

# Tutorial 9

ET0917 / ET0817 / ET0832

INDUSTRIAL CONTROL SYSTEM

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ICS OVERVIEW AND HMI

# Learning Outcome for ICS

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Describe industrial control system

List common industrial networking protocols/standards

Describe various functions of Human Machine Interface (HMI)

Describe a typical SCADA application

Explain OPC-UA principle and benefits

Describe the functionality of Digital Twin

# Q1 - MCQ

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Which is NOT a typical Industrial Control System (ICS)

- a) **Systems deploying Raspberry Pi**
- b) Distributed Control System (DCS)
- c) Supervisory Control & Data Acquisition (SCADA)
- d) Systems deploying Programmable Logic Controllers (PLC)

## Q2 - MCQ

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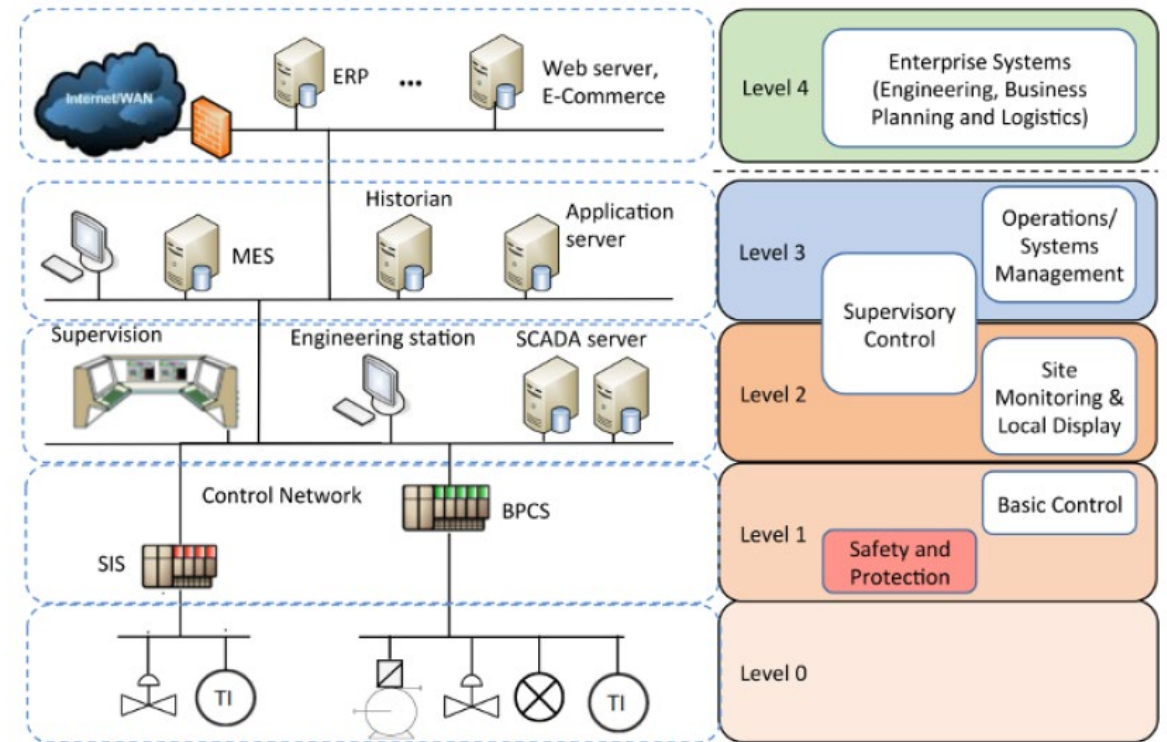
Typical ICS operation would require several components to work. Select the option that is NOT a typical component for ICS.

- a) Sensors
- b) Actuators
- c) Human Machine Interface (HMI)
- d) **Power electronics such as Inverter**

# Q3 - MCQ

Select the option that correctly describe the image.

- a) **Purdue Model**
- b) Industry 4.0 Model
- c) Automation Pyramid
- d) Typical ICS Architecture



## Q4 - MCQ

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Select the correct statement about Purdue Model.

- a) Automation pyramid is the same as Purdue Model
- b) It is a guideline for industrial network of an ICS
- c) **It is a reference model for hierarchical representation of ICS**
- d) It suggest that Manufacturing Enterprise System (MES) and Enterprise Resource Planning (ERP) shall be in the same level

## Q5 - MCQ

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Select the most suitable statement that describes Fieldbus.

- a) 4-20mA that is commonly used for instrument is one of the fieldbus
- b) Fieldbus is very popular as it provides multiple 4-20mA signal output from a single instrument
- c) Fieldbus is proprietary communication protocol that only allow specific vendor products to communicate to the controller
- d) **Fieldbus is non-proprietary (open) communication protocol that define how devices communicate with other devices or controllers**

## Q6 - MCQ

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Select the option that is **FALSE** about Human Machine Interface (HMI).

- a) Enable local inspection and manipulation of process values
- b) **4-20mA is commonly used to communicate from controller to HMI**
- c) Controller such as PLC interfaced to HMI has the actual control over the process
- d) HMI is capable of trend logging of process values



## Q7 - MCQ

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How does a Human Machine Interface (HMI) communicate with a controller?

- a) I/O device such as buttons, sensors, lamps and relays are directly wired to HMI
- b) HMI communicate with a controller via the established (during engineering) connection between HMI and controllers for specific HMI tags**
- c) Root screen of HMI is used for selection of communication protocol
- d) Engineering station with valid license such as Siemens TIA Portal need to be connected to HMI to facilitate communication

## Q8 - MCQ

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What are the considerations of planning screen structure for HMI?

- a) It should be eye catching with as many flashing animation as possible
- b) It is a MUST for operator to log in with secure password to operate HMI
- c) EVERYTHING shall fit into 1 page, as multi-screen is not possible for HMI
- d) **Collect, group and structure the information to display in the manner that is optimal for user navigation**