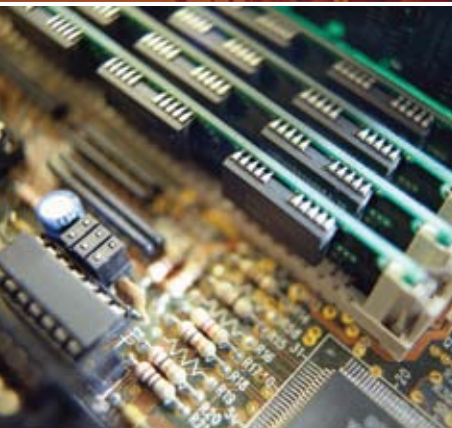




PROFESSIONAL CERTIFICATE OF COMPETENCY IN
**PROGRAMMABLE LOGIC
CONTROLLERS (PLCs)
AND SCADA SYSTEMS**

Presented by
Dr. Rodney Jacobs

NH Dip, M Dip Tech, BA (Hons), D Tech



12 MODULES OVER 3 MONTHS

For upcoming commencement dates, please view our course schedule at:
<http://www.eit.edu.au/schedule>

OBJECTIVES

At the end of this course participants will have an understanding of:

- Fundamentals of SCADA systems
- Essentials of SCADA software configuration
- Tricks and tips in installation of SCADA systems
- Essentials of telecommunications links
- Use of Industrial Ethernet in SCADA systems
- OPC and SCADA systems
- SCADA network security issues
- How to troubleshoot SCADA systems
- Specifying PLC hardware and installation criteria
- Describe PLC software structure
- How to write medium level PLC programs (using ladderlogic)
- Troubleshooting a typical PLC system
- Specifying PLC systems

CERTIFICATION

Participants completing all the assignments, and achieving 60% or more for their final mark, will receive the EIT Professional Certificate of Competency in Programmable Logic Controllers (PLCs) and SCADA Systems



ENROL NOW: Fax the enrolment form to us,
or email enquiries@eit.edu.au



BENEFITS OF LIVE E-LEARNING

- Attend lessons in an online classroom with your instructor and fellow students
- Upgrade your skills and refresh your knowledge without having to take valuable time away from work
- Receive information and materials in small, easy to digest sections
- Learn while you travel - all you need is an Internet connection
- Have constant support from your course instructor and coordinator for the duration of the course
- Interact and network with participants from around the globe and gain valuable insight into international practice
- Learn from international industry experts, based around the globe
- Live interactive webinars, not just a 'book on the web'
- Receive a certificate of completion for CPD purposes

PRESENTATION FORMAT

The certificate program features real-world applications and use a multi-pronged approach involving self-study, interactive on-line webinars and homework assignments with a mentor on call. The course consists of 12 modules, over a period of 3 months.

Some modules may involve a practical component or group activity. For each module there will be an initial reading assignment along with coursework or problems to be handed in and practical exercises in some cases. Participants will have ongoing support from their instructor and course coordinator.

Course reading material will be delivered in electronic (PDF) format in advance of on-line presentations. Presentations and group discussions will be conducted using a live interactive software system. Assignments will be submitted electronically and wherever possible, practical exercises will be conducted using simulation software and remote labs.

LIVE WEBINARS

During the program you will participate in 6 live interactive sessions with the instructor and other participants from around the world. Each webinar will last approximately 60 to 90 minutes, and we take student availability into consideration wherever possible before schedule webinar times. Contact us for details of webinar session scheduling. All you need to participate is an adequate Internet connection, speakers and a microphone. The software package and setup details will be sent to you prior to the course.

HARDWARE AND SOFTWARE REQUIREMENTS

All you need to participate is an adequate Internet connection, PC, speakers and a microphone. The software package and setup details will be sent to you prior to the course.

PRESENTED BY

DR. RODNEY JACOBS

NH Dip, M Dip Tech, BA (Hons), D Tech



Rodney has over 20 years experience in the gold mining industry, underground as well as specialising in Metallurgical operations in the Gold Plants. He has worked predominately in the instrumentation; process control and automation field, and is responsible for hardware and software designs associated with instrumentation. His areas of special interest include PLCs, SCADA systems, process control and programming. Having spent many years on the shop-floor, Rodney has built up a vast amount of hands-on practical experience, and is a past recipient of the N & Z award, which is one of the most prestigious awards, for South Africans in the field of instrumentation.

