Problems & prospects of Ferromanganese industry in India

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ABSTRACT

This paper deals with the trend of production and export of ferro-manganese in the country with reference to steel production. The various problems encountered by this industry, such as deterioration in the quality of raw materials, their price rise, shortage of power with its high tariff and non-utilisation of installed capacity have been discussed in detail. Attention has also been drawn to some of the commercial points related to rise in excise duty, railway freight, decline in sales and export. The prospect of Fe-Mn industry vis-a-vis the increase in output of steel in the country and improvement in the global trend has been dealt with.

Introduction

The development of ferromanganese industry in India has not only been dependent on the development of iron & steel industry in the country but also on the demand of the alloy in the world market. During the second five year plan period, licences were issued to five ferromanganese units to create additional capacity to the already existing two units in the country.

From the very beginning, the industry has been considered as an export oriented one. Lately two more large units have come into existence, bringing the present total number of ferromanganese plants to nine and the installed capacity to about 2,85,000 tonnes per year. This does not include recent claim of one of the pig iron producers that they too have been granted licence to produce ferromaganese. The Table - 1 shows names, locations and capacity of these plants in India.

The fate of ferromanganese industry has inevitably been tied to the steel making industry which itself during the last 30 years has seen bouts of recession and prosperity in cyclic pattern. Lately, the steel industry is undergoing traumatic process of adaption to new conditions. The frequent changes in the cycle of steel industry has led to multitude of management and operational problems to the ferromanganese industry. The high cost of manufacturing, huge inventory problems, high energy cost, over capacity and lean domestic market, has created a chaotic condition and has cast a shadow of gloom on the future of the ferromanganese industry in the country.

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TABLE—1

Ferromanganese plants in India

Sl.No.	Name of Company	Location of Plant	Furance capacities in KVA	Production capacities of Fe.Mn.& Si.Mn. in tonnes.
1.	Ferro Alloys Corporation.	Garividi	3x7500	45,000
2.	Visvesvaraya Iron & Steel Limited.	Bhadravati	2x1500	3,000
3.	Jeypore Sugar Co. Limited.	Rayagada	1x3600 1x7500	20,000
4.	Tata Iron & Steel Co.	Joda	2x9000	30,000
5.	Dandeli Ferro Alloys	Dandeli	1x4600	12,000
6.	Universal Ferro & Allied Chemicals Ltd.	Tumsar	2x9000	40,000
7.	Uniferro International	Tumsar	2x16500	45,000
8.	Khandelwal Ferro Alloys Limited.	Kanhan	2x9000	40,000
9.	Maharashtra Electrosmelt Ltd.	Chandrapur	1x33000	50,000
	T O T A L :-			2,85,000

The late sixties did witness a favourable period both in terms of production and exports of this vital alloy. In the year 1969, the export figure touched nearly 1,00,000 tonnes. This resulted in the production boom in the year 1970, when 1,75,000 tonnes of alloy was produced with capacity utilization of 103%. Again the late seventies witnessed similar trend and in the year 1978, the production of ferromanganese was to the tune of 2,20,000 tonnes which was equal to the then installed capacity of the industry. The export in the same year was 76,000 tonnes bringing to the country much needed foreign exchange to the tune of 160 million rupees. The Table - 2, shows production and export figure of ferromanganese compared to the production of steel ingots for the period 1969 to 1982.

Problems

Some of the problems of the industry needing immediate attention have been discussed below :—

Over Capacity

The crisis in the steel industry has favoured advancement in technological progress, which in turn, has affected the use both quantitatively and qualitatively of manganese alloys. Acid operation of blast furnaces and subsequent desulphurization through calcium carbide, mixed

