Dandeli, Distt Uttara Kannada.	Ferromanganese	Mn: 70-75%, C: 0.1%, Si: 2.4%, P : 0.15%, S: 0.05%, Size: 37 mm	6,000
	MC ferromanganese	Mn: 70-75%, C: 1.5%, P: 0.25%, Si: 2%, S: 0.05%	
S.R. Chemicals & Ferro-Alloys, KIADB Honaga, Distt Belagavi.	LC Ferromanganese	Mn: 70%, C: 0.1%, P: 0.12%	25
Thermit Alloys (Pvt.) Ltd, N-7, Industrial Estate, Distt Shivamogga	Ferromanganese Silicomanganese Ferrochrome Ferrosilicon Silicochrome	NA NA NA NA NA	1,200
Padmavati Ferrous Ltd, Distt Ballari	Ferromanganese Silicomanganese	Mn: 24 to 48% Fe:4 to 30%	5,000 5,000
	Ferrosilicon		2,000
Kerala			
The Silical Metallurgic Ltd, Wayalur, Distt Palakkad.	Silicomanganese	Mn: 70-75%	3,600
INDSIL Electrosmelts Ltd, Pallatheri, Distt Palakkad.	Silicomanganese Ferrosilicon	NA NA	NA NA
INDSIL Hydro Power & Manganese Ltd, Distt Palakkad, Kerala	Silicomanganese	Mn: 55% (min.), Si: 23-27%, C: 0.1 % (max.)/0.2% (max.)/0.5% (max.), S: 0.02% (max.), P: 0.15% (max.)	14,400
Shri Laxmi Electro Smelters (Pvt.) Ltd, Industrial Development Area Erumathala, P.O. Aluva- 683 105.	Ferrosilicon	NA	NA
Madhya Pradesh			
MOIL Ltd, (formerly Manganese Ore India Ltd) Ferro-manganese Plant, Bharweli (Manjhara), Distt Balaghat.	HC ferromanganese	Mn:78±1%, P: 0.35% (max.), C: 6.8%	10,000

(contd)

Table- 3 (contd)

Name and location of the plant	Product	Specifications	Installed capacity (tpy)
Jalan Ispat Castings Ltd, Industrial Area, Meghnagar, Distt Jhabua.	Silicomanganese	Mn: 60-65%, Si: 15-20%, C: 2% (max.), P: 0.35%	12,000
Crescent Alloys Pvt. Ltd, Seoni.	Ferrosilicon Ferromanganese	N.A. N.A.	4,500 (Total)
S.R Ferro Alloys, Jhabua	Silicomanganese	NA	8,639
Maharashtra			
Chandrapur Ferro Alloy Plant (Erstwhile Maharashtra Electrosmelt Ltd), Distt Chandrapur- 442 401.	HC ferromanganese	Mn: 70-74 % and 74-78% , Si: 1.5% (max.), C: 6.8%, P: 0.43%. (max.)	1,90,000
	MC ferromanganese	Mn : 70-74% and 74-78% , Si: 2% max., C: 1 - 3% , P: 0.4% max.	1,800
	LC ferromanganese	Mn: 70-74% and 74-78% , Si: 2% (max.), C: 1.5% max., P: 0.4% max.	NA
	Silicomanganese	Mn: 60-65% and 65% min., Si: 15-20%, C: 2 % max., P: 0.35% max.	1,30,000
Nagpur Power & Industries Ltd, P.O. Khandelwal Nagar, Distt Nagpur.	Silicomanganese HC ferromanganese	Mn: 60-65%, P: 0.35% Mn: 70-75%, P: 0.4%	NA NA
Bharat Pulverising Mills Ltd, Andheri, Mumbai.	Ferromolybdenum Ferrotungsten Ferrovanadium	NA NA NA	200 (Total)
Sunbel Alloys Co. of India Ltd, Thane-Belapur, Mumbai.	Ferromolybdenum Ferrosilicon Ferrotungsten Ferrovanadium	NA NA NA NA	300 (Total)
Natural Sugar and Allied Ind. Ltd, Sainagar, Ranjani, Distt Osmanabad.	HC Ferromanganese	Mn: 70-75%, Si: 2-2.5%, P: 0.4%, C: 6-8%	16,500
	Silicomanganese	Mn: 60-65%, Si: 13-15%, P: 0.3%, C: 2-2.5%	16,500
Mahavir Ferro Alloys, Paonakhari, Distt Bhandara	Ferroalloys	NA	100
Minex Metallurgical Co. Ltd, Distt Nagpur	Ferrotitanium	NA	250
Meghalaya			
Maithan Alloys Ltd, Distt Rio Bhoi.	Ferromanganese	NA	28,000
Odisha			
Ferro Alloys Corporation Ltd, (Ferro Chrome Plant Randia), D.P. Nagar, Randia, Distt Bhadrak.	HC ferrochrome/ Chargechrome	Cr: 60-64%, Si: 3-4%, C: 6-8%, P: 0.03-0.05% (max.), S: 0.03-0.05% (max.)	75,000
Tata Steel Ltd, Ferro Manganese Plant, Joda, Distt Keonjhar	HC ferromanganese Silicomanganese	Mn: + 70%, C: 6-8 %, Si :0.3-2%, P: 0.2-0.4%, Mn: 46-48%,	50,400 - 65,000

(contd)

Table- 3 (contd)

