



# MAINTENANCE TROUBLESHOOTING INTERNATIONAL LLC

TEM-302

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## TEM-302 TROUBLESHOOTING ESSENTIALS FOR MAINTENANCE TECHNICIANS AND ENGINEERS

Can troubleshooting be taught? Is it a science or an art? Is it true that some people don't have the knack and it's a waste of time to try to train them? We at Maintenance Troubleshooting know it is a learned skill and many have left this class with the ability to figure out complex problems in their work environment under pressure. Long term correction of problems is a slow and laborious process but troubleshooting is often "right now" to get the plant back in operation or the building HVAC system under control. Minutes often count and heading down the wrong path for a corrective solution costs time and prolongs outages. How do you collect your thoughts and troubleshoot the problem to a correct solution? The answer is a combination of applied logic with occasional flashes of insight to think out of the box. This course is taught by an engineer with 45 years of troubleshooting experience. There is no class quite like this one. It changes your thought process and gives you the tools for success on the job.



### The Concept of Troubleshooting

- What exactly is troubleshooting?
- What falls outside the realm of Troubleshooting?

### Classical Steps of Troubleshooting

- Step #1 – Problem Identification
- Step #2 – Establish Theory of Probable Cause
- Step #3 – Establish Plan of Action
- Step #4 – Implement the Plan
- Step #5 – Verify Full Functionality
- Step #6 – Document Findings, Actions, and Outcomes

### Class Troubleshooting Scenarios

- The Ceiling Light problem
- The Kitchen Faucet problem
- The Three Switch Attic problem

### Formalized Troubleshooting

- Fishbone diagram
- FEMA (Failure Mode and Effects Analysis)
- Flow charting

### Plant Equipment Knowledge

- Create a machine critical element card
- Knowing what the equipment does and the components
- Obtaining work books and maintenance manuals
- Cutaway or assembly drawings
- Spare components for swap out
- Factory training

- Make use of manufacturer's troubleshooting guides
- TEXT or phone assistance including video and pictures

### Case History: The Roof Fan Radiator

- The problem
- The costs
- Beginning the investigation
- Obtaining the manuals
- Checking past history
- Physical inspection
- Mislead by misunderstanding
- Corrective action
- Building an informational base
- Testing

### Case History— The Cooling Tower

- Catastrophic blade failure
- Vendor report
- Failure analysis
- Repair decisions
- Shaft alignment
- Blade pitch and tracking
- Testing
- Rework other towers

### Case History: The Clean Room Exhaust Fan

- Rebuild by the numbers
- Unsuccessful rebuilds
- Manufacturer's reissue
- Bearing mistakes
- Successful rebuilding

### Case History: Oil Lubrication Failure

- Repeated bearing failure on agitator gear boxes
- Contaminated oil measurement
- Water in oil

### Case History: Early Bearing Failures

- Across the plant
  - The local theory
  - The cause and solution
- ### Thinking Outside the Box
- Eliminating everything else
  - Divide and conquer
  - Shot in the dark
  - Dumb luck

### CLASS FORMATS AVAILABLE

- MTI Hands-On Center \$995/person
- On-Site (Your Location) Ask for Quote

Quick Quote Available in 48 hrs.

### CLASS DURATION

2-days, 15 hours of instruction

**Class Details:** Each student will receive class books, work activity sheets, self-test progress evaluations, as well as questions from the instructor to make sure they understand the material presented. It is expected that an attendee will leave the class with the basic knowledge of the subject and possess new found skills to better equip them when they return to their job. A certificate suitable for framing will be issued to each attendee who successfully completes the course. Call, email or check the website for the next time this course is scheduled at the MTI training center or as a ZOOM interactive session. On-site sessions? Request a quick 48-hour turnaround quote. Revised: 22/19/2021