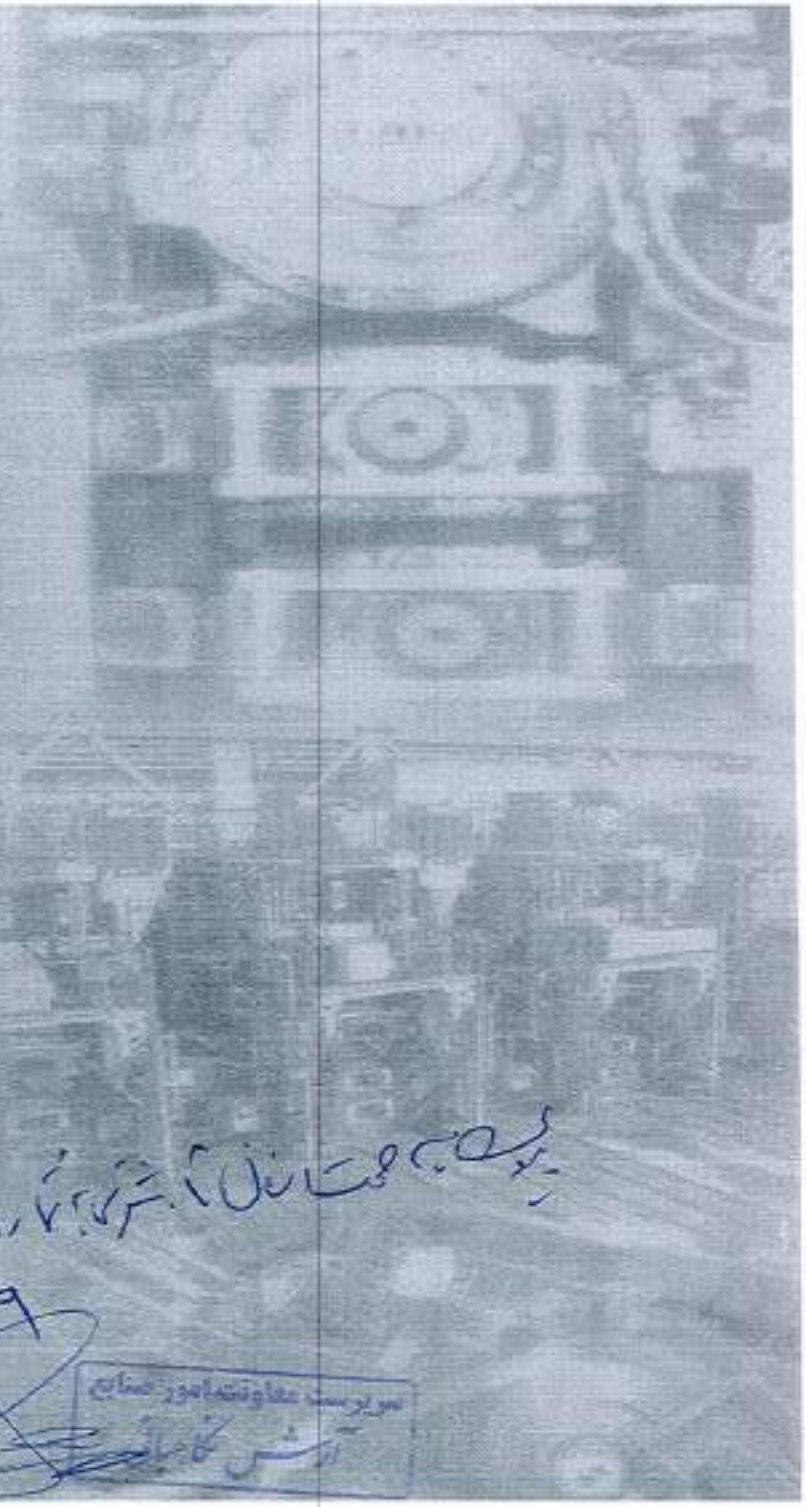
HOT ROLLING MILL



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SUPPLY SCOPE

USED HOT ROLLING MILL PRODUCTION LINE + ACCESSORIES

- Hot rolling is a metalworking process in which metal is heated above the recrystallization temperature to plastically deform it in the working or rolling operation. This process is used to create shapes with the desired geometrical dimensions and material properties while maintaining the same volume of metal.
- This heavy industrial Hot Rolling Mill has been refurbishment and manufactured at 2019.
- The most important trend in the steel plate is the demand for plates with increasingly higher strengths, high toughness, hardness, and good weldability. Prime quality in terms of thickness, width, profile, flatness, rectangularity, and a homogeneous microstructure are likewise expected with all steel grades and even extreme dimensions. At the same time, ever closer tolerances are being demanded in respect of dimensional accuracy and flatness. For meeting of these requirements, the plate mills are required to have the capabilities of large range of product mix with a high proportion of high strength plates to be produced, and hence new plate mills are designed for a great variety of production technologies. In addition to this, unrestricted compilation of the rolling campaigns is called for with great variations in terms of thickness, width, and steel grades from one plate to the next without negative effects on the productivity.
- for the production of the heavy plate, there are requirements of qualified operators, efficient plant installations, and suitable control and instrumentation systems for all the process stages. Systematic procedures based on the up-to-date know-how and considerable quantities of energy (heating gases, and power for drive systems, etc.) are to flow into the rolling mill as input with the output consisting of, in addition to the plates, comprehensive process data registered for the purpose of quality monitoring and evaluation, and of test samples for mechanical and technological testing by the acceptance inspection personnel.

- Reheating furnaces are used in hot rolling mills to heat the steel stock (Billets, blooms or slabs) to the rolling temperatures of around 1200 deg C which is suitable for plastic deformation of steel and hence for rolling in the mill. The heating process in a reheating furnace is a continuous process where the steel stock is charged at the furnace entrance, heated in the furnace, and discharged at the furnace exit. Heat is transferred to the steel stock during its traverse through the furnace mainly by means of convection and radiation from the burner gases and the furnace walls. Uncoiling, leveling and shearing production line is an equipment for leveling metal sheet and shearing it into massive plate. Normally it's composed of skip car, uncoiling machine, guide plate pressing device, leveling machine, active bridge-oriented correction device, sizing mechanism, shearing machine, conveying workbench, hydraulic lifting stacking station, transport rolling platform, hydraulic system, and electrical system. Main hydraulic