Name and location of the plant	Product	Specifications	Installed capacity (tpy)
Tata Steel Ltd, (Charge-chrome Plant), Bamnipal, Distt Keonjhar.	Ferrochrome	NA	65,000
	Chargechrome	Cr: 60% (min.), Si: 4% (max.) , C: 8% (max.), P: 0.03% (max.), S: 0.03% (max.)	55,000
	Ferromanganese	Mn: 46 to 49%	50,400
Balasore Alloys Ltd, Balgopalpur, Distt Balasore. (Formerly Ispat Alloys Ltd)	HC ferrochrome	Cr: 60-63%, Si: 3.5% (max.) Grade I C: 8.0% (max.), Cr: 57-60% S: 4.0% (max.) Grade II, C: 8.0% (max.)	1,50,000
Jeypore Sugar Co. Ltd, (Ferro-manganese Plant) Distt Rayagada.	HC ferrochrome	Cr: 60-65%, P: 0.055%, C: 2%, S: 0.05%, Si: 4%, Fe: Balance	22,000
	Silicomanganese	Mn: 60-65%, Si: 15-18%, C: 2% max.	22,000
J.B. Ferro Alloys, At Tanto, P.O. Bhadrashahi, Keonjhar.	LC ferromanganese	NA	200
IDCOL Ferro Chrome & Alloys Ltd, Jajpur Road, Distt Jajpur.	HC ferrochrome	Cr: 62-65%, Si: 1.5 to 8%, C: 8% (max.)	18,000
Indian Metals & Ferro Alloys Ltd, (IMFA)	HC ferrochrome/ Chargechrome	Cr: 60%	62,500
Indian Metals & Ferro Alloys Ltd, (IMFA), Therubali, Distt Rayagada.	Ferrosilicon	Si: 70-75%,	61,000
	HC ferrochrome	Cr: 60%	1,16,400
Superb-Metal Alloys (Pvt.) Ltd, Rairangpur, Distt Sundergarh.	Ferrocolumbium Ferromolybdenum Ferrotungsten Ferrovanadium	NA	300 (Total)
Jabamayee Ferro Alloys Ltd, Sukinda, Distt Jajpur	HC Ferrochrome	NA	15,660
M M Minerals & Alloys Pvt. Ltd, Jamirdiha, Distt Mayurbhanj.	HC Ferrochrome	NA	25,000
T S Alloys Ltd, Anantapur, Cuttack.	Ferrochrome	NA	59,400
Stork Ferro and Mineral Industries Pvt. Ltd, Somnathpur, Distt Balasore	Silicomanganese	NA	25,000
	Ferromanganese	NA	29,700
	Ferrochrome	NA	25,000
Aarti Steel Ltd, Ghantikhal, Distt Cuttack.	Ferrochrome	NA	25,000
Kalinga Ferro Ispat Pvt. Ltd, Mandia, Distt Jajpur	HC Ferrochrome	NA	8052
Puducherry			
The Silical Metallurgic Ltd	Ferrosilicon	–	10,560
	Ferro-silicon-magnesium	–	1,800
VSK Ferro Alloys Ltd, Thuthipet.	Ferrosilicon	Si: 72.3%, C: 0.15%, S: 0.051%, Mn: 0.55%, P: 0.042%, Fe: 26.13%	3,000
Snam Alloys (Pvt.) Ltd, Kariamanikam, Distt, Puducherry.	Ferrosilicon	NA	12,000
	Ferro-silicon-magnesium Ferrochrome	Si: 14.56%, P: 0.197%	

(contd)

Table- 3 (contd)

Name and location of the plant	Product	Specifications	Installed capacity (tpy)
Tata Steel Alloys Ltd, Ferro Alloy Plant, Cuttack.	Ferrochrome		50,000
Punjab			
Mehra Ferro-Alloys, Verka, Amritsar.	Ferromolybdenum Ferrovanadium Ferrotitanium Ferrotungsten Ferroboron	NA	300 (Total)
Sikkim			
Akshay Ispat & Ferro Alloys Ltd, Mamring, Namchi, Distt South Sikkim.	Ferrosilicon	NA	6,000
Telangana			
VBC Ferro Alloys Ltd, Village Rudraram, Patancheru Mandal Distt Medak.	Ferrosilicon Ferrochrome Silicomanganese/ Ferromanganese	– –	10,000 27,000 31,500
Shree Raghvendra Ferro Alloys Pvt. Ltd, Nalgonda	Silicomanganese	NA	15000
Nava Bharat Ventures Limited, Paloncha, Distt Khammam,	HC Silicomanganese HC ferromanganese	NA	1,25,000
Uttar Pradesh			
The India Thermit Corp. Ltd, Fazalganj, Distt Kanpur.	Ferromolybdenum Ferrotitanium Ferrochrome Ferroboron Chromium metal LC ferromanganese Ferrovanadium	NA	300 (Total)
Hindustan Ferro-Alloys, Hamirpur.	Ferrosilicon	NA	3,200
West Bengal			
Bhaskar Shrachi Alloys Ltd, Durgapur	Silicomanganese	Si: 15%	24,000
Cosmic Ferro Tech. Ltd, Bishnupur, Distt Bankura.	HC ferromanganese	Mn: 66-71%, Si: 1.4% C: 6.5-7%, P: 0.3%	45,375
	Silicomanganese	Mn: 61-65%, Si: 15.5% C: 1.9%, P: 0.28%	
Sri Gayatri Minerals Pvt. Ltd, WBIIDC Growth Centre, Bishnupur, Bankura.	HC silicomanganese	Mn: 60-65% & 65% min., Si: 15% min. & 16% min., C: 2% max., P: 0.3% max., S: 0.03% max.	24,000
Industrial Metals & Ferro Alloys, Jamuria, Burdwan.	LC ferrotitanium LC ferrochrome	NA NA	20 20
Hira Concast Ltd, Salanpur, Burdwan.	Silicomanganese Ferromanganese	NA NA	11,455 15,225
Karthik Alloys Ltd (I & II), Durgapur.	MC silicomanganese	Mn: 54-56%, C: 0.2-0.5% Si: 22-25% P: 0.15-0.2%, S: 0.05%	19,000

