

## Heating furnace and electric furnace equipment engineering achievements (As of March 2015)

Chuo Refractory Sales &amp; Engineering Corporation

Delivery Year	Delivery Destination	Equipment Name	Specifications/Outline	Concept	Equipment Design	Instrumentation/Controls	Transport Control	Production Manag	Tracking	Additional Systems	Trial Run	Remarks	
1987	OTANI STEEL CORPORATION	Heating furnace equipment (new installation)	WB type heating furnace 45t/h		⊙	⊙	⊙				⊙		
1994	MITSUBOSHI METAL INDUSTRY CO.,LTD.	Heat retaining furnace and soaking furnace (new installation)	WB type heating furnace (h) 90t/h, (c) 65t/h		⊙	⊙(DCS)	⊙				⊙		
2004	NIPPON CHUTETSUKAN K.K.	Large-diameter tube inner surface wate drainage burner	New installation	⊙	⊙	⊙	⊙				⊙	Installation of (13A) regenerative burner	
	GODO STEEL, Ltd. Funabashi Works	Heating furnace fuel conversion	Kerosene > 13A	⊙	⊙	○					⊙	Gasification grant	
	KANTO STEEL LTD.	Billet tip heating equipment inside heat retaining furnace	Expansion of existing furnace	⊙	⊙	○					⊙	(Kerosene) High speed burner	
	OSAKA STEEL CO., LTD. Osaka Okajima Works	Updating of heating furnace control system	(Existing system μXL)	⊙	⊙	⊙(PLC)				Predictive control	⊙		
	TOKYO STEEL CO.,LTD.	Conversion of heating furnace roof to CF and modification of upper partition wall (update)	Manufacture of soaking furnace ceiling hardware	⊙	⊙							05 - '06 Heating zone implementation	
	MITSUBOSHI METAL INDUSTRY CO.,LTD.	Soaking furnace Monitoring ITV within furnace	Expansion of existing furnace		⊙							○	
	KYOEI STEEL LTD. Hirakata Division (Hirakata Mill)	Cold material cut out equipment	Update (modification)		⊙							⊙	
	CHIYODA-STEEL CO.,LTD.	Conversion of heating furnace roof to CF	Manufacture of ceiling hardware	⊙	⊙								
2005	OSAKA STEEL CO., LTD. Osaka Okajima Works	Modification of refractory material of the heating furnace and soaking furnace floors	Installation of high mechanical strength TCS-185	⊙	⊙								
	TOKYO STEEL CO.,LTD.	Heating furnace Furnace pressure control (escape exhaust)	Added as independent equipment	⊙	⊙	⊙					⊙		
	MITSUBOSHI METAL INDUSTRY CO.,LTD.	Soaking furnace WB seal port scale cover	Update (modification)	⊙	⊙								
Soaking furnace extraction H.R. backhaul stopper		Expansion of existing furnace											
2006	Toa Valve Engineering Inc.	Improved performance of the annealing furnace and heat treatment furnace	on-off pattern control	⊙	⊙	⊙					⊙	(Kerosene) High speed burner	
	OSAKA STEEL CO., LTD. Osaka Okajima Works	Heating furnace fuel conversion	Kerosene > 13A	⊙	⊙	○					⊙	Gasification grant	
	KYOEI STEEL LTD. Hirakata Division (Hirakata Mill)	Direct and conversion of heating furnace into high efficiency industrial furnace	(h) 100t/h, (c) 60t/h	⊙	⊙	⊙(STD)	⊙		⊙	Predictive control	⊙	(NEDO subsidy)	

