



شركة ميرك العربية السعودية
MEIRC Saudi Arabia

Basic Metallurgy & Rolling Mill Operation

Duration 5 Days

Introduction

This course covers the fundamental principles of metal rolling with emphasis on the hot rolling concepts and the metallurgy of rolling.

Who Should Attend

Foremen and operators.

Course Objectives

At the end of the course trainees will be able to:

- ↪ Become familiar with the hot rolling concepts and the metallurgy of rolling
- ↪ Provide a clear understanding of the key aspects of rolling mills, its advantages and limitations.
- ↪ Demonstrate how to develop a successful operational program at your organization and
- ↪ Provide you with the practical and effective methods you need to perform an analysis.
- ↪ Develop a good understanding of roll pass design and mill operation
- ↪ Recognize defects in products and their reasons

Course Outlines:

- 1. Fundamental Principles of Metal Rolling**
 - 1.1. Range of Billet and Rolled Product Sizes
 - 1.2. Steel Grades and Bad Steel Qualities
 - 1.3. Classification of Rolling Mills
 - 1.4. Main Line of a Rolling Mill
- 2. Heating of Metal before Rolling**
 - 2.1. Function of Metal Re-heating before Rolling
 - 2.2. Base of Selection of Reheat Temperature
 - 2.3. Effect of Re-heating on Billet Properties
 - 2.4. Billet Temperature Control
 - 2.5. Design of Reheating Furnace
- 3. Fundamentals of Pass Design**
 - 3.1. 3-1 Types of Rolling Passes
 - 3.2. 3-2 Components of Passes
 - 3.3. 3-3 Rolling Gap Setting
 - 3.4. 3-4 Stand Draughting and coefficient of Deformation
- 4. Breakdown Sequences**
 - 4.1. Box Pass Sequences – Design and Calculation
 - 4.2. Oval – Square Sequences
 - 4.3. Design of Square and Oval Passes
 - 4.4. Distribution of Elongation among Passes
 - 4.5. Characteristics and Orders of Calculations
 - 4.6. Oval – Round Sequences
 - 4.7. Pass Cooling and Bar Shape
- 5. Factors Affecting Accurate Rolling**
 - 5.1. Rigidity of Working Rolling Standard
 - 5.2. Rolling Temperature



- 5.3. Temperature of Working Roll
- 5.4. Wear of Rolls and Other stand Components
- 5.5. Guides
- 5.6. Looping and interested tension

6. Product Quality

- 6.1. Quality history
- 6.2. Quality terms and definitions
- 6.3. Quality control
- 6.4. Quality assurance
- 6.5. ISO & TQM
- 6.6. Steel Categorization, classification, specification
- 6.7. International Standards

7. Inspection & Testing

7.1. Defects Types

- 7.1.1. Shape Defects
 - 7.1.1.1. Under & over size
 - 7.1.1.2. Over & under fill
 - 7.1.1.3. Ovality
- 7.1.2. Surface Defects
 - 7.1.2.1. Shelly & silver
 - 7.1.2.2. Pass mark
 - 7.1.2.3. Fins
 - 7.1.2.4. Lap mark
 - 7.1.2.5. Guide seize
 - 7.1.2.6. Roll mark
 - 7.1.2.7. Seam
 - 7.1.2.8. Scratch/ mechanical damage
 - 7.1.2.9. Excess gap
 - 7.1.2.10. Tangle
 - 7.1.2.11. Untidy
 - 7.1.2.12. Collar Mark
 - 7.1.2.13. Fire crack
 - 7.1.2.14. Rolled in
 - 7.1.2.15. Scale
 - 7.1.2.16. Roughness
- 7.1.3. Internal Defects
 - 7.1.3.1. Hot shortness & Burnt steel
 - 7.1.3.2. Core segregation
 - 7.1.3.3. None metallic inclusion
 - 7.1.3.4. Coarse grain
 - 7.1.3.5. Grain boundary damage

7.2. Types of Testing

- 7.2.1. Stress, strain, stress strain curve.
- 7.2.2. YS strength
- 7.2.3. Young's Modulus
- 7.2.4. Ductility
- 7.2.5. Elongation
- 7.2.6. Bend & re-bend test
- 7.2.7. Formability
- 7.2.8. Toughness
- 7.2.9. Hardness test



- 7.2.10. Impact test
- 7.2.11. Fatigue test
- 7.2.12. Creep test

8. Refractory

- 8.1. Use of refractory in reheating Furnace
- 8.2. Basic Principles and Technology
- 8.3. RPD for the Rolling of Rounds

9. Rollin Mill Calculations

- 9.1. Speed control
- 9.2. Setting speed
- 9.3. Adjust speed
- 9.4. Adjust gap
- 9.5. looper control
- 9.6. Speed arc factor
- 9.7. **Safety in Rolling Mills Plant for Long Products**