TABLE—2

Production and Export of Ferromanganese

Years	Production of Ingot steel in M/Tonne	Production of ferro-manganese in M/tonne	Export of ferromanganese in M/Tonne
1969	6.367	154,905	99,920
1970	6.232	175,612	91,756
1971	6.322	166,342	34,916
1972	6.842	160,020	50,960
1973	6.882	139,650	39,386
1974	6.850	146,015	19,766
1975	7.829	143,491	4,982
1976	9.403	174,821	35,158
1977	9.852	193,908	20,793
1978	9.917	219,900	76,200
1979	9.936	186,083	52,681
1980	9.338	178,308	Not Exported
1981	9.720	181,200	-do-
1981/82	10.597	201,303	28,296
1982/83	10.725	152,335	5,683

blowing of molten steel with oxygen and inert gas like argon, has brought down the unit consumption of ferromanganese per tonne of steel. In the year 1982-83, the integrated steel plants under the Steel Authority of India Ltd. produced 6.68 million tonnes of ingot steel compared to the installed capacity of 9.4 million tonnes. This shows a capacity utilization of only 71%. The requirement of ferromanganese was less than 1,00,000 tonnes compared to the projected requirement of 1,32,000 tonnes during this period. Also due to continued recession in the steel industry the world over, the demand in the international market too, has gone down considerably. The demand trend has very well been reflected in Table - 2. All these factors have resulted in grave under utilization of the installed capacity. The capacity utilization in 1982-83 was less than 60%. The under utilization of the capa city has tended to drain profits from the industry.

The Government seems to be totally unaware of all these problems and has been taking ad-hoc decisions to add extra production capacity to the already existing under utilized capacity. If this trend is not stopped forthwith the entire capacity utilisation of the existing units will reach a level, which will make them economically unviable.

Power

The ferromanganese industry is highly power intensive where power rightly can be termed as a raw material. The furnaces producing ferromanganese must receive continuous power supply at the optimum load level. But the industry which, solely draws its power requirement from the State Electricity Boards, perpetually faces problem on this score. The power cuts varying from 20 to 60% from state to state have become a regular feature. In some of the states, like Orissa and Karnataka, where hydel power contributes to the majority of the generating capacity, the power cuts to ferromanganese industries are sometimes to the extent of 100%. Apart from these regular power cuts, the Electricity Boards impose daily load shedding asking the plants to cut down load by 25% to 50% from the already reduced level, as a result either the furnaces have to operate on lowest possible load or switched off until the load shedding is relaxed. This often happens two to three times a day with variable durations. Owing to this, the furnace operating conditions become very bad, not to speak of loss of production.

It is high time that Government realises seriousness of the situation and damages which these frequent power cuts are causing to the industry and declare ferromanganese industry as a core sector industry for supply of power as has been done for steel and coal.

The Government published figures reveal that during last 30 years power generating capacity in the country has increased by 17 times. However, it is blissfully ignored that power houses are operating at ridiculously low load factor, 46.8% during 1981-82. Hardly anything concrete has been done to reduce transmission losses which are on an average to the tune of 17 to 18% compared to 5 to 7% of world average. Incidently, even 0.25% reduction in the transmission losses could eliminate the power cuts being imposed over this industry.

The other problem faced by the industry is exorbitant power tariff.

There has been tremendous rise in the power tariff of different States in the country. During the last 25 years, the power tariffs have gone up by 20 times. The tariff varies from 51 paise per unit in Maharashtra State to 25 paise in the Karnataka State. A typical example of increase in the power tariff in the State of Maharashtra where four major ferromanganese units are situated, was 28 paise in 1980, 39 paise in 1981, 43 to 48 paise in 1982 and 51 paise in 1983.

Due to oil price escalations triggered by OPEC in 1973, it became advantageous to produce ferromanganese in the ore producing countries. During the period 1975 to 1980, the

world manganese alloy production growth was 5.1% whereas the growth rate in the countries producing manganese ore was comparatively of a very high level. For example, during this period, the growth rate in Australia was 99.4%, Brazil 113%, Mexico 180% and South Africa 76.5%. Unfortunately, India which is one of the leading countries producing manganese ore in the world, could not take advantage of this situation due to multifold increase in the power rate and thereby making Indian ferromanganese uncompetitive in the world market.