pneumatic electrical control components and sizing system mechanism use internationally brand-name products. This equipment is mainly used to process cold rolled carbon steel coil plate, stainless steel coil plate and non-ferrous metal plate. Fitted with six-roll leveling machine, it can execute leveling, fixing length, transport material and shearing on plates with high panel requirements such as metal aluminum plate. There are ordinary mechanical or hydraulic shearing machines to choose for shearing, based on user need for cross shear or horizontal shear. Relevant supporting machines can have functions extensions to a larger extent.
- In addition to carbon steel, this line is capable of rolling stainless steel and silicon steel

Technical Information:

Description of Plate Mill

1. Our proposal is 1.2 million tons hot roll strips yearly with variety range of input slab and output strip width

The range of strip is up to 650 mm and variety of thicknesses from 1 mm start with

.2. Weight of the entire mechanicals is 3500 T

3. This heavy industrial Hot Rolling Mill has been refurbishment and manufactured at 2019.

- We will take overall responsibility
- We guarantee the completeness and functionality of the equipment as per the scope described in the attached division list
- We shall be responsible for the process functionality of the complete system: technology + mechanics + automation+ electrics to produce the targeted product mix/ productivity in the guaranteed quality.

The equipment involved in the supply are as follows:

REHEATING FURNACE

-- Entry roller table (1 set)

-- Pusher and hydraulic system (1 set)

-- Furnace and dust remove system (1 set)

-- Tapping machine and exit roller tables (1 set)

-- All electrical and control equipment (1 set)

- ROLLING STANDS

-- Roughing horizontal and vertical stands including electromotors and gearbox (8 set)

-- Finishing horizontal and vertical stands including electromotors and gearbox (10 set)

-- Roller tables between equipment (1 set)

-- Hydraulic system and lubrication system (1 set)

-- Descaler system (1 set)

-- All electrical and control equipment (1 set)

- LEVELING AND SHEARING

-- Five roll tension leveler (1 set)

-- Tight coiler (2 set)

-- Hydraulic system and lubrication system (1 set)

-- All electrical and control equipment (1 set)

Note: The first time the line was stablished and start to manufacturing at 2015

3. Production Process Flow

3.1 Slab Reheating

The slabs, after being put on the charging skid by the crane, are pushed onto the charging roller table and sent to the RF run-in table by the pusher for reheating. The cold slabs will be reheated up to 1050~1200°C and delivered to the RF run-out table by the slab withdrawing machine.

3.2 High Pressure Water Descaling Machine

There are three descaling point, the first being arranged after the RF, the second before the 4HI mill and the last after the mill

The reheated slabs will be transported to the descaling box via the roller table after RF and the scales are removed from the slab surfaces with 20MPa high pressure water. The height of the descaling nozzles can be adjusted in accordance with slabs' different thickness.

