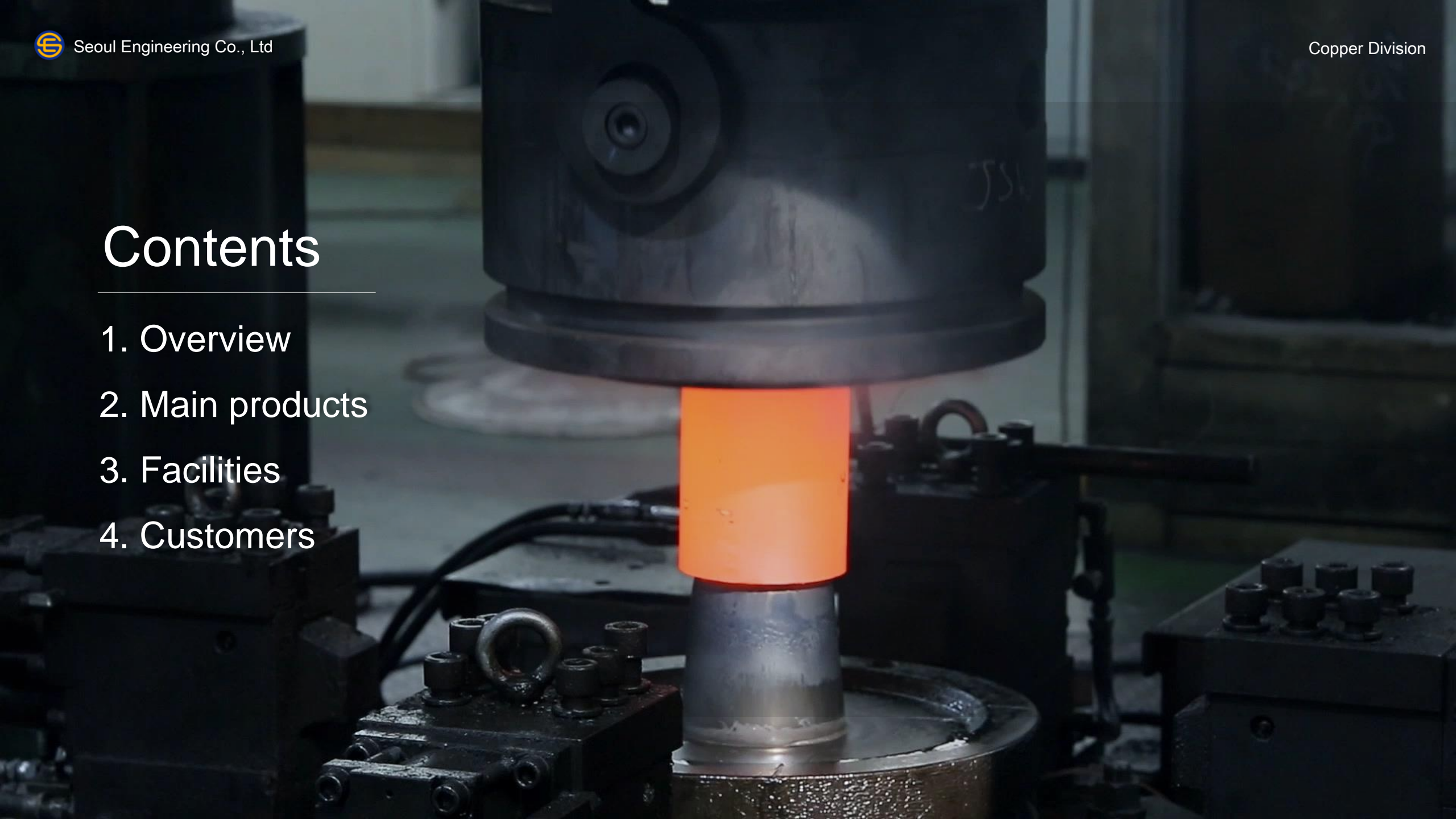


Introduction of Seoul Engineering

Contents

1. Overview
2. Main products
3. Facilities
4. Customers



(주)서울엔지니어링

서울엔지니어링

SEOUL ENGINEERING
本社工場

Business Area

안전모착용
10
금지
사서계명속도



Copper Division

1. Copper Castings for Blast Furnace and Steelmaking plant
(Tuyere Nozzle and Cooler, Lance Nozzle, Cooling Plate, Copper Staves, Jackets, Panels)
2. Cooling Products for Non-ferrous Metal Smelters

