



Australian Government

MEM23134 Evaluate jigs and fixtures

Release: 1

MEM23134 Evaluate jigs and fixtures

Modification History

Release 1. Supersedes and is equivalent to MEM23134A Evaluate jigs and fixtures.

Application

This unit of competency defines the skills and knowledge required to evaluate design features and functions of jigs, fixtures, templates and gauges for the machining, fabrication, assembly and welding of manufactured products including evaluating the safety and suitability of proposed or existing jigs, fixtures, templates and gauges for the manufacture of components for engineering or related applications.

It is suitable for people working as tool designers and maintenance technicians or paraprofessionals and draftspersons, and for those pursuing manufacturing engineering or related technical qualifications and careers.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

MEM23004 Apply technical mathematics

MEM23109 Apply engineering mechanics principles

Competency Field

Engineering science

Elements and Performance Criteria

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Determine scope of evaluation	1.1 Identify purpose and extent of use of jigs, fixtures, templates and gauges to be evaluated 1.2 Confirm stakeholders to be consulted on evaluation 1.3 Confirm that appropriate support, including technical and professional assistance, is available 1.4 Identify relevant work health and safety (WHS) and regulatory requirements, standards, codes of practice, risk management and

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	organisational procedures
2. Prepare for evaluation	2.1 Identify principles and techniques required to evaluate and optimise selected jigs, fixtures, templates and gauges and their use in related manufacturing processes 2.2 Select appropriate analysis and development software and software validation techniques 2.3 Consult with relevant tradespersons or contractors on any specific requirements or constraints for manufacture, supply or modification of jigs, fixtures, templates and gauges
3. Evaluate jigs, fixtures, templates and gauges and related manufacturing processes	3.1 Review design and construction features and functions of jigs, fixtures, templates and gauges and related manufacturing processes 3.2 Apply systems thinking, continuous improvement, problem-solving and decision- making, and constraint and contingency management principles and techniques to evaluation 3.3 Assess jigs, fixtures, templates and gauges for compliance with WHS and other regulatory and risk management requirements 3.4 Assess jigs, fixtures, templates and gauges, products and processes for sustainability 3.5 Assess effectiveness of integration of jigs, fixtures, templates and gauges with lean systems and techniques used within the organisation 3.6 Review integration of jigs, fixtures, templates and gauges with production management and control software 3.7 Assess effectiveness of jigs, fixtures, templates and gauges for manufacturing process design and optimisation 3.8 Review jigs, fixtures, templates and gauges in relation to product manufacturability and process maintainability
4. Report results	4.1 Record results of evaluation 4.2 Provide documentation including tool, product and process analysis, and computer-aided design (CAD) files

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Jigs and fixtures are used for one or more of the following:	- to position, hold and support components for assembly, fabrication or machining operations - guide operations including drilling - to enable large numbers of components to be machined or assembled identically while maintaining the correct relationship and alignment between the tool and the work piece - to ensure interchangeability of components.
Templates are production tools used to:	- accurately manufacture duplicate and interchangeable parts - perform positioning and guidance functions - check profiles for machining and fabrication operations.
Features and functions, of jigs, fixtures, templates and gauges include:	- materials used in their construction - method of fabrication including welding and machining - dimensions and tolerances - method of holding or locating work pieces or production items - method of installation and any capacity for operator adjustment during use - method of adjustment for production changeover - where the jig, fixture, template or gauge is being used by someone other than the designer or manufacturer, the degree of training required for its correct use - any limitations on the use of the jig, fixture, template and gauge - cost - degree of saving generated by the jig, fixture, template or gauge over alternatives and the saving can be in: - quality - error rate - production capacity - labour requirement.
WHS, regulatory requirements and organisational procedures	- WHS acts, regulations and relevant standards - codes of practice from Australian and overseas engineering and technical associations and societies

