



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:
www.bin95.com/certificate_program_online/control-systems-technology.htm

WHAT YOU WILL LEARN:

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, as well as attending 65% of the live webinars, will receive the Engineering Institute of Technology Professional Certificate of Competency in Programmable Logic Controllers (PLCs) and SCADA Systems.



ENROL NOW: Fax the enrolment form to us, or email bin95@bin95.com



Institute of Measurement and Control
 Measurement Services



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

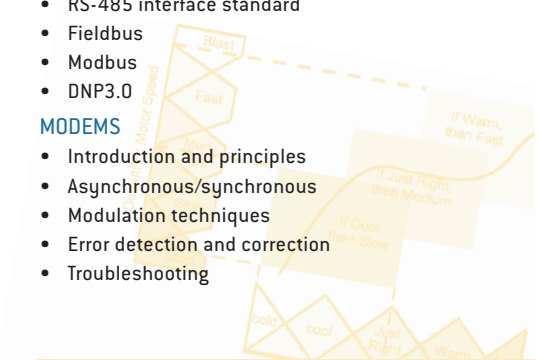
Some practical work experience in some of these topics would obviously be advantageous.

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: BIN95@BIN95.com



ENGINEERING INSTITUTE OF TECHNOLOGY ACCREDITATION STATUS

The Engineering Institute of Technology (EIT) is an institute for higher learning. It has emerged from its founding organisation, IDC Technologies, which is an international provider of practical, technical training. Since its conception in 1991, three hundred thousand engineers, technicians and technologists have been trained globally. The EIT has received recognition, endorsement and/or accreditation (varies by course and location) from authorising bodies based around the world. These include:

IEEE – The world's largest professional association advancing innovation and technological excellence. The EIT is an IEEE Continuing Education Provider.

South Africa – The EIT has obtained validation for CPD Points from the SAIMechE (South African Mechanical Institute), COET (Chamber of Engineering Technology) and SAIEE (South African Institute of Electrical Engineers), who are Voluntary Associations recognised by ECSA (Engineering Council of South Africa). To view our list of validated workshops, visit ECSA's website www.ecsa.co.za and refer to the CPD Activities.

The Institute of Measurement and Control – Britain's foremost professional body for the Automation Industry.

Asia Pacific Utilities Group Supplier Management System – EIT has achieved full registration on the Asia Pacific Utilities Group Supplier Management System (APUG SMS).

EIC – EIT is a Participating Partner with the Engineering Institute of Canada (EIC) and EIT programs and courses can be utilised by members to register for Continuing Education Units (CEUs). The EIC's Continuing Education Program is supported by The Canadian Council of Professional Engineers, The Association of Consulting Engineers of Canada, and The Canadian Academy for Engineering. The EIC is a member of the International Association for Continuing Education and Training, with headquarters in Washington, DC.



ENROLMENT FORM

For upcoming commencement dates, please view the course schedule at: www.bin95.com/certificate_program_online/control-systems-technology.htm

Professional Certificate of Competency in Programmable Logic Controllers (PLCs) and SCADA Systems

1. PARTICIPANT DETAILS

CONTACT: _____

COMPANY NAME: _____

COMPANY ADDRESS: _____

CITY: _____ STATE: _____ ZIP CODE: _____

COUNTRY: _____

PHONE: () _____ FAX: () _____

E-MAIL: _____

PARTICIPANT NAME: MR/MS: _____ JOB TITLE: _____

IMPORTANT INFORMATION

Would you be able to attend online sessions during working hours? _____ What are your usual working hours? _____

Can you attend online sessions after hours? _____ Can you attend online sessions on Saturdays? _____

Should you have more people interested in participating in this course, please contact us at: EIT.course@bin95.com

AREAS OF INTEREST (please check)

- | | | |
|--|---|---|
| <input type="checkbox"/> Data Communications & Networking | <input type="checkbox"/> Electrical | <input type="checkbox"/> Electronics |
| <input type="checkbox"/> Instrumentation, Automation & Process Control | <input type="checkbox"/> Information Technology | <input type="checkbox"/> Project & Financial Management |
| <input type="checkbox"/> Mechanical Engineering | <input type="checkbox"/> Chemical Engineering | <input type="checkbox"/> Civil Engineering |

2. PAYMENT DETAILS

Full payment is required prior to the commencement of the course.

YES, I WOULD LIKE TO ATTEND THIS COURSE: US\$1850 x _____ delegates = US\$ _____

TOTAL DUE = US\$ _____

I wish to pay by: ELECTRONIC FUNDS TRANSFER
 COMPANY ORDER NUMBER: _____

Please charge my: MASTERCARD VISA _____

CARDHOLDER'S NAME: _____ CARDHOLDER'S SIGNATURE: _____ EXPIRY DATE: _____ / _____

On the reverse of your card, above the signature, is a security number. In order to authorise your card transaction, we require the last 3 digits: _____ If the Cardholder's address is not the same as shown above please check this box:

3. ON-SITE TRAINING & CONSULTATION

YES, I would like to find out more about on-site training and consultation services:

- Professional Certificate of Competency in _____ (Please fill in)
 Other training options Consultancy Services

BOOKING CODE: BIN

ABOUT THE ENGINEERING INSTITUTE OF TECHNOLOGY (EIT)

The key objective of the Engineering Institute of Technology (EIT) is to provide an outstanding practical engineering and technology education. The finest engineering lecturers and instructors, with extensive real engineering experience in industry, are drawn from around the world. The learning is gained through synchronous, online (e-learning) technologies.

The EIT offers certificates and diplomas in a growing array of engineering fields.

Many (perhaps, most) engineering faculties at universities and colleges experience a significant challenge delivering the course-work affordably and with excellence. The EIT achieves this using online based education - economical class sizes are attainable, international experts are engaged to instruct and remote laboratories and simulation software are employed.

The EIT is a sister company of the well known and reputable engineering training organisation, IDC Technologies. IDC has been operating for over 20 years, from offices throughout the world, delivering practical short courses to well over 300,000 engineers and technicians.

PROFESSIONAL CERTIFICATE OF COMPETENCY COURSE DETAILS

- The course fees are per participant and include 4 reference manuals, 6 webinars, assignments and ongoing support.
- Full payment is required prior to the commencement of the course.

CANCELLATION

A fee of 20% will apply for written cancellations received 7-14 days prior to the commencement of the course. Cancellations received less than 7 days prior to the course are not refundable however substitutes are welcome.

CONFIRMATION

Official confirmation of your place will be sent by email within 2 business days of acceptance of your application. Detailed course instructions will be supplied upon commencement date.

PLEASE NOTE

The Engineering Institute of Technology has no affiliation with suppliers or manufacturers and therefore presents a completely unbiased factual view of the industry.

PRIVACY INFORMATION

If your address details are incorrect, or you wish to remove your name from our mailing list, please contact us by phone, fax or e-mail (see below). At times we make use of lists that cannot be crosschecked against our own database and you may receive a duplicate. If so, please pass this on to an interested colleague.

ENQUIRIES

For further information, please contact bin95@bin95.com

HOW TO ENROL

By Fax: 1-573-547-6153

By Mail:
 Business Industrial Network
 2 Cityplace Drive
 Suite 200
 St. Louis, MO. 63141

By E-mail: bin95@bin95.com

Via our Web Site: www.bin95.com