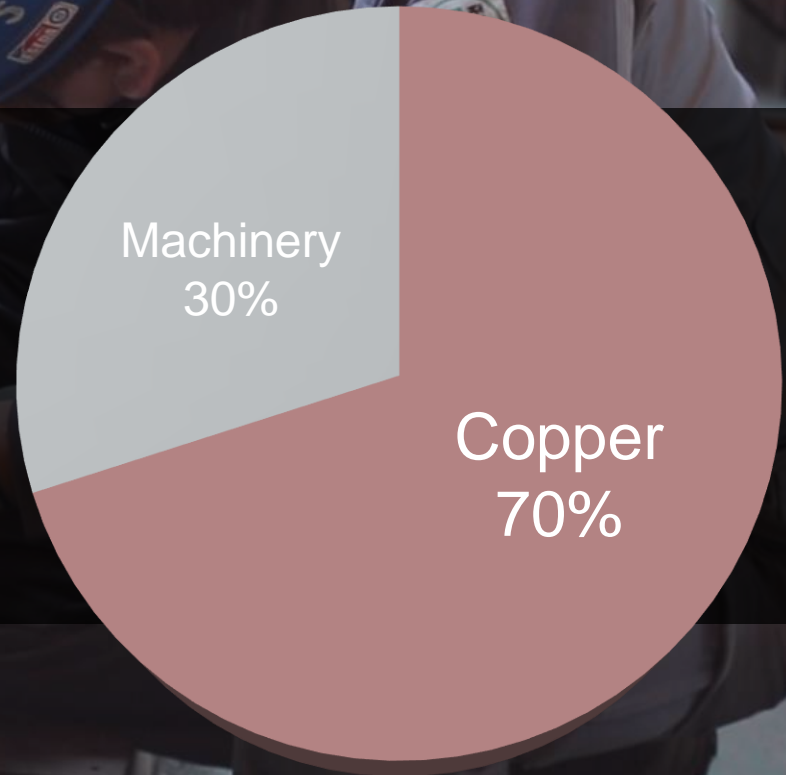
Industrial Machinery Division

1. Reel & Mandrel, Down Coiler Assembly, Gear Box, etc.
2. Terminal Equipment - Side Trimmer, Belt Wrapper, Sheer, etc.
3. Mill Stand Precision Machinery - Mandrel, Out board, etc
4. Coil Strip Line - CCL, RCL, BL/BHL, CTL, etc.



Number of Employees

Total 250
Copper Dept. 155
Machinery Dept. 95



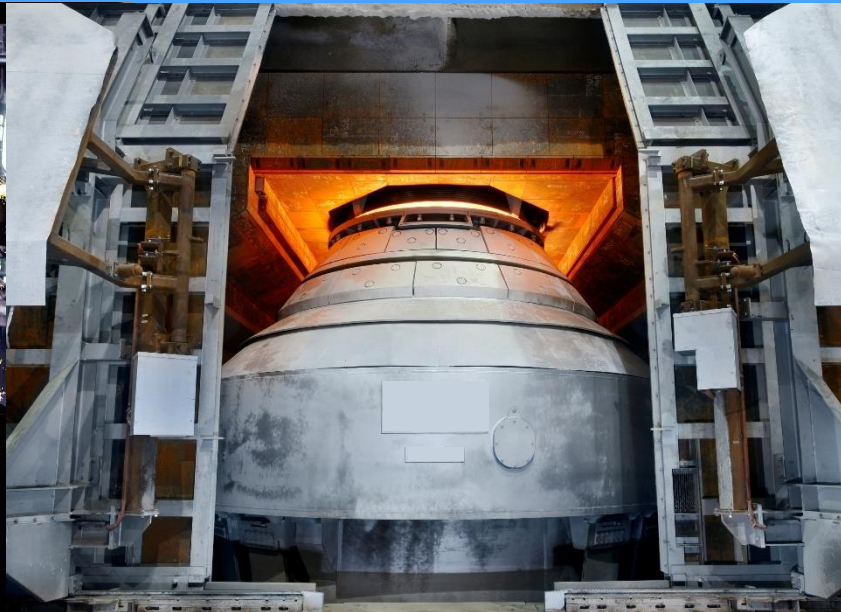
History

- Nov. 1968 Established
- Sep. 1974 Starting of supplying products to POSCO
- Oct. 1995 ISO 9002 Certified by KMA
- Dec. 1997 ISO 9001 Certified by IQNet & KSA-QA
- May. 2003 Constructed 2nd manufacturing plant - Industrial machinery
- Sep. 2003 Constructed 3rd manufacturing plant - Copper staves
- Oct. 2006 Expansion of 1st & 3rd plants into new facilities
- Jun. 2012 **Developed Multi Chamber(2C2S, 3C3S) Spiral Tuyere**
- Nov. 2012 Awarded 50 Million Dollar Annual Export Tower
- Sep. 2013 Awarded Gold Tower Order of Industrial Service Merit(Chairman)
- Jun. 2013 **Developed Injection-Hole Forged Lance Nozzle**
- Nov. 2016 Managing Director HY LEE won Silver Tower Order of Industrial Service Merit
- Jan. 2018 Selected as POSCO CERTIFIED PARTNER for 12 consecutive years

