Course Description
This course consists of lectures and demonstrations designed to familiarize the student with the features and terminology of batch processes, the engineering methodology for automating a batch plant, and the implementation of batch control and recipe management on the CENTUM VP Batch platform.

Duration
5 days

Objectives/Outcomes
Upon completing the course, the learner will be able to exhibit the ability to:

- Describe the unique characteristics of batch processes
- Relate to the terminology and batch control models of ISA standard S88.01
- Express the methodology for engineering a batch control project
- Use the Yokogawa batch software manuals, including on-line documentation
- Design and build Unit Instruments using CENTUM VP Batch
- Design and build recipe Operations and Phase logic using CENTUM VP Batch
- Accommodate shared process resources such as pumps and headers
- Build Master Recipes including header, logic, formula data, and equipment requirements
- Create, load, execute, pause, restart and otherwise operate Control Recipes
- Create a batch report which is automatically printed at the end of each batch
- Configure access control security for recipe engineering functions
- Create and display a batch trend
- Backup and restore a batch project

Intended Audience
All Application/Process Engineers responsible for the design, implementation, or application maintenance of a CENTUM VP Batch control system.

Course Prerequisites
- CENTUM VP Engineering - Course #7420

Technical Requirements
- Experience with Basic Process Control and DCS Systems
- Basic file/folder manipulation in a Windows environment

Materials
Each learner will be provided with a copy of the course training manual, class handouts, and laboratory exercises.

Requirements to Be Awarded Certification
- Submit completed course Registration Form
- Fulfill financial obligations
- Fulfill the 90% attendance requirement by signing-in each day of facilitated course
- Fulfill the 70% or above overall scoring requirement on labs and projects

Evaluation Methods
- Laboratory exercises
- Question and answer sessions
Course Syllabus

Day 1
- Introduction
- Course Objectives, Outline & Schedule
- Characteristics & Control Requirements of Batch Processes
  - Typical Batch Process Equipment
  - Types of Batch Processes
  - Batch Automation Objectives
- Familiarization with Example Process *(hands-on Laboratory)*
- ISA S88.01 Batch Control Models and Terminology
- Additional Batch Automation Concepts
- General Batch Control Engineering Methodology
- Overview of CENTUM VP Batch Packages
- Familiarization with an Automated Recipe *(hands-on Laboratory)*
- Step-by-Step Activities Involved in Configuring Centum VP Batch
- Simultaneous Execution of Multiple Batches *(hands-on Laboratory)*

Day 2
- Concept of Unit Supervision
- Batch Engineering Activities
  - Identification of Unit Instruments
  - Identification of Shared Resources
  - Assignment of Field Devices to Unit Instruments
- Concept of Plant Hierarchy
- Building a Plant Hierarchy *(hands-on Laboratory)*
- Building Unit Instruments
  - TEAPOT Unit Instrument *(hands-on Laboratory)*
  - PITCHER1 Unit Instrument *(hands-on Laboratory)*
  - PITCHER2 Unit Instrument *(hands-on Laboratory)*
- Management of Shared Resources
- Building Supporting Instruments *(hands-on Laboratory)*
- Concept of Recipe Common Blocks
- Setup of User-Defined Common Blocks *(hands-on Laboratory)*
- Project Backup & Restore *(hands-on Laboratory)*

Day 3
- Derivation of Batch Operations from a Recipe
- Concept of SFC Sequences, Operations & Phases
- SFC Sequence Engineering Builder Screens
- Operation SFC Function Blocks
- Basics of SEBOL Batch Control Language
- Building SFC Sequences *(hands-on Laboratory)*
- Building Operation SFC Instruments *(hands-on Laboratory)*

Day 4
- Concept of Process Management
- Setup of Process Management Environment *(hands-on Laboratory)*
- Batch Plant Trains and Paths
Building Trains and Paths *(hands-on Laboratory)*

- Concept of Master Recipes
  - Overview of CENTUM VP Recipe Handling
  - Recipe Management Engineering Builder Screens
- Building a Master Recipe *(hands-on Laboratory)*
- Overview of Batch Operation & Monitoring Screens
- Loading and Operation of a Control Recipe *(hands-on Laboratory)*

**Day 5**

- Concept of Exception Handling Logic
- Modification of Master Recipe to Include Exception Handling *(hands-on Laboratory)*
- Operation of Control Recipe with Exception Handling Logic *(hands-on Laboratory)*
- Customizing the State Transition Matrix
- Creating a Custom State Transition Matrix *(hands-on Laboratory)*
- Concept of Batch Reporting
- Batch Report Builder
- Adding a Batch Report to the Master Recipe *(hands-on Laboratory)*
- Access Control Utilities
- Configuring Access Control for Recipe View *(hands-on Laboratory)*
- Batch Trends
- Creating and displaying a Batch Trend *(hands-on Laboratory)*
- Wrap-up, Question-and-Answer

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