



Australian Government

**UEENEEI152A Develop, enter and verify
programs in Supervisory Control and Data
Acquisition systems**

Release: 2

UEENEEI152A Develop, enter and verify programs in Supervisory Control and Data Acquisition systems

Modification History

		UEENEEI152A	Develop, enter and verify programs in Supervisory Control and Data Acquisition systems	
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	Adjust numbering in Elements and Performance Criteria.	
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 development, installation and testing of programs for supervisory control and data acquisition. It encompasses working safely, process analysis, developing process condition database and Human-Machine Interface (HMI) using SCADA software package and documenting programming activities.

Application of the Unit

Application of the Unit 2)

This unit is intended to augment formally recognised competencies. It is suitable for employment-based programs under an approved contract of training.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus, site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

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

Unit Code	Unit Title
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Prerequisite Unit(s) 4)

- UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace
- UEENEEI150A Develop, enter and verify discrete control programs for programmable logic controllers
- UEENEEI151A Develop, enter and verify word and analogue control programs for programmable logic controllers.

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 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

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 develop programs for supervisory control and data acquisition systems. | 1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures. |
| | 1.2 Established OHS risk control measures and procedures are followed in preparation for the work. |
| | 1.3 The extent of the SCADA system is determined from design brief and process specifications. |
| | 1.4 Process data are analysed for development of graphical design/mimic diagrams. |
| | 1.5 PLC analogue and digital addresses are related to tag database. |
| | 1.6 Tag data types are configured in the database. |
| | 1.7 Graphic objects are created and where appropriate are added to a graphic library. (See Note 1) |
| | 1.8 Consideration is give to the security requirements for the SCADA system to prevent access by unauthorised personnel. |
| | 1.9 The SCADA system is configured to provide appropriate reporting mechanisms. |
| | 1.10 Equipment, software and testing devices needed to carry out the work are obtained and checked for correct operation and safety. |

ELEMENT	PERFORMANCE CRITERIA
2 Develop and enter programs using dedicated supervisory control and data acquisition software.	2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
	2.2 SCADA software is used to develop human-machine interface (HMI) of processes.
	2.3 Supervisory control functions, data acquisition components and automated tasks are programmed using SCADA software.
	2.4 Data is manipulated within the SCADA software.
	2.5 Alarms and limits for process variables are identified and programmed accordingly.
	2.6 Trends for process variables and limits are programmed accordingly.
	2.7 Reports are configured to display/print appropriate information.
	2.8 User rights/security is configured to provide appropriate access to the different sections/controls of the SCADA system.
	2.9 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
3 Monitor, verify and document programming activities.	3.1 Device operation is tested in strict accordance OHS requirements and procedures.
	3.2 Entered objects and settings are tested as meeting those specified in the design brief.
	3.3 SCADA software tools are used to test and monitor programs and operating faults, anomalies are identified and rectified.
	3.4 OHS work completion risk control measures and procedures are followed.
	3.5 SCADA system specification and program are documented in accordance with established procedures.

ELEMENT

PERFORMANCE CRITERIA

3.6 Work completion is reported and appropriate personnel notified in accordance with established procedures.

Note.

1. Graphic libraries are typically part of vendor software for SCADA systems.

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 developing, entering and verifying programs in Supervisory Control and Data Acquisition systems.

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

KS01-EI152A Supervisory control and data acquisition systems programming

Evidence shall show an understanding of supervisory control and data acquisition systems programming to an extent indicated by the following aspects:

T1. SCADA system communications and networking encompassing:

- PLC Interface requirements
- Networking requirements of the system
- SCADA system differences from DCS Process Control systems
- SCADA HMI software package costing
- Types of networks available with SCADA HMI
- Coordinate and access of networking to factory network
- Understands the difference between SCADA and Process Control systems

T2. Mimics and animated graphics encompassing:

- Graphic designs, balance clarity of layout and navigation
- Assessment of data required to be entered in software package
- Validation of entered data

T3. Trending encompassing:

- Analysis of process to select data, i.e., sampling of the process
- Viewing data and graphical representation of selected information
- Trend graphs and data matching
- Understands the difference between real time trends and historic trends.

T4. Alarm logging encompassing:

- Analysing selected data and applying limits to processes
- Corrective actions and notifications of alarm status
- Alarm data availability for third party software systems

T5. Recipes and scheduling encompassing:

- Methods of producing libraries for different process parameters required for varied production runs
- Analysis of different production runs, i.e., amounts of materials, pressure,

REQUIRED SKILLS AND KNOWLEDGE

temperature, weights etc.

- Alarm limits/material specifications
- Understands where & when scheduling is used
- Scheduling, setting limits and evoking program changes

T6. Data collection and databases encompassing:

- Produce a database of variable tags and range specifications involved in the process
- Conversion Export of raw data into appropriate forms for data management and report creation, e.g., Excel, Paradox
- Types and layout of reports
- Aims of customer, management, statistical and account reports
- Analysis of data in reports: Design and graphical data representations
- Assessment of data required for the report

T7. Programming language encompassing:

- Scripting languages in SCADA HMI software
- Automate tasks within the software PLC or SCADA?
- Provide complex processing of process data where field equipment i.e. PLC!! does not have the capability or to minimise control lag

T8. Implementation and applications encompassing:

- Typical applications in manufacturing and process control, e.g., food processing, packaging, automotive industry, energy management and steel production and mining

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this 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. It is recognised that, 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 have a bearing on the decision as to how much and how detailed 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 shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall 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 knowledge and associated skills 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, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Developing, entering and verifying programs in Supervisory Control and Data Acquisition systems as described in 8) and including:
 - A Collecting and analysing data accurately.
 - B Converting data to an appropriate database.
 - C Creating appropriate graphic objects.

- D Adding graphic objects to a library.
- E Developing effective HMI.
- F Programming SCADA functions and data acquisition components correctly.
- G Producing a report by the SCADA system
- H Correcting programming faults and anomalies.
- I Configuring user access rights.
- J Documenting SCADA system and programming clearly.
- K Dealing with unplanned events by drawing on required knowledge and skills 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 should 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 in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment 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 develop, enter and verify programs in Supervisory Control and Data Acquisition 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 primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the required knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for 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 shall be demonstrated in relation to developing entering and verifying programs in Supervisory Control and Data Acquisition systems.

The program shall include the following programming activities:

- Configuring tag data type
- Creating at least five graphic objects
- Adding graphic objects to the graphic library
- Developing a HMI for a given system
- Incorporating alarms and limits for process variables
- Incorporating trends for process variables and limits.
- Entering objects and testing
- Rectifying operating faults and anomalies
- Configure user rights for access/security.
- Configure and output at least one report.

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