(contd)

Table- 3 (concld)

Name and location of the plant	Product	Specifications	Installed capacity (tpy)
	LC silicomanganese	Mn: 53-55%, C: 0.15-0.2% Si: 25-28% P: 0.15-0.2%, S: 0.05%	NA
Maithan Alloys Ltd, Burdwan.	Ferromanganese Silicomanganese Ferrochrome	NA	94,600 (Total)
Monnet Ferro Alloys Ltd, Burdwan.	Silicomanganese	NA	12,500
Shyam Ferro Alloys Ltd, Palitpur Road, Burdwan, Dewandighi (Katwa Road)	HC silicomanganese HC ferromanganese HC ferrochrome	NA	1,04,957 (Total)
Srinivasa Ferro Alloys Ltd, Durgapur, Burdwan.	HC ferromanganese	Mn: 70-74%, 74-76% Si: 1.5% max., C: 6-8%,, P: 0.25%, 0.30% and 0.40% max., S: 0.03% max.	10,800
	HC silicomanganese	Mn: 60-65% & 65% min. Si: 15% min. & 16% min. C: 2% max., P: 0.3% max., S: 0.03% max.	23,400
	LC silicomanganese	NA	5,400
Shri Vasavi Industries Ltd, WBIIDC Industrial Growth Centre, Bishnupur, Distt Bankura.	HC ferrochrome	Cr: 58-60%, Si: 2-4%, C: 8% max., P: 0.05% max. S: 0.05% max.	45,000 (16MVA 1No. & 12MVA 1 No.)
Modern India Con-Cast Ltd, WBIIDC Industrial Growth Centre, Bishnupur, Distt Bankura.	Bulk ferroalloys	–	22,000
Rohit Ferro Tech. Ltd, Bishnupur, Distt Bankura	HC ferrochrome	Cr: 60% (min.), C: 8% (max.) Si: 3.5% (max.), P: 0.03% (max.) S: 0.04% (max.)	45,375
Sharp Ferro Alloys, Durgapur	HC silicomanganese	NA	42,500
Nilkantha Ferro Ltd, Bankura	HC silicomanganese	NA	39,960
	Silicomanganese Slag	NA	40,200
Lalwani Ferro Alloysa Ltd, Kolkata	Silicomanganese	NA	48,780
	HC ferromangenese	NA	69,285
Ispat Damodar Pvt. Ltd, (Sponge Iron Plant), Nabagram, PS-Neturia, Digha, Purulia.	Ferroalloys	NA	40,000
Sonic Thermal Pvt. Ltd, (Ferro Alloys Plant), Namobandh, Sitarampur, Bankura.	Silicomanganese	NA	39,500
Shree Ambry Ispat Pvt. Ltd, Basdebpur, Distt Bankura.	Ferromanganese	NA	22,600
	Silicomanganese	NA	17,400
	Ferrosilicon	NA	7,600

Note: *HC : High carbon. MC: Medium carbon. LC: Low carbon*
Source: *Information collected by IBM*

Table – 4 : Consumption* of Principal Ferroalloys, 2017-18 (P)

(In tonnes)

	Consumption
Ferrochrome	14600
Ferromanganese	50800
Ferrosilicon	23400
Silicomanganese	122600

Note: *1) *Includes actual reported consumption and/or estimates made wherever required; Due to paucity of data, hence consumption figures may not be complete*

ENVIRONMENT

Studies reveal that depending on the ferroalloy manufactured, waste generation per day in 35 tpd and 50 tpd ferrosilicon and ferrochrome plants may be in the following range:

Silica fines: 7 to 8 tonnes/day

Fe-Cr slag (fined boulder): 40 tonnes/day

Charcoal & coke fines: 7 to 8 tonnes/day

Waste from ferroalloys industries could be effectively utilised— a typical Fe-Si or Fe-Cr manufacturing unit can provide material for 10 small-scale units for manufacturing bricks and each unit can produce 2,400 bricks per day. Other units which can be set up are board-and-briquette-making units. The utilisation of waste materials for converting them into building materials will result in bringing down the building material cost, and therefore, lead to conservation of natural resources like clay and sand.

Domestic vanadium sludge is used for producing ferrovanadium by Essel Mining & Industries Ltd, Gujarat.

The implementation of the Kyoto Protocol by the European Union provides significant opportunities for Ferroalloys Industry in India to implement CO_2 reduction technologies, which could be traded in terms of carbon credits. Installation of an electricity generation facility driven by CO-rich furnace gas is an obvious means by which CO_2 saving could be achieved.

WORLD REVIEW

The major ferroalloys producing countries were China, South Africa, India, Russia and Kazakhstan. The production of ferroalloys in China during 2021 was 36,000 thousand tonnes, while production of ferroalloys in South Africa during 2021 was 3,478 thousand tonnes. Kazakhstan reported production of 1,704 thousand tonnes of ferrochrome during 2021. The markets for the bulk alloys like high-carbon ferromanganese, silicomanganese, ferrosilicon and high-carbon ferrochrome showed varied responses to the fluctuations in steel and stainless steel production which seem to have influence as per the different circumstances that prevailed in different markets.

World production of various ferroalloys in principal producing countries is furnished in Table- 5.

