NWP610 Apply statistical methods for quality control and reliability

Release: 1

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Modification History

NWP610 Release 1:   Primary release.

Unit Descriptor

This unit of competency sets out the knowledge and skills required to apply statistical concepts and methods that are common to all engineering fields for the purpose of quality control. This includes averages, probability, frequency distributions, standard deviation, and quality control applications.

Application of the Unit

This unit applies to personnel operating in a para-professional engineering role across a range of industries.
No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Not applicable.

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the tasks you need to be able to perform, to demonstrate that you can achieve the element. Where **bold italicised** text is used, further information is detailed in range statement. Assessment of performance is to be consistent with the evidence guide.

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Elements and Performance Criteria

1	**Identify statistical requirements**	1.2 Determine the **statistical task** through requests, design briefs or equivalent and clarify with the ***appropriate personnel***.
		1.3 Seek expert advice with respect to the statistical task and according to enterprise procedures when appropriate.
		1.3 Consult appropriate personnel to ensure the work is co-ordinated effectively with others involved at the work site.
2	**Select appropriate statistical method**	2.2 Interpret and apply industry codes, regulations and technical documentation relevant to the statistical task.
		2.3 Identify and use ***sources of computational data***.
		2.4 Make and record appropriate assumptions underlying the statistical task.
		2.5 Identify and obtain ***resources*** required and check as fit for purpose.
3	**Perform statistical computation**	3.1 Identify and use appropriate computer applications in computational sequences.
		3.2 Efficiently perform computations using statistical ***features of a scientific calculator***.
		3.3 Perform statistical task and record results.
		3.4 Select methods for dealing with unexpected situations based on discussions with appropriate personnel, job specifications and ***enterprise procedures***.
4	**Verify and present results**	4.1 Discuss and verify results with appropriate personnel.
		4.2 Present results as required from initial request or brief.

Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

Required skills:

- identify engineering situations that require solution using probability considerations
- translate statistical data into engineering parameters
- produce qualitative statistical modelling
- calculation of mean, mode, deviation

Required knowledge:

- statistical terms and statements relevant to engineering quality control
- probability, permutations and combinations
- frequency distribution: normal, rectangular, binomial (qualitative), poisson (qualitative)
- cost analysis as part of system quality including scrap and rework issues, and customer returns

- computer traceability systems for material and quality

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	The candidate should demonstrate the ability to: - apply statistical methods and use appropriate computer programs for quality control and reliability evaluation. - perform a range of statistical computation to obtain enumerated data on quality systems and reliability of outputs in different engineering contexts.
Context of and specific resources for assessment	Access to the workplace and resources including: - documentation that should normally be available in a water industry organisation - workplace specific equipment and technology - supervision and experienced team members to provide observations, feedback and third party reports - enterprise operating procedures and work allocation - relevant codes, standards, and government regulations. Where applicable, physical resources should include equipment modified for people with disabilities. Access must be provided to appropriate learning and/or assessment support when required. Assessment processes and techniques must be culturally appropriate, and appropriate to the language and literacy capacity of the candidate and the work being performed. Validity and sufficiency of evidence require that: - competency will need to be demonstrated over a period of time reflecting the scope of the role and the practical requirements of the workplace - where the assessment is part of a structured learning experience the evidence collected must relate to a number of performances assessed at different points in time and separated by further learning and practice - a decision of competence should only be made when the assessor has complete confidence in the person's competence over time and in various contexts - all assessment that is part of a structured learning experience must include a combination of direct, indirect and supplementary evidence - where assessment is for the purpose of recognition (RCC/RPL), the evidence provided will need to be

               authenticated and show that it represents competency demonstrated over a period of time

- assessment can be through simulated project-based activity and must include evidence relating to each of the elements in this unit.

In all cases where practical assessment is used it will be combined with targeted questioning to assess the underpinning knowledge. Questioning will be undertaken in a manner appropriate to the skill levels of the candidate, any cultural issues that may affect responses to the questions, and reflecting the requirements of the competency and the work being performed.

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Statistical task must include:	- probability - permutation - combinations - distribution - mean - median - mode - deviation - statistical modelling
Appropriate personnel may include:	- supervisor - colleague - foreman - team leader - supervising engineer - teacher
Sources of computational data may include:	- tables - graphs
Resources may include:	- computer - scientific calculator - engineering tables and graphs - regulations and codes of practices
Features of a scientific calculator may include:	- arithmetic functions - trigonometric functions - inverse trigonometric functions - exponentials and logarithmic functions - reciprocals - scientific number representation - engineering number representation - rectangular to polar conversions
Enterprise procedures may include:	- the use of tools and equipment - instructions, including job sheets, cutting lists, plans, drawings and designs - reporting and communication - manufacturers' specifications and operational procedures

Unit Sector(s)

Not applicable.

Competency Field

General Engineering.