



Australian Government

Department of Education, Employment and Workplace Relations

MSACMT452A Apply statistics to processes in manufacturing

Revision Number: 1

MSACMT452A Apply statistics to processes in manufacturing

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit covers the knowledge and skills required to apply statistical theory and principles to the analysis and control of processes in manufacturing.
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Application of the Unit

Application of the unit	In a typical scenario, statistical process control is being used on a process in a manufacturing organisation. Usually this will be to monitor the process and determine when action needs to be taken. The appropriate action will then be taken in accordance with standard procedures. To do this the person will apply their knowledge of frequency distribution and variation to the data/chart to distinguish between random and non-random variation and their understanding of the process and/or equipment to help interpret those results. This unit primarily requires the application of skills associated with gathering and analysing data and communicating statistical information to others. This unit also has a strong emphasis on problem solving, initiative and enterprise, planning and organising, and self management to solve problems and manage processes.
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units	
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Employability Skills Information

Employability skills	This unit contains employability skills
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Collect process data.	1.1. Interpret sampling scheme 1.2. Obtain measurements in accordance with standard procedures 1.3. Handle data as required.
2. Interpret data	2.1. Plot data on appropriate control chart 2.2. Distinguish between random and non-random patterns of results 2.3. Identify results outside the control limits 2.4. Recognise situations requiring action 2.5. Take appropriate action in accordance with standard procedures 2.6. Determine cost of non-conformance
3. Calculate control limits.	3.1. Consult relevant stakeholders to determine appropriate limits 3.2. Use relevant methods to calculate/revise control limits 3.3. Plot limits on control chart 3.4. Explain impact of limit to relevant stakeholders

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills:

- analysis
- problem solving
- communication
- documenting
- calculations
- use of statistics

Required knowledge:

- sampling techniques
- purpose of sampling and measurement
- random, systematic, stratified sampling
- relevance, reliability and representativeness of samples/data collected
- purpose of replication of data for statistical control
- samples, populations, finite and infinite populations and the differences
- methods of calculating means, standard deviations and the like and their purpose in statistical control
- the causes of variation in a process
- the meaning of broad/ narrow frequency distributions/ range/standard deviations and skewed distributions in process terms
- types of control charts and their applications to different types of process/product and for different purposes
- process causes of variation and typical cause types of non-random variation
- non-process (eg measurement) causes of variation
- recognition of stable and unstable processes
- causes of stability/instability in the process
- calculation of control limits/process capability and the applications of different control limits
- the standard distribution curve and confidence limits.

Evidence Guide

EVIDENCE GUIDE

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence. It is essential for assessment and must be read conjunction with the performance criteria, the range statement and the assessment guidelines of the relevant Training Package

Overview of assessment requirements	The competent person will be able to apply statistical theory to a process to interpret and reduce its variation.
What critical aspects of evidence is required to demonstrate competency in this unit?	Evidence of the application of statistical theory to a process should be available
In what context should assessment occur?	Assessment will need to occur in an organisation implementing statistical process control or by project.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit could be assessed concurrently with other units dealing with process capability and/or change management.
What method of assessment should apply?	Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment. Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit. The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace. The method of assessment should be discussed and agreed with the assessee prior to the commencement of

EVIDENCE GUIDE**What evidence is required for demonstration of consistent performance?**

Generally the application of statistics over a period of time would be required to generate sufficient evidence

What are the specific resource requirements for this unit?

Access to an organisation using statistical control.

Range Statement

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.

Sampling scheme	Sampling scheme may include: • sampling for attributes or sampling for variables • batch, continuous or custom made products • number of items/samples • size of sample • timing of sampling • location of sampling points • type of sample • number/type of measurements to be done on each sample • sampling equipment • measurement/testing equipment/methods
Procedures	Procedures includes all work instructions, standard operating procedures, formulas/ recipes, batch sheets, temporary instructions and similar instructions provided for the smooth running of the plant. They may be written, verbal, computer based or in some other form. For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice (eg Good Manufacturing Practice (GMP), Responsible Care) and government regulations.
Handle data	Handle data may include: • calculating means, ranges, mean of means, standard deviation (using appropriate calculation aids) • entering data into a software package • recording data either in writing or electronically • other required manipulations of the data.
Control chart	Control charts may include: • run • tally

RANGE STATEMENT	
	• mean/range • attributes • other relevant charts
Random	Random variation is the term used in statistical control to refer to those variations for which no cause can be found.
Non-random	Non-random, also called identifiable cause, or assignable cause or special cause are those variations for which a cause can be found and so the cause of the variation eliminated. Non-random variation may also be used to predict possible breaches of the control limits.
Control limits	Control limits, also referred to as process capability are those limits within which the process will operate if it is 'under control'.
Cost of non-conformance	Cost of non-conformance includes: • reprocessing/rework • expediting • unplanned service • excess inventory • complaint handline • downtime • returns • scrap • labour costs • material costs • infrastructure costs/overhead • utility costs
Appropriate limits	Appropriate limits may include: • 1 sigma warning limits • 2 sigma warning limits • 3 sigma control limits • 6 sigma limits

Unit Sector(s)

Unit Sector	CM Tools
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corequisite units

Corequisite units	
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Functional area

Functional Area	
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