







Introduction

- >History of hot rolling
- > Definition of hot rolling and types
- ≻Terminology
- ≻Hot rolling process in details
- ≻Section rolling
- > Applications
- ≻Simulations





What is rolling?

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- Plastically deforming process of metal by passing through the rolls
- It provides the high production
- Basicly divided into 2 stages;
 - Hot rolling
 - Cold rolling



Hot rolling

A metal working process

occurs above the recrystallization temperature

while cold rolling occurs <u>below</u> the recrysallization temperature



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Aim of the hot rolling

- >Elimination of cast ingot structure defects
- > Obtaining the required shape, dimensions and surface quality of a product



Products of hot rolling

- ≻Flat products
- ≻Long products
- ≻Seamless tube
- > Speciality products such as wheels, rings, bars

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Types of rolling process

- ≻ Continuous rolling
- >Transverse rolling
- > Shaped rolling or section rolling
- ≻Ring rolling

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- > Powder rolling
- > Continuous casting or hot rolling
- > Thread rolling



Shaped Rolling or Section Rolling

A variety of sections can be produced by roll forming process using a series of forming rollers in a continuous method to roll the metal sheet to a specific shape.





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A variety of rolled sections





Terminology

Semi Finished Products:

- Bloom is the product of first breakdown of ingot. (cross sectional area > 230 cm²)
- Billet is the product obtained from a Further reduction by hot rolling.

(cross sectional area > $40x40 \text{ mm}^2$)

> Slab is the hot rolled ingot (cross sectional area > 100 cm 2 and with a width $\ge 2 \text{ x}$ thickness).





Mill Products:

- Plate is the product with a thickness > 6 mm.
- > Sheet is the product with a thickness < 6 mm and width > 600 mm.
- > Strip is the product with a thickness < 6 mm and width < 600 mm.













Universal roll



Rolling mills

- A machine or a factory for shaping metal by passing it through rollers
- A rolling mill basically consists of
- > rolls
- bearings
- > a housing for containing these parts
- > a drive (motor) for applying power to the rolls and controlling the speed



Modern Rolling Mills have

- Very rigid construction
- > Large motors to supply enough power (MN).
- > Successive stands of a large continuous mill
- Engineering design
- > Skills
- > Huge capital investment





Manufacturing of Hot Rolled Process

First step: Heating and Hot Forming

- The first operation of any hot rolling process is heating of the stock to the proper deformation temperature.

- The objective is :
- > to improve the ductility
- reduce metal deformation resistance
- > improve internal tissues and performance
- The main purpose: facilitate the rolling process.



1st step: Heating and Hot Forming

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- >The heating temperature depends the steel characteristic and Rolling process requirements to ensure the steel quality and yield.
- During heating and hot forming, scale forms on the stock surface which must be systematically removed. Descaling can be formed mechanically or buy spraying with water under high pressure.



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1st step: Heating and Hot Forming



	(A)
(2)	

2nd Step: Rolling

- During Rolling, deformation of material occurs between dies in the form of rotating, driven rolls.

- It is a stationary.

- Stationary means that a deformation zone does not change its position in time.

- The transporting force during Rolling is the friction between rolls and a processed material.



- Hot Rolling is carried out using various types of rolling mills.
- > The selection of appropirate rolling techniqes is made according to particular hot-rolled product.









3rd Step: Cooling and Finishing Cooling

- After Rolling, different cooling methods are available according to the product technical requirement and characteristic of steel.

- Cooling methods commoly used are :
- > water-cooled
- ≥ air-cooled
- ➢ stack cooling
- > slow cooling among others



Finishing

- For the required geometric product features to be obtained, some finishing and heat treatment operations are necessary after hot rolling.

- Typical finishing operations are:
- ≻ cooling straightening
- > sizing and surface cleaning



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- The further stages of the production process are quality control, marking, piling and preparation for storage and transportation some hot rolled products are coated for protection and decoration.





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Section rolling

	Section Rolling	Hot Plate Rolling
Final Product	Long Product	Flat Product
Surface Healing	At the end	At the beginning
Rolling Mills	1 mill 6 sections	1 mill connected to the cylinders for turning
Number of repeated rolls	17	5
Cutting	Edge cutting	Cutting to length
Example of products	Rails	Sheet Metal



long products



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Applications of Section Rolling

- > Construction materials
- > Partition beam
- > Ceiling panel
- > Roofing panels
- > Steel pipe





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Applications of Section Rolling

- ≻Automotive parts
- >Household appliances
- > Metal furniture
- > Door and window frames
- > Other metal products





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Simulation	n	
	Rolling Schedule E	

	Hot rolling			
Rolling Sched	ule			
	Stand	Length	CSA	
>	Fumace	4 m	140000 mml	0
>	Scale breaker	4 m	148000 mm ²	
	Rolling stand	24.5 m	24153 mm ²	
	Shearing	24.5 m	24153 mm ²	
	Rougher	33.4 m	19500 mm ²	
	Edger	34 m	19200 mm ²	
	Edger	24.1 m	19100 mm ²	
\diamond	Rougher	47.3 m	13800 mm ²	
	Rougher	00.2 m	9600 mm ²	
\diamond	Edger	69.5 m	9390 mm ²	
>	Edger	69.7 m	9369 mm ²	
	Rougher	97.7 m	0000 mm ²	
	Rougher	121 m	5390 mm ²	
	Edger	125 m	5220 mm ²	
	Finisher	145.5 m	4490 mm ²	
	Sawing	145.5 m	4490 mm ²	





















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END OF THE PRESENTATION

THANK YOU FOR LISTENING...