Rodney is currently active as a Consulting Engineer in the field of instrumentation, both to the mining industry as well as to other general engineering companies, which require specialised solutions. He has also lectured in Electronics, Electrical Engineering and Digital Systems, at a university level. Rodney feels that people are the most important asset of any organisation and has a qualification in Psychology to complement his Engineering knowledge and experience.

Rodney has presented numerous IDC training courses in the United States, England, Ireland, Scotland, Bahrain, United Arab Emirates, Iran, South Africa, Australia, New Zealand and Malaysia.

OVERVIEW

SCADA has traditionally meant a window into the process of a plant and / or a method of gathering of data from devices in the field. Today, the focus is on integrating this process data into the actual business, and using it in real time. In addition to this, today's emphasis is on using Open Standards, such as communication protocols (eg IEC 60870, DNP3 and TCP/IP) and 'off-the-shelf' hardware and software, as well as focusing on keeping the costs down. PLCs continue to gain in popularity. In fact, many SCADA applications use PLCs as the RTU of choice, when communicating with field devices. This comprehensive course covers the essentials of SCADA and PLC systems, which are often used in close association with each other.

A selection of case studies are used to illustrate the key concepts with examples of real world working SCADA and PLC systems in the water, electrical and processing industries. This course will be an excellent opportunity to network with your peers, as well as to gain significant new information and techniques for your next SCADA / PLC project.

Although the emphasis of the course will be on practical industry topics highlighting recent developments, using case studies, the latest application of SCADA, PLC technologies and fundamentals will be covered. The course is aimed at those who want to be updated on the latest developments in SCADA and PLC systems and want to get a solid appreciation of the fundamentals of their design, installation and troubleshooting.

This course is designed to benefit you with practical up-to-date information on the application of PLC systems to the automation and process control industries. It is suitable for people who have little or no exposure to PLCs, but expect to become involved in some or all aspects of PLC installation. It aims to give practical advice from experts in the field, to assist you to correctly plan, program and install a PLC with a shorter learning curve and more confidence. While the course is ideal for electricians, technicians and engineers who are new to PLCs, much of the material covered will be of value to those who already have some basic skills, but need a wider perspective for larger and more challenging tasks ahead. The accompanying manual includes contributions from a number of experts and will become a valuable reference document in your work. The information covered advances from the basics to challenge even the most experienced engineer in the industry today.

PRACTICAL EXERCISES

Throughout the course you will participate in hands-on exercises using simulation software, which will help you put theory to practice immediately!

INCLUDES 4 FREE REFERENCE MANUALS

VALUED AT OVER US\$400

YOU WILL RECEIVE 4 OF OUR UP-TO-DATE TECHNICAL E-BOOKS TO ADD TO YOUR LIBRARY.

- Practical Programmable Logic Controllers (PLCs) for Automation and Process Control
- Practical SCADA Systems for Industry
- Practical Process Control
- Practical Troubleshooting & Problem Solving of Industrial Data Communications

Received upon completion.

All materials required for the course will be provided electronically, in smaller, easy-to-read sections.

Please Note: e-Books are available in hard copy at 50% of the recommended retail price. Contact us for pricing details.



COURSE OUTLINE

MODULE 1: INTRODUCTION

- Introduction and brief history of PLCs
- Alternative control systems - where do PLCs fit in?
- Why PLCs have become so widely accepted
- Lingering concerns about PLCs

FUNDAMENTALS OF PLC HARDWARE

- Block diagram of typical PLC
- PLC processor module - memory organisation
- Input and output section - module types
- Power supplies

MODULE 2: BACKGROUND TO SCADA

- Fundamentals and definition of terms
- Comparison of SCADA, DCS, PLC and Smart instruments
- Typical SCADA installations

SCADA SYSTEM HARDWARE

- Comparison of SCADA, DCS, PLC and Smart instruments
- Remote Terminal Unit (RTU) structure
- Analog and digital input/output modules
- Application programs
- PLCs used as RTUs
- Master site structure
- Communications architectures
- Point-to-point and point-to-multipoint systems
- System reliability and availability
- Configuration of a master station

MODULE 3: FUNDAMENTALS OF PLC SOFTWARE

- Methods of representing Logic, Boolean Algebra, instruction code and graphical presentation
- Fundamental ladder logic instruction set
- Comparison of different manufacturers, memory and data representation and instruction code

