IMnI China Conference in Guilin ,China

The Japanese Ferroalloy Industry – Its present condition and its future

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JFA - Japan Ferroalloy Association
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★General situation ▪ Ferroalloy Industry

World Ferroalloy Industry : Rapid and drastic change during past 2 years

In China structural adjustment led by the government has progressed :

World ferroalloy industry paying close attention !

Japanese Ferroalloy Industry :

In Japan much restructuring occurred in the past

★The present situation of the Japanese Ferroalloy Industry

Over 100 years history : In 1900, 1st ferroalloy production by a blast furnace mill for ferro-manganese

Developed together with the Japanese steel industry over many years and several restructuring phases

15 ferro-alloy producers in Japan : Current annual production is about 900Kmt

Main products : Manganese ferroalloys and ferronickel covers almost 98%

★Ferroalloy Production in Japan

Manganese ferroalloys : Nippon Denko , Mizushima Ferroalloy , Chuo Denki Kogyo , and Kobe Steel , 4 producers supplying HcFeMn , RefFeMn , & SiMn mainly in the local market

Table-1 Ferroalloy Production in Japan

Unit :1000mt

Item \ Year	2000	2001	2002	2003	2004	2005	2006
HcFeMn	307	291	280	285	347	354	307
Ref-FeMn	77	77	77	86	94	93	99
SiMn	76	66	74	62	73	95	60
MnAlloyTotal	460	434	431	433	514	542	466
FeSi	0	0	0	0	0	0	0
HcFeCr	123	88	104	14	6	2	3
LcFeCr	9	8	4	6	8	10	10
FeCrTotal	132	96	108	20	14	12	13
FeNi	367	368	371	369	374	391	336
Others	8	7	6	6	6	6	6
FerroalloyTotal	967	905	916	828	908	951	821

Source:Year Book of Iron & Steel (Ministry of Economy,Trade and Industry)

(Remarks) excludes intermediate products

LocalPrdtn(%)							
MnAlloy	47.6%	48.0%	47.1%	52.3%	56.6%	57.0%	56.8%
FeNi	38.0%	40.7%	40.5%	44.6%	41.2%	41.1%	40.9%
Mn+Ni	85.5%	88.6%	87.6%	96.9%	97.8%	98.1%	97.7%

★ Ferroalloy Imports into Japan

Table-2 Ferroalloy Imports into Japan

Unit :1000mt

Item \ Year	2000	2001	2002	2003	2004	2005	2006
HcFeMn	54	41	44	77	45	52	88
Ref-FeMn	16	13	14	10	6	10	10
SiMn	224	218	254	283	300	234	274
MnAlbyTotal	294	272	312	370	351	296	372
FeSi	505	473	463	510	563	487	543
HcFeCr	715	686	727	854	907	954	807
LcFeCr	62	53	56	59	70	65	72
FeCrTotal	777	739	783	913	977	1,019	879
FeNi	38	45	50	57	56	48	45
Others	42	44	43	49	53	49	50
FerroalbyTotal	1,656	1,573	1,651	1,899	2,000	1,899	1,889

Source:Trade Statistics of Japan (Ministry of Finance Japan)

- Ferroalloy imports into Japan : about 1.90 – 2.00 Million mt annually
- Main items imported : FeCr , FeSi , & SiMn

★Ferroalloy Consumption for Steel Making in Japan

Table-3 Ferroalloy Consumption for Steel Making in Japan Unit :1000mt

	2000	2001	2002	2003	2004	2005	2006
Crude Steel Prdtn	106,444	102,866	107,745	110,516	112,716	112,474	116,227
HcFeMn	322	329	332	332	361	384	401
Ref-FeMn	65	74	76	62	68	71	78
SiMn	286	289	302	327	313	323	340
MnAlloyTotal	673	692	710	721	742	778	819
FeSi	345	337	332	334	380	383	398
HcFeCr	833	796	803	850	870	881	871
LcFeCr	45	43	39	42	45	50	52
FeCrTotal	878	839	842	892	915	931	923
FeNi	265	298	309	308	315	282	307
Others	13	13	12	13	14	14	14
FerroalloyTotal	2,174	2,179	2,205	2,268	2,366	2,388	2,461

