



Aluminium Rolling Technology

This course contains the following modules:

The Business of Rolling

- Economics of rolling
- Business cycles
- Future trends

Outline of the Sheet Rolling Process

- Outline of the process routes and metal conditions at various stages from cast ingot to coil

Process Metallurgy

- Alloy choice
- Microstructure
- Strengthening mechanisms
- Annealing

Mechanics of Rolling

- Yield criteria
- Friction hill
- Factors determining rolling load
- Closed and open gap rolling
- Attenuation

The Machinery of Rolling

- Types of roll stacks
- Major components of reversing and hot tandem mills
- Cold mills
- Special actuators: VC, CVC, DSR, 6hi

Thermal Aspects of Rolling

- Heat sources and sinks
- Temperature distributions in rolls and strip
- Design of roll spray cooling systems
- Strip cooling

Mechanics of Profile & Flatness

- Definitions of profile and flatness
- Sources of variation
- In-process specification and targets for control

Introduction to the Innoval Rolling Model

- Process simulation of hot and cold rolling using a physics-based model

Aluminium Rolling Lubrication

- Friction and lubrication basic principles
- Interaction of rough surfaces
- Role of additives
- Hot and cold rolling oils
- System maintenance
- Filtration

Surface Generation

- Surface generation during rolling
- Oil entrapment
- Strip brightness control
- Scuffing
- Types of defect
- Reduction marks
- Surface inspection

Introduction to Control

- Open and closed loop control systems
- PID control and gain determination
- Ziegler-Nichols testing
- Use of feedback

Profile Measurement and Control

- Measurement of profile
- Actuators for control
- An integrated control strategy
- Scheduling, setup, adapted setup & in-coil strategies

Automatic Gauge Control

- Total gauge description
- Gauge control loops
- Measurement devices
- Different methods of gauge control in current use

Automatic Flatness Control

- Definition
- I-units
- Different types of off-flatness
- Relation with stress
- On-line measurement
- Flatness control actuators
- Strategies to control flatness

Rolling Mill Vibration

- Main types of mill vibration
- Torsional, 3rd and 5th octave chatter
- Resonance modes of mills
- Self excitation
- Examples of solutions to vibration problems

Condition Monitoring

- Maintenance strategies: reactive, preventive and predictive
- Reliability-centred maintenance
- Vibration detection
- Thermography and wear analysis

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