Main Products



Blast Furnace



Steelmaking Plant

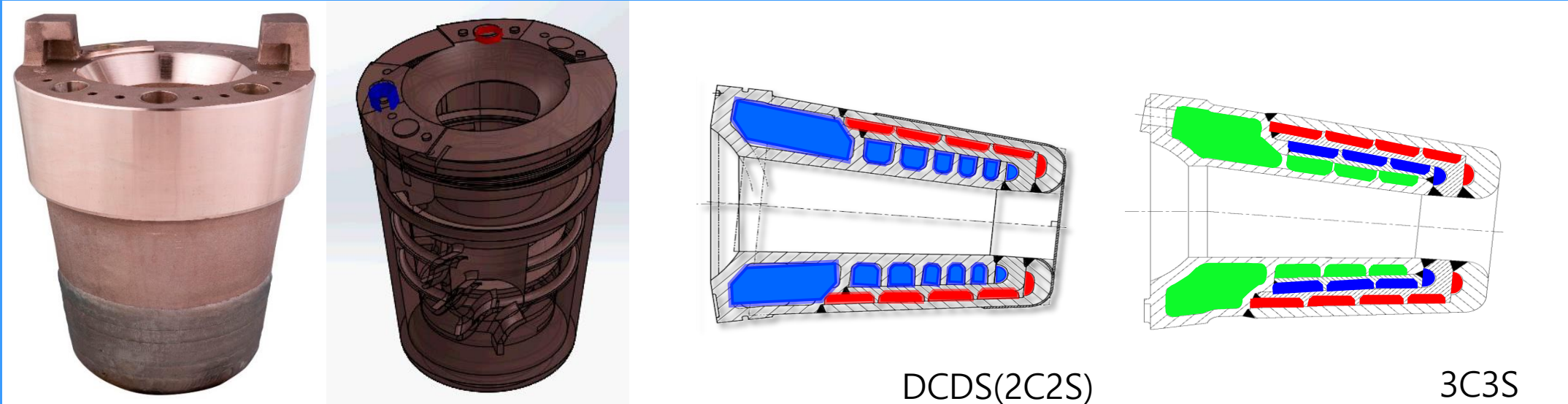


Non-Ferrous Metal Smelter

1 Blast Furnace

Tuyere nozzle

Patented multi chamber multi spiral tuyere in more than 10 countries



Sales Records - Tuyere Nozzle 2012-2017						
Year	2012	2013	2014	2015	2016	2017
Quantity(pcs)	3,704	2,831	3,878	2,727	3,233	3,511
Total 19,884pcs						
Average: 3,314pcs a year						

Customers of DCDS Tuyere

Company	BF	Product Type	Remarks
Thyssen Schwelgern	BF1(4,500m ³) BF2(5,500m ³)	3C3S 2C2S	2013~ 2016~
Posco Gwangyang	BF1(6,000m ³) BF5(5,500m ³)	2C2S	2013~ 2016~
Posco Pohang	BF2(2,550m ³) BF3(5,600m ³)	2C2S	2015~ 2017~
KrakatauPosco	BF1(3,800m ³)	2C2S	2013~
CSP	BF1(4,500m ³)	2C2S	2016~
voestalpine Donawitz	BF1,4(2,300m ³)	2C2S	2016~
JSW Bellary	BF1(2,300m ³) BF3,4(4,016m ³)	2C2S	2016~
Esfahan	BF3(2,000m ³)	2C2S	2016~
IISCO	BF5(4,160m ³)	2C2S	2016~
AM Temirtau	BF2,3(3,200m ³)	2C2S	2016~
AM Ostrava	BF2,3(3,500m ³)	2C2S	2017~
AM Gent	BFA,B(3,000m ³)	2C2S	2017~

Sales Records – Tuyere Nozzle(DCDS) 2016-2017

Customer	Year		Total	Remarks
	2016	2017		
Posco Kwangyang	50	176	226	
Posco Pohang	109	141	250	
Thyssenkrupp	122	144	266	
KrakatauPosco	28	48	76	
Voestalpine Donawitz	25	0	25	
AM Temirtau	20	0	20	
JSW Bellary	3	36	39	
IISCO	10	35	45	
AM Ostrava	0	25	25	
AM Gent	0	32	32	
Total	367	637	1,004	

Patent Registration

No.	Our Ref.	Country	Application Subject	Applicant	Attorney	Receipt Date	Application Date	Publication Date	Registration Date
							Application No.	Publication No.	Registration No.
1	OPP110173DE	Germany	Tuyere For Iron Making Furnace	Seoul Engineering Co., Ltd.	GRUNECKER	2011.07.21	2011.09.19.	2012.07.26.	2014.04.10.
							102011082904	DE 102011082904	10 2011 082 904.0
2	OPP110174CN	China	Tuyere For Iron Making Furnace	Seoul Engineering Co., Ltd.	Peksung Intellectual Property Ltd.	2011.07.25	2011.09.23.	2012.07.25.	2015.06.17.
							2011102866310	CN102607282 A	201110286631 0
3	OPP110177US	USA	Tuyere For Iron Making Furnace	Seoul Engineering Co., Ltd.	COOPER & DUNHAM LLP	2011.07.28	2011.08.22.	2012.07.26.	2014.08.19.
							13/214,477	US-2012-0187 613	8808615
4	OPP110178JP	Japan	Tuyere For Iron Making Furnace	Seoul Engineering Co., Ltd.	OGURA & CO	2011.07.28	2011.08.23.	2012.08.16.	2014.07.04.
							2011-181627	2012-153973	5572137
5	OPP110179IN	India	Tuyere For Iron Making Furnace	Seoul Engineering Co., Ltd.	KAN & KRISHME	2011.07.28	2011.09.01.	2013.01.04.	Publicated
							2510/DEL/2011		
6	OPP120020ID	Indonesia	Tuyere For Iron Making Furnace	Seoul Engineering Co., Ltd.	ABSOLUT PATENT & TRADEMARK	2012.01.30	2012.04.03.	2012.07.26.	2015.11.02.
							W00 2012 01268	2012/03377A	IDP000039770
7	OPP120092BR	Brazil	Tuyere For Iron Making Furnace	Seoul Engineering Co., Ltd.	Dannemann Siemsen	2012.04.19	2012.05.25.	2016.08.23.	
							BR11201201269 7-0		
8	OPP130042EP	Europe	Tuyere For Iron Making Furnace	Seoul Engineering Co., Ltd.	CABINET CHAILLOT	2013.06.11	2013.07.08.	2013.12.04.	
							11857092.8	2669388	
9	OPP130043RU	Russia	Tuyere For Iron Making Furnace	Seoul Engineering Co., Ltd.	Gorodissky	2013.06.11	2013.07.22.		2015.03.10.
							2013134266		2543582
10	OPP130044VN	Vietnam	Tuyere For Iron Making Furnace	Seoul Engineering Co., Ltd.	Ambys Hanoi Law Firm	2013.06.11	2013.07.15.	2013.10.25.	Publicated
							1-2013-02202	35542	

