MALAYSIAN SMART FACTORY 4.0

SWISS SMART FACTORY

Smart Factory Training Programs 2021

Preparing Workforce for Industry 4.0

SHRDC

Overview

Smart Factory takes current manufacturing processes to Industry 4.0 standards; highly agile, efficient and automated production lines capable of data generation and collation. Combined with analytics and machine learning, the factory of the future will have predictive and prescriptive capabilities, contributing to higher productivity & boundless innovation.

The Malaysian Smart Factory (MSF) 4.0 program @ SHRDC offers smart factory competency training through hands-on and online/remote learning approaches, ideal for relevant skillset and talent development towards an Industry 4.0 ready workforce in Malaysia.

Training Methodology

Participants are exposed to theoretical fundamentals and demonstrations of information technology related to smart factory competencies and processes, followed by hands-on and remote learning activities to support application of competencies acquired.

List of Programs

- **Smart Factory Technical Overview : Enabling Technology for Industry**
- **Data Generation**
- **Machine Data Logging & Visualisation for Smart Factory**
- **Data Formulation: Overall Equipment Effectiveness (OEE)**
- **Data Analytics Essentials**
- **PLC Essentials for Smart Factory**
- **IoT Gateway**
- **Cyber Physical Systems (CPS) based Automation**
- **Cyber Physical Systems (SPC) based Communication Systems**
- **IO-LINK Technology**

Contact Us

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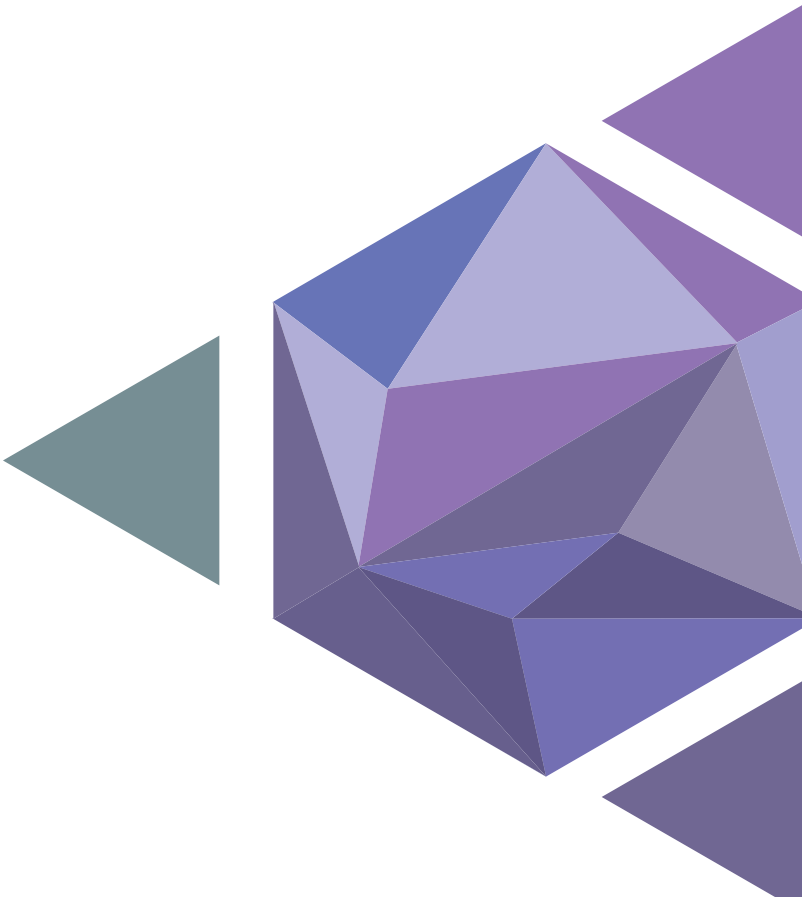

Smart Factory Technical Overview : Enabling Technology for Industry

Target audience

For Manufacturers who seeks better understanding on the importance and capabilities of Industry 4.0, leveraging on the power of data and connectivity to improve competitiveness and efficiency. MD / CEO, COO, Factory Manager, Finance, Corporate Planning and Business Development.

Summary

The program offers essential knowledge and demonstration of enabling technologies and competencies that facilitates the implementation of digital transformation for Industry 4.0.

Smart Factory
- Introduction of Industry 4.0
- Introduction: Smart Factory Concept
- The Smart Factory System Architecture

Cyber Physical Systems (CPS)
- Automation Pyramid
- Relevant Communication Standards

Cloud-based Services
- Analysis and design principles for cloud and edge connections
- Interoperable IT-based communication standards

Big Data and Analytics
- Automation Pyramid
- Analysis and design principles for (big) data analytical applications

Smart Operation Technology
- Design and implementation of advanced human-machine-systems
- Analysis and design principles for usability and user acceptance

Digital Twin
- Analysis and design principles for digital twin representations
- Interoperable information models for description of digital twins (machines, tools, equipment)

Digital Product Memory
- Analysis and design principles for cross-value-chain digital product memories
- Interoperable information models for description of products

