The goal of this course is to develop the skills necessary to setup, tune, and verify Headbox control and Machine Direction transition controls in the ABB Quality Control System.

Learning objectives
Upon completion of this course the participants will be able to:

- Setup, tune, and validate headbox control
- Test for a relationship between headbox pressure and moisture
- Setup, tune, and validate Transition Machine direction controls:
  - Coordinated speed change
  - Speed Optimization (minimum steam range and dryer limited)
  - Automatic grade change control

Participant profile
This training is targeted to Customer Process Control Engineers or ABB Engineers.

Prerequisites
Students should have completed the MD1 training module and the MD1 field module or be able to demonstrate equivalent skills.

Course type and methods
In this course, students will learn the skills necessary to setup, tune, and validate headbox control, coordinated speed change, speed optimization (minimum steam range and dryer limited), and grade change. Laboratory exercises utilize a process simulator to provide hands-on practice of setup, tuning, and verification steps.

Platform
The fundamental machine direction control knowledge gained in this course can be applied to ABB Quality Control Systems with any of the following hardware: MP280, AC450, or 800xA. The class will be taught from an 800xA platform. User interface and program differences will be related back to the other platforms.

Duration
The duration is 5 days.
Course outline

Day 1
- Kick off and introductions.
- Review field module 1 best practices
- Headbox types
  - Airpad vs pneumatic
- Headbox control
  - Theory of operation
  - J/W Control options
  - Dryline
  - Liquid level control
  - Total head control
  - Block diagram
  - Total head algorithm
  - Moisture with respect to total head
  - Inferred flow calculation
  - Jet Velocity equation options
  - Lab exercise
    - Configure
    - Tune Jet/Wire control
    - Setup Dryline control
    - Tune feedforward jet/Wire from slice

Day 2
- Review Q/A
- Speed change options
  - Manual vs Automatic
- Coordinated Speed Change control
- Headbox control considerations (internal or external to ABB QCS)
- Operator interface
- Feedforward bump test procedure
- Setup, Tuning, and testing procedures
- Necessary feedforwards to enable
  - Tune Speed level 1
  - Perform speed bumps to determine feedforward model
  - Tune coordinated Speed change
  - Compare the results of the following speed changes:
  - full manual, fast automatic, Coordinated

Day 3
- Review Q/A
- Auto Grade Change Objectives
- Coordinated Uncoordinated
- Operator interface Abort/suspend conditions
- Tuning procedures Fast Grade change option
- Setting independent tuning options for Feedback vs auto grade change
- Ash compensation options
  - Lab exercise
    - Setup and Tune speed optimization - minimum steam range
    - Test a manual grade change
    - Test auto grade change without any scan level controls required
    - Test auto grade change with scan level controls required

Day 4
- Review Q/A
- Speed Optimization
  - Minimum steam range
  - Theory of operation
  - Maximum feasible speed
  - Setup, tuning, and testing procedures
  - Speed Optimization
    - Dryer limited
    - Theory of operation
    - Setup, tuning, and testing procedures.
    - Lab exercise
      - Setup and Tune speed optimization - minimum steam range
      - Test a manual grade change
      - Test auto grade change without any scan level controls required
      - Test auto grade change with scan level controls required

Day 5
- Review Q/A
- Troubleshooting
- Auto Grade change
  - Auto Grade change static gain verification worksheet
  - Grade Change
  - Speed optimization
  - Data Collection options
  - Grade Change performance monitoring
  - Case Studies
  - Review field module 2 requirements

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