USING LADDER LOGIC FOR SIMPLE DIGITAL FUNCTIONS

- The basic rules
- Comparison of relay ladder diagrams
- The concept of the 'scan' and how to apply it
- Infinite fan-out
- Contact 'normal' states
- Positive and negative logic
- Basic Boolean functions
- The usefulness of DeMorgan's Law

USING REGISTERS (WORDS)

- Number systems, timers, types of register data, counters, bit shift and rotate, table functions and register (matrix) logic functions

MODULE 4: SCADA SYSTEMS SOFTWARE

- Components of a SCADA system
- Software - design of SCADA packages
- Configuration of SCADA systems
- Building the user interface
- Connecting to PLCs and other hardware
- SCADA system design
- The Twelve Golden Rules

MODULE 5: GOOD PROGRAMMING HABITS

- Keeping track of addresses and data used
- Looking ahead - how will programs be maintained?
- Practical methods to improve quality:

organisation of code, thorough documentation and simplifying changes

GOOD INSTALLATION PRACTICE

- Location of hardware
- Good wiring practice
- Cable spacing, power distribution and wire numbering
- Reducing noise and interference
- Screening and shielding

MODULE 6: HUMAN MACHINE INTERFACES (HMIs)

- Human and ergonomic factors
- HMI configuration
- Design and layout
- Alarming and reporting philosophies
- Alarm system design

GOOD INSTALLATION PRACTICE

- Recommended installation practice
- Ergonomic considerations

MODULE 7: ADVANCED CONTROL WITH PLCs

- The concept of reusable logic
- Examples, drive logic and alarm handling
- Use of advanced programming functions
- Matrix logic
- Table functions and indirect addressing
- Example: simple display driver

BATCH PROCESSES AND SEQUENTIAL CONTROL

- Remembering the program state
- Creating a 'stepper'
- Step advance
- Fault detection and recovery
- Operator intervention
- Multiple recipes or alternative paths
- Sequential function charts

PID CONTROL

- The importance of timing and scan time
- When PID is not always appropriate:
 - Intermittent measurements
 - Long transport delays

SAFETY PROGRAMMABLE SYSTEMS

- Why regular PLCs should not be used for safety functions
- Programmable electronic logic solvers
- Safety certification
- Certified programming systems
- Application examples
- Growth of networked safety devices and certified networks
- Integrated safety systems

MODULE 8: LANDLINE MEDIA

- Background to cables
- Noise and interference on cables
- Twisted pair cables and fibre optic cables
- Public network provided services

WIDE AREA NETWORK (WAN) TECHNOLOGIES

- Digital hierarchies, T1 and E1
- Packet switching
- Frame relay
- ATM
- SDH/sonnet

LOCAL AREA NETWORKS (LANs)

- Ethernet networks
- Industrial Ethernet

- TCP/IP
- LAN connectivity: bridges, routers and switches
- Redundancy options
- Web based Industrial SCADA
- Wireless
- OPC

MODULE 9: INTRODUCTION TO IEC 61131-3

- Concepts
- Common elements
- Programming languages: structured text
- Function block diagrams

MODULE 10: SCADA NETWORK SECURITY

- Introduction
- Authentication and encryption
- SCADA firewalls
- Firewall architectures and guidelines

TROUBLESHOOTING AND MAINTENANCE

- Troubleshooting SCADA systems
- Maintenance tasks

SPECIFICATION OF SYSTEMS

- Common pitfalls, standards, performance criteria, testing, documentation and future trends

MODULE 11: BUILDING A PLC PANEL, AS WELL AS GENERAL COMMISSIONING, TESTING AND UPGRADING

- Electrical design & construction
- Commissioning & Installation
- Simulation & Testing
- Problem Isolation & Faultfinding
- Upgrading of control systems

MODULE 12: INDUSTRIAL COMMUNICATIONS PROTOCOLS

- RS-232 interface standard
- RS-485 interface standard
- Fieldbus
- Modbus
- DNP3.0

MODEMS

- Introduction and principles
- Asynchronous/synchronous
- Modulation techniques
- Error detection and correction
- Troubleshooting

ENTRANCE REQUIREMENTS

Some practical work experience in some of these topics would obviously be advantageous.

ON-SITE TRAINING

We can provide our training at the venue of your choice. On-site training can be customised and by bringing the trainer to site the dates can be set to suit you!

"The Customer is Always Right" – so tell us what you need and we will design a training solution at your own site.

For a FREE detailed proposal please contact Kevin Baker via e-mail: training@idc-online.com