Source:Year Book of Iron & Steel (Ministry of Economy,Trade and Industry)

- Crude Steel Production : about 116 Million mt per year
- Consumption of f-alloys total (for steel making) : about 2.40 Mil mt per year
- Consumption of f-alloys total (for others) : about 200 K mt per year
- Consumption of Mn f-alloys (for steel making) : about 800 K mt per year
- FeMn : for blast furnace mills (Ex. NSC)/ SiMn : for electric furnace mills

★ Structural Adjustments in the 1960s in Japan

- Common Subject : Steel & Ferroalloy Industries While undergoing expansion of local crude steel production : Assure stable supply of Ferroalloys
- Essential features of the structural adjustment plan（1964）: fixed and proposed by Japan Ferroalloy Association < J F A >

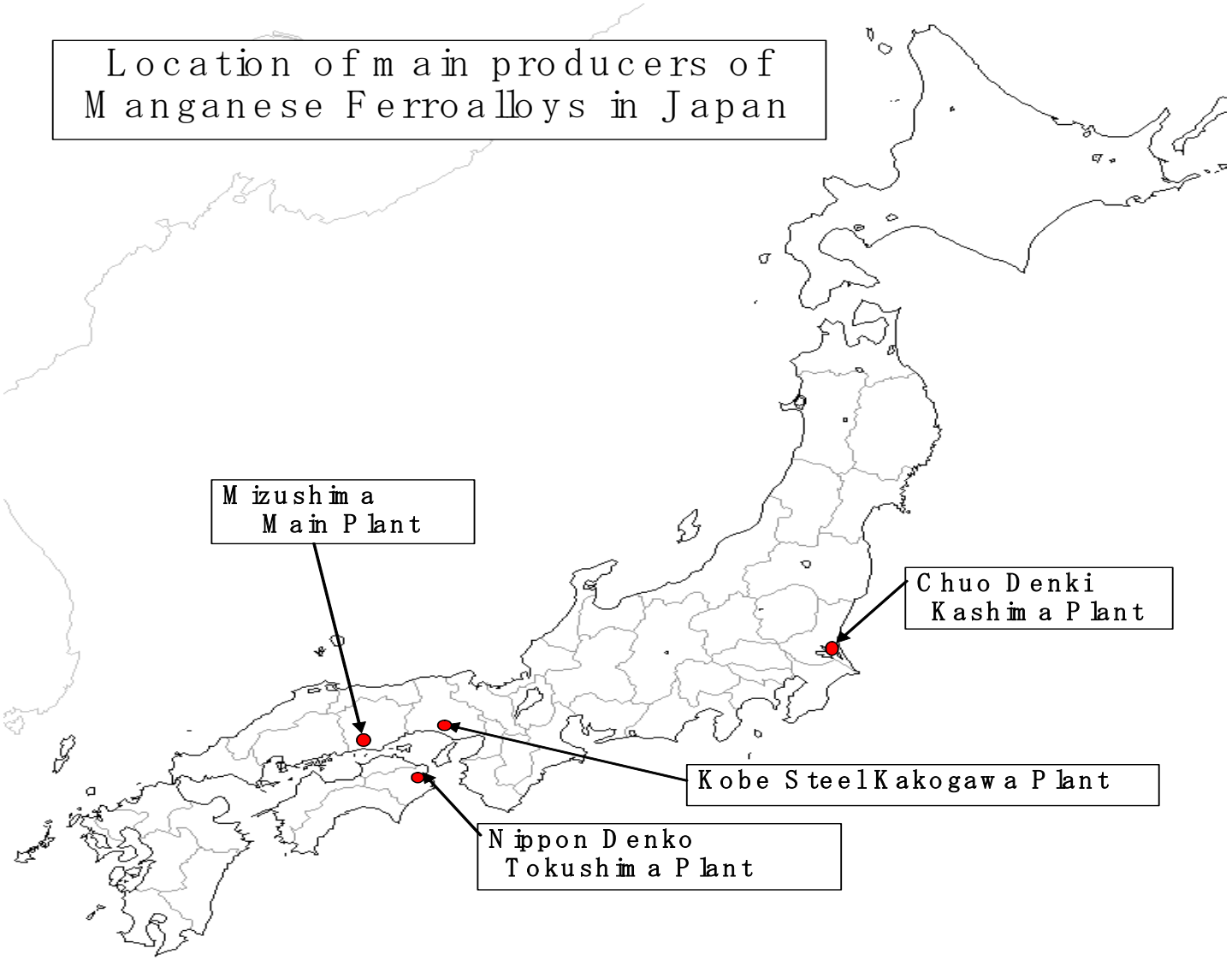
  Restructuring ferroalloy producers within blast furnace mills'groups →

