Power Plant Start-Up: Boiler, Turbine and Generator Course

28 December 2026 – 1 January 2027
Rome (Italy)

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Power Plant Start-Up: Boiler, Turbine and Generator is a 1-week course for commissioning engineers, operations staff and project managers who bring new or overhauled generating units into service. You plan the sequence from mechanical completion to first fire, turbine rolling, synchronization and load tests. You take back a Unit Start-Up Sequence and Test Plan. This power plant start-up course is delivered by Mercury Training Center.

About This Course

Generating units often lose weeks at start-up through dirty lube oil, missed system turnovers and trips during synchronization. To follow the course you should already work in plant operation, maintenance or project delivery. You practice on sample turnover packages, start-up curves and trip logs, then on the sequence for a unit you know.

Who It Is For

- Managers who answer for bringing a new or overhauled generating unit into service.
- Engineers who plan and lead system turnover, pre-commissioning and start-up tests.
- Operations and maintenance staff who will run the unit after handover.
- Electrical and instrumentation specialists who energize switchgear, protection and control systems.
- Project control staff who track commissioning cost, resources and progress.

This course is not for engineers commissioning chemical or refinery process units, who are better served by a process plant commissioning course, nor for control room operators seeking routine operating practice, who suit an operator course on unit operation.

Competencies You Will Build

- Start-Up Strategy: you set the order of systems from mechanical completion to commercial operation and defend it to the project team.
- System Turnover Control: you accept systems through punch lists, integrity checks and turnover packages.
- Boiler and Turbine Readiness: you plan boiler checks, lube oil flushing and first rolling of the turbine.
- Generator Synchronization: you check protection, excitation and synchronizing conditions before closing the breaker.
- Performance Testing: you organize load increase, reliability runs and heat rate tests and record acceptance.
- Commissioning Control: you plan resources, cost and spares and track progress with earned value.

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What You Will Be Able to Do

By the end of the course you will be able to:

- From a unit's system list, build the start-up sequence from mechanical completion to commercial operation with hold points.
- Given a turnover package, check integrity, punch list and isolation records and decide whether the system can be energized.
- Using turbine oil flushing and barring records, judge readiness for first roll and set the trip checks to perform.
- Given generator protection and excitation test sheets, confirm the conditions for synchronization and first load.
- From a performance test result, compare output and heat rate with contract values and list the acceptance issues.
- Using a commissioning schedule and cost estimate, apply earned value to report progress and forecast completion.

Course Content

Day 1: Commissioning Stages and Organization

- Six Stages of Commissioning from Construction Completion to Acceptance
- Commissioning Organization, Roles and Contractor Interfaces
- Start-Up Strategy and System Sequencing for Generating Units
- Cost Estimation and Resource Plans for Commissioning
- Spare Parts and Consumables Planning for First Operation

Day 2: Mechanical Completion and Pre-Commissioning

- Mechanical Completion, Punch Lists and Integrity Checks
- System Turnover Packages and Isolation Procedures
- Utilities, Water Treatment and Auxiliary Systems Readiness
- Electrical Switchgear Energization and Protection Checks
- Instrumentation, Control Systems and Loop Testing

Day 3: Boiler and Turbine Start-Up

- Boiler Readiness Checks and First Fire Preparation
- Steam Turbine Lube Oil Flushing and Barring Gear Operation
- First Rolling of the Turbine and Trip Testing
- Machinery Vibration and Alignment Checks During Start-Up
- Gas Turbine Start-Up Sequence in Combined-Cycle Units

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Day 4: Synchronization, Load Tests and Control

- Generator Excitation and Synchronization Conditions
- Load Increase, Reliability Runs and Acceptance Testing
- Performance, Output and Heat Rate Testing
- Progress Monitoring, Short-Cut Planning and Earned Value Analysis
- Troubleshooting, Risk, Safety and Quality Control During Start-Up

Day 5: Building Your Unit Start-Up Sequence and Test Plan

- Exercise: Sequencing Systems for Your Unit
- Exercise: Checking a Turnover Package Before Energization
- Exercise: Planning First Roll and Synchronization Hold Points
- Exercise: Analyzing a Start-Up Trip and Setting Corrective Actions
- Completing the Unit Start-Up Sequence and Test Plan

Case Studies and Exercises

The items below are suggested activities, drawn from utility and industrial power settings.

- Case study: A combined-cycle unit trips repeatedly during first synchronization; you trace the cause in protection and excitation records and decide the conditions for the next attempt.
- Case study: A refinery cogeneration unit returns from overhaul with a delayed turbine roll after oil contamination; you set the flushing and acceptance criteria.
- Exercise: A desalination plant's steam unit nears handover; you prepare the performance and heat rate test plan and acceptance record.
- Exercise: The commissioning schedule of a new generating station slips; you apply earned value and propose a recovery plan.

What You Take Back

The Unit Start-Up Sequence and Test Plan sets out, for a generating unit you work on, the system order, hold points and tests from mechanical completion to acceptance. In your first month back you use it to brief the commissioning team, check turnover readiness and agree test criteria with the contractor.

- A system sequence with hold points.
- A turnover readiness checklist.
- First roll and synchronization check sheets.
- A performance and heat rate test plan.

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Quick Answers FAQ

What should you know before power plant start-up training?

You should already work in plant operation, maintenance or project delivery and read piping, electrical and control diagrams. Prior commissioning experience helps but is not needed: the stages are built up before boiler, turbine and generator start-up are practiced.

How does power plant start-up training differ from process plant commissioning training?

Process plant commissioning covers vessels, pumps and process units in chemical and refinery settings. Power plant start-up training follows a generating unit through boiler first fire, turbine flushing and rolling, generator synchronization, load increase and heat rate testing.

Why do generators trip during first synchronization?

Common causes are wrong protection settings, excitation faults, phase or voltage mismatch at the breaker and unchecked control logic. Each can be found earlier through protection tests, loop checks and a written synchronization checklist.

What do you take back from power plant start-up training?

You take back the Unit Start-Up Sequence and Test Plan for a unit you work on: system sequence with hold points, turnover checklist, first roll and synchronization check sheets, and a performance test plan.

For Your Manager

After the course, the team member will be able to sequence a generating unit's start-up, accept systems at turnover, prepare turbine rolling and generator synchronization, and organize performance and heat rate tests. They return with the Unit Start-Up Sequence and Test Plan, first used to brief the commissioning team and agree test criteria with the contractor.