e Learning

Certificate in
Programmable Logic Controllers (PLCs) and SCADA Systems

INTERACTIVE ON-LINE LIVE WEBCASTS

Presented by
Richard Wyman
BSME, MSME,

Professional Control System Engineer

INCLUDES
4 FREE REFERENCE MANUALS
VALUED AT OVER **$490**

OVER 1400 PAGES OF VALUABLE REFERENCE MATERIAL

IDC TECHNOLOGIES

Technology Training that Works

AUSTRALIA • CANADA • INDIA
IRELAND • MALAYSIA • NEW ZEALAND
POLAND • SINGAPORE • SOUTH AFRICA
UNITED KINGDOM • UNITED STATES • VIETNAM

12 MODULES OVER 3 MONTHS
Commencing on
1st September 2009

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 IDC Certificate in Programmable Logic Controllers and SCADA Systems

Register **NOW:** Fax the Registration Form to us on
1-573-547-6153

BENEFITS OF E-LEARNING

- 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, microphone and speakers
- 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
- Receive a certificate of completion for CPD purposes

PRESENTATION FORMAT

The certificate program is conducted by E-Learning, and features real-world applications using a multi-pronged approach involving self-study, interactive on-line webcasts and homework assignments with a mentor on call.

The course consists of 12 modules over a period of 3 months. All modules involve a practical component or group activity. For each module there will be an initial reading assignment along with course work or problems to be handed in. Participants will have ongoing support from their instructor via phone, fax and e-mail. 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 via e-mail. You will receive 4 technical manuals in hard copy upon completion.

LIVE WEBCASTS

During the program you will participate in 6 live interactive sessions with the instructor and other participants from around the world.

Each webcast will be scheduled at 2 varying times, so you can select one that is most convenient for you. All you need to participate is an adequate Internet connection and a headset with a microphone.

During the live webcasts you will have the opportunity to learn and discuss the techniques and procedures used in the design and engineering of complex process plants and piping systems.

The software package and setup details will be sent to you prior to the course. Session times to be confirmed upon registration.

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
RICHARD WYMAN

BSME, MSME, Professional Control System Engineer

Richard Wyman has worked for over 20 years as a control systems engineer with the petroleum and utility industries. As the project manager and technical lead, he recently completed the installation of a large distributed SCADA system. This innovative SCADA system is highly redundant and supports multiple control centers. Prior to his career as a control systems engineer, Richard supported a variety of offshore oil and gas exploration programs as a drilling engineer in Australia, Singapore, Malaysia, Canada and Brazil.

In addition to his technical expertise Richard has given presentations on controls and communications at several professional conferences including Entelec, DistrubTech and the American Water Works Association's Information Management & Technology conference.

Richard is an enthusiastic and experienced instructor with a wealth of knowledge and practical experience who will transfer the key concepts to you in an effective manner.

12 MODULES OVER 3 MONTHS

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 workshop 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 workshop 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.

INCLUDES 4 FREE REFERENCE MANUALS
VALUED AT OVER $490

(RECEIVED UPON COMPLETION)

Over 1400 pages of tables, charts, figures and handy hints

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

COURSE OUTLINE

UNIT 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 organization
- Input and output section - module types
- Power supplies

UNIT 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

UNIT 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

UNIT 4: SCADA SYSTEMS SOFTWARE
- Components of a SCADA system
- Software - design of SCADA packages
- Configuration of SCADA systems
- Building the user interface
- Connecting to PLC's and other hardware
- SCADA system design
- The Twelve Golden Rules

UNIT 5: GOOD PROGRAMMING HABITS
- Keeping track of addresses and data used
- Looking ahead - how will programs be maintained?