  Expansion of each production scale → Further cost reduction
- Reorganization and merger of companies : Large plants built

  Nippon Denko : Tokushima Plant Mizushima Ferroalloys : Main Plant

  Chuo Denki Kogyo : Kashima Plant etc.
- Foundations of Japanese ferroalloy industry built by strengthening capital and human relationships with blast-furnace steel-mill customers
- Locations of large plants built during the 1960s～1970s are shown in Slide 6

★ Location of large plants built during the 1960s～1970s



★ Structural adjustments in the 1960s in Japan

- Table – 4 shows the reorganization of each group of blast furnace steel mills

Table-4 Structural adjustments of Japanese ferroalloy industry in the 1960s

Individual groups	Details of structural adjustment					Remarks
	Concentration of ferroalloy manufacturers			New plants constructed		
Former Yahata Steel Group	Jan-69	Japan Metals & Chemicals	Merger of 3 companies			In 1970, merger of Yahata & Fuji Steel
Former Fuji Steel Group	Dec-63	Nippon Denko	Merger of 2 companies	1970	Tokushima Main Plant	Nippon Steel Group JMC : stopped local production
Former Kawasaki Steel Group	Nov-64	Mizushima Ferroalloy	Joint investment company by KSC and 4 ferroalloy affiliate companies	1965	Mizushima Main Plant	In 2002, merger of Kawasaki Steel and Nippon Kokan JFE Group
Sumitomo Metal Ind. Group		Chuo Denki Kogyo	Specialty of Mn ferroalloys by item adjustment within group of sumitomo metal	1970	Kashima Plant	
Former Nippon Kokan Group			Self-production	1969	Niigata Plant	In 1989, ceased production of Manganese ferroalloy
Kobe Steel Group			Self-production	1970	Kakogawa Plant	Production in Kakogawa Steel Works

★ Structural adjustment during the 1960s～1970s in Japan

In 1974:Ferroalloy producers＝44 companies　Crude steel production : 117 Mil.mt

Ferroalloy Production total : 2.267 Mil. mt ＝Highest production in history

Mn Ferroalloys total ＝1.072 Mil mt ＜FeMn 624Kmt ＋ SiMn 448Kmt＞

In 1974 Ferroalloy Export : 177K mt

Import : 187K mt

1974	
Number of Manufacturers	44 companies
Ferroalloy Production	2,267 K mt
FeMn	624 K mt
SiMn	448 K mt
Exports	177 K mt
Imports	187 K mt

In 1973&1979　2 oil crises :

Electricity cost soared :Serious damage to industries consuming much electricity

Japanese Ferroalloy Ind. : became less competitive in world market

Import of FeSi steadily increased : unit consumption of electricity was high

Structural adjustment law by the government : FeSi・FeCr foster revitalization

1985 Plaza Accord : Yen strengthens → Imports accelerate →

In 1987 total volume of imported F-Alloy finally exceeded local production

★ Structural Adjustments in the 1970s & onwards

Table-5 Ferroalloy Production / Exports & Imports

Unit:Kmt

Year	Crude Stl	Ferroalloys Production			Ferroalloy Exports	Ferroalloy Imports
		Total	FeMn	SiMn		
1974	117,131	2,267	624	448	177	187
1980	111,395	1,866	569	311	71	477
1985	105,279	1,389	442	217	39	820
1987	98,513	973	332	92	32	1,044
1990	110,339	1,132	452	77	18	1,233
1995	101,640	990	347	65	70	1,869
2000	106,444	967	338	72	175	1,656
2005	112,474	951	449	95	150	1,899
2006	116,227	821	406	60	155	1,889

