



Australian Government

MEM23134A Evaluate jigs and fixtures

Release 1

MEM23134A Evaluate jigs and fixtures

Modification History

Release 1 (MEM05v9).

Unit Descriptor

This unit of competency covers the evaluation of design features and functions of jigs, fixtures, templates and gauges for the machining, fabrication, assembly and welding of manufactured products.

Application of the Unit

This unit applies to 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 those pursuing manufacturing engineering or related technical qualifications and careers.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

MEM23004A	Apply technical mathematics
MEM23109A	Apply engineering mechanic principles

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 performance needed to demonstrate achievement of the element.

Elements and Performance Criteria

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 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, such as tool, product and process analysis, and computer-aided design (CAD) files

Required Skills and Knowledge

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

Required skills

Required skills include:

- determining role and benefit of jigs, fixtures, templates and gauges in a manufacturing process
- reviewing materials, treatments, finishing and assembly, and installation of jigs, fixtures, templates and gauges
- investigating sustainability implications of jigs, fixtures, templates and gauges
- selecting and using appropriate analysis techniques and software for evaluation of jigs, fixtures, templates and gauges
- identifying relevant WHS, regulatory and risk management compliance requirements
- relating use of jigs, fixtures, templates and gauges to:
 - lean manufacturing systems and techniques
 - requirements of manufacturing control software, such as system control and data acquisition software (SCADA)
- applying systems thinking, continuous improvement, and constraint and contingency management to evaluation of jigs, fixtures, templates and gauges
- reporting and documenting scoping, principles and techniques identification and evaluation of jigs, fixtures, templates and gauges and related manufacturing processes, graphics and models

Required knowledge

Required knowledge includes:

- WHS and regulatory compliance requirements, and risk management practices relevant to jigs, fixtures, templates and gauges and related manufacturing and maintenance processes
- typical range of jigs, fixtures, templates and gauge applications, including effects on:
 - repeatability of processes
 - accuracy and other quality requirements
 - labour and skill requirements for operations
- integration with or facilitation of jigs, fixtures, templates and gauges with lean manufacturing techniques, including:
 - standardisation
 - reduction of waste (also often called muda)
 - takt 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 affect on manufacturing method
- materials and their applications in jigs, fixtures, templates and gauges
- positioning, locating and clamping methods
- design and simulation techniques, including use of CAD software for design and animations
- jig, fixture, template and gauge manufacturing techniques, such as:
 - fabrication and joining processes
 - machining (e.g. milling, turning and grinding)
 - post-processing of CAD files
 - computer numeric control (CNC) machining
 - electro-discharge machining (EDM)
 - 'rapid' (additive) 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

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.

Overview of assessment	A person who demonstrates competency in this unit must be able to evaluate jigs, fixtures, templates and gauges and their applications within manufacturing processes for safety, economy and fitness for purpose.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Assessors must be satisfied that the candidate can competently and consistently:</p> <ul style="list-style-type: none"> • determine parameters and context of jigs, fixtures, templates and gauges in manufacturing processes • review design and construction features, functions, applications and limitations of jigs, fixtures, templates and gauges • identify principles, design, analysis techniques and software required to evaluate and optimise jigs, fixtures, templates and gauges and related manufacturing processes • evaluate WHS, regulatory and risk management compliance • report and document results.
Context of and specific resources for assessment	<ul style="list-style-type: none"> • This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, then a simulated working environment must be used where the range of conditions reflects realistic workplace situations. • The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. • Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability. • Access must be provided to appropriate learning and/or assessment support when required. Where applicable, physical resources should include equipment modified for people with disabilities.
Method of assessment	<ul style="list-style-type: none"> • Assessment must satisfy the endorsed Assessment Guidelines of the MEM05 Metal and Engineering Training Package. • Assessment methods must confirm consistency and accuracy of performance (over time and in a range of

	<p>workplace relevant contexts) together with application of underpinning knowledge.</p> <ul style="list-style-type: none"> • Assessment methods must be by direct observation of tasks and include questioning on underpinning knowledge to ensure correct interpretation and application. • Assessment may be applied under project-related conditions (real or simulated) and require evidence of process. • Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstance, but is able to be transferred to other circumstances. • Assessment may be in conjunction with assessment of other units of competency where required.
Guidance information for assessment	Assessment processes and techniques must be culturally appropriate and appropriate to the language and literacy capacity of the candidate 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.