Technology Applications
- Technology Enablers and Tools to Kickstart your Industry 4.0 Journey
- Industrial Applications Pathway for Industries
- Review and Discussion session with participants

Upon completion of this training program, participants should be able to:

- Understand the enabling technologies of a smart factory and cyber-physical systems
- Identify the platforms supporting industrial IT within the 3 main areas; cloud-based applications and services, big data and analytics, smart operation technologies
- Understand the underlying technologies for digital factory, insights in digital twin and digital product memory

Program Details

Duration:
2 Days

Cost:
In-House
RM5,300 per day

Public
RM 3,000.00 per Pax

(HRDF SBL Khas Claimable)

fee is inclusive of 6% SST

Data Generation

Target audience: Engineers, Technicians, Technical Managers, Production Managers, Academia with relevant background.

Summary

- Configuration and set up of the IoT Gateway network
- Configuration and set up of the flow-based development tool, Node-Red
- Connect sensor(s) and the IoT Gateway to a PLC Controlled tower light system
- Utilize Node-Red to read data from the sensor module and setup a data visualization dashboard
- Implement MQTT with Node-Red to send data to mobile App or Web browser to generate notifications and alerts

Upon completion of this training program, participants should be able to:

- Connect sensor(s) and the IoT Gateway to a PLC controlled tower light system
- Utilize Node-Red to read data from the sensor(s) and setup a data visualization dashboard.
- Implement MQTT to send data for web and/or mobile applications notification and alert generation

Module Details

Duration:
6 Days

Cost:
RM5,300 per pax
HRDF SBL Khas Claimable

fee is inclusive of 6% SST

Machine Data Logging & Visualisation for Smart Factory (On-premise & Cloud)

Target audience: For manufacturing production teams with good knowledge on Data Generation looking into advanced data storage and visualization analytics to allow remote access of real time & summary data, for analytics and making informed business decisions.

Pre-Requisite: Successful completion of the SHRDC MSF Data Generation program.

Summary

- Overview of Machine Data Logging and Visualization methods
- Utilize Node-Red to store machine process information and sensor data with time-stamp information into an on-premise and/or cloud-based database (such as SQL and/or time-series database)
- Utilize a time-series visualization platform to display real-time and historical data from an on-premise and/or cloud-based database

Upon completion of this training program, participants should be able to:

- Apply the knowledge, techniques, and tools to log data generated from a machine for monitoring and visualization
- Log machine process and sensor data with time-stamp information into on-premise and/or cloud-based database (such as SQL and/or time-series database) using the flow-based development tool, Node-Red
- Display real-time and historical data from an on-premise and/or cloud-based database using a time-series visualization platform

Module Details

Duration:
5 Days

Cost:
RM5,300.00 per pax (HRDF SBL Khas Claimable)

fee is inclusive of 6% SST

Data Formulation: Overall Equipment Effectiveness (OEE)

Target audience: Engineers, Technicians, Technical Managers, Production Managers, Academia with relevant background.

Pre-requisite: Successful completion of the SHRDC MSF Data Generation program

Summary

- Overview of System Architecture (PLC, Local Server)
- Introduction to Overall Equipment Effectiveness (OEE)
- Identification of OEE variables from an existing production process
- Configuration of PLC and gateway to obtain key engineering parameters from a machine's sensors to perform OEE calculation

Upon completion of this training program, participants should be able to:

- Identify the key system parameters required to monitor and calculate Overall Equipment Effectiveness (OEE).
- Describe the approaches to calculate Availability, Performance, and Quality for OEE.
- Identify the six big losses related to Availability, Performance, and Quality Loss.
- Construct a process flow to monitor and calculate Availability, Performance, and Quality in real-time using a flow-based development tool.
- Construct a process flow to monitor and formulate the calculation of OEE in real-time using a flow-based development tool.
- Integrate the hardware and software-based process flow developed to verify and validate the formulation of OEE developed

Module Details

Duration:
5 Days

Cost:
RM5,300.00 per pax (HRDF SBL Khas Claimable)

fees are inclusive of 6% SST

Data Analytics Essentials

Target audience: Engineers, technicians, technical managers, IT/ERP support teams, academia with relevant background.

Pre-Requisite: Computer science / mathematics / statistics / analytics / engineering

Summary

- Overview of Data Analytics and Data Science
- Perform Data Cleaning and Manipulation
- Data Exploration over Dashboard
- Overview of Data Mining and Machine Learning
- Implementation of different Machine Learning Algorithm(s) for Data Analytics
- Data Reporting and Visualization

Upon completion of this training program, participants should be able to:

- Describe the fundamental steps in performing Data Analytics
- Manipulate data to meet specific data analytics requirements
- Develop a training model to analyze and evaluate the data
- Demonstrate data reporting and visualization of the results through the data analytics platform

Module Details

Duration:
6 Days

Cost:
RM6,360.00 per pax (HRDF SBL Khas Claimable)

fees are inclusive of 6% SST

PLC Essentials for Smart Factory

Target audience
Engineers, Technicians, Technical Managers, Production Managers, Academia with relevant background.