include:	• risk assessments • safe work practices • state and territory regulatory requirements.
Appropriate technical and professional assistance includes:	• technical support and advice relating to elements which have intrinsic dangers • professional support for technologies.
Sustainability includes:	• meeting all regulatory requirements • conforming to all industry covenants, protocols and best practice guides • minimising ecological and environmental footprint of process, plant and product • maximising economic benefit of process plant and product to the organisation and the community • minimising the negative WHS impact on employees, community and customer.
Continuous improvement implementation includes one or more of the following techniques:	• balanced scorecard • current and future state mapping • measuring performance against benchmarks • process improvement, problem solving and decision making • data management, generation, recording, analysing, storing and use of software • training for improvement systems participation • technical training.
Constraints and contingencies include one or more of the following:	• financial • organisational • procedural • cultural • physical (resource, access and logistical limitations).
Lean principles affecting tooling and related processes include:	• tooling and processing costs • capacity and responsiveness to product demand • quality of product • reliability of tooling, process and supply • waste minimisation which includes ease of tool change.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM23134A Evaluate jigs and fixtures.

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>

Assessment Requirements for MEM23134 Evaluate jigs and fixtures

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include:

- determining parameters and context of jigs, fixtures, templates and gauges in manufacturing processes
- reviewing design and construction features, functions, applications and limitations of jigs, fixtures, templates and gauges on at least two occasions
- investigating sustainability implications of jigs, fixtures, templates and gauges
- identifying principles, design, analysis techniques and requirements of manufacturing software, including supervisory control and data acquisition (SCADA) required to evaluate and optimise jigs, fixtures, templates and gauges and related manufacturing processes
- evaluating WHS, regulatory and risk management compliance
- reporting and documenting results of evaluation.

Note: Where a volume and/or frequency is not specified, demonstration must be provided at least once.

Knowledge Evidence

Evidence required to demonstrate the required knowledge for this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include knowledge of:

- work health and safety (WHS) and regulatory compliance requirements, and risk management practices relevant to jigs, fixtures, templates and gauges and related manufacturing and maintenance processes
- purpose of jigs and fixtures
- typical jigs, fixtures, templates and gauge applications, including effects on:
 - repeatability of processes
 - accuracy and other quality requirements
 - labour and skill requirements for operations
- features and functions, of jigs, fixtures, templates and gauges
- integration with or facilitation of jigs, fixtures, templates and gauges with lean manufacturing techniques including:
 - standardisation
 - reduction of waste (also often called muda)
 - task time

- just in time (JIT)
- typical construction methods for jigs, fixtures, templates and gauges
- graphical representations and developments of jigs, fixtures, templates and gauges, including assemblies, component parts, operational overlays and user instructions
- dimensioning systems, including tolerances, limits and fits, and effect on manufacturing method
- appropriate technical and professional assistance
- materials and their applications in jigs, fixtures, templates and gauges
- positioning, locating and clamping methods
- design and simulation techniques, including use of computer-aided design (CAD) software for design and animations
- jig, fixture, template and gauge manufacturing techniques including:
 - fabrication and joining processes
 - machining including milling, turning and grinding
 - post-processing of CAD files
 - computer numeric control (CNC) machining
 - electro-discharge machining (EDM)
 - additive and rapid processes
 - heat treatment
 - surface treatments
 - finish grinding and polishing
- SCADA and other manufacturing control software and implications for jigs, fixtures, templates and gauges
- systems thinking, continuous improvement, constraint and contingency management, and comparative supply chain performance
- sustainability implications of jigs, fixtures, templates and gauges.
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Assessment Conditions

- Assessors must:
 - have vocational competency in evaluating jigs and fixtures at least to the level being assessed with relevant industry knowledge and experience
 - satisfy the assessor requirements in the *Standards for Registered Training Organisations 2015 or its replacement* and comply with the *National Vocational Education and Training Regulator Act 2011*, its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires.
- Where possible assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions that cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills.

- Conditions for assessment must include access to all tools, equipment, materials and documentation required including relevant workplace procedures, product and manufacturing specifications.
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
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Links

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<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>