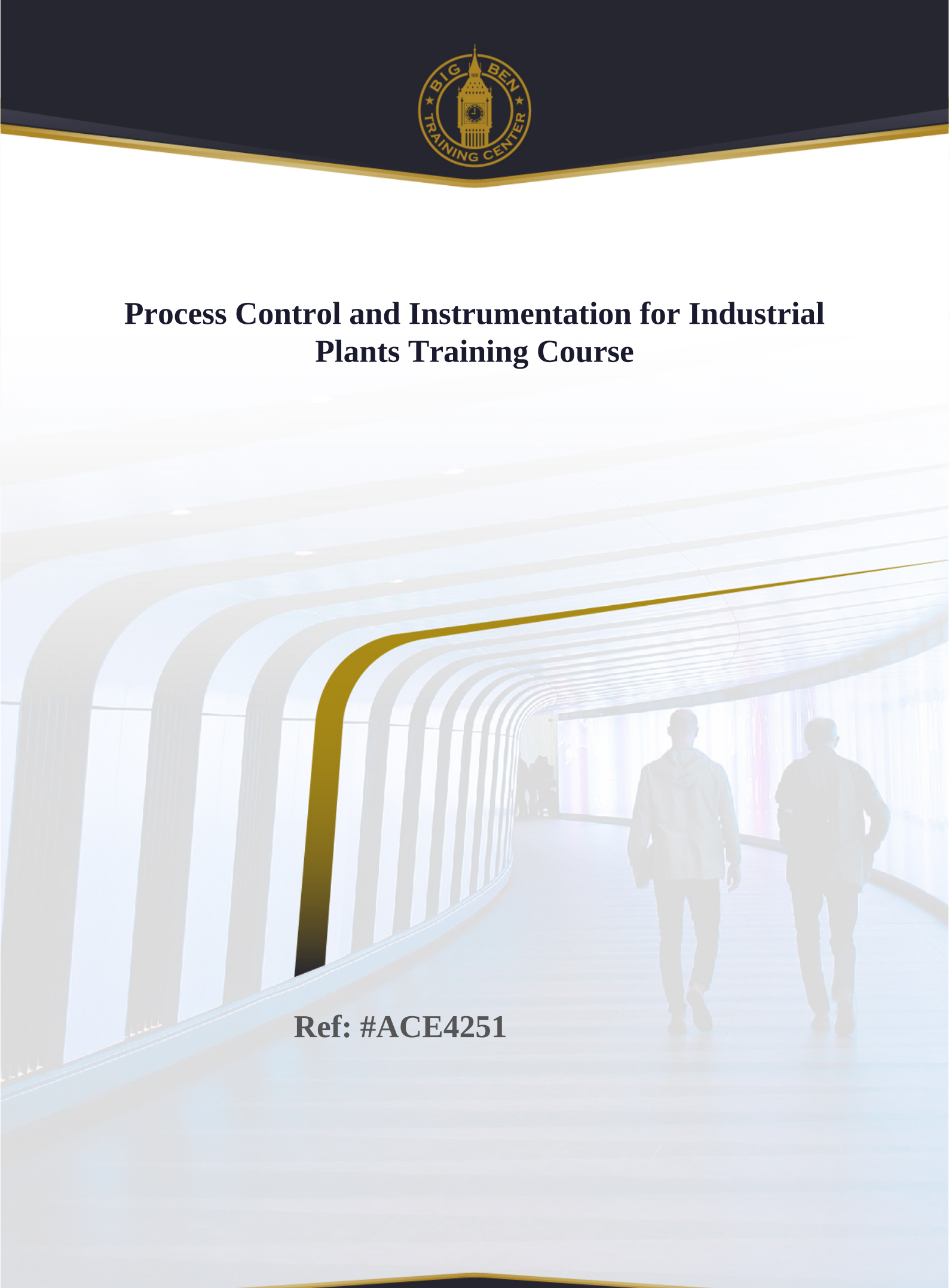
Process Control and Instrumentation for Industrial Plants Training Course



Ref: #ACE4251

Course Introduction / Overview:

This training course gives a comprehensive look into the core principles of process control and instrumentation, which are essential for safe, efficient, and profitable operations in industrial plants. In today's highly automated world, a strong understanding of how to measure, analyze, and control process variables is crucial for engineers and technicians. This course gives participants a solid foundation in the fundamental concepts of measurement, control loop design, and the use of modern instrumentation. We cover everything from basic sensors and transmitters to advanced control strategies and distributed control systems (DCS). The curriculum is informed by leading academic research and industry standards. The book Process Control: A First Course with MATLAB® by Pao C. Chau is a foundational reference that serves as a core part of the course content. BIG BEN Training Center is committed to giving a forward-thinking curriculum that equips professionals with the practical skills needed to optimize plant performance. This course is designed to meet the growing demand for expertise in industrial automation and process control.