Table – 5 : World Production of Ferroalloys, 2019 to 2021 (By Principal Countries)

(In tonnes)

Country	Ferroalloys	2019	2020	2021
Albania	Ferrochrome	66402	53543	103700
Armenia	Ferromolybdenum	7712	6718	8335
Austria	Ferromolybdenum	4000	3000	3000
	Ferronickel	2500	2500	2500
	Ferrovanadium	7000	7000	7000
Bosnia & Herzegovina	Ferroalloys	31911	14641	35920
Czech Republic	Ferrovanadium	6700	5600	6900
Finland	Ferrochrome	505000	498000	515000

(contd)

(Table-5 contd)

Country	Ferroalloys	2019	2020	2021
France	Ferromanganese	115000	68000	68000
	Ferro-ilico-manganese	68000	62000	62000
	Ferrosilicon	48000	41000	41000
	Silicon metal	105000	87000	87000
Georgia	Ferromanganese	4500	4500	4500
	Ferro-silicon-manganese	291608	217463	322877
Germany	Ferrochrome	26000	11000	12000
	Silicon metal	29606	30234	31318
	Other ferroalloys	8200	8000	8000
Greece	Ferronickel	62251	30518	19394
Iceland	Ferrosilicon	120255	128187	123800
Italy	Ferro-silico-manganese	90000	90000	90000
Kosovo	Ferronickel	7200	7000	5000
North Macedonia	Ferronickel	15202	17747	17714
	Ferro-silicon	117	-	-
Norway	Ferromanganese	330000	330000	330000
	Ferro-silico-manganese	290000	260000	310000
	Ferrosilicon	200000	260000	240000
	Silicon metal	200000	210000	200000
Poland				
	Ferromanganese	-	-	-
	Ferrosilicon	65523	61709	73370
	Other ferroalloys	16815	38104	31170
Russia	Spiegeleisen	7000	7000	7000
	Ferrochrome	384089	390000	390000
	Ferro-silicon-chrome	4200	4200	4200
	Ferromanganese	273000	240000	240000
	Ferro-silico-manganese	51774	50000	50000
	Ferromolybdenum	4700	4700	4700
	Ferronickel	20000	20000	20000

(contd)

(Table-5 concld)

Country	Ferroalloys	2019	2020	2021
	Ferrosilicon	846579	830000	830000
	Ferrovanadium	10894	12000	12000
	Silicon metal	48000	48000	48000
	Other ferroalloys	34000	34000	34000
Slovakia				
	Ferromanganese	26200	24000	30900
	Ferro-silico-manganese	49900	33800	48600
	Ferrosilicon	29400	29600	34700
	Other ferroalloys	2100	1200	1500
Spain				
	Ferromanganese	55500	28000	25000
	Ferro-silico-manganese	98400	83000	83000
	Ferrosilicon	90000	77000	83000
	Silicon metal	7500	5000	5800
Sweden				
	Ferrochrome	120000	120000	120000
Turkey				
	Ferrochrome	81743	94200	100750
	Ferrosilicon	7500	5000	5800
Ukraine				
	Ferromanganese	172508	117215	117000
	Ferro-silico-manganese	858708	850000	850000
	Ferronickel	79334	73700	74000
	Ferrosilicon	97000	97000	97000
	Other ferroalloys	100000	100000	100000
Egyp (b)				
	Ferrosilicon	60500	60000	60000
	Other ferroalloys	20000	20000	20000
Gabon				
	Ferro-silico-manganese	43000	37000	22000
South Africa				
	Ferroalloys	3806766	2984105	3478867
Zimbabwe				
	Ferrochrome	308593	134000	306847
Canada				
	Ferroniobium	6600	6200	7400
	Ferrosilicon	37000	34000	30000
	Ferrovanadium	1200	1300	1100
	Silicon metal	34000	25000	30000
Dominican Republic				
	Ferronickel	78662	59211	75887

(contd)

(Table-5 contd)

Country	Ferroalloys	2019	2020	2021
Mexico				
	Ferromanganese	72937	57127	71637
	Ferro-silico-manganese	154209	147784	170929
USA				
	Ferrosilicon & Silicon metal	310000	277000	411000
Argentina				
	Ferro-silico-manganese	-	-	-
	Ferrosilicon	13000	11200	13000
Brazil				
	Ferrochrome [c]	136780	254346	300000
	Ferro-silico-manganese	20000	20000	20000
	Ferromanganese	151000	73000	71000
	Ferronickel [d]	45543	46000	41700
	Ferroniobium	60000	60000	60000
	Ferrosilicon	100000	100000	100000
	Silicon metal	214051	203940	200000
	Other ferroalloys	40000	40000	40000
Chile				
	Ferromolybdenum	14500	14500	14500
Colombia				
	Ferronickel	116000	103000	109000
Venezuela				
	Ferromanganese	6000	6000	6000
	Ferro-silico-manganese	7000	7000	7000
	Ferronickel	25000	25000	25000
	Ferrosilicon	40000	40000	40000
Bhutan				
	Ferrosilicon	138900	103500	130400
China				
	Ferroalloys	36577000	36000000	36000000
	Silicon metal	2400000	2400000	2400000
India [e]				
	Aluminium	1461	1119	1100
	Ferrochrome	921000	868000	855300
	Ferromagnesium	14173	9700	9700
	Ferromanganese	-	-	-
	Ferro-silico-manganese	320594	329295	328000
	Ferromolybdenum	527	428	430
	Ferrosilicon	-	-	-
	Ferrotitanium	121	249	210
	Ferrovanadium	665	634	610
Indonesia				
	Ferro-silico-manganese	4000	4000	13000