The growth rate of ferromanganese industry in India during the above period, was around 24.25% only. Power is a critical item in power-intensive industry like ferromanganese and the Government, Electricity Boards and the industrialists shall have to sit together to find out ways and means to make sufficient power available to the plants at the constant rate and at a competitive cost.

Manganese Ore

The manganese ore required for production of ferromanganese should conform to certain physical and chemical specifications. Normally, manganese ore having size -75 mm to + 3 mm analysing manganese 48%, sillca 9% maximum, iron 7.5% maximum and phosphorus 0.15% are used to produce standard grade of high carbon ferromanganese. The last few years have seen gradual decline in the physical and chemical characteristics of the ore received from the major suppliers. One of the major suppliers in the country used to supply till 1973 ore containing 49% manganese but the same supplier today finds it difficult to supply ore even of 47% manganese. Similarly, deterioration in quality and consequent increase in 'fines' contents in the ore, have created enormous problems to the plant operators. Table - 3 shows a typical example of average analysis of six monthly composite parcels of ore supplies received from one of the ore suppliers. Simultaneously, there has been a steep increase in the ore prices and during the last ten years, the prices have been jacked up as much as four times as shown in Table - 4. Composite monthly parcel of the ore is composed of several smaller consignments received during the period extended to more than a month and the analysis of different receipts varies in manganese contents from 42% to 49%, silica from 5% to 15% and phosphorous from 0.07% to 0.30%, thus up-setting the production schedule beyond control.

Compared to the local proved reserves of 6600 million tonnes of iron ore, the known proved reserves of manganese ore in the country as per the Indian Bureau of Mines published figures in 1977 is only 20 million tonnes, all grades taken together. Further there are 31.49 million tonnes as indicated and 57.33 million tonnes as inferred reserves. Table - 5, shows the State-wise details of these reserves.

Out of these reserves, only 80% of ore available in Maharashtra and Madhya Pradesh satisfy the ferromanganese producers. Only 15

TABLE - 3

Manganese ore chemical analysis

Sl.No.	Month	Year	ANALYSIS IN PERCENTAGE			
			Manganese	Silica	Iron	Phosphorus
1.	Sept.	1982	46.27	10.75	6.74	.168
2.	Oct.	1982	47.50	8.13	6.26	.179
3.	Nov.	1982	46.95	9.52	7.53	.190
4.	Dec.	1982	47.92	10.00	6.7	.172
5.	Jan.	1983	47.07	9.91	7.7	.179
6.	Feb.	1983	47.34	8.45	7.6	.185

TABLE - 4

Increase in Manganese ore price

Sl.No.	Year	Price Per M.T.
1.	1973	Rs. 120.00
2.	1974	Rs. 160.00
3.	1975	Rs. 225.00
4.	1976-77	Rs. 250.00
5.	1978-79	Rs. 262.50
6.	1980-81	Rs. 347.50
7.	1982	Rs. 390.00
8.	1983 (April)	Rs. 450.00

to 20% of the ore available in Orissa are of medium and high grade and the rest of the ores are high in iron and low in manganese contents and suitable only for blending. Ores of Andhra Pradesh also seldom exceed manganese 42% but the silicious ores of Adilabad district has very high Mn : Fe ratio. Ores from Goa and Karnataka Sectors also contain high iron and have got low Mn : Fe ratio. In view of this, this ore cannot be used for ferromanganese production, except for blending purposes. The trend of manganese ore mining in different states is shown in Table - 6, for the year 1980 and 1981 with the number of mines, quantity and value of product.

Till recently manganese ore has been considered as one of the traditional export items. Table - 7 shows the export figures of the ore from 1970 to 1979. Considering the low reserves of high and medium grade manganese ore in the country, an immediate ban has to be imposed for its export. There is also a crying need to make serious efforts at the national level to assess manganese ore reserves in the country. Simultaneously, serious efforts have to be made to set up a structure for reserve management.

