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## COURSE DESCRIPTION

# CHH604 – Cement Mineral Processing

### Course goal

The goal of this course is to give ABB service, sales and engineering staff as well as project managers and employees in other functions a broad and comprehensive understanding of the cement industry in the economic, ecological and technical function and enable the course participants to rapid and qualified problem solving for cement plants and equipment.

### Main learning objectives

The participants will be able to:

- Understand the different steps in cement production
- Recognize the basic equipment and plant design in the cement industries
- Understand some basics about the world cement market
- Identify elementary ecological and health issues in this industry branch
- Thermodynamics and kinetics of cement
- ABB in cement production
- Quality control and testing
- Logistics of transport and storage
- Economical and market aspects
- Ecological and environmental aspects
- Health aspects and safety
- Half-day visit of a cement plant in Switzerland (optional)

### Participant profile

This training is targeted to ABB service, sales and engineering staff as well as project managers and employees in other functions.

### Prerequisites

Participants should be fluent in English and have an affinity to technical and scientific issues.

### Topics

- Introduction and generalities
- Steps in cement and concrete development
- Resources and availability
- Chemistry and physics of cement
- Application and requirements of modern cements
- Processing of cement, plant and equipment

### Course type and methods

The course is designed as interactive and multimedia presentation with intensive discussions, case studies and problem solving.

In addition to some virtual excursions a half-day optional visit of a Swiss cement production site is planned.

### Duration

The duration is 2.5 days.

## Course map

	DAY 1	DAY 2	DAY 3
<b>Topics</b>	Welcome, personnel introduction	Review day 1 ABB in cement production	Cement plant visit (if scheduled)
	Course roadmap, chapters overview, goals	Machinery and services Plants and process design	
	Steps in cement and concrete development	Energy requirements	
	Historical development	Quality control	
	Modern issues in building and construction	Standards	
	Environmental issues and trends	Test methods ABB process control	
	Resources and availability	Logistics	
	Geo-economical overview	Storage and packaging	
	Raw material extraction	Transportation (sea, railway, street)	
	Trading and markets	Concrete mixtures	
	Chemistry and physics of cement	Economical aspects	
	Atomic view	Cost structures of fabrication	
	Crystalline view	Trade and markets	
	Macroscopic view	Distribution policies (regulations, cartels, etc.)	
	Additives and auxiliaries	Environmental aspects	
	Application and requirements of modern cements	Energy consumption	
	General mechanical properties	Carbon dioxide emission	
	Underground engineering	Dust separation	
	High-building	New developments in cement "Green cements"	
	Processing of cement	Nano reinforces cements	
Plant design	Raw materials		
Grinding and milling	Health aspects in cement production		
Pyroprocessing	Risks and safety		
Clinker and grinding	Swiss standards		
Cooler equipment and heat recovery	Summary		
Thermodynamics	Questions and answers		
Combustion and fuel types	Evaluation		
Heat distribution and phase diagrams			
Hydration kinetics			
<b>Time</b>	9:00 am – 5:00 pm	9:00 am – 5:00 pm	8:30 am – 12:30 pm

Typical course layout (time or sequence may change)