(Table-5 concld)

Country	Ferroalloys	2019	2020	2021
	Ferronickel	128565	129850	129090
Iran [f]				
	Ferrochrome	8000	8000	8000
	Ferrosilicon	70000	60000	60000
Japan				
	Ferromanganese	462740	400331	440173
	Ferronickel	337790	234505	243275
	Other ferroalloys	74015	49544	54275
Kazakhstan				
	Ferrochrome	1858130	1841309	1704561
	Ferro-silico-chrome	110500	110500	110500
	Ferro-silico-manganese	123528	122743	132119
	Ferrosilicon	79930	180645	180000
Korea, Rep. of				
	Ferro-magnesium	355000	355000	355000
	Ferro-silico-manganese	196000	196000	196000
	Other ferroalloys	4200	4200	4200
Korea, Dem. P.R. of				
	Ferroalloys	46000	15300	37000
Myanmar				
	Ferronickel [e]	54247	76347	52970
Australia				
	Ferromanganese &			
	Ferro-silico-manganese (b)	257000	270000	270000
	Silicon metal	52000	45000	45000
New Caledonia				
	Ferronickel	247746	236421	205108

Source: *BGS, World Mineral Production, 2017-2021 BGS*

Note: *FeAl : Ferroaluminium; FeCr : Ferrochrome; FeSiCr : Ferro-silico-chrome; FeSiMg : Ferro-silico-magnesium; FeMn : Ferromanganese; FeSiMn : Ferro-silico-manganese; FeMo : Ferromolybdenum; FeNi : Ferronickel; FeNb : Ferroniobium; FeSi : Ferrosilicon; FeTi : Ferrotitanium; FeV : Ferrovanadium*

(e) *Estimate*

(b) Years ended 31st March following that stated

(d) Including ferro-silico-chrome

(f) Including ferro-silico-manganese

(g) Years ended 30th June of that stated

(x) Sales

(y) Nickel Content

FOREIGN TRADE

Exports

In 2021-22, exports of ferroalloys (total) increased by 38% to 25,37,463 tonnes in 2021-22 from 18,43,322 tonnes in the previous year. In terms of value, ferroalloys exports also increased to₹ 27,124 crore in 2021-22 from ₹12,773 crore in 2020-21.

Out of total export, in terms of quantity, majority were exports of followed by ferro-silico-manganese (44%), ferrochrome (29%) ferromanganese (25%) and ferrosilicon (1%). The other ferroalloys together accounted for the remaining 1% of exports in 2021-22. Exports were mainly to China (12%), UAE, Japan & Italy (9% each) and Republic of Korea & Taiwan (7%) (Tables-6 to 25).

Table – 6 : Exports of Ferroalloys : Total (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**1843322**	**127735114**	**2537463**	**271246477**
China	365306	25279096	316403	33180156
UAE	210748	15800630	231856	30019225
Japan	144689	10340378	215738	23037081
Italy	119785	7649075	225401	21888415
Korea, Rep. of	175560	12094753	186591	19338068
Taiwan	133816	8647484	185523	18016330
Egypt	65616	4396277	122188	13134786
Indonesia	59316	4451852	123611	12587112
Turkey	48615	3311803	87978	9884723
Netherlands	37523	2479126	82551	8900787
Other countries	482348	33284640	759623	81259794

Figures rounded off

Table – 7 : Exports of Ferroboron (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**39**	**9728**	**33**	11024
South Africa	31	7527	27	8917
Turkey	2	573	3	977
U A E	-	-	2	470
Brazil	1	303	1	362
Malaysia	++	73	++	188
Thailand	-	-	++	88
Nepal	-	-	++	21
Colombia	-	-	++	1
Ukraine	2	524	-	-
Oman	2	381	-	-
Other countries	1	347	-	-

Figures rounded off

Table – 8 : Exports of Ferrochrome (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**720539**	**49939983**	**753389**	**76899138**
China	362570	24871853	299949	31187711
Korea, Rep. of	160428	11043385	148501	15076551
Indonesia	45272	3456230	104161	10205766
Taiwan	49667	3334406	77539	7302786
Japan	35780	2639979	67382	7237905
Thailand	13532	1049023	11880	1285703
Netherlands	7601	364171	12594	808110
Italy	11882	814645	6978	762353
Mexico	6533	434927	5124	563457
U A E	970	101434	1886	371871
Other countries	26304	1829930	17395	2096925

Figures rounded off

Table – 9 : Exports of Ferromanganese (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**335229**	**23997006**	**638850**	**74044066**
UAE	105006	8680752	122816	19104032
Italy	25342	1691665	73251	7647223
USA	16110	1183401	56152	5708010
Netherlands	16932	1185968	44150	5288306
Egypt	13001	823569	41460	4738817
Brazil	16958	1165667	39313	4143453
Turkey	12826	822519	36375	4093503
Taiwan	19999	1207025	36525	3491361
Korea, Rep . of	7242	443380	28843	3072007
Vietnam	12639	768150	23395	2599718
Other countries	89174	6024910	136570	14157636

Figures rounded off

Table – 10 : Exports of Ferromolybdenum (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**279**	**324540**	**324**	**529440**
Oman	220	240963	242	369881
UAE	4	5669	41	56260
Peru	1	2063	14	44320
Thailand	6	6459	10	18748
Indonesia	3	5515	6	14080
Brazil	++	833	4	12037
Saudi Arabia	4	4029	1	2939
South Africa	25	34174	2	2629
Chile	-	-	1	1975
Malaysia	++	605	1	1513
Other countries	16	24230	2	5058