Summary
Fundamental:
- Programmable Logic Controllers (PLC) Overview
- PLC Programming using Ladder Diagram
- Programming with Logic Operations
- Programming with Timers
- Programming with Counters

Intermediate:
- Programming with Function Blocks
- Programming with Data
- Programming with Analog Signals

Advanced:
- Programming with Sequential Control using GRAFCET
- PLC Program Simulation using Factory I/O

Upon completion of this training program, participants should be able to:
Fundamental:
- Determine the hardware and software requirements for Programmable Logic Controllers (PLC)
- Construct the PLC Input and Output (I/O) wiring diagram
- Connect Sensor(s) and actuator(s) to a PLC
- Construct a basic PLC Program
- Run tests to validate the constructed program and to ensure compliance with the required operation

Intermediate:
- Define Function Block (FB), Function (FC), and Data Block (DB) in a PLC Program
- Solve mathematical operations using a PLC Program
- Connect an analog input to a PLC program
- Construct a PLC program for analog signals
- Run tests to validate the constructed program and to ensure compliance with the required operation

Advanced:
- Create a sequence flowchart using the GRAFCET Software
- Construct a sequential control operation using a PLC
- Create a scenario of an operation using the Factory IO Software
- Run tests to validate the constructed program and to ensure compliance with the required operation

Program Details

Modular Options & Duration:
- Fundamental: 4 Days
- Intermediate: 2 Days
- Advanced: 3 Days

Cost per program:
RM8,480
(HRDF SBL Khas Claimable)

Cost per module:
- Fundamental: RM3,180 (HRDF SBL Khas Claimable)
- Intermediate: RM2,120 (HRDF SBL Khas Claimable)
- Advanced: RM3,180 (HRDF SBL Khas Claimable)

fees are inclusive of 6% SST

IoT Gateway

Target audience: Engineers, technicians, technical managers, IT/ERP support teams, academia with relevant background.

Summary
- Configuration and set up of the IoT Gateway network
- Configuration and set up of the flow-based development tool, Node-Red
- Read variable data from the PLC using Node-Red
- Dashboard configuration to visualize PLC data using Node-Red
- Utilize Node-Red to write data into a PLC
- Utilize MQTT with Node-Red to read/write data from/into a PLC

Upon completion of this training program, participants should be able to:
- Set up and configure an IoT Gateway network for machine status monitoring
- Utilize a flow-based development tool to for visual programming
- Rapidly develop dashboards for visualizing data from a PLC-based system
- Utilize Node-Red and MQTT to bridge between multiple devices and develop a smart control and monitoring system

Module Details

Duration:
4 Days

Cost:
RM4,770.00 per pax (HRDF SBL Khas Claimable)

fees are inclusive of 6% SST

Cyber Physical Systems (CPS) based Automation

Target audience: Engineers, Technicians, Technical Managers, Production Managers, Academia with relevant background.

Summary
- Introduction to Reference Architecture Model Industry 4.0 (RAMI 4.0)
- Introduction to Cyber Physical Systems (CPS) based Automation
- State Chart and Function Block programming

Upon completion of this training program, participants should be able to:
- Understand the fundamentals of RAMI 4.0
- Apply PLC Programming to reflect a CPS-based automation
- Apply PLC Programming through state charts, UML and Function Blocks
- Apply PLC Programming to test and validate CPS-based Function Blocks

Module Details

Duration:
4 Days

Cost:
RM4,770.00 per pax (HRDF SBL Khas Claimable)

fees are inclusive of 6% SST

Cyber Physical Systems (CPS) based Communication Systems

Target audience: Engineers, Technicians, Technical Managers, Production Managers, Academia with relevant background.

Summary

- Introduction to Industrial field buses
- Configuration of Hardware and Network for a CPS-based Communication System
- Configuration of an Operating System with program block, function block, and data block
- Configuration of an Open User Communication (OUC)

Upon completion of this training program, participants should be able to:

- Configure a CPS-based Communication System
- Utilize the OUC Function Block to enable TCP device to device communication
- Understand the fundamentals of industrial ethernet and its utilization as an industrial fieldbus

Module Details

Duration:
4 Days

Cost:
RM4,770.00 per pax (HRDF SBL Khas Claimable)

fees are inclusive of 6% SST

IO-LINK Technology

Target audience: Engineers, Technicians, Technical Managers, Production Managers, Academia with relevant background

Summary

- Introduction to IO-Link Technology
- Configuration of IO-Link Hardware System
- Configuration of IO-Link sensors and actuators (Web-Based)
- Monitor & control of IO-Link Devices

Upon completion of this training program, participants should be able to:

- Describe the fundamentals of IO-LINK Technology
- Configure, deploy, test, and validate the IO-LINK Hardware, Sensors, and Actuators
- Configure, deploy, test, and validate the IO-LINK Hardware integrated with the Programmable Logic Controller (PLC)

Module Details

Duration:
4 Days

Cost:
RM4,770.00 per pax (HRDF SBL Khas Claimable)
fees are inclusive of 6% SST