Advanced Process Plant Troubleshooting and Problem Solving Training Course

02 - 06 Nov 2026

Cape town

4600 € (Per Person)

Ref: #ACE2571_296494

Course Introduction / Overview:

This intensive training course provides a systematic framework for diagnosing, analyzing, and resolving complex operational issues within process plants. Moving beyond reactive, trial-and-error approaches, this program instills a structured, engineering-based mindset essential for enhancing plant reliability, safety, and efficiency. The curriculum is deeply influenced by the principles of systematic problem analysis, similar to those pioneered by academics like Charles H. Kepner and Benjamin B. Tregoe in their seminal work, "The New Rational Manager". Participants will learn to differentiate between symptoms and root causes, applying a range of analytical tools to unravel multifaceted problems. At BIG BEN Training Center, we have designed this course to bridge the gap between theoretical knowledge and practical application, equipping professionals with the skills to manage upset conditions, prevent recurrence of failures, and drive continuous improvement. This journey from problem identification to sustainable solution implementation is critical for maintaining operational excellence and a competitive edge in today's demanding industrial landscape.

Target Audience / This training course is suitable for:

- Process Engineers.
- Operations Managers and Supervisors.
- Maintenance Engineers and Technicians.
- Plant Operators and Control Room Personnel.
- Reliability and Integrity Engineers.
- Technical Service Professionals.
- Health, Safety, and Environmental (HSE) Specialists.
- Project Engineers involved in plant commissioning and startup.

Target Sectors and Industries:

- Oil and Gas Production and Refining.
- Petrochemical and Chemical Manufacturing.
- Power Generation and Utilities.
- Pharmaceuticals and Biotechnology.
- Food and Beverage Processing.
- Water and Wastewater Treatment.
- Pulp and Paper Manufacturing.
- Governmental regulatory bodies and national industrial agencies.

Target Organizations Departments:

- Operations and Production.
- Maintenance and Reliability.
- Engineering and Technical Services.
- Process Safety Management (PSM).
- Health, Safety, and Environment (HSE).
- Quality Assurance and Control.
- Research and Development.

Course Offerings:

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

- Apply a structured, systematic methodology to any operational problem.
- Effectively distinguish between problem symptoms and underlying root causes.
- Utilize a variety of Root Cause Analysis (RCA) tools like Fishbone Diagrams and Fault Tree Analysis.
- Diagnose and troubleshoot common failures in critical process equipment such as pumps, compressors, and heat exchangers.
- Analyze process data to identify trends and deviations indicative of potential issues.
- Understand the impact of human factors and cognitive biases on problem-solving effectiveness.
- Develop and implement robust corrective and preventive action plans.
- Lead and contribute effectively to cross-functional troubleshooting teams.
- Improve technical report writing for documenting investigations and solutions.
- Contribute to a proactive culture of safety and continuous improvement within the organization.

Course Methodology:

The training methodology at BIG BEN Training Center is designed to be highly interactive and experiential, ensuring that participants can immediately apply the concepts learned. We move beyond traditional lectures to create a dynamic learning environment centered on practical application. The course heavily utilizes real-world case studies drawn from a diverse range of process industries, allowing participants to analyze complex failures and operational upsets in a controlled setting. A significant portion of the training is dedicated to hands-on workshops and group exercises where teams collaborate to solve simulated plant problems using the methodologies taught. This collaborative problem-solving approach fosters critical thinking and communication skills. Our expert instructors facilitate these sessions, providing personalized feedback and guiding discussions to deepen understanding. The program integrates interactive simulations, peer-to-peer learning sessions, and structured debriefs to reinforce key principles and ensure a high level of knowledge retention and skill mastery.

Course Agenda (Course Units):

Unit One: Foundations of Systematic Problem Solving

- Introduction to troubleshooting and problem-solving methodologies.
- Defining the problem accurately and gathering critical information.
- The psychology of problem-solving and avoiding common mental traps.
- Moving from reactive fixes to a structured, analytical approach.
- The Kepner-Tregoe problem analysis framework.
- Developing a clear problem statement and scope.
- Prioritizing problems based on risk, cost, and operational impact.

Unit Two: Mastering Root Cause Analysis (RCA) Methodologies

- Introduction to Root Cause Analysis (RCA) principles.
- The 5 Whys technique for simple to moderately complex problems.
- Developing Cause-and-Effect (Fishbone/Ishikawa) diagrams.
- Introduction to Fault Tree Analysis (FTA) for system-level failures.
- Applying Failure Mode and Effects Analysis (FMEA) proactively.
- Event and Causal Factor Analysis (ECFA) for incident investigation.
- Workshop on selecting the appropriate RCA tool for different scenarios.

Unit Three: Practical Troubleshooting of Process Plant Equipment

- Systematic troubleshooting of rotating equipment like pumps and compressors.
- Diagnosing issues in heat exchangers and cooling systems.
- Troubleshooting distillation columns and separation processes.
- Analyzing problems in chemical reactors and fired heaters.
- Investigating utility system failures (steam, compressed air, water).
- Understanding instrumentation and control loop malfunctions.
- Case studies on integrated equipment failure analysis.

Unit Four: Data-Driven and Human-Centric Troubleshooting

- Utilizing process data (historians, logs) for troubleshooting.
- Introduction to Statistical Process Control (SPC) for problem identification.
- Recognizing patterns, trends, and anomalies in operational data.
- Understanding the role of human factors in process upsets.
- Analyzing cognitive biases and their effect on decision-making.
- Leading effective team-based troubleshooting sessions.
- Techniques for effective communication during plant emergencies.

Unit Five: Proactive Strategies and Incident Prevention

- Developing effective and sustainable corrective actions.
- Implementing preventive measures to avoid problem recurrence.
- Conducting post-incident reviews and lessons-learned sessions.
- Integrating troubleshooting findings into maintenance strategies.
- The role of management of change (MOC) in preventing new problems.
- Fostering a culture of continuous improvement and operational excellence.
- Final course project presenting a complete troubleshooting investigation.

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:

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

Beyond technical tools and methodologies, how do cognitive biases and organizational culture impact the effectiveness of troubleshooting in a high-stakes process plant environment?

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

This course distinguishes itself by adopting a holistic and integrated approach to engineering problem-solving. While many programs focus solely on the technical application of tools like RCA or FMEA, this training dedicates significant attention to the human and organizational dimensions of troubleshooting. We explore the critical role of cognitive biases, team dynamics, and communication in the success or failure of an investigation, providing participants with a more robust and realistic skill set. The curriculum is uniquely structured to bridge the gap between reactive problem-solving and proactive failure prevention, empowering attendees not just to fix current issues but to build more resilient systems for the future. Furthermore, the course content is not confined to a single industry; it leverages a wide array of cross-industrial case studies, enriching the learning experience and demonstrating the universal applicability of the core principles. This emphasis on transferable skills, combined with a deep dive into both equipment-specific and system-wide analysis, ensures that participants leave with a comprehensive and profoundly practical mastery of the subject.