



Process Plant Troubleshooting Course: Root Cause Analysis of Upsets, Off-Spec Product and Losses



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Introduction:

Process plant troubleshooting, covering root cause analysis of upsets, off-spec product and losses, is a 1-week course for process, operations and production engineers and shift supervisors in refineries, petrochemical, chemical, gas and utility plants, ending with a Process Troubleshooting Report with root cause evidence and corrective actions. Units lose throughput and make off-specification product for weeks when teams change settings by trial and error instead of testing causes against data. Nominees already run or support process units, and teaching is by case study on historian trends, laboratory results and field data. CoreConcept Training Center delivers this process plant troubleshooting course.

Course Objectives:

- Define process problems precisely with deviation statements and is/is-not analysis before searching for causes
- Gather and check evidence from DCS historian trends, laboratory results, field readings and operator logs
- Use mass and heat balance checks to separate instrument errors from real process changes
- Apply fishbone diagrams, 5 Whys and fault trees to generate and rank candidate causes
- Troubleshoot distillation columns, heat exchangers, fired heaters, separators and compressors from their operating symptoms
- Test likely causes with safe plant trials and write a troubleshooting report with corrective actions

Target Audience:

- Process engineers responsible for unit performance and product quality
 - Operations engineers responsible for day-to-day unit stability and upset response
 - Production supervisors responsible for shift performance and off-spec handling
 - Technical support engineers responsible for investigating recurring unit problems
 - Laboratory and quality staff who supply analytical evidence for investigations
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Course Outline:

Day 1: Process Problems and Structured Troubleshooting

- Process Upset, Off-Spec and Loss Problem Categories
- Structured Troubleshooting Cycle From Symptom to Verified Cause
- Deviation Statement and Problem Boundary Definition
- Is and Is-Not Analysis for Process Problems
- Recent Unit Problem Review Using Shift and Event Logs

Day 2: Evidence Gathering and Cause Analysis Methods

- DCS Historian Trend Review and Event Timeline Building
- Laboratory Result and Sampling Validity Checks
- Mass and Heat Balance Closure for Instrument Validation
- Fishbone and 5 Whys Applied to Process Data
- Fault Tree Construction for Unit Performance Loss

Day 3: Troubleshooting Separation and Heat Transfer Equipment

- Distillation Column Flooding, Weeping and Foaming Diagnosis
- Column Pressure Profile and Tray Efficiency Checks
- Heat Exchanger Fouling Diagnosis From Duty and Approach
- Fired Heater Draft, Excess Air and Tube Temperature Checks
- Separator Carry-Over and Level Control Problem Diagnosis

Day 4: Complex Problems, Trials and Corrective Action

- Compressor Surge and Performance Loss Symptom Analysis
- Interacting Causes and Control Loop Contributions
- Safe Plant Trial Design With Management of Change
- Hypothesis Confirmation From Trial and Test Results
- Corrective Action Selection and Recurrence Prevention

Day 5: Case Study Troubleshooting and the Report

- Off-Spec Column Product Case Study Using Historian Data
 - Exchanger Train Capacity Loss Case Study
 - Recurring Separator Upset Case Study With Fault Tree
 - Peer Review of Evidence and Proposed Fixes
 - Process Troubleshooting Report Completion and Briefing
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Skills You Will Gain:

- Problem Definition
- Process Data Interpretation
- Balance Closure Checks
- Cause Ranking
- Column Troubleshooting
- Heat Transfer Diagnosis
- Plant Trial Planning
- Troubleshooting Report Writing

Why Attend This Course:

- Deliver a Process Troubleshooting Report with root cause evidence and corrective actions to the operations manager and the technical manager
- Decide whether a symptom comes from an instrument fault, an equipment limit or an operating change
- Avoid lost throughput, extended off-spec production and repeat upsets caused by trial-and-error fixes
- Teach shift teams the problem definition, evidence and balance check methods used in the case studies

Conclusion:

Back at work, the participant gives the Process Troubleshooting Report to the operations manager, the technical manager and the shift supervisors. They use it to approve the corrective actions, decide which plant trials or inspections are still needed and assign owners for each fix. After the first corrective action is in place, the unit should check whether throughput, product quality and upset frequency have returned to target and record the confirmed cause in its troubleshooting log for future reference.

Frequently Asked Questions FAQ:

What should participants know before a process plant troubleshooting course?

Participants should already work on or support a process unit and understand its main equipment and control loops. Bringing anonymised historian trends, laboratory results or a recent upset report helps them apply the case study methods to a real problem from their own plant.

How does a process plant troubleshooting course differ from a root cause failure analysis course for equipment?

Root cause failure analysis courses investigate why a pump, bearing or component broke. This course investigates why a process unit underperforms, upsets or makes off-spec product, using operating data, balances and process knowledge rather than failed parts and metallurgy.

Why do mass and heat balances matter in process plant troubleshooting?

A balance that does not close shows that a meter, analyser or assumption is wrong. Checking closure early stops teams chasing false symptoms and points them to the real change in the process.

What do participants take back from the process plant troubleshooting course?

Participants take back a Process Troubleshooting Report with a defined problem, evidence timeline, ranked causes, trial results and corrective actions, plus checklists for columns, exchangers, heaters and separators they can use on the next upset.