

# Z115 Multiple Loop Control Theory

## Course Description



## Course Duration

The duration is 5 days.

## Course Goal

The goal of this course is to teach students to analyze and tune the control performance of interacting control loops.

## Student Profile

This training is targeted to customer Process Engineers or ABB Engineers.

## Prerequisites and Recommendations

Students should have completed course Z110.

## Description

In this course, students will learn about the tuning techniques and characteristics of interacting control loops including cascade, feed forward, mid-range, ratio, and adaptive.

## Course Objectives

Upon completion of this course, students will be able to:

- Troubleshoot interacting and digital control tuning problems.
- Recommend an interacting control strategy.
- Tune interacting and digital controls for robustness.
- Develop tuning rules based on PID forms.
- State the importance of a correctly tuned control loop.

## Main Topics

- Non-linearization
- Model Mismatch
- Tuning techniques for interacting control loops.
- Block diagrams, Root Locus, Bode Plots
- Internal model control theory
- Troubleshooting with Time Series Analysis
- Drum Level Tuning Techniques



## Course Calendar

Day 1	Day 2	Day 3	Day 4	Day 5
<ul style="list-style-type: none"> <li>• Course Introduction</li> <li>• Model Processes               <ul style="list-style-type: none"> <li>• 1<sup>st</sup> Order</li> <li>• 2<sup>nd</sup> Order</li> <li>• 1<sup>st</sup> Order with Deadtime</li> <li>• 2<sup>nd</sup> Order with Deadtime</li> </ul> </li> <li>• Pade Approximations</li> <li>• Deadtime Compensations               <ul style="list-style-type: none"> <li>• Smith</li> <li>• Modified Smith</li> <li>• IMC</li> </ul> </li> <li>• Lab</li> </ul>	<ul style="list-style-type: none"> <li>• Review – Q/A</li> <li>• Signal Analysis</li> <li>• Variance</li> <li>• Skewness</li> <li>• Kurtosis</li> <li>• Auto Correlation</li> <li>• Cross Covariance</li> <li>• Fourier Transform</li> <li>• Lab</li> </ul>	<ul style="list-style-type: none"> <li>• Review – Q/A</li> <li>• Video</li> <li>• Cascade Control</li> <li>• Lab</li> </ul>	<ul style="list-style-type: none"> <li>• Review – Q/A</li> <li>• Feedforward Control</li> <li>• Lab</li> <li>• Boilers               <ul style="list-style-type: none"> <li>• Single-Element</li> <li>• Two-Element</li> <li>• Three-Element</li> </ul> </li> <li>• Lab</li> </ul>	<ul style="list-style-type: none"> <li>• Review – Q/A</li> <li>• Decoupling</li> <li>• Lab</li> </ul>