Target Audience / This training course is suitable for:

- Process and control engineers.
- Instrumentation and automation technicians.
- Plant operators and supervisors.
- R&D scientists and researchers.
- Chemical and mechanical engineers.
- Engineering students and recent graduates.
- Professionals in industrial plant maintenance.

Target Sectors and Industries:

- Oil and gas.
- Chemical and petrochemical manufacturing.
- Pharmaceuticals.
- Power generation.
- Food and beverage processing.
- Government agencies and utilities.
- Mining and metallurgy.

Target Organizations Departments:

- Process control and automation.
- Instrumentation and electrical.
- Operations and production.
- Engineering and design.
- Research and development.
- Maintenance and reliability.
- Quality assurance.

Course Offerings:

By the end of this course, the participants will have able to:

- Describe the main process variables and their measurement.
- Explain the components and functions of a control loop.
- Design and tune simple feedback control loops.
- Differentiate between different types of control valves and actuators.
- Understand the principles of advanced control strategies.
- Read and interpret process and instrumentation diagrams (P&IDs).
- Troubleshoot common control system problems.
- Apply process control concepts to optimize plant operations.

Course Methodology:

This training course uses a mix of interactive and practical training methods to give dynamic learning experience. The curriculum combines theoretical lectures with real-world case studies to bridge the gap between academic concepts and practical application. Participants will use hands-on activities, including group workshops and scenario-based exercises, to reinforce their understanding of key topics. We use discussions and Q&A sessions to encourage a collaborative learning environment, where participants can share experiences and insights. The course also includes an in-depth analysis of successful and unsuccessful projects from various industries to highlight best practices and common pitfalls. This approach gives participants the confidence to apply their new knowledge directly to their professional roles. At BIG BEN Training Center, we believe that an engaging and interactive format is key to mastering new skills, so we focus on giving immediate feedback and continuous support throughout the training. The methods are designed to ensure every participant leaf with a clear, practical skill set.

Course Agenda (Course Units):

Unit One: Fundamentals of Process Measurement.

- Process variables and their measurement.
- Temperature, pressure, and flow measurement.
- Level and composition sensors.
- Transducers, transmitters, and signal conditioning.
- Calibration and sensor errors.

Unit Two: Principles of Process Control.

- Introduction to process control loops.
- Manual vs. automatic control.
- Feedback and feedforward control.
- PID control loop fundamentals.
- Block diagrams and control system modeling.

Unit Three: Control Loop Components and Tuning.

- Control valves and actuators.
- Types of final control elements.
- PID controller tuning methods.
- Ziegler-Nichols and other tuning rules.
- Loop performance evaluation.

Unit Four: Advanced Control Strategies and Documentation.

- Cascade and ratio control.
- Split-range and override control.
- Introduction to distributed control systems (DCS).
- Reading and creating Process and Instrumentation Diagrams (P&IDs).
- Safety instrumented systems (SIS).

Unit Five: Plant-Wide Control and Troubleshooting.

- Control of common chemical processes.
- Troubleshooting control system issues.
- Alarm management and process safety.
- Introduction to plant optimization.
- Future trends in industrial automation.

FAQ:

Qualifications required for registering to this course?

There are no requirements.

How long is each daily session, and what is the total number of training hours for the course?

This training course spans five days, with daily sessions ranging between 4 to 5 hours, including breaks and interactive activities, bringing the total duration to 20 - 25 training hours.

Something to think about:

How can the integration of artificial intelligence and machine learning with traditional control systems fundamentally change process optimization and predictive maintenance in industrial plants?

What unique qualities does this course offer compared to other courses?

This training course is unique because it bridges the gap between the theoretical aspects of process control and the practical challenges faced in industrial settings. While other courses may focus on either the theoretical models or the software tools, our program gives a comprehensive view, enabling participants to not only understand how control systems work but also to apply them to improve plant operations. We don't just give a general overview; we help you find out how to troubleshoot real-world issues through detailed case studies and hands-on exercises. The curriculum covers a wide range of topics, from basic instrumentation to advanced control strategies and safety systems, ensuring that participants get a modern and relevant education. It’s an advanced program that gives professionals the skills to optimize plant performance, which is critical for safety, efficiency, and profitability.