3.3 Rolling Process

Conventional Rolling Based on the slab width and required final plate width, the slabs will be rolled on the 4HI mill in forming rolling process, or spreading rolling process and stretching rolling process. Namely, when the slab length is not quite suitable, the slab will first undergoes forming rolling for 1~3 passes, then the slab will be turned 90°before/after the 4HI mill for spreading rolling until it is rolled as wide as required final product width, then turned 90°again for stretching rolling.

When the slab length is close to or as long as the max. Slab length specified, the slab will first be turned 90 ° before the 4HI mill for spreading rolling until it is as wide as required final product width, then turned 90 ° again for stretching rolling. In some special cases, only cross rolling or longitudinal rolling will be used.

Control Rolling (TMR or CR Rolling)

There are two phases in control rolling. For 8~50mm thick plate with a yield strength about 500MPa or less, control rolling can be adopted.

The intermediate slabs before entering the straightener, according to the rolling process, final plate thickness and mechanical property requirements, shall be 1.5~2.5 times of final product thickness; and with special products, it can be 4~5 times of final product thickness. The intermediate slabs swing on the roller table waiting to get cooled to 850°C for final rolling which will be carried out at around 700 ~750°C. During the rolling process, the regenerated scales on the slab surface shall be removed by the descaling machine. The rolling speed and screw down speed shall be carried out according to the rolling schedule based on the final plate size and steel grade.

3.4 Cooling and Straightening

An ultra-fast cooling system is applied between the 4HI mill and the straightener. The rolled pieces from the last pass leaving the 4HI mill will be delivered at specified speed to the ACC device via the roller table. The plate entering the ACC device will be sprayed with water on both surfaces for fast cooling, so that the plate temperature will rapidly drop from 700~800°C to 400-650°C.

The plates usually enter the 11HI straightener at 600-850°C, while thinner plates can be straightened at 500-550°C and thicker ones around 800-900°C. The straightening speed ranges at 0-2.5m/s. The plates after straightening usually go onto the cooling bed at 600-900°C.

Note: The most main parts are from different years 2013 and so on.

3.5 Plate Cooling and Shearing

The plates are cooled down to 100-150°C on the cooling bed and then transported to the inspection stand for visual check on the top/bottom surfaces, edges, flatness, etc.

The cooled plates are then sent to the trimming line, where they are cut off the heads and tails by the crop shear first, and then cut to length if needed for the next edge trimming process. The plate edges will be trimmed after the shear gap is adjusted according to the specified final plate width.

The plates will be cut to length by the cut-to-length shear and then labeled before they are piled and lifted to the warehouse by the crane

Hot strip mills have evolved in various steps from original tinplate and sheet rolling mills. The development of semi-continuous and continuous multi-stand mills followed, producing small-diameter and eventually large-diameter steel coil products. Low-, medium- and high-carbon steels, high-strength low alloy steels, X grade pipe steels, silicon steels and stainless steels were rolled. Surface defects may occur due to scale, rust or impurities. Scale is produced when the hot surface is oxidized by air. This mill scale can reduce corrosion if steel is exposed to air over short periods, however, the corrosion increases if exposed for long periods. Large amounts of mill scale also cause severe pitting corrosion if the surface is in contact with water.

In addition to carbon steel, this line is capable of rolling stainless steel and silicon steel.

List of Used Hot Rolling Mill factory:

REHEATING FURNACE

-- Entry roller table (1 set)
-- Pusher and hydraulic system (1 set)
-- Furnace and dust remove system (1 set)
-- Tapping machine and exit roller tables (1 set)
-- All electrical and control equipment (1 set)

ROLLING STANDS

-- Roughing horizontal and vertical stands including electromotors and gearbox (8 set)
-- Finishing horizontal and vertical stands including electromotors and gearbox (10 set)
-- Roller tables between equipment (1 set)
-- Hydraulic system and lubrication system (1 set)
-- Descaler system (1 set)
-- All electrical and control equipment (1 set)

LEVELING AND SHEARING

-- Five roll tension leveler (1 set)
-- Tight coiler (2 set)
-- Hydraulic system and lubrication system (1 set)
-- All electrical and control equipment (1 set)

The Line Layout Has Attached

Line specification: yearly 1.2 million tons hot roll strips with variety range of input slab and output strip width.

The range of strip is up to 650 mm and variety of thicknesses from 1 mm start with.

