Australian Government

UEENEEI113A Setup and configure Human-Machine Interface (HMI) and industrial networks

Release: 3

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

UEENEEI113A Setup and configure Human-Machine Interface (HMI) and industrial networks

Modification History

		UEENEEI113A	Setup and configure Human-Machine Interface (HMI) and industrial networks	
Release	Action	Core/Elective	Details	Points
2	Editorial	N/A	Show full pre-req chain in the unit.	
2	Editorial	N/A	In Pre-requisites, delete "For the full prerequisite chain details for this unit please refer to Table 2 in Volume 1, Part 2".	
2	Editorial	N/A	In Required Skills and Knowledge, insert topic numbering.	
2	Editorial	N/A	Replace "essential knowledge and associated skills" with "required skills and knowledge".	

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers the setting up and configuring human machine interface and industrial networks for process control systems to meet performance standards. This encompasses the adoption of process control schemes that meet safety and process requirements, selection of control equipment and interconnecting cabling and tubing/piping based on calculated and deemed-to-comply arrangements.

Application of the Unit

Application of the Unit **2)**

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control systems to meet performance standards. This encompasses the adoption of process control schemes that meet safety and process requirements, selection of control equipment and interconnecting cabling and tubing/piping based on calculated and deemed-to-comply arrangements.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Common Unit Group

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEI101A	Use instrumentation drawings, specification, standards and equipment manuals
UEENEEI102	Solve problems in pressure measurement

Prerequisite Unit(s)

4)

A	components and systems
UEENEEI103 A	Solve problems in density/level measurement components and systems
UEENEEI104 A	Solve problems in flow measurement components and systems
UEENEEI105 A	Solve problems in temperature measurement components and systems
UEENEEI110 A	Set up and adjust advanced PID process control loops
UEENEEI106 A	Set up and adjust PID control loops

Electrical Pathway Group

UEENEEG101 A	Solve problems in electromagnetic devices and related circuits
UEENEEG102 A	Solve problems in low voltage a.c. circuits

Instrumentation and Control Pathway Group

UEENEEE119 A	Solve problems in multiple path extra low voltage (ELV) a.c. circuits

Literacy and numeracy skills

4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills **5)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to set-up and configure HMI and industrial networks	1.1	The extent and nature of the control system is determined from job specifications.
		1.2	Safety and other regulatory requirements to which the control system shall comply are identified, obtained and understood
		1.3	Control apparatus and interconnecting components need for the control system and how they are arranged is determined from job specifications and knowledge of process control systems.
2	Set-up and configure HMI and industrial networks	2.1	Manufacturer's specifications and limitations of appropriate control apparatus is sought and comparisons made with process parameters and control requirements.
		2.2	Control apparatus is selected on compatibility with process parameters and control requirements and environmental conditions.

ELEMENT	PERFORMANCE CRITERIA	
	2.3	Evidence of specified apparatus IP rating is sought from manufacturer where necessary.
	2.4	Control valves are selected based on percentage travel, flow and loop-and-process characteristics, optimum size, range ability, ability to cope with process pressures and environmental considerations.
3 Select interconnecting cabling and tubing/piping	3.1	Types of control cabling and their configuration are selected to meet environmental conditions and interconnection requirements.
	3.2	Tubing/piping and accessories are sized to meet capacity and pressure requirements
	3.3	Route lengths of cable and tubing/piping are determined from site drawings.
4 Document process control system	4.1	Reasons for selections made, including calculations, are documented in accordance with established procedures.
	4.2	Process control system arrange and specifications for all selected items are documented in accordance with established procedures and forwarded to appropriate person(s).

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the required skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and selecting equipment for process control systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EI113A HMI and industrial networks

Evidence shall show an understanding of HMI interfacing and industrial networks to an extent indicated by the following aspects:

REQUIRED SKILLS AND KNOWLEDGE

T1 Purpose and application of control system networks systems:

- Open and common proprietary control system networks models (layers) and protocols - CANopen, ControlNet, Devicenet, Ethernet, Foundation Fieldbus, Interbus, Modbus, and Pofibus.
- Control system networks interface.
- Common types of signal conditioning, instruments encompassing:
- principles of operation signal conditioners and instruments
- isolators and protection equipment.

T2 Analogue and digital signals encompassing:

- structure of a typical message block.
- differences between analogue and digital signals.
- typical message block used with a digital telemetry systems.
- Types of transmission links,

T3 Telemetry overview encompassing:

- Definition
- Applications
- Basic principle of operation
- Telemetry standards

T4 Telemetry Components encompassing:

- Analog signals
- Digital signals
- Signal conditioning
- Control system networks
- Connection/link types

T5 Telemetry Systems encompassing:

- Pneumatic
- Current
- Digital
- Wireless
- Microwave
- Optical
- Data Bus

T6 Telemetry Installation encompassing:

- System selection

REQUIRED SKILLS AND KNOWLEDGE

- Hardware –
- Types of cable, connectors, sources and detectors used in a fibre optic telemetry system
- Interconnection requirements
- Calibration/configuration
- System testing.

T7 Distributive control principles (DCS) encompassing:

- Concepts of a DCS
- differences between hierarchical and distributive systems.
- Functional and geographical distribution.
- Individual features of a DCS -
- Major components in a DCS
- historical and managerial data collection
- type and form of information at the operator and engineering interface levels - programmable logic controllers, SCADA/touch screen systems, system server and smart devices connected by a control network.
- Function block technology to design control algorithm - various loop types, using function block technology from an available DCS.
- Optimum control of a variety of process loops.
- Connection of field instrumentation for selected control operation and diagnostic checking to ensure correct operation of system.
- On-line changes to parameters in a DCS with minimum interference to controlled variable

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit **9.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the required skills and knowledge as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Setting up and configuring human machine interface and industrial networks for process control systems as listed as described in 8) and including:

A Setting up control system to comply with safety and other regulatory requirements and process functions

B Configuring human machine interface control systems

C	Setting up industrial networks for control systems
D	Documenting control system arrangement, specification for items selected and reasons for the selections made
E	Dealing with unplanned events by drawing on required skills and knowledge to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment

9.3)

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to selecting equipment for process control systems.

Method of assessment **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the required skills and knowledge described in this unit.

Concurrent assessment and relationship with other units **9.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEED10 Use computer applications relevant to a workplace 1A

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to setting up and configuring human machine interface and industrial networks for two process control systems each with more than one input and more than one final control element.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Instrumentation and Control