	MITSUBOSHI METAL INDUSTRY CO.,LTD.	Conversion of heatin furnace equipment fuel and modification of soaking furnace into high efficiency industrial furnace	Kerosene > 13A (Existing system μXL)	⊙	⊙	⊙(STD)	⊙		⊙	Transport PLC update (modification)	⊙	Gasification grant
2007	NIHON STEEL Co.,Ltd.	Updating of control systems and improving capabilities of the heating furnace	(c) 80t/h > 90t/h (existing astnex)	⊙	⊙	⊙(STD)	○		⊙	Energy saving control	⊙	Transport control PLC update
	KISHIWADA STEEL CO.,LTD.	Laser sensors inside the heating furnace	Expansion	○	⊙		○				⊙	
2008	CHIYODA-STEEL CO.,LTD.	Charged pusher hydraulic unit	Update (modification)	○	○						⊙	
	MITSUBOSHI METAL INDUSTRY CO.,LTD.	Direct billet turner	Update (modification)		⊙						⊙	
		Rolling operation logging system	Update (modification)					Access	⊙		⊙	
	KISHIWADA STEEL CO.,LTD.	Heating furnace equipment system update	Transport and combustion (instrumentation) (Existing 1 loop & PC)	⊙	⊙	⊙(STD)	⊙	Access	⊙	Transport PLC update (modification) and (includes warehouse)	⊙	Heating furnace with (13A) regenerative burner installed
	OSAKA STEEL CO., LTD. Osaka Okajima Works	Electric furnace burner	Kerosene > 13A	⊙	⊙	⊙(PLC)					⊙	Gasification grant
	NAKAYAMA STEEL PRODUCTS CO.,LTD.	Thermal mass heat insulation tank	Update (modification)	○	○		⊙				⊙	
2009	KYOEI STEEL LTD. Yamaguchi Division	Modification to direct feed (rolling)	CCM - rolling line direct connection	⊙	○		⊙	Access	⊙		⊙	
		Heating furnace equipment system update	(Existing astnex & 1 loop)	⊙	⊙	⊙(STD)				Predictive control	⊙	
	KISHIWADA STEEL CO.,LTD.	Heating furnace WB seal trough update	Update (modification)	○	⊙							
2010	CHIYODA-STEEL CO.,LTD.	Skid update	Update (modification)	○	○							
	ASAHI INDUSTRIES CO., LTD.	Electric furnace burner	Reclaimed oil > 13A	⊙	⊙	⊙(PLC)						
	KISHIWADA STEEL CO.,LTD.	Heat retention furnace WB seal trough update	Update (modification)	○	○							
	VINA KYOEI	Improving capabilities of the heating furnace and making it more energy efficient	(c) 75t/h > 85t/h	⊙	⊙	⊙(STD)					⊙	(NG) Regenerative burner installation
2011	KYOEI STEEL LTD. Nagoya Division	Modification to direct feed (rolling)	CCM - rolling line direct connection	⊙	⊙		⊙	SQL	⊙		⊙	
	KYOEI STEEL LTD. Hirakata Division (Hirakata Mill)	Modification to direct feed (rolling) heating furnace	Extraction HR and extractor installation	⊙	⊙		⊙				⊙	
	KANTO STEEL LTD	Heating furnace equipment system modification	Transport and instrumentation	⊙	⊙	⊙(STD)	⊙	SQL	⊙		⊙	

2012	KANTO STEEL LTD.	Heat retention furnace equipment system modification	Transport and instrumentation	◎	◎	◎(STD)	◎	SQL	◎		◎	
	KYOEI STEEL LTD. Hirakata Division (Hirakata Mill)	Modification to direct feed (rolling)	Rolling line direct connection work	◎	◎		◎				◎	
2013	OTANI STEEL CORPORATION.	Heating furnace fuel conversion	Kerosene > 13A	◎	◎	◎		SQL		Oxygen enrichment	◎	Gasification grant
		Electric furnace burner		◎	◎	◎				Oxygen enrichment	◎	Gasification grant
	SHINKANSAI STEEL CORPORATION Sakai Works	CC direct feed modification	CCM - heating furnace insertion line direct connection	◎	◎		◎		◎		◎	
	SHINKANSAI STEEL CORPORATION Hoshida Works	Modification of first reduction roll / heating furnace equipment (new installation)	(c) 60t/h, WB type, extractor installation	◎	◎	◎(STD)	◎	SQL	◎	Energy saving control	◎	Installation of (13A) regenerative burner
	MITSUBOSHI METAL INDUSTRY CO.,LTD.	CC direct feed billet cooling system	Quality improvement				◎		◎		◎	
	SHINKANSAI STEEL CORPORATION Sakai Works	TWP measurment device	Continuous measurment of transported steel pieces		◎					Laser displacement meter	◎	
	KYOEI STEEL LTD. Nagoya Division	Steelmaking production management system	Production management					SQL			◎	Remote control
	KANTO STEEL LTD.	Rolling flaw detection and tracking system	Quality improvement				◎	SQL	◎		◎	
2014	KAMAHARA STEEL CASTING MANUFACTURE Co.,Ltd.	Bogie type annealing furnace (new installation)	Impulse control	◎	◎	◎(PLC)		SQL			◎	(LPG) High speed burner
	GODO STEEL, Ltd. Osaka Works	Wire heating furnace extraction equipment modification and conversion of ceiling to CF-B	WB type, extractor installation	◎	◎		◎				◎	(SII subsidy) Planned completion in May 2015
	KYOEI STEEL VIETNAM CO., LTD.	Heating furnace modification and fuel conversion/instrumentation update work	(c) 50t/h, pusher type	◎	◎	◎(STD)		SQL		OIL < > CNG switching system	◎	Planned completion in March 2015
	KANTO STEEL LTD.	Heat retention furnace insertion door modification and update	Aging measures	◎	◎		◎				◎	
	KYOEI STEEL LTD. Nagoya Division	Rolling production management system	Production management					SQL			◎	Remote control
2015	SHINKANSAI STEEL CORPORATION Hoshida Works	Second reduction roll heating furnace instrumentation system	Aging measures			◎(STD)		SQL			◎	Planned completion in June 2015

Colored cells indicate equipment installed with regenerative burners