Beneficiation & Agglomeration

The latest technique of beneficiation and agglomeration has not yet touched the field of manganese ore industry in India, except that at Maharashtra Electrosmelt Ltd, Chandrapur, they use sinters of Manganese ore fines regularly as a part of the feed to the furnace. Manganese ore fines of —3 mm sizes are generated at the mines site and at various stages of handling at the plant site. These fines are screened and rejected. The total amount of fines may well exceed 15% of the ore charged to the furnace. Sintering is, of course, one way of utilizing the fines but since all these dusty materials are poorer in grade, a lot of silica and other gangue materials pass on to the furnace. Sinters should be charged to furnace in the red hot condition to utilize the heat value and this creates problems with existing furnace charging system.

Fines generated out of good grade charged materials, should be up-graded by using Dorr Oliver type rake classification with controlled density of the medium depending on the grade of ore Looking at the abundance of ferruginous ores in the country, the beneficiation process of reduction roasting followed by low intensity mangnetic separation, should be utilized to upgrade the ores upto 50% Mn. The fines product should be then briquetted or pelletized to prepare excellent furnace feed.

It is worth mentioning the efforts of ICOMI, the largest manganese ore producer of Brazil where the methods of fluosolid roasting, magnetic separation and pelletization are utilized to produce 2,12,000 tonnes per year of furnace feed with 55% manganese contents out of a feed of 42% manganese ore.

Coke

The ferromanganese plants receive their coke supply from various steel plants. Coke received is again screened at the users' end and size fractions of —30 mm to + 6 mm used in the furnaces. The fixed carbon should be minimum 70%, ash content less than 25% and phosphorus content lower than .1% to keep the slag volume lower and the product as clean as possible. But the qualities of coke received have deteriorated alarmingly with respect to the

TABLE - 5

Reserves of Manganese ore in India

Sl.No.	Name of States.	Measured in tonnes	Indicated in tonnes	Inferred in tonnes	Total in tonnes.
1.	Orissa	5,952,610	5,778,816	19,256,214	30,987,640
2.	M.P.	4,186,280	6,900,222	7,902,549	18,989,051
3.	Maharashtra	10,141,984	16,099,465	4,387,223	30,628,672
4.	Gujrat	-	-	2,469,077	2,469,077
5.	Rajastan	-	-	271,245	271,245
6.	A.P.	-	876,576	372,000	1,248,576
7.	Karnataka	-	1,833,520	18,302,343	20,135,863
8.	Goa	-	-	4,376,989	4,376,989
		20,280,874	31,488,599	57,337,640	109,107,113

TABLE - 6

Production of manganese ore

States	Year 1980			Year 1981		
	No.of mines	Qty.in Metric tonne.	Value in Rs.'000	No.of mines.	Qty.in Metric tonne	Value in Rs.'000
ANDHRA PRADESH	33	94,448	8,283	24	74,388	6,781
BIHAR	6	3,524	158	3	1,345	61
GUJRAT	1	2,319	209	2	1,386	113
GOA	78	71,315	4,251	89	86,038	4,639
KARNATAKA	88	472,095	52,236	84	444,390	45,388
M.P.	9	267,867	76,637	11	243,860	72,673
MAHARASHTRA	19	226,122	52,082	19	221,676	51,363
ORISSA	36	554,228	63,295	38	452,676	59,003
TOTAL:-	270	1,691,918	257,781	270	1,525,559	240,020

TABLE - 7

Manganese ore exports

Year	Total Export in M.Tonne	1st Grade +48% Mn.	2nd Grade -48%+ 35%Mn.	Low Grade - 35% Mn.
1970	1613,715	81,625	438,058	1090,600
1971	1242,686	88,241	359,896	791,351
1972	860,948	31,583	274,909	552,725
1973	691,898	16,624	203,735	470,539
1974	1034,603	57,634	208,454	768,515
1975	807,276	43,069	214,398	549,809
1976	714,438	Not available	198,175	516,263
1977	554,375	-do-	166,861	387,514
1978	577,292	96,389(*1)	44,280 (*2)	436,623
1979	629,944	10,943(*1)	93,831 (*2)	525,620

*1 + 46% manganese

*2 - 46% + 35% manganese.

