



Australian Government

MEM23137 Evaluate rolling tools and processes

Release: 1

MEM23137 Evaluate rolling tools and processes

Modification History

Release 1. Supersedes and is equivalent to MEM23137A Evaluate rolling tools and processes.

Application

This unit of competency defines the skills and knowledge required to evaluate hot and cold rolling tools for structural profiles and roll forming of sheet and strip metal and includes consideration of roll design criteria, materials properties and product features, work health and safety (WHS) and sustainability implications.

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 rolling tool evaluation	1.1 Identify rolling tools and related rolling products for evaluation 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 WHS and regulatory requirements, standards, codes of practice, risk management and organisational procedures
2. Prepare for evaluation of rolling tools	2.1 Identify principles and techniques required to evaluate and optimise rolling tools and related manufacturing processes

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	2.2 Select appropriate analysis techniques, software and software validation techniques 2.3 Investigate sustainability implications of roll tooling and related manufacturing processes
3. Evaluate rolling tools and related manufacturing processes	3.1 Review design and construction features and functions of rolling tools and related manufacturing processes 3.2 Assess rolling tools and related manufacturing processes for compliance with WHS and other regulatory and risk management requirements 3.3 Assess rolling tools, roll products and related processes for sustainability 3.4 Assess suitability of rolling tools for integration with quick changeover, preventative maintenance and other lean manufacturing-related techniques 3.5 Review integration of rolling tools with production management and control software 3.6 Apply systems thinking, continuous improvement, problem-solving and decision-making, and constraint and contingency management principles and techniques to evaluation 3.7 Review rolling tools 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.	
Appropriate technical and professional assistance includes:	• technical support and advice relating to elements which have intrinsic dangers • professional support for technologies.
WHS, regulatory requirements and organisational procedures include:	• WHS acts, regulations and relevant standards • codes of practice from Australian and overseas engineering and technical associations and societies • risk assessments • registration requirements • safe work practices • state and territory regulatory requirements.
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).

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM23137A Evaluate rolling tools and processes.

Links

Companion Volume Implementation Guides are available on VETNet -

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

Assessment Requirements for MEM23137 Evaluate rolling tools and processes

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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 rolling tools in manufacturing processes
- reviewing design and construction features, functions, applications and limitations of rolling tools on at least two occasions
- investigating sustainability implications of rolling tools and associated manufacturing process
- identifying principles, design, analysis techniques and software including supervisory control and data acquisition (SCADA) required to evaluate and optimise rolling tools and related manufacturing processes
- establishing cross-sectional dimensions
- developing a flower pattern for progressive forming on at least two occasions
- establishing product and roll orientation
- designing rolls to suit the flower pattern
- adding support operations including fixtures, guides, side rolls, straightening devices, cutting and punching on at least two occasions
- evaluating work health and safety (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:

- properties of hot and cold working of metals and alloys, including:
 - recrystallisation temperature
 - grain size and microstructure
- features and functions of rolling tools in a manufacturing operation
- sources of technical and professional assistance
- WHS and regulatory compliance requirements and risk management practices for rolling tools and related manufacturing and maintenance processes
- sustainability and lean systems implications for rolling tools and related manufacturing processes

- hot rolling including:
 - critical design considerations for tooling
 - multi-pass, multi-roll including three high, four high mills and reversing mills
 - hot rolled products
 - effect of hot rolling and variations in rolling process on properties of rolled materials
 - ring rolling
- cold rolling including:
 - critical design considerations for tooling
 - related processes including pickling, cleaning, annealing and slitting
 - cold rolled products
 - properties of cold rolled materials including strength and hardness increase and ductility decrease
- hot and cold rolling effects
- roll forming including:
 - thread rolling for screws and bolts
 - combined rolling techniques
- roll pass design features including:
 - product mechanical properties including:
 - yield strength in tension and shear
 - work hardening strain rate effect
 - driven and non-driven rolls, and applied tension
 - friction in rolling process
 - roll bite geometry
 - deflection compensation
 - roll materials, manufacture and heat treatment
 - roll force, torque and power
 - product guide systems
 - roll and product temperature and cooling rate control
- roll forming pass design features
- labour and skills distribution requirements
- systems thinking, continuous improvement, constraint and contingency management, and comparative supply chain performance
- WHS and regulatory requirements, codes of practice, standards, risk management and registration requirements
- reporting and documentation requirements.
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Assessment Conditions

- Assessors must:
 - have vocational competency in evaluating rolling tools and processes 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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