1 Blast Furnace

Facing and coating

- Hardfacing(Fe-Cr, Ni-Cr)
- Calorizing(Al_2O_3)
- Refractory Coating(Ceramic, Al_2O_3)



1 Blast Furnace

Tuyere Cooler



- 6,896pcs(2002-2017)
- Average 431pcs a year

1 Blast Furnace

Cooling Plate(Plate Cooler)



Supply Records

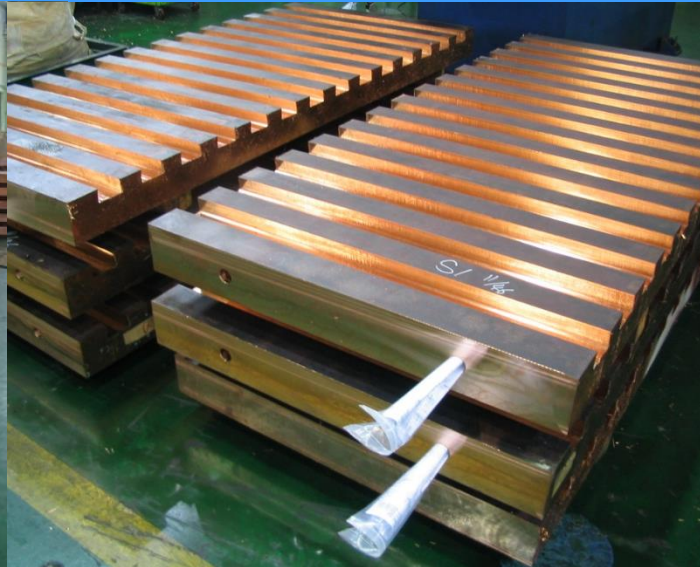
- 62,329pcs(1999-2017)
- Average 3,280pcs a year

Recent Projects

- Hòa Phát Dung Quất(Vietnam)
- CSC(Taiwan)
- RSP(India)