Figures rounded off

Table – 11 : Exports of Ferronickel (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**77**	**65052**	**1**	2822
China	76	63882	1	1222
Kyrgyzstan	1	1170	++	854
Bahrain Is	-	-	++	737
Malaysia	-	-	++	8
U A E	-	-	++	1

Figures rounded off

Table – 12 : Exports of Ferroniobium (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**14**	**25114**	**25**	**69528**
Malaysia	++	640	9	22061
Peru	-	-	7	20981
South Africa	-	-	4	10739
China	-	-	3	8614
UAE	14	23884	2	3863
Indonesia	-	-	++	1351
Thailand	-	-	++	895
Saudi Arabia	-	-	++	492
France	++	36	++	268
U K	-	-	++	138
Other Countries	++	554	++	126

Figures rounded off

Table – 13 : Exports of Ferro-phosphorus (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**77**	**11038**	**156**	16804
Sweden	76	10909	74	11205
Canada	-	-	55	3609
Oman	-	-	24	1760
Saudi Arabia	1	129	3	223
Italy	-	-	++	7

Figures rounded off

Table – 14: Exports of Ferro-silico-chrome (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**32**	**12095**	**20**	**8932**
Netherlands	-	-	20	8417
U A E	-	-	++	285
U S A	-	-	++	115
Canada	-	-	++	115
Turkey	12	10152	-	-
Nepal	16	1287	-	-
Jordan	2	436	-	-
Saudi Arabia	2	216	-	-
Japan	++	4	-	-

Figures rounded off

Table – 15 : Exports of Ferro-silico-magnesium (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**4192**	**483234**	**6407**	**1098652**
USA	540	60061	1763	305710
Mexico	1051	112845	1220	214004
Turkey	488	54045	1002	178353
South Africa	178	18309	432	70216
Italy	273	31379	327	59367
UAE	489	60077	300	48544
Saudi Arabia	148	17520	303	46743
Sri Lanka	157	24779	208	38336
Oman	140	17898	122	20581
Slovenia	112	12411	97	17500
Other countries	616	73910	633	99298

Figures rounded off

Table – 16 : Exports of Ferro-silico-Manganese (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**764747**	**50326047**	**1112950**	**113600728**
Japan	99815	7081430	131321	14007615
Italy	80714	4977728	142948	13104422
UAE	100922	6409352	101904	9718850
Egypt	52366	3552108	80183	8311903
Taiwan	63878	4068495	71150	7162030
Bangladesh	36256	2208861	55244	5445075
Turkey	33880	2296815	47543	5006237
Malaysia	42338	2868163	46348	4910829
Saudi Arabia	20194	1304853	37367	4142661
Thailand	30156	1956520	40230	4086765
Other countries	204228	13601722	358712	37704341

Figures rounded off

Table – 17 : Exports of Ferrosilicon (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**11236**	**1194260**	**19567**	**3246485**
UAE	2012	196679	3833	541141
Italy	379	48893	1349	262881
USA	512	77741	1106	201740
Slovenia	687	82827	1020	187896
Turkey	302	36897	762	151243
Brazil	766	87456	974	148940
Oman	616	61957	970	145164
Bangladesh	872	72541	1105	145124
Libya	-	-	550	132637
Nigeria	418	37332	603	122915
Other countries	4672	491937	7295	1206804

Figures rounded off

Table – 18 : Exports of Ferrotitanium (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**2553**	**567131**	**1860**	**689076**
Japan	220	57155	320	116547
Spain	120	31706	288	108481
Korea, Rep. of	279	73593	316	108049
UK	99	26611	191	69989
UAE	240	67047	174	62063
Netherlands	100	24288	173	60833
South Africa	32	9288	106	58498
Oman	52	11616	90	33650
Saudi Arabia	25	6012	53	19412
Taiwan	24	4445	49	17406
Other countries	1362	255370	100	34148

Figures rounded off

Table – 19 : Exports of Ferrotungsten (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**++**	**1150**	**1**	**4368**
Brazil	++	234	1	2926
U A E			++	1442
South Africa	++	740	-	-
Qatar	++	148	-	-
Venezuela	++	13	-	-
Kenya	++	12	-	-
Spain	++	3	-	-

Figures rounded off

Table – 20 : Exports of Ferrovanadium (By Countries)

Country	2019-20 (R)		2020-21 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**240**	**346840**	**168**	**353217**
Oman	32	49299	66	126260
Thailand	42	64449	58	118040
Netherlands	40	55916	20	53247
UAE	102	141985	18	38004
France	1	2162	2	6043
Turkey	1	1508	1	3017
Brazil	2	3803	1	2679
Fiji Is	-	-	1	1649
Bangladesh	++	141	1	1067
Indonesia	++	507	++	1057
Other countries	20	27070	++	2154

Figures rounded off

Table – 21 : Exports of Ferrocolumbium (By Countries)

Country	2019-20 (R)		2020-21 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**++**	**1522**	**1**	**1787**
Malaysia	-	-	1	1662
U A E	++	849	++	125
U K	++	648	-	-
Qatar	++	25	-	-

Figures rounded off

Table – 22 : Exports of Ferrozirconium (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**3**	**1644**	**16**	**7127**
Brazil	3	1644	6	3347
Germany	-	-	7	1761
Malaysia	-	-	2	1600
Israel	-	-	1	419

Figures rounded off

Table – 23 : Exports of Ferroselenium (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**++**	**979**	**5**	**3653**
China	-	-	5	2172
Malaysia	++	979	++	1481

