

PRACTICAL INDUSTRIAL PROGRAMMING USING 61131-3 FOR PROGRAMMABLE LOGIC CONTROLLERS (PLCS)



WHAT YOU WILL LEARN:

- To confidently work with the generic standard IEC 61131-3 for industrial programming
- To effectively utilize IsaGraf programming software to program PLCs
- To understand the concepts and common elements concerning the IEC 61131-3 programming model
- To program using languages such as: structured text, function blocks, ladder diagrams, instruction lists and sequential function charts
- To troubleshoot sequencing problems
- To boost productivity and enhance software quality

WHO SHOULD ATTEND:

For anyone who needs to program Programmable Logic Controllers (PLCs) using the standard developed by the International Electro-technical Commission (IEC) which is now being used worldwide by most major PLC manufacturers.



The Workshop

PLCs have become part of the backbone of industrial automation. The International Electro-technical Commission (IEC) has developed a standard set of programming languages for industrial PLCs. The success of these languages can be measured by the large number of major PLC manufacturers who are developing products that are 61131-3 compliant. IEC 61131-3 is becoming the standard of choice in many industries, and will boost productivity and enhance software quality. If you master the subject today, your programming knowledge will be applicable across brands well into the future. This knowledge is vital for personal career development.

The aim of this intensive two-day course is to go beyond the basic concepts and introduce you to the practical techniques and applications of 61131-3. We cut across apparent differences wherever PLCs are used and introduce standards that are widely applicable.

If you ever need to program PLCs or just understand more about their capabilities, then this course is for you. The course is pitched at an intermediate level suitable for anyone with some experience with PLCs. If you are a trainee engineer, graduate, control systems engineer, technician, or senior operator you will gain essential knowledge that will significantly enhance existing knowledge of PLCs.

Workshop Objectives

At the completion of this course participants will be able to:

- Confidently work with this emerging generic standard for industrial programming
- Effectively utilize typical industrial programming software to program PLCs
- Explain important concepts and common elements concerning the IEC 61131-3 programming model
- Program in the following languages:
 - Structured text
 - Function blocks
 - Ladder diagrams
 - Instruction lists
 - Sequential function charts
- Troubleshoot sequencing problems by differentiating application issues from sequencing issues



work with 61131-3 and OPC in your workplace.

The Program

INTRODUCTION

- What is IEC 61131-3?
- Why the need for IEC 61131-3?
- Deficiencies of current ladder logic
- IEC 61131-3 main features
- IEC 61131-3 major benefits
- Other components of IEC 61131-3

IEC 61131-3 CONCEPTS

- I/O interfaces
- Communication interfaces
- System interfaces
- IEC 61131-3 PLC software model main elements:
 - Configuration
 - Resource
 - Programs
 - Tasks
- Mapping software model to real systems

COMMON ELEMENTS

- Character set
- Identifiers
- Data types elementary: integer, floating point, date and time, strings, boolean and generic
- Data types derived: structured, enumerated and array
- Variables: input, output, input/output, global, external, directly represented and access
- Functions: numerical, bit string, boolean, comparison and bit string
- Program: usage and instances
- Resources and tasks: usage, scheduling - non pre-emptive and pre-emptive
- Configuration

PROGRAMMING LANGUAGE: STRUCTURED TEXT

- Language
- Assignment statements
- Expressions
- Operators
- Statements: calling FBs, conditional and iteration

Practical Session: Programming using structured text

PROGRAMMING LANGUAGE: FUNCTION BLOCK (FB) DIAGRAMS

- Methodology
- Signal flow
- Feedback paths
- Execution control: jumps and labels
- Network evaluation rules

Practical Session: Programming using function block diagrams

PROGRAMMING LANGUAGE: LADDER DIAGRAMS

- Concepts
- Symbols
- Methodology
- Connecting FBs
- Execution control: jumps and labels
- Network evaluation rules

Practical Session: Programming using ladder diagrams

PROGRAMMING LANGUAGE: INSTRUCTION LIST

- Language structure
- Instruction semantics: modifiers
- Comparison and jump operators
- Calling FBs

Practical Session: Programming using instruction list

PROGRAMMING LANGUAGE: SEQUENTIAL FUNCTION CHART

- Chart structure
- Main features
- Steps
- Transitions
- Actions

Practical Session: Programming using Sequential function chart

TYING IT ALL TOGETHER PROJECT

- Complete programming project

CONCLUSION

- Workshop review and discussion