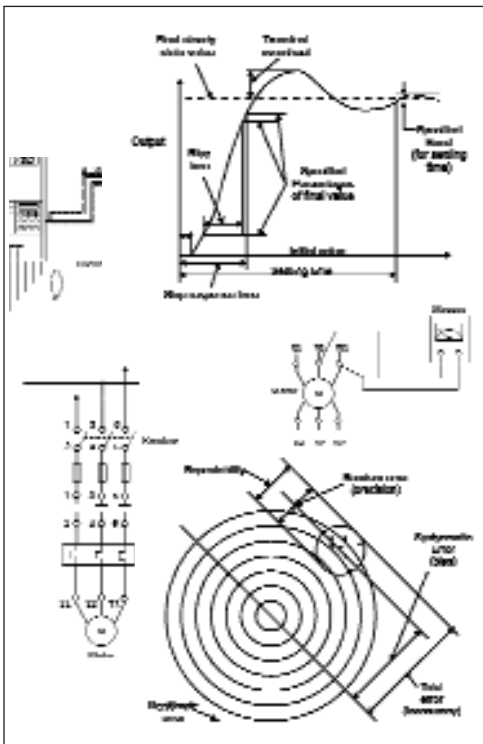


# PRACTICAL INDUSTRIAL TROUBLESHOOTING OF INSTRUMENTATION, ELECTRICAL AND PROCESS CONTROL FOR ENGINEERS AND TECHNICIANS



## YOU WILL LEARN HOW TO:

- Evaluate industrial processes
- Competently diagnose fault conditions
- Accurately interpret drawings and documentation
- Reliably explain the nature of faults, how they should be repaired and how the system should be tested on completion
- Troubleshoot communication links using test equipment and available software packages - IDC's Protocol Analysis Tool (PAT). Free copy of this tool for all delegates
- Demonstrate a working knowledge of how instrumentation and control systems are interfaced
- Compile concise fault analysis reports and make recommendations to prevent recurrence

## WHO SHOULD ATTEND:

This workshop is designed for personnel with a need to understand the techniques required to use and apply industrial fault finding, troubleshooting and repair technology as productively and economically as possible. This includes technicians and artisans involved with:

- Consulting and design
- Control and instrumentation
- Control systems
- Electrical and instrumentation installations
- Maintenance supervisors
- Maintenance technicians
- Process control
- Process development
- Project management
- SCADA and telemetry system



*Technology Training that Works*

## The Workshop

This interactive workshop uses a systems approach to troubleshooting and is designed to encourage delegates to take a new look at the methodology of faultfinding and rectification on their plant. Having covered the types of equipment, we look at first line troubleshooting, then the advanced level and finally work through some typical examples.

The first step is to get to grips with the processes and relevant process variables, then to look at their measurements and the basics of the systems that control them. Before embarking on the look-feel-listen-decide sequence, we pause for a while to consider aspects of safety; at the plant, equipment, component and personal levels.

Troubleshooting basics covers the systematic approach to information gathering, fault diagnosis and decision-making. Emphasis is placed on gathering relevant information and using it to prove where the fault isn't; thereby eliminating false decisions and "red herrings".

Having implemented the right solution, we then look at how to learn from the experience and prevent a recurrence.

'First level' troubleshooting will help in localising the faulty module or sub-system and narrow it down to a set of possible

components. The 'advanced' chapters will cover more details/expert level investigation and will address the component level and, more importantly, a validation of the decision taken at the first level troubleshooting; verifying if it requires a component change - incorrect decisions at this stage having significant cost implications.

Taking the case of an apparent PLC fault, the first level trouble-shooting can eliminate the PLC from the actual fault condition and pin-point the section of plant where the real fault may be located; typically a range of 5 to 10 components. The advanced section will focus more on tracing faults to the final component and might require using more sophisticated equipment, and/or debugging. The point is that if the PLC programming was correctly commissioned, it will not be the cause of the problem.

Similarly, first line motor faults can be related to individual motors, drive circuitry, relays, switches, etc. The advanced troubleshooting will cover tracing the fault to the specific IC or other drive component, such as a thyristor or fuse. In some cases, a re-calibration of the drive might also be required.

The assumption here is that most faults can be traced to fuses, misaligned components,

loose connections, etc wrong. This can be addressed by first line troubleshooting. If the fault goes beyond this and is caused by a faulty component, it needs to be verified by a person with more expertise. Rarely is incorrect configuration or malfunctioning coding the actual problem.

Emphasis is placed on the diagnostician's dependence on accurate drawings and documentation and the need to be able to correctly interpret the facts contained in drawings and documentation.

Clients often feel the same way about these problems; where components are being replaced more on an ad-hoc basis, so causing unnecessary wastage and plant down-time.

Delegates will be encouraged to bring typical troubleshooting problems to the workshop and to discover a more cost-effective way of resolving their problems, thereby saving them time, whilst saving their plant from unnecessary wastage and down-time.

### Pre-requisites

A basic working knowledge of industrial electrical, instrumentation and communications applications is useful.

## Practical Sessions

This is a practical, hands on workshop enabling participants to work through practical exercises which reinforce the concepts discussed.

**To gain full value from this workshop, please bring your laptop/notebook computer.**

## On-Site Training

- ✓ SAVE over 50% by having an IDC workshop presented at your premises.
- ✓ Customise the training to YOUR workplace.
- ✓ Have the training delivered when and where you need it.

Contact us for a FREE proposal.

## The Program

### BASICS

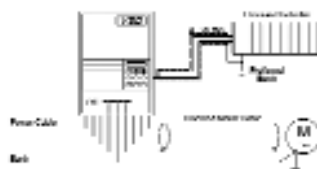
- Processes
- Process variables
- Measurement
- Control systems basics
- Matters of safety
- Decision making
- Troubleshooting basics
- Feedback to prevent a recurrence
- Examples of personal experience

### PLC TROUBLESHOOTING

- Types of PLC's in use
- System architecture
- Communication strategies
- Strategic use of documentation to aid fault location and diagnosis
- Actual PLC fault identification
- Examples of typical fault conditions, diagnosis and repair

### SENSORS AND MEASURING DEVICES

- Overview of sensor types
- Voltage, current and frequency/pulse interfacing
- Using the P&I Diagram and loop schematics to aid fault location
- Testing, repair, replacement and recommissioning of devices
- Examples of typical fault conditions, diagnosis and repair



### ACTUATORS AND DRIVES

- Overview of actuators and drive types
- Control strategies
- Communication and power interfacing
- Examples of typical fault conditions, diagnosis and repair

### ELECTRICAL SYSTEMS

- Overview of MV power systems, cabling, transformers and switching, shielding and grounding
- Motors and Motor Control Centres (MCCs)
- Variable Speed Drive (VSD) suites
- Lighting and small power systems
- Examples of typical fault conditions, diagnosis and repair

### COMMUNICATIONS AND NETWORK TROUBLESHOOTING

- Overview of process plant communications and network strategies
- Interfacing problems and system fault location
- Examples of typical fault conditions, diagnosis and repair

### TROUBLESHOOTING TOOLS AND INSTRUMENTS

- Overview of appropriate tools and test equipment
- Safe and effective use
- Calibration of test equipment
- Examples of how fault conditions can be incorrectly diagnosed

### SUMMARY, OPEN FORUM AND CLOSING