Source : Year Book of Iron & Steel (Ministry of Economy,Trade and Industry)
Trade Statistics of Japan (Ministry of Finance Japan)

★ Structural reform ・ Economization ・ Transplanting abroad

・Structural reform and economization of the local production system

・Transfer of local production to abroad for certain items, especially those having high consumption of electricity per unit.

★ JV companies abroad made by Japanese F-A producers

Table－6 JV by Japanese Ferroalloy Producers

	Establishment	Products	Location	Name of JV	Partner	Remarks
Japan Metals	1994.08	FeSi	Brazil	Silicio De Alta Pureza	Pojuca Bahia	Silvasa / Ferobasa
& Chemicals				De Bahia S/A	Brazil	
	1996.01	LcFeCr	Zimbabwe	JM Alloys	Zimbabwe-alloys	In 2004:Tech
						Agreement expired
	1996.06	MLcFeMn	South Africa	Advalloy	Samancor-Mn	Shares：sold
Nippon Denko	1993.03	HcFeCr	South Africa	NST Ferrochrome	Samancor-Cr	
	2002.03	FeV	South Africa	SAJ Vanadium	Highveld Steel	
	2004.08	SiMn	China	Jinzhou Nichiden	CITIC Jinzhou	
					Ferroalloy	
Mizushima						
Ferroalloy	1996.06	MLcFeMn	South Africa	Cato Ridge Alloys	Ferralloy	
				MTC-Middleburg		
Showa Denko	1995.07	MLcFeCr	South Africa	Techno Chrome	Samancor-Cr	Shares：sold

(JV by customers / consumers)

JFE Steel	2004.08	SiMn	China	Erdos EJM	Erdos Group	

- Primarily Cr – Projects with South African partners
- Recently 2 SiMn projects with China partners established
- SiMn JVs in China： JV-1 is made between Japanese & Chinese F-A producers
  JV-2 is made between Japanese Steel Mill and Chinese F-A producer

★ Maintain local production＜FeMn , etc＞

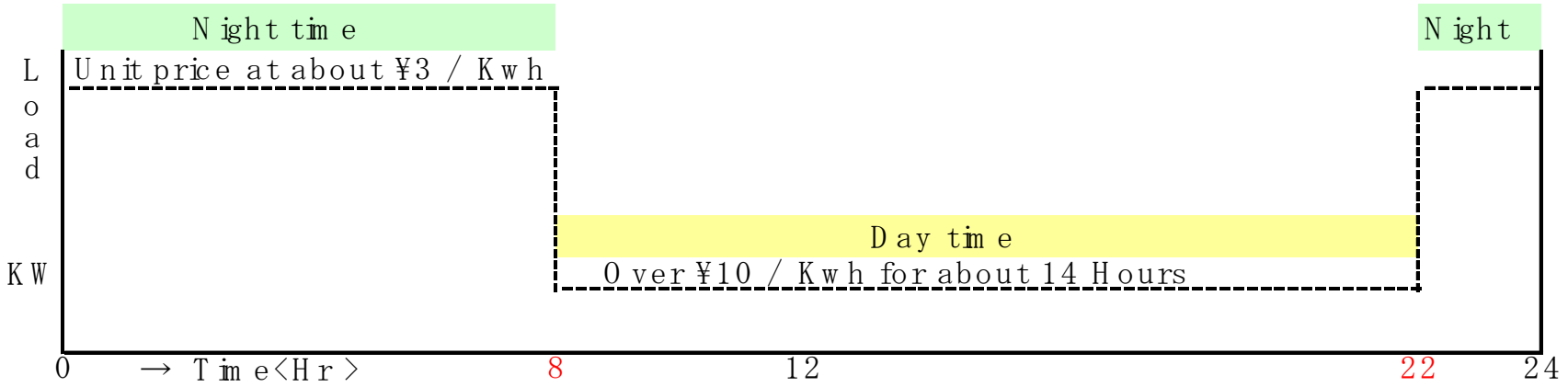
- Electricity consumption per unit , if low cost… : FeMn, etc. /alloy → **Maintain Local Production**

