PLATE ROLLING

PROCESS METALLURGY

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Objectives

- To achieve the correct dimensions
- To achieve the correct mechanical properties
Features

Plates are:

- Strong
- Withstand high loads
- Enduring impacts and pressures
- Highly durable

Reheat Furnace

- Heat temperature: 1150-1270°C
- The deformation strength of steel is reduced
- Furnace is fired by gas burners

Descaling

- Oxide layer on the outer surfaces of the slab is removed
- High pressure water sprays are used to remove it

Rolling

- Plate mill stands are usually 4 high design
- They are largest type of rolling mill
- All plate mills are of the reversing type
Rolling Process

- Rolling is carried out in two stock orientations.
- The plate is roadside and turned through 90° to rolled.
- Presizing is used before broadsizing.

Accelerated Cooling

Once the required dimensions and thickness has been reached in the mill, the plate undergoes cooling. For many steel grades and applications, the cooling path is as influential in the plates’ metallurgical development as is the strain path in the mill. Systems for this purpose of controlled cooling are known as accelerated cooling systems, and are designed to reduce the plate temperature at high rates, down to a level at which all microstructural transformations are complete.

Finishing Process: Shearing

Purposes:
- Cutting plates to desired size
- Removing edge and end material which deviates from the required properties
- Extracting test samples

Cooling Beds

Whether or not accelerated cooling is applied, plates are finally air-cooled as they are transferred across a cooling bed. In special cases, stacking of plates to reduce the cooling rate is employed. This is to allow hydrogen to diffuse out of the plate, thereby reducing its embrittling effect in service.
Shearing

Finishing Process: Levelling

Purposes:

• Surface smoothing
• Stress relieving

Shearing and Levelling

Testing

Mechanical Expansion
- The final diameter and straightness of the pipe is obtained.
- This corrects any deformations.

Hydrostatic Testing
- All pipes are subjected to automatic hydrostatic testing after mechanical expansion.
Nondestructive Examinations

Automatic Plate UST
- The entire surface of each plate is scanned by multi-channel UST with a self-sensitivity assurance system and a self-calibration function.
- Plate edges are carefully checked by double-probe mechanisms.

Automatic UST of Welds
- Welds are ultrasonically tested by multi-channel UST.

PLATE ROLLING SIMULATION

Nondestructive Examinations

X-Ray Fluoroscopy

X-Ray Radiography

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THANK YOU FOR LISTENING!