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Motion Control Fundamentals Course

Overview:

The Motion Control Fundamentals course teaches you the fundamentals of PC-based motion control, including motion software and hardware such as stepper and servo motors, amplifiers, and controllers. The hands-on course uses LabVIEW, NI motion control hardware and software to teach you how to configure a motion control system, develop basic motion trajectories, and create feedback control loops. You learn basic move types and how to apply them to create complex moves so that you can quickly incorporate motion in your application.

Audience:

- Developers and users of LabVIEW, NI-Motion software, and motion control hardware to create motion applications which use servo and stepper motors
- Users new to PC-based motion control

After attending this course you will be able to:

- Select the correct motion control hardware for your needs
- Quickly configure your motion control hardware
- Use Motion Assistant software to quickly define moves
- Create smooth movements using stepper motors
- Correctly handle errors to safely stop your system
- Create repetitive precise moves
- Create complex moves using basic move types
- Trigger a multi-axis move to start at the same time
- Use stepper and servo motors in your application
- Develop motion applications with greater ease and efficiency

Prerequisites: LabVIEW Basics I and II courses or equivalent experience

Duration: Two Days

Ordering Information: 910643-XX (-01 NI Corporate or Branch, -11 Regional, -21 Onsite)



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Course Topics:

Introduction to Motion Control

- Overview of motion control hardware such as motors, amplifiers, controllers, feedback, and NI-Motion software
- Types of motion control systems
- Understanding stepper motor operation
- Using microstepping to provide smoother motion at slower speeds
- Using Measurement and Automation Explorer (MAX) to quickly configure motion control hardware

Feedback in Motion Control

- Understanding industry standard motor encoder architectures
- Using analog sensors in a feedback loop
- Understanding the use of limit switches to control motion
- Using the Trajectory Generator to quickly develop a simple PID algorithm for creating smooth movements
- Understanding motion error and its effects in closed-loop and open-loop control
- Using inhibits to quickly kill a motion control move
- Understanding three modes of stopping: decelerate, kill, and halt
- Creating repetitive precise moves

Servo Motor Systems

- Introduction to various types of servo motors
- Choosing an appropriate server motor amplifier
- Configuring a servo motor controller system
- Understanding PID servo motor control loops
- Handling backlash that can cause system instability

Advanced Motion Control

- Creating arbitrary motion control profiles with lines, lines and arcs, and points
- Extrapolating a smooth curve with a contoured move
- Starting multiple axes moves at the same time with a synchronous start
- Using blending to reduce cycle time
- Using electronic gearing to slave one or more axes of motion to another axis

Integration

- Sending and receiving triggers in real-time, and using NI-Motion to program triggers
- Using Motion Assistant to quickly develop motion trajectories