TRAINING PROGRAM SYLLABUS

Applied PLC Programming for Industrial Automation

(Pemrograman PLC Terapan untuk Otomasi Industri)

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1. General Information

Training Program Name : Applied PLC Programming for Industrial Automation

Program Code : PM-032.01

Training Category : Industrial Automation Program

Program Graduate Profile :

1. Entry-level automation technicians capable of explaining the operating principles, components, and input-process-output flow of PLC systems.
2. Entry-level PLC programmers capable of using SIMATIC Manager to develop and test simple control logic.
3. Participants capable of demonstrating a simple PLC project and documenting its operating sequence, input-output list, and test results.

Short Description : Applied introductory training in PLC control systems to develop skills in using SIMATIC Manager, creating program logic, performing simulations, and demonstrating simple industrial automation projects.

2. Detailed Description

Duration : 32 JP

Full Description : This program equips participants with an understanding of programmable control systems based on Programmable Logic Controllers (PLCs) and their applications in industrial automation. Topics include PLC operating principles and components, input-process-output flow, SIMATIC Manager, data types and memory, and timer, counter, and comparator functions. Participants develop and test simple programs for simulated motor control, conveyors, or automated processes, then complete a project based on assigned control requirements. Instructor-led theory is combined with demonstrations, software practice, case studies, and project-based learning.

Participant Requirements : An understanding of basic electricity and basic programming logic.

Certification : Certificate of Training Completion. Optional competency certification is available through a separate competency assessment according to participant needs and the requirements of the relevant certification body.

Trainer Qualifications : Practitioners and/or trainers experienced in industrial automation, PLC programming, and control systems; capable of using SIMATIC Manager, guiding practice on PLC trainers, and evaluating program logic and test results.

Learning Outcomes :

1. Explain PLC operating principles and component functions, and map the input-process-output flow of a simple control system.
2. Use SIMATIC Manager and apply data types, memory, timers, counters, and comparators in basic programming exercises.
3. Develop, test, and correct simple PLC program logic for industrial control applications.
4. Complete and demonstrate a simple PLC project and document the program flow, inputs and outputs, and test results.

3. Training Materials

Module 1 : PLC System Fundamentals

Topic 1.1 : PLC Operating Principles, Components, and Control Flow

Summary : PLC concepts and functions in industrial automation; principal components and their functions; input reading, logic processing, and output updating; and introduction to control systems through observation of a PLC trainer.

Topic Learning Outcomes : 1. Explain PLC operating principles and component functions, and map the input-process-output flow of a simple control system.

1.1. Explain PLC functions and examples of their application in industrial automation.

1.2. Identify the main PLC components and the functions of inputs, CPU, memory, and outputs.

1.3. Map the relationship between inputs, processing, and outputs in a simple control system example.

Topic Duration : 8 JP

Learning Method : Instructor-led theory, discussion of application examples, system demonstrations, and PLC trainer observation.

Assessment Method : Short oral/written questions, a component identification task, and an input-process-output flow diagram.

Assessment Indicators : Accurate explanation of operating principles; correct identification of components and their functions; and input-process-output mapping consistent with the assigned case.

Assessment Weight : 20%

Module 2 : PLC Software, Data, and Memory

Topic 2.1 : Using SIMATIC Manager and Basic PLC Instructions

Summary : Introduction to the SIMATIC Manager working environment, basic project and program management, addressing, data types and memory, and the use of timers, counters, and comparators in simple exercises matched to the PLC trainer configuration.

Topic Learning Outcomes : 2. Use SIMATIC Manager and apply data types, memory, timers, counters, and comparators in basic programming exercises.

2.1. Create or open a project and access a basic program in SIMATIC Manager in accordance with the exercise configuration.

2.2. Determine suitable data types, input-output addresses, and memory areas for exercise variables.

2.3. Apply timers, counters, and comparators and test their responses using simulation or a PLC trainer.

Topic Duration : 8 JP

Learning Method : Technical instruction, software demonstrations, guided practice, and basic function exercises.

Assessment Method : A software project task, addressing and data type worksheets, and testing of timer, counter, and comparator instructions.

Assessment Indicators : The project can be opened and inspected; data types and addressing match the configuration; and timer, counter, and comparator functions respond as specified in the test scenarios.

Assessment Weight : 25%

Module 3 : PLC Programming and Applications

Topic 3.1 : Development and Testing of Simple Industrial Control Programs

Summary : Translating control requirements into simple PLC program logic for simulated motor control, conveyors, and automated processes. Exercises cover input-output mapping, start-stop logic, case-specific logic interlocks, integration of basic instructions, testing, and basic program troubleshooting.

Topic Learning Outcomes : 3. Develop, test, and correct simple PLC program logic for industrial control applications.

3.1. Prepare an input-output list and operating sequence based on the assigned control case.

3.2. Create a simple program using basic logic, memory, and timing, counting, or comparison instructions according to application requirements.

3.3. Test program responses, identify logic or addressing errors, and correct them based on observed results.

Topic Duration : 10 JP

Learning Method : Programming practice, motor/conveyor/automated-process case studies, simulation, and coaching in basic troubleshooting.

Assessment Method : Application program assessment, test scenario worksheets, and observation of error identification and correction.

Assessment Indicators : Logic matches the operating sequence; inputs and outputs are mapped correctly; start-stop and logic interlock responses match the scenarios; basic errors are corrected; and test results are recorded.

Assessment Weight : 30%

Module 4 : Simple PLC Project

Topic 4.1 : Development and Demonstration of a PLC Control Project

Summary : Completion of one simple PLC programming project based on control requirements. Participants prepare the operating sequence and input-output list, develop the program, perform simulation or trainer testing, evaluate the results, and demonstrate system functions with supporting documentation.

Topic Learning Outcomes : 4. Complete and demonstrate a simple PLC project and document the program flow, inputs and outputs, and test results.

4.1. Prepare the operating sequence, input-output list, and test plan for the assigned project.

4.2. Develop and test the project program until it meets the assigned control scenarios.

4.3. Demonstrate program functions and submit logic documentation, program files, and test records.

Topic Duration : 6 JP

Learning Method : Project-based learning, guided independent practice, coaching, demonstrations, and review of results.

Assessment Method : Project assessment through program file inspection, demonstration observation, and evaluation of documentation and test results.

Assessment Indicators : The program meets control requirements; the demonstration shows appropriate responses; participants can explain the logic; and program flow, input-output, and test documentation is complete.

Assessment Weight : 25%

Target Participants : Electrical engineering or mechatronics students, entry-level automation technicians, and vocational educators in industrial automation who meet the participant requirements.

Learning Media & Facilities : Computers/laptops, SIMATIC Manager software, compatible PLC trainer kits, simulated wiring or trainer boards, training modules, automation case studies, and program development and testing worksheets. Practice is conducted using simulation or trainers in accordance with safety procedures and trainer instructions.

Program Advantages : Applied learning that connects basic PLC concepts, SIMATIC Manager use, and control logic practice with industrial application examples. A simple project supported by coaching helps participants develop programming, testing, basic troubleshooting, and control system documentation skills.

TRAINING PROGRAM SYLLABUS APPROVAL PAGE

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(Pemrograman PLC Terapan untuk Otomasi Industri)

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