COURSE DESCRIPTION

CHH624 – Gearless Mill Drive
Operation and Maintenance

Course goal
The goal of this course is to provide participants with the required practical knowledge and information on safe operation and maintenance of the gearless mill drive (GMD) system. This training will help to enhance the operation and the maintenance of the GMD in order to ensure a flawless execution of the maintenance tasks.

Main learning objectives
The participants will be able to:
- Safely operate the GMD system on a day-to-day basis
- Understand the start/stop sequence and requirements
- Understand the process interface, alarm list, interlocking
- Understand the maintenance program of a GMD system
- Optimize the maintenance process of the a GMD system

GMD human machine interface (HMI)
- Cyclo control terminal (CCT) and operations
- Faults and reset function
- How to work with alarms, trips and faults
- Excitation controller faults E-stop

Mill start-up and stop sequences
- GMD start/stop sequence
- Inching, creeping, normal operation
- Auxiliaries start-up sequence
- Close circuit breaker command
- System shutdown
- Abnormal stop sequence

Motor local control panel (MLCP)
- Control location selection / key switch
- Pushbutton and control station

Ring motor sub-systems
- Air gap monitoring
- Dust sealing system
- Off-load disconnect switch (knife switch)
- Sub-systems / auxiliaries

GMD medium voltage system
- MV main circuit breaker(s)
- Cycloconverter and excitation transformer

Rotor excitation
- Excitation converter DCS800
- Rotor protection / overvoltage arrester
- Diagnostic software tool

Thyristor firing & supervision (operational overview)

Participant profile
This training is targeted to operators, electricians, technicians and site engineers.

Prerequisites
Participants should have basic electro technical background.
It is highly recommended that the participants successfully completed the course “Gearless Mill Drive – Theoretical System Overview” (CHH621).

Topics
- E-house and motor overview
  - Sub-systems / auxiliaries
  - Motor control center, PLC (overview)
- GMD regulation & operation (operational overview)
  - Operation of synchronous motor
  - Vector control
  - Motor equivalent circuit
  - Current based flux calculation
  - Voltage based flux calculation
  - Controlling the motor torque
  - Synchronous motor operation curves
    - Voltage and flux
    - Torque
    - Power
    - Operation curve
  - Principle of regulation
    - Speed control (task C)
    - Flux control (task B)
    - Current control (task B)
    - Excitation control (task C)
  - Operation functions
    - Controlled rollback
    - Frozen charge protection (task C)
    - Ride through function
    - Load shedding function
    - Speed calculation for the ring motor
    - Air gap measure and protection

- Maintenance strategies and concepts applied to the GMD system

- 6/12/36 months maintenance tasks and inspections according to electrical maintenance plan, periodical tests

- Spare parts/tools and their storage

## Course type and methods
This is an instructor led course and includes classroom training, discussions, demonstrations and practical hands-on activities (depending on drive availability).

## Duration
The duration is 5 days:
- 8 hours daily for face-to-face classes
- 5 hours daily for remote sessions

### Remarks
This course can be delivered at:
- Customer site / any training facility organized by customer
- ABB training center in Switzerland
- As a remote training session
## Course map

<table>
<thead>
<tr>
<th>DAY 1</th>
<th>DAY 2</th>
<th>DAY 3</th>
<th>DAY 4</th>
<th>DAY 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Topics</strong></td>
<td>Welcome, personnel introduction</td>
<td>Review day 1</td>
<td>Review day 2</td>
<td>Review day 3</td>
</tr>
<tr>
<td></td>
<td>Course introduction</td>
<td>Motor local control panel (MLCP)</td>
<td>Thyristor firing &amp; supervision</td>
<td>Operation and maintenance manuals (OMM) of the GMD system</td>
</tr>
<tr>
<td></td>
<td>E-house and ring motor overview</td>
<td>Ring motor sub-systems (auxiliaries)</td>
<td>GMD regulation &amp; operation</td>
<td>Spare parts/tools and their storage, periodical tests/checks</td>
</tr>
<tr>
<td></td>
<td>AC 800PEC hardware</td>
<td>GMD medium voltage system</td>
<td>Questions and answers</td>
<td>6/12/36 months shutdown for electrical maintenance tasks and inspections</td>
</tr>
<tr>
<td></td>
<td>GMD human machine interface</td>
<td>E-house</td>
<td>Exercise on GMD operation</td>
<td>Review of the exercise</td>
</tr>
<tr>
<td></td>
<td>Faults &amp; reset function</td>
<td>Motor control center</td>
<td>Review of the exercise</td>
<td>Summary</td>
</tr>
<tr>
<td></td>
<td>Mill start-up &amp; stop sequences</td>
<td>E-house</td>
<td></td>
<td>Questions and answers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rotor excitation</td>
<td></td>
<td>Evaluation</td>
</tr>
</tbody>
</table>

### Time (face-to-face class)

<table>
<thead>
<tr>
<th>9:00 am – 5:00 pm</th>
<th>9:00 am – 5:00 pm</th>
<th>9:00 am – 5:00 pm</th>
<th>9:00 am – 5:00 pm</th>
<th>9:00 am – 5:00 pm</th>
</tr>
</thead>
</table>

### Time (remote session)

<table>
<thead>
<tr>
<th>to be defined</th>
<th>to be defined</th>
<th>to be defined</th>
<th>to be defined</th>
<th>to be defined</th>
</tr>
</thead>
</table>

**Typical course layout (time or sequence may change)**