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

- Use the Reel report variance portioned analysis (VPA) data to quantify control performance
- Data Collection methods
- Determine the Return on Investment related to process control
- Setup, tune, and validate both incremental and full value style actuators
- Setup, tune, and validate Basis Weight, Moisture 1, Moisture 2, Opacity, and Ash controls
- Setup, tune, and validate Drystock compensation
- Utilize system features such as: Dryer Reduction, Dryer Loading, and sheet break recovery suspend logic

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.

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

Prerequisites
Students should have completed Z100 and Z105 or be able to demonstrate equivalent skills.

Course type and methods
In this course, students will learn how to setup, tune, and validate ABB QCS Paper Machine Direction controls on a single headbox fourdrinier machine. Students will learn appropriate tuning techniques for Cascade, Deadtime compensation, Feedback, and Feedforward types of controllers. Laboratory exercises utilize a process simulator to provide hands-on practice of setup, tuning, and verification steps.
Course outline

Day 1
- Kick off and introductions
- Reel Report VPA Data
- Definitions of variation: CD, MDL, RES, and Total.
- Source of data
- Analysis techniques
- Data Collection Options
- System trending
- ROI of process control
- Lab exercise
- Setup data collection options
- Extract VPA data
- Analyze VPA data to establish a performance baseline.
- Setup data collection programs
- Determine financial impacts for both regulation and time to target improvements

Day 2
- Review Q/A
- MD Control Overview
- Cascade control
- Deadtime compensation
- Feedback control
- Feedforward compensation
- System Navigation
- Tuning displays
- User displays
- Trends
- Actuator level setup and tuning
- Incremental no valve position feedback, PD
- Incremental with valve position feedback, PI
- Full Value, PID
- Lab exercise
- Incremental Tuning of Stock, Speed, PCC, and gross slice.
- Full value tuning of Steam

Day 3
- Review Q/A
- Measurement processing
- MD and CD separation
- Process Decoupling
- Moisture 1 and moisture 2 with respect to stock
- Moisture 1 with respect to the steam of moisture 2
- Bone Dry with respect to stockflow
- Bump test size determination
- Feedforward setup, tuning, and verification
- Lab Exercise
- Perform bump tests to determine feedforward models
- Tune and verify feedforward controlstructured Text

Day 4
- Review Q/A
- Scan Level Weight, Moisture 1, and moisture 2 controls
- Target Entry options
- Deadtime compensation
- Delay Speed Reference
- Process Model
- Abort/Suspend conditions
- Setpoint change versus disturbance rejection tuning
- Verification steps
- Ash control
- PCC to dryweight Target decoupling
- PCC to Ash Gain decoupling
- PCC base loading and addition points
- Control Expectations
- Cutoff frequency
- Time-to-target issues
- Lab exercise
- Perform bump tests to determine feedback model parameters
- Tune and verify all scan level controls for both setpoint and disturbance regulation

Day 5
- Review Q/A
- Drystock compensation
- Setup and tuning
- Wet weight calculation
- When to use inferred stock flow
- Sheet break recovery options
- Dryer controls
- Loading
- Reduction
- Review Field Module Requirements
- Lab exercise
- Setup, tune, and verify drystock compensation
- Setup dryer loading and dryer reduction

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