'fines' contents and chemical analysis. Table-8 and Table 9 show a few typical examples of screen and chemical analysis respectively. The —6 mm fraction in pearl coke is found to very between 25 to 35% and that of mixed coke around 50 to 65%. The fixed carbon has dropped down to around 67% whereas ash content is higher than 30% and phosphorus vary from 0.130 to 0.160% on an average.

The much talked about low ash formed coke or LTC has not yet been made available to the industry. However, the biggest problem with coke, has been the recent heavy increase in price of pearl coke by as much as 62% from Rs. 554/- to Rs. 900/- per metric tonne with effect from May 1983. The actual cost of coke at the plant site will still be very high because of freight rate and other losses. On top of it, the quality of material is inferior.

Disposal of ferromanganese fines

During handling of the alloy more than 10% of the product becomes undersize i. e. less than 30mm and the main customers like steel plants do not accept any size less than 40 to 50 mm. There is always mounting resistance from other customers also to accept any so called under-size and thus the disposal of these small sized materials have become a serious problem to the ferromanganese producers Remelting the fines involve energy consumption, losses in slag and volatalization losses. It is time that technocrats managing steel sector, find out ways and means to use material below 40mm size also.

Taxation and Central Excise

The recent hike in the taxation and railway freight have added immense misery to the ferromanganese producers in addition to the

TABLE - 8

Screen analysis of coke

Sl.No.	Date of Receipt.	Type of coke	Size in Percentage			
			+25mm	-25mm. +10mm.	-10mm + 6mm	-6mm
1.	22.5.1982	Pearl	10.19	46.12	14.50	29.13
2.	18.7.1982	Pearl	13.85	53.08	3.84	29.29
3.	9.9.1982	Pearl	14.50	50.50	9.50	25.50
4.	21.1.1983	Pearl	2.20	51.50	10.00	36.26
5.	15.5.1983	Pearl	2.29	72.94	2.75	22.02
6.	31.5.1983	Pearl	5.98	64.14	3.59	26.29
7.	5,3.1982	Mixed	18.37	20.77	13.68	47.18
8.	25.7.1982	Mixed	10.44	32.17	6.52	50.87
9.	27.5.1983	Mixed	11.40	36.05	6.98	45.57

TABLE - 9

Chemical analysis of coke

Sl.No.	Date of Receipt	ANALYSIS IN PERCENTAGE				
		Moisture	V.M.	Ash.	Fixed Carbon	Phosphorus
1.	7.4.1982	.67	3.03	28.93	67.37	.132
2.	25.7.1982	.62	2.01	29.53	67.84	.156
3.	31.12.1982	.64	3.29	27.95	68.12	.135
4.	21.1.1983	.64	3.29	26.92	69.0	.137
5.	23.2.1983	.68	1.67	28.45	69.0	.095
6.	19.4.1983	1.36	1.70	32.72	64.22	.116
7.	31.5.1983	0.10	1.89	30.14	67.87	.159

heavy taxation involved in the form of Central Excise and Electricity duty with the supply of energy. The Central Excise levy and electricity duty over electric power are responsible to a large extent for higher tariff in the country. These Government levies constitute nearly 11.5% of the power cost.

During the year 1975, ferromanganese was covered under the Central Excise Levy and today the rate of Central Excise comes to 11% ad volorem.

All these levies cause tremendous strain on the working capital of the units which are already hard-pressed with difficult cash liquidity. It is felt that the Government must take appropriate steps to with-draw completely Central Excise and Electricity duty from the power consumed by this industry and also take out ferromanganese from the purview of the Central Excise. This will help to a great extent in reviving this industry which is today on the brink of sickness.

