Learn how to setup and tune color control on a QCS system and the different functions of Color Control.

Course type and methods
This is an instructor-led workshop with short presentations and demonstrations, extended exercises, and hands-on sessions and discussion.

Student Profile
This training is targeted to personnel responsible for installation and tuning of color control.

Prerequisites
Students should have completed the C103 course (Machine Direction control) and possess basic knowledge of personal computers, process control and electronics.

Course objectives
Upon completion of this course, the participants will be able to:
• Understand color theory
• Understand Color Control and Color Measurement
• Describe how color is quantified
• Install and setup QCS Color Control
• Setup Shade files
• Troubleshoot color control problems
• Setup control related shade files
• Tune OBA control
• Configure color control for site specifics
• Perform dye calibration
• Tune level 1 pump control
• Tune level 2 color control
• Identify typical dye kitchen configurations, actuator types, and dye addition strategies

Main topics
• Color theory
• Color control
• Color measurement
• Operator interface
• Shade setup
• Color reflectance
• Dye kitchen examples
• Shade file setup
• Dye calibration
• OBA configuration
• Color control tuning

Duration
The duration of this course is 5 days.
# Course Outline

## Day 1
- **Course introduction**
  - Color theory
  - Definitions
  - Energy spectrum
  - Color measurement methods
  - Illuminants
  - Reflectance and scattering
  - Standard observer
  - Tristimulus curves
  - Metamerism
- **Color sensor**
  - Overview
- **Lab Exercise**
  - Familiarize yourself with color displays.

## Day 2
- **Review: questions/answers**
- **Shade setup for control**
  - Control overview
  - Control features
  - Delay vector
  - Online and offline shade setup for control
- **Shade setup for measurement**
  - Online and offline shade setup for measurement
  - Master/Slave relationship
  - Measurement setup
  - Color units
  - Color difference
- **General configuration**
  - Throughput setup
  - Miscellaneous
  - Measurement configuration
  - Coupling coefficient
- **Dye rate calculation**
  - Overview
  - Inputs
  - Examples
- **Lab**
  - Online Shade setup
  - Offline Shade setup
  - Shade setup for control
  - Shade setup for measurement
  - Throughput calculations
  - Dye rate calculations
  - Master/Slave relationship

## Day 3
- **Review: questions/answers**
- **Dye setup**
  - Online and offline dye setup
- **Dye calibration**
  - Overview
  - Curves and results
  - Method
  - Video demonstration
- **Process Model inputs**
  - Gain matrix inputs
  - Gain matrix function
  - Variable gain
  - OBA gain
  - Error power scaling
- **Lab**
  - Online dye setup
  - Offline dye setup
  - Dye calibration (at scanner)
  - Variable gain excel file
  - Process model time constants
  - Process model control gain
  - Gain matrix
  - Coupling coefficient

## Day 4
- **Review: questions/answers**
- **Log configuration**
  - History source
  - Log configuration setup
- **Trends**
  - Setup
  - Data logger
  - Tag locations
- **Control tuning**
  - Pump types
  - Level 1
  - Level 2
  - OBA Gain
- **Tuning parameters**
  - Bump tests
  - Calculations
  - Dual color control
- **Shade change**
  - Manual shade change
  - Advanced shade change
- **Midranging**
- **Functional buttons**
- **Dye code conversion utilities**
- **Simulator setup**
- **Review previous labs**

## Day 5
- **Review: questions/answers**
- **Lab**
  - Control tuning
  - Level 1
  - Level 2
  - Calculations
  - Tuning parameters
  - OBA Gain
  - Simulator setup
- **Color Control Step-by-step**
  - **Lab**
    - Setup log configuration
    - Setup trends
    - Setup data logger
    - Functional button uses
    - Convert dye codes
    - Manual shade change
    - Advanced shade change
  - **Review previous labs**

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## Course Booking & Training Centers

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