1 Blast Furnace

Copper stave



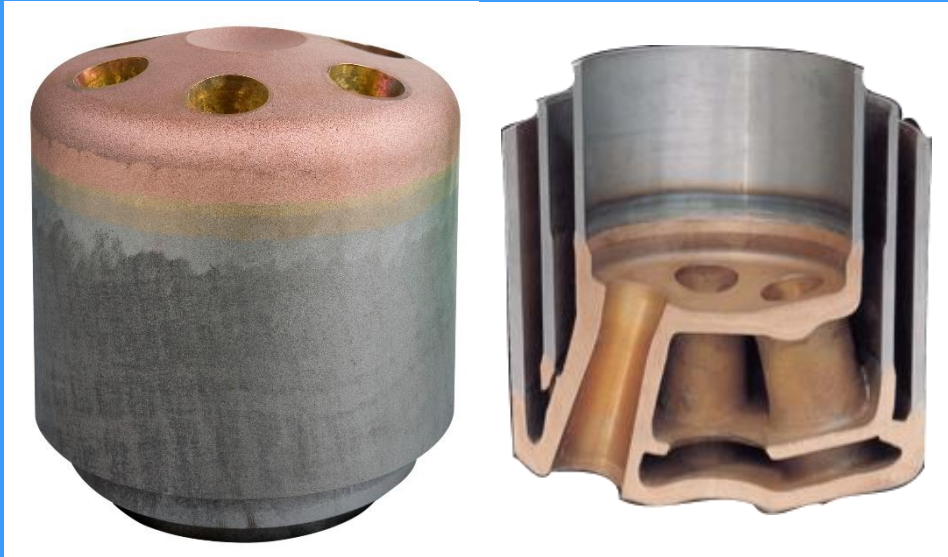
Sales Record - Copper Stave

No.	Customer		Q'ty	Shipping date	Type	Remarks
	Country	Company				
1	Germany	HKM	718pcs	Aug. 2000	Sand cored casting	For HKM BF "B", Small copper stave
2	Japan	MMT**	616pcs	May 2004	Rolled & Drilled (OFHC*)	For copper smelting furnace
3	Korea	LG Nikko	1500pcs	1988 ~ Now	Rolled & Drilled (OFHC)	For copper smelting furnace
4	Korea	POSCO	322pcs	Jan. 2005	Rolled & Drilled (OFHC)	For Kwangyang BF2 relining (4,350m ^{3****})
5	Korea	POSCO	76pcs	Sept. 2005	Rolled & Drilled (OFHC)	For FINEX Plant
6	Korea	POSCO	322pcs	Dec. 2005	Rolled & Drilled (OFHC)	For Pohang BF3 relining (4,350m ^{3****})
7	Korea	POSCO	322pcs	Sep. 2007	Rolled & Drilled (OFHC)	For Kwangyang BF3 relining (4,600m ^{3****})
8	Korea	Hyundai	412pcs	Aug. 2008	Rolled & Drilled (OFHC)	For BF1 Construction project (5,250m ^{3****})
9	Korea	POSCO	324pcs	Feb. 2009	Rolled & Drilled (OFHC)	For Kwangyang BF4 relining (5,500m ^{3****})
10	India	IISCO	176pcs	Mar. 2009	Rolled & Drilled (OFHC)	For BF5 Construction project
11	Korea	Hyundai	412pcs	Aug. 2009	Rolled & Drilled (OFHC)	For BF2 Construction project (5,250m ^{3****})
12	Korea	POSCO	320pcs	Jun. 2010	Rolled & Drilled (OFHC)	For Pohang BF4 relining (5,600m ^{3****})
13	Korea	POSCO	8pcs	Jun. 2010	Rolled & Drilled (OFHC)	For FINEX Plant. Reconstruction
14	Korea	Hyundai	352pcs	May 2009	Rolled & Drilled (OFHC)	For BF3 Construction project (5,250m ^{3****})
15	Korea	POSCO	108PCS	Aug. 2012	Rolled & Drilled (OFHC)	For FINEX Plant. Construction project
16	Korea	POSCO	32pcs	Feb. 2016	Rolled & Drilled (OFHC)	For Pohang BF4
17	Korea	POSCO	77pcs	Jun. 2016	Rolled & Drilled (OFHC)	For Pohang BF4
18	Korea	POSCO	29pcs	Sep. 2016	Rolled & Drilled (OFHC)	For Pohang BF4
19	Korea	POSCO	16pcs	Apr. 2017	Rolled & Drilled (OFHC)	For Kwangyang BF2
20	Korea	POSCO	31pcs	<u>Sep. 2017</u>	Rolled & Drilled (OFHC)	For Pohang BF4
21	Korea	Hyundai	8pcs	<u>Sep. 2017</u>	Rolled & Drilled (OFHC)	For BF1
Total 6,181 pcs						

2 Steelmaking Plant - BOF and EAF

Lance nozzle

Patent for Injection-hole forged lance tip



Annual 2,500pcs

Customers

Europe

- Thyssenkrupp, Germany
- voestalpine, Austria
- Salzgitter, Germany
- Ilva Taranto, Italy
- TATA Port Talbot, UK
- NTMK, Russia
- ZSMK, Russia
- Sevestal, Russia
- ISD Dunafer, Hungary
- AM Temirtau, Kazakhstan

America

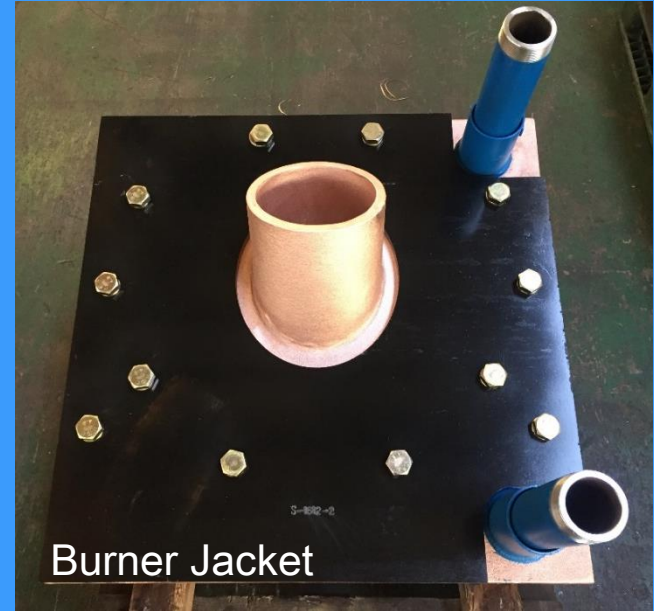
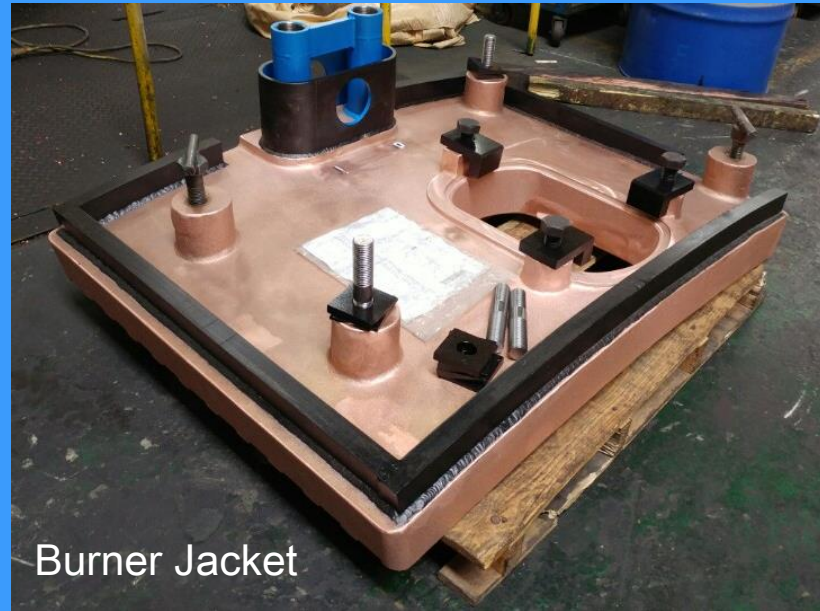
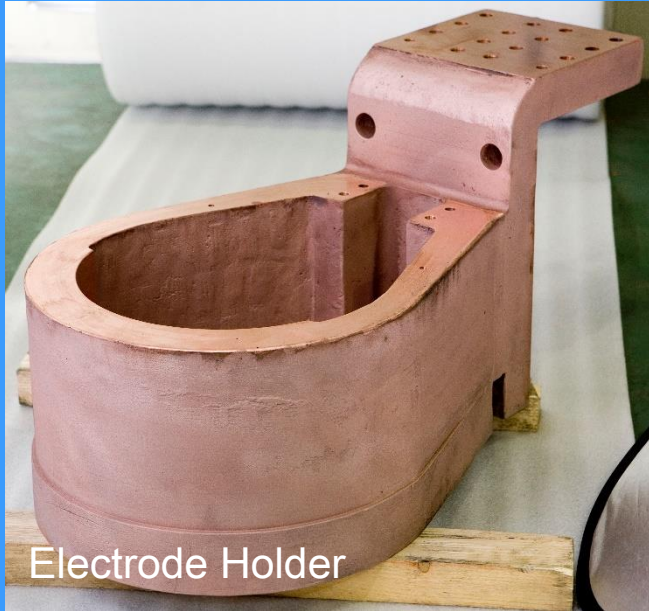
- AM Lazaro Cardenas, Mexico