- Maintain ・ further upgrade high level in-house technologies : -1) -2) -3)

  -1) Use lower-cost night-time electricity intensively ・night time high loading operation technology established

Unit price of electricity : \5-6 / Kwh achieved ＜ International level ＞

Table－7 Pattern image of operating load



★ Maintain local production ＜FeMn , etc＞

-2) Improvement of productivity per head : Reduction of total output

Rationalization (downsizing)

In 2005, average production was 920 mt / head , or 5.4 times that of 1974

Table－8 Productivity (Per Head)

	1974	1985	1990	1995	2000	2005
(km t)						
Ferroalloy Production	2,267	1,389	1,132	990	967	951
(erson)						
Workers in Ferroalloy Div.	13,200	4,160	3,070	1,860	1,250	1,030
(t/head)						
Production per head	172	334	369	532	774	923
vs 1974 %	100%	194%	215%	310%	450%	538%

-3) Recycling of exhaust gas : fuel for thermal power generation , or for home power generators

★ Ferroalloy : Import ratio %

Import of Ferroalloys into Japan are now about 65% of total. Less than 10% are FeMn

Local market quite stable : Good balance between imports and local production

Table－9 Ferroalby Total Import Ratio %

Unit：K m t

	Year	1990	1995	2000	2001	2002	2003	2004	2005	2006
Ferroalby Total	Production	1,343	1,227	1,038	1,050	1,032	977	1,057	1,112	982
	Imports	1,233	1,869	1,656	1,573	1,651	1,899	2,000	1,899	1,889
	Exports	18	70	175	161	144	131	136	150	155
	Apparent-consumption	2,558	3,026	2,519	2,462	2,539	2,745	2,921	2,861	2,716
	Import Ratio	48.2%	61.8%	65.7%	63.9%	65.0%	69.2%	68.5%	66.4%	69.6%

Remarks: Production figures above include intermediate products

Apparent consumption = Production + Imports － Exports

Import Ratio % ＝Imports ÷Apparent-consumption %)

★ Future expectation

< World >

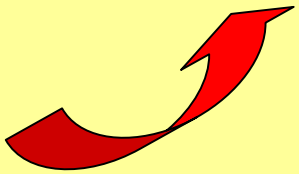
According to the IISI Forecast（ Oct.,2006 ）:

In 2007, annual apparent world steel consumption : 1.179 Bil.mt (5.2% up vs 2006)

3 years ave. growth from 2007 to 2010 forecast to be 4.9% and 1.319 Bil.mt in 2010

- Equivallent to **1.450Bil mt** of crude steel （ in 2010 ）

World ferroalloy demand is increasing



< Japan >

Crude Steel Production: Good and stable and in excess of 100Mil. mt since 2000

Largest demand from following manufacturing sectors : Automobile, Shipbuilding and Industrial machinery

Blast furnace mills : Production of crude steel planed to increase 10-20% through to 2010, for high grade steels for automobiles and high strength steel

Ferroalloy producers : Must maintain stable supply

Repairing furnaces and adding capacity

Mission : especially for Manganese ferroalloys , to maintain stable supply of high quality ferroalloys and to keep in balance with demand

★ Future expectations & conclusion

Chinese Ferroalloy Industry : Undergoing restructuring. Now changing

from an industry that wastes energy and valuable resources into

→ an industry that is highly efficient and environmental friendly

World Steel & Ferroalloy Industries **China = No.1 !**

China's influence keeps growing

Toward sustainable growth of world ferroalloy industry

China's structural adjustment such as implementing of supply reduction surely will occur

Certain improvement is expected and hoped for

The world's ferroalloy producers are paying great attention !