Continuous Process Control

SERIES SPECIFICATIONS & COURSE OUTLINE

CONTENTS
Produced in cooperation with ISA – The Instrumentation, Systems and Automation Society (ISA™) - this instrumentation series is designed to help participants understand the controls, instrumentation, and applications of continuous processes in manufacturing. The series is designed to provide an overview of principles of automatic process control as they apply to continuous processes in order to achieve the goals of safety, product quality, and process economy.

AUDIENCE
The Continuous Process Control series is designed for control systems technicians, electricians, mechanics, process operators, and other instrumentation and control professionals. These programs are particularly helpful for technicians preparing for ISA's Certified Control System Technician® (CCST®) program.

LEARNER EXPECTATIONS
This series is intended to be used as an essential component in your instrumentation curriculum. Each lesson has specific objectives associated with the information presented. Our experience indicates that those who complete the training are likely to accomplish the stated objectives. Furthermore, if these lessons are built into a total curriculum which includes practice in the working environment, it will help provide participants with the knowledge necessary to master the subject.
Continuous Process Control

**CPC001 Principles of Continuous Control**

**Purpose:** This course teaches participants the characteristics of continuous processes as well as the requirements for control and the control strategies and instrumentation associated with this type of process.

**Objectives:** Define continuous process and the control requirements of a continuous process; identify the four fundamental variables for most continuous processes; describe the types of instrumentation used; describe the additional variables associated with a specific product, for example, product composition, product-to-energy ratios, and product economy; explain the function of a final control element in a continuous process; explain how signal transmission is used to communicate to all the elements in a continuous process; and describe the characteristics and applications of a closed loop system to include the feedback control loop, the cascade control loop, and the feed forward control loop.

**CPC002 Applications of Heat Exchanger Control**

**Purpose:** This course discusses the basic operation of a liquid-to-liquid exchanger. It discusses controlled versus manipulated variables and the features, application, and changes of cascade control and feed forward control. In addition, it covers effects a modified heat exchanger system has on a continuous process.

**Objectives:** Define the basic function of a heat exchanger system; identify the characteristics of a common heat exchanger system; describe the two types of variables needed for the heat exchanger to function properly; explain how the heat exchanger controls product flow and product temperature; describe how the heat exchanger functions with changes in product temperature; describe how the heat exchanger operates in a cascade control loop; describe how the heat exchanger operates in a feed forward control loop; and describe the effect on the process control system when a second heat exchanger is added.

**CPC003 Applications of Distillation Control**

**Purpose:** This course identifies the process components of distillation control and examines some of the theories of operation.

**Objectives:** Identify the process components of a distillation control system; describe the basic operation of the components of a distillation control system; explain why maintaining a good product composition is an important function of the distillation column; describe the variables that affect distillation and product composition; explain why control of the reflux system is a function of the distillation column; identify the impact of maintaining a proper phase relationship of the column contents; describe the process for controlling heat in the system to include temperature and pressure control as well as control of column feed, column bottoms, and column temperature; and describe how the process for transporting condensate from the column to the accumulator is controlled.

**CPC004 Applications of pH Control**

**Purpose:** This course teaches the basics of pH and how the efficiency of a process is influenced by this factor. pH is one of the most difficult process variables to control, so an understanding of the chemistry and characteristics of pH is important. In addition, it examines the equipment used in a pH control system and some of the factors that must be considered in the selection and utilization of various types of equipment.

**Objectives:** Define pH; describe the basic characteristics of pH and how they can influence pH control; define the chemical breakdown of pH and how the pH scale should be interpreted; describe the essential components of a pH control system; describe the factors affecting pH control, such as rangeability, nonlinearity, and sensitivity of pH; describe how the equipment and hardware can affect pH measurements in a pH control system; and recognize the conditions of the pH adjustment process and the outcome of this process.