

# Troubleshooting Skills

## Course 110: Troubleshooting Skills

Explores the subject of troubleshooting and the importance of proper maintenance procedures. Covers working with others, aids in communication, and trade responsibilities. Outlines troubleshooting techniques and aids, using schematics and symbols. Focuses on specific maintenance tasks, breakdown maintenance, and planned maintenance.

TPC Training is accredited by IACET to offer **1.0 CEU** for this program.



### Lesson 1: Introduction to Troubleshooting

#### Topics

Troubleshooting; Troubleshooting Skills; Troubleshooting Duties; Troubleshooting Aids; Mechanical Troubleshooting; Electrical Troubleshooting; Importance of Maintenance; Maintenance Organization; Maintenance Personnel; Scheduling; Challenge of Maintenance

#### Objectives

- Tell why efficient troubleshooting is important in a production plant.
- Name the four common troubleshooting aids.
- List the steps in troubleshooting a machine.
- List the steps in troubleshooting a system.
- Describe a typical maintenance organization.

### Lesson 2: Working with Other People

#### Topics

Communicating with People; People Skills; Human Behavior; Communication Cycles; Aids to Communicating; Being Tactful; Preventing Misunderstandings; Working with Older Persons; Trade Responsibilities; Differences of Opinion; You and Your Supervisor; Upgrading Your Skills

#### Objectives

- Tell why good communication between plant personnel is needed.
- List the ways a person usually sees himself/herself.
- Explain the communication cycle.
- Explain the correct method of delivering a written message from your supervisor to another person.

### Lesson 3: Troubleshooting Techniques

#### Topics

Job Responsibilities; Recognizing Normal Operations; Learning About Normal Operations; Simple Testing and Observation; Reducing Downtime; Routine Repairs; Emergency Repairs

#### Objectives

- List the steps to recognizing normal machine operations.
- List the questions you should ask yourself when a machine fails.
- List the signs of a machine in need of service.

### Lesson 4: Aids to Troubleshooting

#### Topics

Equipment Repairs; Drawings and Blueprints; Sketches; Manufacturer's Literature; Service Representatives; Planned-Maintenance Records; Machine Records and Work Orders; Electrical Test Equipment; Mechanical Instruments; Temperature-Measuring Instruments

#### Objectives

- Describe a blueprint.
- List the information that should be recorded in a machine equipment record.
- Identify calibration standards.
- Identify a multimeter (VOM).
- Identify different troubleshooting test equipment.

### Lesson 5: Preparing for Troubleshooting

#### Topics

Troubleshooting Responsibilities; Tools for Troubleshooting; Parts and Supplies; Safety Rules; Example of Troubleshooting; Charts and Diagrams for Troubleshooting; Correcting Malfunctions; Power-Transmission Equipment; Drive and Conveyor Belts; Drive and Conveyor Chains

#### Objectives

- List the information you must know about mechanical or electrical systems before you can troubleshoot them successfully.
- Name the commonly used items that should be carried in every troubleshooter's tool box.
- List the steps to follow in reading a pneumatic or hydraulic schematic.
- List the responsibilities of a troubleshooter.

### Lesson 6: Using Schematics and Diagrams

#### Topics

Using Schematic Diagrams; Piping Schematics; Compressor and Engine Piping Schematics; Hydraulic and Pneumatic Schematics; Pneumatic Circuits; Pneumatic-Hydraulic Schematics; Electrical Schematics; Motor-Starting Circuits; Plant Lighting Diagrams; Plant Lighting Controls; Electrical Troubleshooting Charts

#### Objectives

- Discuss how to use schematics when troubleshooting.
- Identify differences in schematics.
- Explain how to use a troubleshooting chart.

## Troubleshooting Skills

### Lesson 7: Solving Mechanical Problems

#### Topics

Bearing Problems; Pump Problems; Piping Systems; Flexible Hose; Compressed-Air Equipment; Hydraulic Systems; Heating, Ventilating, and Air Conditioning; Refrigeration Equipment; Pollution-Control Equipment; Building Maintenance

#### Objectives

- Identify bearing wear problems.
- Identify pump failure problems and solutions.
- Identify types of hosing.
- Identify different plant equipment and their problems.

### Lesson 8: Solving Electrical Problems

#### Topics

Power Generation and Distribution; Feeders, Subfeeders, and Branch Circuits; Fuses and Circuit Breakers; Current Capacity of a Wire; Understanding Basic Principles; Diagnosing Trouble; Testing for Continuity; Electrical Safety; Communication and Diagrams; Using Building Lighting Diagrams; Troubleshooting with Electrical Diagrams; Electrical Instruments

#### Objectives

- State the definition of switchgear.
- Identify current voltage characteristics of wire.
- List the safety rules to follow when working with electrical equipment.
- Identify a pictorial diagram, a block diagram, and a schematic diagram.
- Explain how to troubleshoot an electric problem.

### Lesson 9: Breakdown Maintenance

#### Topics

Definition of Breakdown Maintenance; How Breakdown Maintenance Works; Good Breakdown Maintenance; Work-Order Procedures; Preparing for Emergencies; Skills for Emergency Work; Maintenance Parts and Supplies; Breakdowns in Automatic Machinery; Using Downtime; Resurfacing Machine Parts

#### Objectives

- Explain what to do if you are the first member of the emergency crew.
- Explain the spare parts requisition form.
- Discuss the four main parts of practical machine maintenance.

### Lesson 10: Planned Maintenance

#### Topics

Definition of Planned Maintenance; Importance of Planned Maintenance; Frequency of Planned Maintenance; Benefits of Planned Maintenance; Unscheduled Maintenance; Parts Requiring Planned Maintenance; Keeping Maintenance Records; Inspection Records; Lubrication; Using Lubrication Charts

#### Objectives

- State the definition of planned maintenance.
- List the information that should be included on record sheets or file cards as part of the machine inventory.
- List the benefits to be accrued from an effective lubrication program.
- Describe the proper sag in a drive chain.
- Explain how to service a battery properly.