- Practical methods to improve quality: organization 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

UNIT 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

UNIT 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

UNIT 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

UNIT 9: INTRODUCTION TO IEC 61131-3
- Concepts
- Common elements
- Programming languages: structured text
- Function block diagrams

UNIT 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

## UNIT 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

UNIT 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
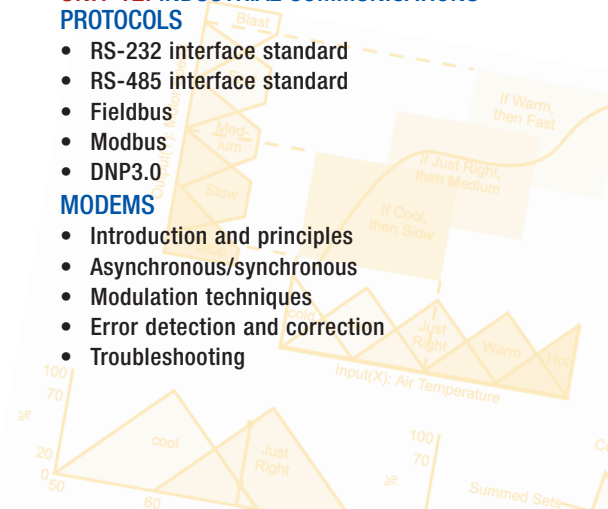
PRACTICAL EXERCISES

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

ENTRANCE REQUIREMENTS

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

IDC TECHNOLOGIES' ACCREDITATION STATUS

IDC Technologies is an internationally endorsed engineering training provider.

It is very important to us at IDC to ensure that our clients can confidently attend our workshops knowing that the professional development they are receiving is of a creditable standard and will provide them with personal, measurable, productivity gains and the opportunity for career advancements.

To date IDC Technologies has received endorsement from the following authorising bodies:

The Institution of Engineering and Technology, which has more than 150,000 members worldwide - the largest professional engineering society in Europe and the second largest of its type in the world.

The Institute of Measurement and Control in the United Kingdom, which is Britain's foremost professional body for the Automation Industry.

The Project Management Institute in the USA, which has more than 265,000 members in over 170 countries.

The Training Accreditation Council in Australia, which is the national leader in the strategic management of the recognition and quality assurance of training.

Engineers Australia, which is the national peak body for all engineering disciplines. It represents 80,000 members.

The Engineering Council of South Africa.

Board of Engineers – Malaysia.

Professional Engineers Board – Singapore.

REGISTRATION FORM
Programmable Logic Controllers (PLCs) and SCADA Systems
Commencing on 1st September 2009

1. DELEGATE DETAILS

CONTACT: _____

COMPANY NAME: _____

COMPANY ADDRESS: _____

CITY: _____ STATE: _____ ZIP CODE: _____

PHONE: (   ) _____ FAX: (   ) _____

E-MAIL: _____

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

AREAS OF INTEREST (please check)

- [ ] Data Communications & Networking
- [ ] Electrical
- [ ] Electronics
- [ ] Instrumentation, Automation & Process Control
- [ ] Information Technology
- [ ] Project & Financial Management
- [ ] Mechanical Engineering
- [ ] Chemical Engineering
- [ ] Civil Engineering

Should you have more people interested in attending this course, please contact us on **1-573-547-5630** or e-mail: register@idc-online.com

2. PAYMENT DETAILS

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

- [ ] **YES, I WOULD LIKE TO ATTEND THIS COURSE:** $1350.00   x _____ delegates   = $ _____

I wish to pay by:
- [ ] **CHECK,** made payable to **IDC Technologies**   TOTAL DUE   = $ _____
- [ ] **COMPANY ORDER NUMBER:** _____

Please charge my:
- [ ] MASTERCARD
- [ ] VISA
- [ ] AMEX*

* Please note: AMEX incurs a 5% surcharge.

CARDHOLDER'S NAME: _____

CARDHOLDER'S SIGNATURE: _____

EXPIRY DATE: /

On the reverse of your card, above the signature, is a 7 digit security number. In order to authorize 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 **IDC Technologies** on-site training and consultation services:

- [ ] Certificate in Programmable Logic Controllers (PLCs) and SCADA Systems
- [ ] Other IDC Technologies workshops
- [ ] IDC Engineering Consultancy Services

BOOKING CODE: A B