Asia

- Posco, Korea
- Hyundai Steel, Korea
- TATA Steel, India
- JSW Bellary, India
- JSW Dolvi, India
- SAIL – Rourkela, India
- SAIL – Durgapur, India
- SAIL – Bokaro, India
- SAIL – Bhilai, India
- SAIL – IISCO, India
- Visakhapatnam Steel, India
- Essar Steel, India
- Bhushan Steel, India
- Esfahan, Iran

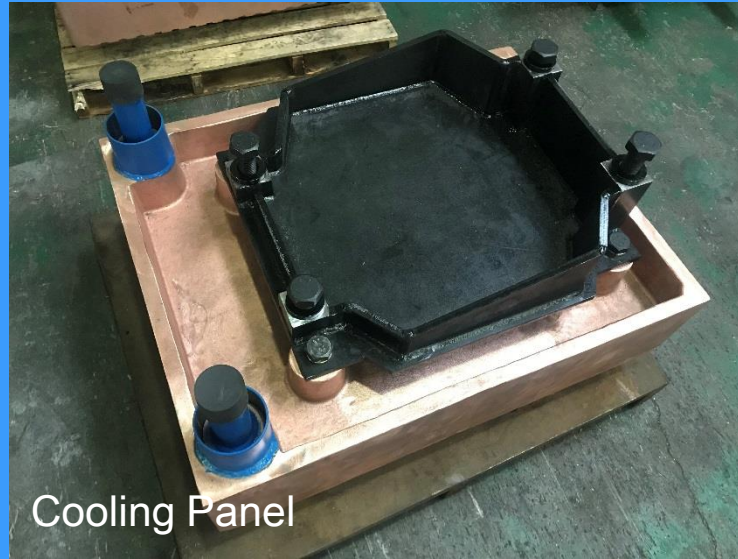
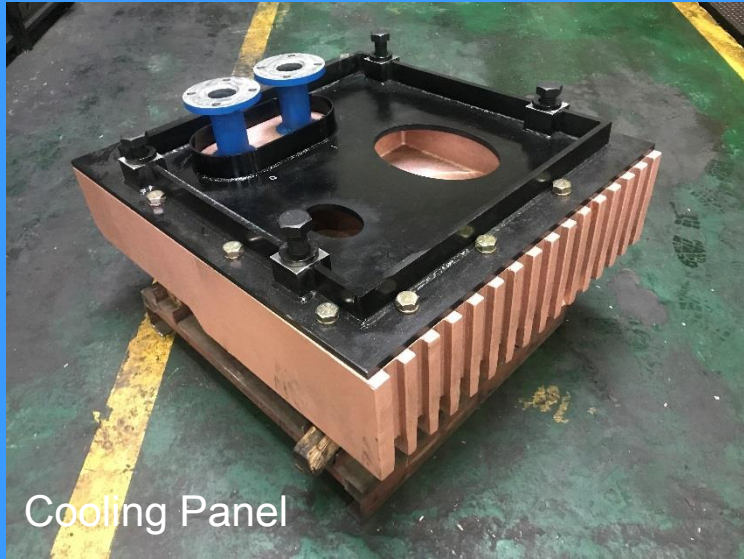
2 Steelmaking Plant - BOF and EAF