Figures rounded off

Table – 24 : Exports of Ferroalloys (Others) (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**4065**	**427722**	**3690**	**659380**
Turkey	143	26042	760	240479
South Africa	260	41345	570	119325
Bangladesh	228	27861	305	80324
U A E	989	112902	880	72274
Italy	1195	84723	548	52039
Germany	1	129	75	22686
Spain	-	-	132	17639
Japan	264	11048	184	10152
Nigeria	3	368	48	9239
Egypt	10	1451	13	8472
Other countries	972	121853	175	26751

Figures rounded off

Table – 25 : Exports of Ferrocobalt
(By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	++	**29**	++	**250**
Korea, Rep. of	-	-	++	250
Germany	++	15	-	-
U S A	++	14	-	-

Figures rounded off

Imports

Imports of ferroalloys (total) increased by 44% to 6,08,617 tonnes in 2021-22 from 4,21,980 tonnes in the previous year. In terms of value, the ferroalloys imports also increased to ₹ 12,334 crore in 2021-22 from ₹ 5,531 crore in 2020-21. Out of total imports in terms of quantity, imports of ferronickel accounted for about (41%) followed by Ferrosilicon (35%), ferrochrome and ferromanganese (7% each) and ferro-silico-manganese (4%). Other ferroalloys together accounted for the remaining 6% of the imports in 2021-22. Imports were mainly from Indonesia (36%), followed by Bhutan 25%), China (8%) Korea, Rep.of (6%) and Russia (4%), (Tables-26 to 44).

Table – 26 : Imports of Ferroalloys : Total
(By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**421980**	**55319083**	**608617**	**123345004**
Indonesia	62209	12174907	218002	45543784
Bhutan	105907	8388867	149221	18859215
Korea, Rep. of	16970	4414616	34633	12993108
China	48375	5045760	48848	8066104
Singapore	10508	5161202	8637	7659089
Brazil	7416	2660712	7879	3257969
Russia	20599	1965356	23982	3223748
Japan	5505	1258262	7582	2806088
Switzerland	4240	605166	11649	2364363
Netherlands	10560	1215357	11689	2311941
Other countries	129691	12428878	86495	16259595

Figures rounded off

Table – 27 : Imports of Ferroboron (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**1238**	**197093**	**1046**	**215732**
China	1224	196384	1046	215606
USA	++	84	++	126
UK	14	625	-	-

Figures rounded off

Table – 28 : Imports of Ferrochrome (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**39002**	**4897369**	**44631**	**8360932**
Russia	6249	819171	11418	2001821
Turkey	2770	322344	8753	1774750
Albania	562	68139	5468	995163
China	19525	2513774	5727	933418
Netherlands	800	119875	3118	831706
Brazil	2528	366851	1735	415281
U S A	600	86659	2472	413534
Sweden	825	75307	1730	310857
U A E	537	51384	1572	266626
Switzerland	844	112104	1625	260250
Other Countries	3762	361761	1013	157526

Figures rounded off

Table – 29 : Imports of Charge-chrome (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**14004**	**741433**	**8832**	769273
South Africa	12018	636251	5359	481167
Switzerland	987	54623	3322	268222
Turkey	-	-	151	19884
Mozambique	999	50559	-	-

Figures rounded off

Table – 30 : Imports of Ferromanganese (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**66089**	**4785976**	**40881**	**7059207**
Korea, Rep. of	13807	1305274	24684	4825454
Japan	1170	132227	4008	788532
Vietnam	540	65473	2749	516534
South Africa	16662	1118462	3287	353533
Malaysia	29550	1808754	3893	279929
China	115	18140	572	110756
UAE	794	45248	628	56070
Norway	2489	219991	342	51597
Netherlands	500	44368	405	47799
Hong Kong	-	-	149	14199
Other countries	462	28039	164	14804

Figures rounded off

Table – 31 : Imports of Ferromolybdenum (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**2883**	**3115738**	**2558**	**6140376**
Korea, Rep. of	2697	2928669	2214	5535468
Switzerland	100	100055	180	299988
China	-	-	131	268565
UAE	80	78222	31	33673
Germany	3	4439	2	2059
Sweden	-	-	++	623
Canada	3	4320	-	-
USA	++	33	-	-

Figures rounded off

Table – 32 : Imports of Ferronickel (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**79737**	**16875880**	**249315**	**55890205**
Indonesia	62174	12168876	218002	45543784
Korea	30	26523	7378	1858644
Singapore	7757	1630801	3979	1497280
Japan	3331	704757	3016	1463786
Switzerland	302	101890	5021	1326578
Albania	1903	467983	3991	1015887
Dominican Rep.	765	616318	2048	1011358
Colombia	-	-	661	627103
New Caledonia	-	-	1876	580399
France	-	-	1181	387353
Other countries	3475	1158732	2162	578033

Figures rounded off

Table – 33 : Imports of Ferroniobium (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**3026**	**5857814**	**3982**	**8642844**
Singapore	1681	3397956	2456	5713088
Brazil	879	1480909	1065	1866600
Canada	275	653843	265	595637
UAE	40	94965	59	127723
Netherands	27	62304	38	119934
Korea, Rep. of	-	-	33	110276
Netherlands	-	-	20	42834
Hong Kong	68	70128	32	31120
Swizerland	30	47403	6	21546
South Africa	-	-	8	14067
Other countries	26	50306	++	19

