

Operation and Maintenance Principles

Course Number

Various

Course Duration

5 days

Audience

Solar turbomachinery operators, maintenance personnel, and engineers

Prerequisites

This course is designed for personnel who may have limited experience of operating Solar turbomachinery packages, but who have a sound general technical background and some industry-related experience as a operator, instrument technician, or mechanical technician. As such, the students should already be able to recognize and understand general technical and industry terms; be able to interpret simple system schematic diagrams; and be proficient in the use of basic instrumentation, electrical, and mechanical tools and techniques.

Course Description

This course will provide a turbo-machinery package operator and maintenance technician with the knowledge and skills necessary to operate and maintain the package safely and efficiently. This requires a degree of background knowledge of the package systems and system components, the working relationship between the components, and their operating sequences. Therefore, the purpose and function of each of the package major components and support systems will be explained, as well as the components in each system, and the sequences of operation. Common malfunction conditions will be discussed, along with the significance of each, the probable causes, and the recommended action for each condition. The students will thus be able to recognize which abnormal conditions may be influenced and corrected by adjusting operational conditions, and which will require further investigation and “maintenance-based” corrective action. The general principles of effective routine maintenance of turbo-machinery will be discussed, along with identification of the sources of information used to plan and support maintenance activities.

The course will be primarily conducted by means of instructor-led presentations and discussions backed up by visits to the equipment, as available.

The specific maintenance requirements will be covered using worksheets to allow the student to gain familiarity with the project data supplied with the package. These worksheet exercises will help identify maintenance requirements for each package system, including the frequency, consumable parts, and sources of procedural information.

A Pre-Test and Post-Test will be administered to measure student progress as a result of the course.

Course Objectives

On completion of this course the student will be able to:

1. Describe Pre-Start Checks; Start Procedures; Stop Procedures; and Normal Operation, including operational configuration and parameter changes
2. Differentiate between common operational-based and maintenance-based abnormal conditions
3. Make operational parameter changes in response to abnormal operational-based conditions or alarms/shutdowns
4. Take appropriate first response action and accurately communicate relevant data to investigative personnel in relation to abnormal maintenance-based conditions
5. Plan and execute predictive, preventative, and corrective maintenance in accordance with Solar recommendations
6. Perform basic performance verification in support of predictive maintenance activities

Course Topics

1. General Package Description
2. Gas Turbine Engine
3. Start System
4. Lube Oil System
5. Fuel System
6. Driven Equipment (Compressor or Generator)
7. Seal System (Compressor Packages Only)
8. Control System
9. Display System
10. Operating Procedures
11. Routine Maintenance Theory and Practices
12. Package System Maintenance Requirements
13. Engine Performance Verification
14. Compressor Performance Verification (Compressor Packages Only)

Reference Material

Students receive a student workbook that contains a thorough description of the purpose, function, and operation of the package, driver, driven equipment, and support systems. An accompanying Project Data Book will be used during the course to record precise details of the specific package or packages, such as operating values, setpoints, sequences, and procedures. Where the data is available, the Data Book will also contain package specific images of the major components and support systems. In addition, a Cause and Effect Matrix will be used to illustrate common malfunction indications. These materials are designed for classroom use and for reference purposes on the job. In addition to the course materials provided, reference may also be made to the project data supplied with the package, including the system hydro-mechanical drawings, mechanical installation drawings, electrical schematics, and Operation and Maintenance Instructions.

For single-customer classes, the materials used will reference the customers' specific package.

For multi-customer classes, the materials used will be representative of a typical package of the specified engine model and package type. Multiple sub-system configurations will be discussed (for example Pneumatic Start as well as Direct AC Start), to ensure that each student gains knowledge of their package configuration.

For multi-customer classes that cover a range of different engine models (for example the Centaur 40, Centaur 50 and Taurus 60 combined course), the selection of engine models covered has been made to ensure the maximum commonality of equipment configuration and operating parameters. Any major differences between the engine models will be highlighted by the instructor during the class.