Jigs and fixtures	Jigs and fixtures are used to position, hold and support components for assembly, fabrication or machining operations. Jigs also guide operations, such as drilling. Jigs and fixtures are specially designed so that large numbers of components can be machined or assembled identically while maintaining the correct relationship and alignment between the tool and the work piece, and to ensure interchangeability of components. A jig or fixture is designed and built to hold, support and locate a component (part) to ensure that it is drilled, machined or fabricated within the specified limits
Templates	Templates are production tools used to accurately manufacture duplicate and interchangeable parts and may perform positioning and guidance functions as well as profile checking for machining and fabrication operations
Gauges	Gauges are used to check dimensions of components, machining operations or assemblies. For this unit gauges refers to:

	<ul style="list-style-type: none"> specifically manufactured items to allow quick dimensional or other checks, for example, go/no-go gauges with references or use of graduated devices or instruments
Features and functions, of jigs, fixtures, templates and gauges	<p>Features and functions of jigs, fixtures, templates and gauges include:</p> <ul style="list-style-type: none"> materials used in their construction method of fabrication (e.g. 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. The saving may be in: <ul style="list-style-type: none"> quality error rate production capacity labour requirement
WHS, regulatory requirements and enterprise procedures	<p>WHS, regulatory requirements and enterprise procedures may include:</p> <ul style="list-style-type: none"> WHS Acts and regulations relevant standards codes of practice from Australian and overseas engineering and technical associations and societies risk assessments safe work practices state and territory regulatory requirements
Standards and codes	<p>Standards and codes refer to all relevant Australian and international standards and codes applicable to evaluation of jigs and fixtures</p>
Appropriate technical and professional assistance	<p>Appropriate technical and professional assistance may include:</p> <ul style="list-style-type: none"> technical support and advice relating to elements which have intrinsic dangers, such as: <ul style="list-style-type: none"> high pressure energised fluid vessels

	<ul style="list-style-type: none"> • high temperatures and heat energy capacity • wiring with high current control voltages above extra low voltage • professional support for technologies, such as: <ul style="list-style-type: none"> • specialist electric motor drives and controllers • specialist materials, plastics, metal alloys and nano materials • special processes, foundry, alloy welding, heat treatment, sealing and fastening
Sustainability	<p>Sustainability is used to mean the entire sustainable performance of the organisation/plant, including:</p> <ul style="list-style-type: none"> • 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
Systems thinking	<p>Systems thinking refers to the conduct of engineering work in a manner that demonstrates knowledge of how the interaction of different technical systems on equipment, machinery or structures, as well as the skills and techniques of personnel, combine to perform or support engineering-related operations, processes or projects. It embraces determining or establishing how the function of each technical system or component, as well as the skills and techniques of personnel, effects or potentially may effect, outcomes. Systems should be interpreted broadly within the context of the organisation and depending on the project or operation can include equipment, related facilities, material, software, internal services and personnel, and other organisations in the value chain</p>
Continuous improvement implementation	<p>Continuous improvement implementation may relate to plant, products, processes, systems or services, including design, development, implementation or manufacture, commissioning, operation or delivery and maintenance.</p> <p>Improvement processes may include techniques, such as:</p> <ul style="list-style-type: none"> • balanced scorecard • current and future state mapping • measuring performance against benchmarks • process improvement, problem solving and decision making

	<ul style="list-style-type: none"> • data management, generation, recording, analysing, storing and use of software • training for improvement systems participation • technical training
Constraints and contingencies	<p>Constraints and contingencies may be:</p> <ul style="list-style-type: none"> • financial • organisational, procedural or cultural • physical constraints, such as limits to resources, limits to site access or logistical limitations
Lean principles	<p>Lean principles affecting tooling and related processes include:</p> <ul style="list-style-type: none"> • 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 Sector(s)

Competency field

Unit sector Engineering science

Custom Content Section

Not applicable.