The railway administration too, should consider in subsidizing freight over movement of raw materials to this raw material oriented industry and also over the finished product while being exported. Some of the earlier concessions which have been withdrawn in recent years, should be re-introduced to save the industry from bankruptcy.

Sale & Export

All the integrated steel plants under the Steel Authority of India Limited, are the major consumers of ferromanganese. The basic price and the quantities to be supplied to each plant are being fixed by discussions among the representatives of SAIL and individual Ferro-producer.

Table - 10 shows the off-take by, these integrated steel plants for the last ten years against their allocations. This table will reveal that very often the contracted quantity has not been lifted by these plants. This is causing grave hardship to the industry not only in the form of upsetting the production planning but also in the form of reduced cash flow.

The other consumers are the mini-steel plants with electric steel making furnaces, alloy steel producers and the foundries. The total requirement of these small units is placed around 23,000 tonnes annually. The surplus quantity, thus available, has to be exported.

Owing to global recession in the steel market, the present demand and price of ferroman-

TABLE - 10

Sales of ferromanganese to SAIL steel plants

Year	Allocation in Metric Tonnes	Actually supply lifted in Metric tonnes.
1973-74	66,775	60,257
1974-75	69,675	61,659
1975-76	72,040	73,488
1976-77	101,283	96,282
1977-78	99,467	98,895
1978-79	101,480	89,276
1979-80	131,912	98,670
1980-81	125,560	101,245
1981-82	110,000	105,000
1982-83	132,000	99,500

ganese in the international market has drastically come down. During the time when prices of all the major cost ingredients of ferromanganese production, like electricity, manganese ore, carbon paste and coke have gone up manyfold, the export price has come down by more than 100 dollars. The world business of this item is about 1.5 million tonnes under normal circumstances and the importing countries are U.S.A., Japan, Rumania, Western Europe and Middle East. But now there is heavy competition from the countries like South Africa, Norway, Brazil, Australia and France, where the power tariff and other cost of production are lower. It has almost become impossible for Indian producers to compete with others in the trade.

Prospects of Ferromanganese Industry

As already mentioned, prospect of ferromanganese industry is closely related to the production of steel in the country. Presently there are six integrated steel plants, five in the Public Sector, controlled by the Steel Authority of India Limited, and the sixth one is the Tata Iron & Steel Co. Ltd. in the Private Sector. The total ingot steel capacity of these plants is 11.4 million tonnes. The Bokaro Steel is being expanded to produce 4.0 million tonnes in near future and the Bhilai Steel Plant is also being expanded to 4 million tonnes. The Tata Iron & Steel Company is under a programme of modernisation and at the end of it, this plant will produce 2.16 million tonnes of saleable steel. In addition, there are several smaller steel plants including the Visvesvaraya Iron & Steel Ltd. and the Mini Steel Plants. Together these plants have produced 2.1 million tonnes steel last year and are expected to produce 2.5 million tonnes steel by 1985-86.

Depending on the quality of steel and type of product, the integrated steel plants consume about 13 kgs. of ferromanganese per tonne of hot metal, except the Bhilai Steel Plant where the consumption is around 15 kgs/tonne. The mini-steel plants with electric steel making process, consume 9 to 10 kgs of ferromanganese per tonne. In the case of manganese alloy steel, the requirement is quite high. Table - 11 shows the plant-wise production of steel in 1981-82, 1982-83, the anticipated production of steel by 1985-86 and the projected demand of ferromanganese by these plants at that time. Thus if the country can produce 17 million tonnes of steel by 1985-86, utilizing full installed capacity, the consumption of ferromanganese may rise to about 2,20,000 tonnes annually.