This heavy industrial Hot Rolling Mill has been refurbishment and manufactured at 2019.

Includes all necessary accessories and auxiliaries, main cranes, grinders and lathes.

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Main Technical Equipment

ITEM NUMBER	DESCRIPTION	SUPPLY						
		QTY	SUP	BD	BE	DE	ASE	ASC
1.0	**Reheating Furnace**							
	Entry roller table	1 set	S	S	S	S	B	B
	Pusher and hydraulic system	1 set	S	S	S	S	B	B
	Furnace and dust remove system	1 set	S	S	S	S	B	B
	Tapping machine and exit roller tables	1 set	S	S	S	S	B	B
	All electrical and control equipment	1 set	S	S	S	S	S	S
2.0	**Rolling Mill Stands**							
	Roughing horizontal and vertical stands including electromotors and gearbox	8 set	S	S	S	S	S	S
	Finishing horizontal and vertical stands including electromotors and gearbox	10 set	S	S	S	S	S	S
	Roller tables between equipment	1 set	s	S	S	S	S	S
	Hydraulic system and lubrication system	1 set	S	S	S	S	[illegible]	S
	Descaler system	1 set	S	S	S	S	[illegible]	S
	All electrical and control equipment	1 Set	S	S	S	S	S	S
3.0	**Levelling & Shearing**							

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Main Technical Equipment								
ITEM NUMBER	**DESCRIPTION**	**SUPPLY**						
		QTY	**SUP**	**BD**	**BE**	**DE**	**ASE**	**ASC**
	Five roll tension levelers	1 set	S	S	S	B	B	B
	Tight coiler	2 set	S	S	S	B	B	B
	Hydraulic system and lubrication system	1 set	S	S	S	S	S	S
	All electrical and control equipment	1 set	S	S	S	S	S	S
	shearing line roller table	1 set	S	S	S	S	S	S
	trimming shear	1set	S	S	S	S	S	S
	dividing shear	1 set	S	S	S	S	S	S
	crane pick-up at the end of the roller table	1 set	S	S	S	S	S	S
4.0	**Media**							
	Mill oil lubrication station	1 Set	S	S	S	S		
	Mill motor oil lubrication station	1 Set	S	S	S	S	B	B
	Mill hydraulic station	1 Set	S	S	S	S	B	B

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Main Technical Equipment

ITEM NUMBER	DESCRIPTION	SUPPLY						
		QTY	SUP	BD	BE	DE	ASE	ASC
	HAGC hydraulic station (HP)	1 Set	S	S	S	S	B	B
	Descaler HP water pumps	1 set	S	S	S	S	S	S
5.0	**Automation (complete, covering mill mechanical scope)**							
	Level-1 automation: complete HW and SW	1 Set	S	S	S	S	S	S
	Level-2 automation: complete HW and SW	1 Set	S	S	S	S	S	S
	HMI system	1 Set	S	S	S	S	S	S
	operation stations incl. pulpits	1 Set	S	S	S	S	S	S
	field devices and Sensors	1 Set	S	S	S	S	S	S
	technological gauges	1 Set	S	S	S	S	S	S
	Pyrometer	1 Set	S	S	S	S	S	S
6.0	**Electrics (for mechanical scope of supply)**							
	MV power distribution	1 Set	S	S	S	S	S	S
	VAR compensation SVC and harmonic filters	1 Set	S	S	S	S	S	S

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Main Technical Equipment								
ITEM NUMBER	**DESCRIPTION**	**SUPPLY**						
		QTY	**SUP**	**BD**	**BE**	**DE**	**ASE**	**ASC**
	LV power distribution, PCC ande MCC	1 Set	S	S	S	S	S	S
	AC & DC converters (main and aux.)	1 Set	S	S	S	S	S	S
	AC & DC motors (main and aux)	1 Set	S	S	S	S	S	S
	UPS	1 Set	S	S	S	S	S	S
7.0	**Installation**							
	WTP for Plate Mill incl. Make-up water system	1 Set	S	S	S	S	S	S
	Compressed air plant (if applicable)	1 Set	B	S	S	S	S	S
	Gas main supply station incl. safety S/D and regulation valves (if applicable)	1 Set	B	S	S	S	S	S
8.0	**Accessories & Auxiliaries of The Line**							

- *Main equipment's manufacturer is Tianjin Tianzhong Zhongzhi Technology Engineering Co., Ltd.*
- *Sinosteel Group provided the engineering services in first installation.*
- *Yiwu YILI Import and Export Trading Co. Ltd is providing whole package of the work.*

10/Jan/24