Electrode holder, Various Burner Jackets and Cooling Panels



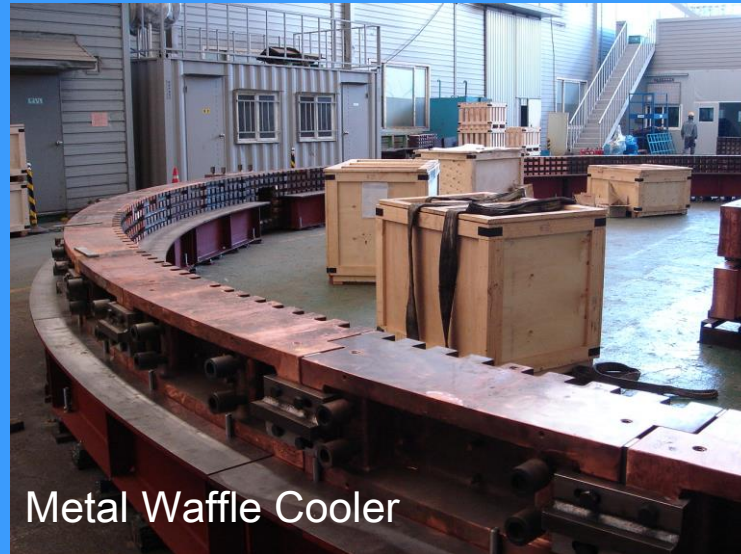
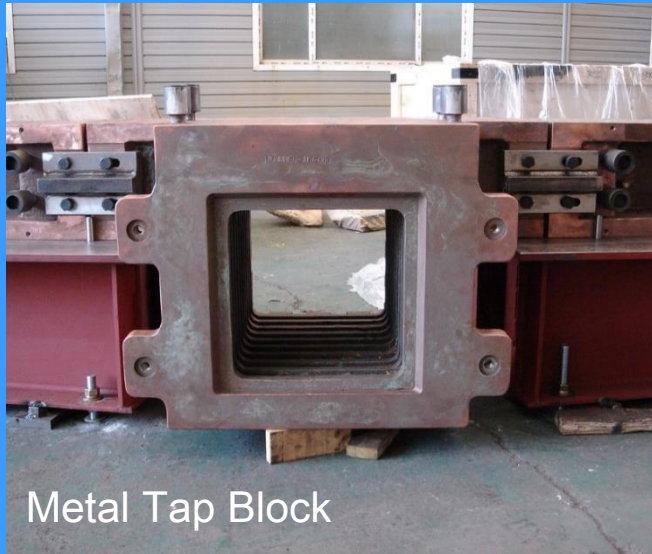
2 Steelmaking Plant - BOF and EAF

Electrode holder, Various Burner Jackets and Cooling Panels



3 Non-Ferrous Metal Smelter

Pipe Embedded Cooling Elements



Facilities

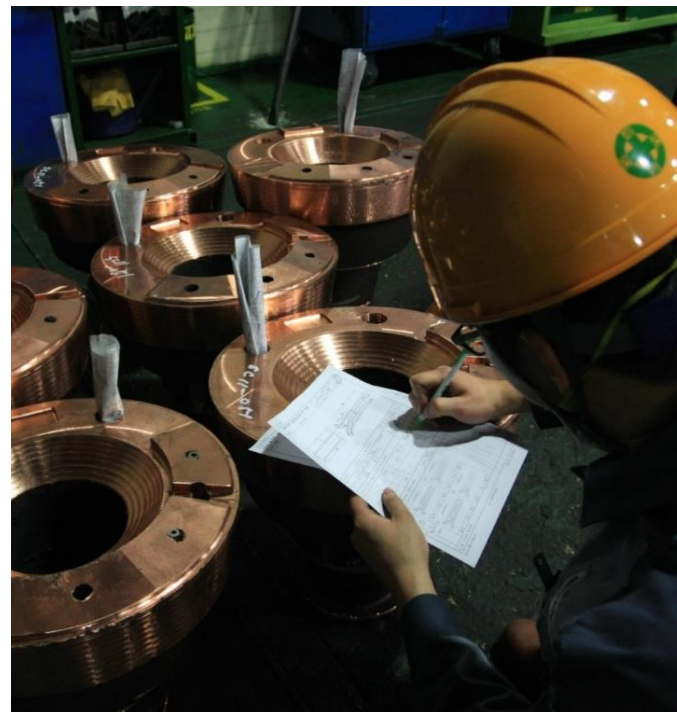


1	2	3	4
· Forging	· Moulding · Casting · Finishing Casting	· Machining · Welding · Patterning · RT	· Machining · Welding

Office

Traveller's Sheet

- Every process is recorded by the manufacturing management system "Traveller's sheet"



Traveller's Sheet

Name of Worker Measured Value Test Results

PROCESS	INSPECTION RESULTS												INSPECTED BY	DATE	OUT CONF.	IN CONF.	QA CONF.	REMARKS				
9 LEAKAGE TEST WITH COMPRESSED AIR 15kg/cm ² 30 MIN.	1ST LEAKAGE TESTED BY:				2ND LEAKAGE TESTED BY:				3RD LEAKAGE TESTED BY:													
	REPAIRED BY :				REPAIRED BY :				REPAIRED BY :													
10 FINAL MACHINING																						
	ITEMS			TOLERANCES			MEASURED VALUE															
A			∅490.5			0 / -0.1																
B			R177.8																			
C			100			±2.2																
D			9°27'11"																			
DEFECTS FOUND AFTER MACHINING						REPAIRED						REJECTED										
11 LEAKAGE TEST WITH COMPRESSED AIR 15kg/cm ² 30 MIN.	1ST LEAKAGE TESTED BY:				2ND LEAKAGE TESTED BY:				3RD LEAKAGE TESTED BY:													
	REPAIRED BY :				REPAIRED BY :				REPAIRED BY :													
12 PRESSURE LOSS TEST	4.5kg/cm ² MAX. 22.9m ³ /hr				INLET PRESSURE:				OUTLET PRESSURE:				PRESSURE LOSS :									
13 FINAL INSPECTION	AUTHORIZED BY																					