Figures rounded off

Table – 34 : Imports of Ferrophosphorus (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**2006**	**55172**	**3746**	**148545**
Vietnam	989	24022	2540	89299
Russia	27	618	862	37811
China	619	22162	308	17333
Sweden	3	1250	8	2857
Kazakhstan	216	4895	27	920
Germany	125	1429	1	325
Thailand	-	-	++	++
Hong Kong	27	603	-	-
Italy	++	173	-	-
USA	-++	20	-	-
Other Countries	-	-	-	-

Figures rounded off

Table – 35 : Imports of Ferro-silico-Chrome (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**-**	**-**	**100**	**12778**
China	-	-	100	12778

Figures rounded off

Table – 36 : Imports of Ferro-silico-manganese (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**10497**	**546336**	**26676**	**2741398**
Bhutan	2964	236017	23557	2496565
Malaysia	5673	234668	1996	150949
Netherlands	10	1122	270	40894
Australia	1620	63433	520	24923
Tanzania	-	-	221	14847
France	10	1222	30	5821
U A E	-	-	54	5105
Sudan	-	-	27	1830
U S A	-	-	1	266
Switzerland	-	-	++	115
Other countries	220	9874	++	83

Figures rounded off

Table – 37 : Imports of Ferro-silico-magnesium (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**2765**	**289625**	**4299**	**631424**
Bhutan	1720	186911	2203	355816
China	946	93015	1623	241440
U A E			375	17363
Marshall Islands	38	3420	68	11437
South Africa	-	-	25	4293
Belgium	7	1069	5	1075
Taiwan	54	5210	-	-

Figures rounded off

Table – 38 : Imports of Ferrosilicon (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**194439**	**16370102**	**212256**	**28265119**
Bhutan	101183	7963507	123461	16006834
China	23053	1869232	33602	5017812
Netherlands	9149	958416	7741	1171057
Russia	14265	1133643	11667	1163832
Malaysia	15976	1234247	7930	957197
Norway	4332	645226	4912	883461
Brazil	2952	288143	4657	689434
UAE	8287	596568	5525	638357
France	3190	508442	3769	619134
South Africa	3256	499144	2886	420211
Other countries	8796	673534	6106	697790

Figures rounded off

Table – 39 : Imports of Ferrotitanium (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**462**	**109565**	**731**	**300529**
UK	255	59672	378	158587
Canada	70	15641	197	75945
Netherlands	69	20561	64	30540
Russia	58	11924	35	20284
Estonia	-	-	18	7625
China	-	-	20	3822
Korea, Rep. of	-	-	19	3573
USA	++	42	++	153
Taiwan	10	1725	-	-

Figures rounded off

Table – 40 : Imports of Ferrovanadium (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**480**	**613762**	**900**	**1806932**
Korea, Rep. of	76	131424	280	658607
Germany	188	260094	287	555669
Japan	113	124205	81	192180
Czech Republic	30	29993	90	122774
UAE	48	26724	56	72657
South Africa	-	-	20	51635
Slovenia	-	-	16	42155
China	-	-	20	25003
Switzerland	20	32604	10	23724
Austria	-	-	10	23282
Other countries	5	8718	30	39246

Figures rounded off

Table – 41 : Imports of Ferrotungsten (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**13**	**23282**	**2**	**4892**
China	9	15511	2	4892
Belgium	4	7448	-	-
USA	++	171	-	-
Turkey	++	152	-	-

Figures rounded off

Table – 42 : Imports of Ferrozirconium (By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**374**	**51237**	**522**	**96181**
China	346	46248	512	92825
Netherlands	-	-	8	3022
UAE	8	1371	2	334
Hong Kong	15	3395	-	-
UK	5	223	-	-

Figures rounded off

Table – 43 : Imports of Ferroalloys (Others)
(By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**4965**	**787297**	**8140**	**2258637**
China	2528	269832	5185	1121771
Singapore	713	103277	1951	407483
Japan	890	296556	423	350834
UAE	45	22985	326	221171
Netherlands	-	-	40	55651
USA	40	15746	59	50813
Brazil	-	-	20	32948
Canada	395	44132	97	14123
Turkey	54	4922	27	3400
U K	++	17	++	102
Other countries	300	29830	12	341

Figures rounded off

Table – 44 : Imports of Ferrocobalt
(By Countries)

Country	2020-21 (R)		2021-22 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	++	**1402**	-	-
Germany	++	1402	-	-

Figures rounded off

FUTURE OUTLOOK

Depending on the process of steel making and the type of steel being manufactured, the requirement of different ferroalloys varies widely.

Indian Ferroalloys Industry has immense potential and capability to compete in the international market. On the positive side, India produces some of the finest ferroalloys in the world. Indian ferroalloys are extensively preferred in Europe. India exports potential is indeed bright with very high growth prospects.

As per the steelworld report, Ferroalloys Industry is estimated to grow at a CAGR of 5.9% between 2017 and 2025 and is expected to reach a valuation of US$ 188.7 billion by 2025.

India is expected to show strong growth in usage of steel in the coming years because of its robust economy, massive infrastructure needs and expansion of industrial production. India is expected to become one of the leading steel consuming nations in the next decade. In this scenario, the Ferro-alloys Industry estimates that the consumption of ferroalloys will increase domestically and internationally in the coming years. Some of the Ferroalloy Producers have already gone for expansion and some new units are coming up.

As per the National Steel Policy, 2017, Ferro-alloy Industry is a power intensive industry. Hence, captive power generation in the ferroalloys plants will be extensively supported. Since the demand for ferroalloys is likely to grow along with steel production in the country, the Industry would have to be encouraged to set up larger units to achieve adequate economies of scale. Efforts in the direction of providing necessary raw materials linkages and stable supply of power to the Ferroalloy units must be rendered priority.