TABLE - 11

Projected demand of ferromanganese

Plants	Present installed capacity in million tonnes.	Production of Ingot steel in million tonnes		Expected production in 1985-86 in million tonnes.	Projected demand of ferromanganese in '000 tonnes.
		1981-82	1982-83		
TISCO	2.0	1.956	1.946	2.10	30.0
IISCO	1.0	0.600	0.624	1.00	13.0
BHILAI	2.5	2.115	2.130	4.00	56.0
ROURKELA	1.8	1.203	1.144	1.80	23.4
DURGAPUR	1.6	0.930	0.952	1.60	20.8
BOKARO	2.5	1.793	1.829	4.00	52.0
OTHER PLANTS COMBINED	2.6	2.000	2.100	2.50	25.0
TOTAL:-	14.0	10.597	10.725	17.00	220.2

Lately, the power supply situation in the State of Maharashtra where most of the ferro-manganese plants are situated, has improved considerably and complete withdrawal of load restriction has been forecast by the authority. Situation in Andhra Pradesh is not bad and that of Karnataka & Orissa is likely to improve with better rain-fall. Under favourable conditions, with the present installed capacity, the industry can easily produce 3,00,000 tonnes annually and a surplus quantity of around 80,000 tonnes could be available for export.

In the International field, figure 1 shows the total and Western World Steel Production

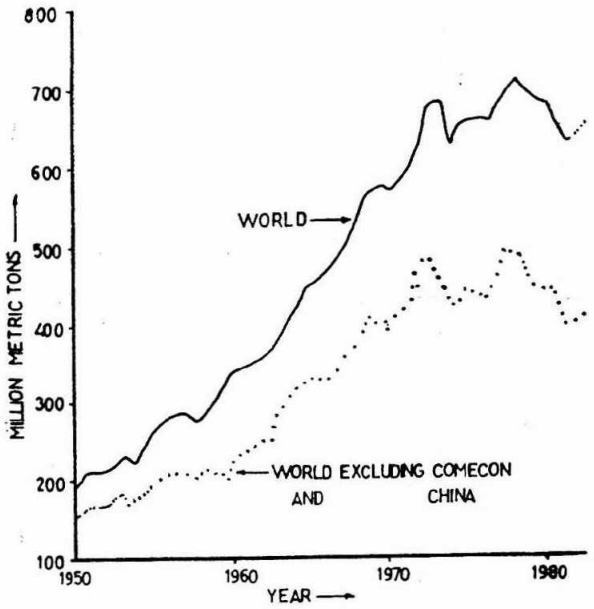

FIG.1:- TOTAL & WESTERN WORLD STEEL PRODUCTION 1950-1982

trend since 1950. It is heartening to note that the sharp fall in steel production has ended by 1982 and there is a clear upward trend after that. According to the latest forecast by one of the leading consultancy firm in London, "the steel industry now looks set for two good years" and is bound to be rapid by 1984-85. The U. S. A. steel industry now improving rapidly and might work at an average of 82% of their capacity by 1985 end. But Japanese market which is now 9.6% down, will remain sluggish for quite sometimes. The Indian Ferromanganese Industry can expect sizeable amount of export in two years' time. However, there is no indication of any price rise for the time being.

Conclusions

To nurse back this vital industry on its way back to recovery, certain immediate steps are necessary.

Power to the producing units should be supplied without interruptions and at peak level. Power should be made available to them at concessional rate. Removal of Central Excise and Electricity duty and rationalisation of fuel cost adjustment, are some of the steps needed to reduce power cost to a reasonable level.

To help export of this vital foreign exchange earning commodity, it is necessary to make it competitive in the world market. This could be done by reducing cost of inputs like power, concessional railway freight over raw materials movement. Concession like freight rebate on ferromanganese transported for export, Tax Credit Certificates, enjoyed by the industry in earlier years, should be re-introduced. The industry's plea for Cash Compensatory Support should be considered.

To maintain regular supply of suitable grade ore to the industry for producing standard quality of ferromanganese, the suppliers and consumers of manganese ore should look together into conservation of high grade manganese ore resources by utilization of low and inferior quality ore by adopting suitable beneficiation and agglomeration technique.

Priority should be given for production and utilization of low phosphorus, low ash formed coke or LTC in the country.