순차	공정명	공정 이상 발생 내용	작업자	불량 확인	방출 승인	QA 확인	비고
1	주조	주입용 동차제원 외형불량, 방울유무 (가스배출), 이물, 폐기					기타결함: 주조 공사
2	절단	10mm 가공여유 부족 절단					공사 기
3	1차 검사	1차 소재 연가공 결함내용:					기
4	2차 검사	항목 두께 10 ±0.5 외경(D) ∅267 ±0.5					NC
5	3차 검사	PIPE 단차 가공 공차 A ∅139 +0.1 / 0 B ∅210 +0.1 / 0 C ∅251 +0.1 / 0 공차 E 50±0.3 F 50±0.2					그림참조
6	4차 검사	공차 SPEC ∅32 ±0.15 ∅42.2 ±0.15					
7	수입	15kg/cm ² 30분간 시험.					1차 검사 2차 검사 3차 검사
8	내부 검사	내부결함을 완전히 제거					합격 불합격 이동(폐기)
9	완제품 수입	15kg/cm ² 30분간 시험.					1차 검사 2차 검사 3차 검사
10	출고	QA 확인안:					QA

Quality Management System



- ISO Certified
- 1995. ISO 9002
- 1997. ISO 9001
- 2014. ISO 14001



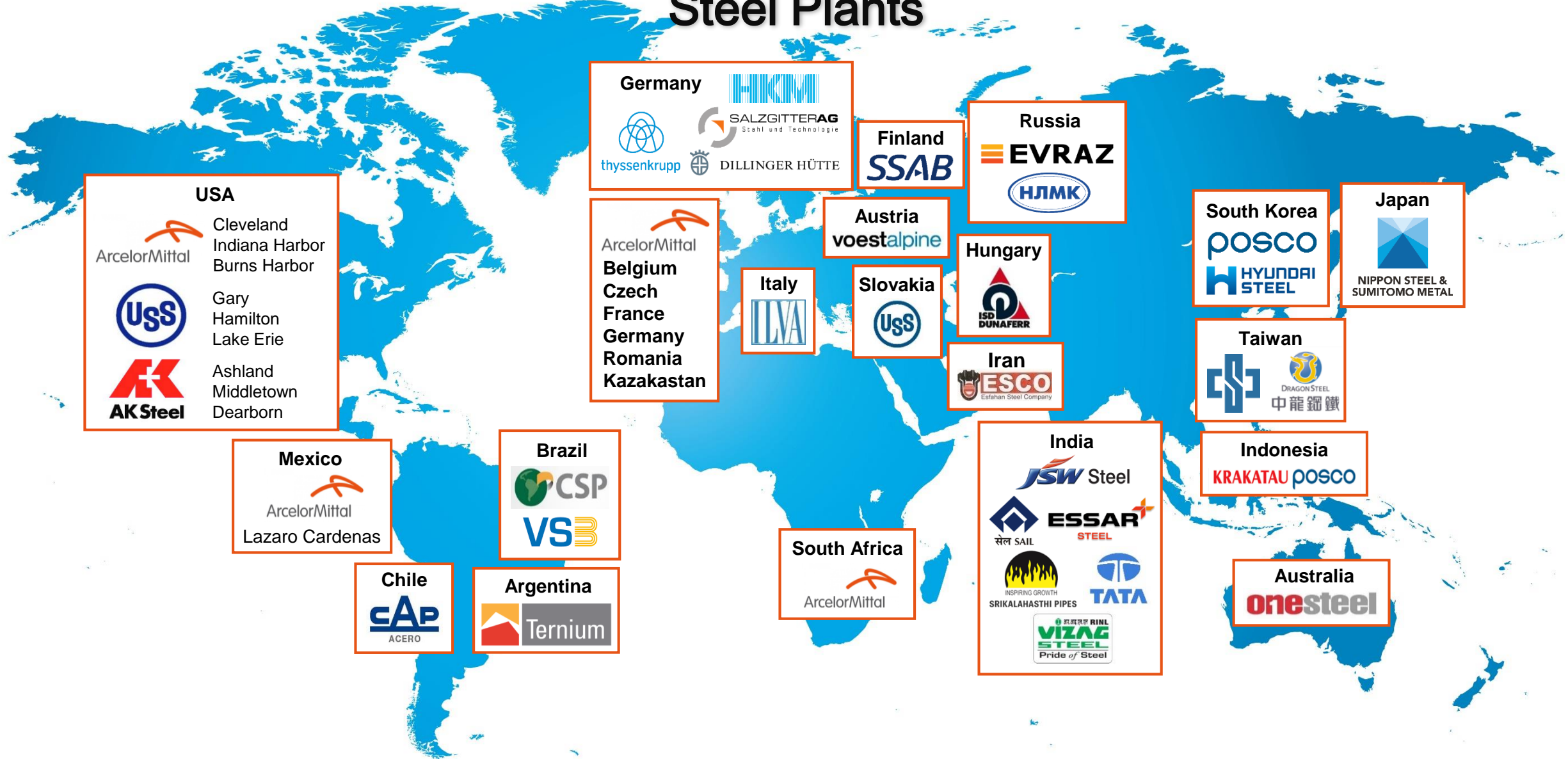
Customers



Blast Furnace Engineering Companies

Non-Ferrous Metal Smelters

Steel Plants





34 Countries
87 Steel Plants
148 Blast Furnaces

**Blast Furnace Specialized Copper Foundry
with 30% Share in Tuyere Nozzle Market**

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Thank you for your attention

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SEOUL ENGINEERING
本社工場

