Australian Government
Department of Education, Employment and Workplace Relations

MSATCM505A Select metal joining process

Revision Number: 1

ISC INDUSTRY SKILLS COUNCILS
Creating Australia's Future

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Modification History

Not applicable.

Unit Descriptor

Unit Descriptor	This competency covers the selection of the appropriate metal joining processes for an application. It requires using metallurgical principles and techniques to select a process which is appropriate for the required product end use and the metal(s) to be used.

Application of the Unit

Application of the unit	This competency applies to technicians who are required to recommend a metal joining process for making a metal product. It includes: • knowing the principles of common joining processes and their typical applications • identifying the key factors in the product to be made which will guide the joining process selection • applying basic metallurgy to the situation so as to make an appropriate recommendation.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Pre-requisite Units	*MEM09002B*	*Interpret technical drawing*
	MEM30007A	*Select common engineering materials*
	MSATCM406A	*Apply basic chemistry principles to metallurgy*

Pre-requisite Units	*MEM09002B*	*Interpret technical drawing*

Employability Skills Information

Employability Skills	This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Not applicable.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Confirm requirements.	1.1. Communicate with stakeholders regarding technical and aesthetic specification 1.2. Identify process constraints such as timelines and cost 1.3. Identify any special requirements of product or process 1.4. Confirm product and process requirements with stakeholders.
2. Shortlist possible joining processes.	2.1. Identify joining processes which may be appropriate. 2.2. Discuss suitability of different processes with stakeholders. 2.3. Guide stakeholders to determine relative benefits of individual processes 2.4. Clarify conflicts of information and benefits that arise.
3. Select metal joining process.	3.1. Select the most appropriate process for the application. 3.2. Explain reasons for selecting process to stakeholders. 3.3. Clarify any unresolved areas.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE
This describes the essential skills and knowledge and their level, required for this unit.
Required skills:
• identify and ask questions which will lead stakeholders to describe the key factors and properties required • communicate technical information both with technical and non-technical stakeholders who may be customers or managers • Write to the level of reading technical information and writing technical reports and production specifications • understand and interpret numeric data.
Required knowledge:

Competence in this unit requires knowledge of the principles, strengths and weaknesses and typical applications of:
• Metal Joining without parent metal fusion including soldering, brazing&adhesives
• Solid phase welding&diffusion bonding including time, temperature, pressure, deformation, friction welding, explosive welding, ultrasonic welding, butterwelding
• Metal Joining - Fusion welding including heat sources, atmosphere, arc, gas, laser, electroslag, MIG and TIG welding, use of heat blankets
• Heat effects of metal joining processes including heat flow, heat affected zone, weld pool solidification etc;
• Weldability, testing, weld defects including solidification cracking, heat affected zone hot tearing, hydrogen cracking, lamellar tearing, porosity, heat treatment cracking, weld decay, stress corrosion cracking, brittle fracture, fatigue,
• Time-Temperature-Transformation TTT Curves applied to preheat, post heat and post weld heat treatment
• Welding&weldability of
  • carbon steels, low alloy steels&cast irons
  • aluminium&alloys, copper&alloys
  • stainless steels&nickel alloys
• Residual stresses in welding including causes and elimination
• Economic and timeliness factors
• Quality
• Aesthetics of finish
• Technical differences such as:
  • strength
  • rigidity
  • corrosion resistance
  • grain structure

REQUIRED SKILLS AND KNOWLEDGE
• chemical composition

Evidence Guide

EVIDENCE GUIDE	
The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	This competency also requires evidence of competency in the selection of appropriate processes for various scenarios. The scenarios should be relevant to the application of metallurgy to the joining process and may be drawn directly from the workplace or may be simulated case studies.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	It is essential that competence is demonstrated in the ability to: • select appropriate joining process • justify the selection of that process • ask appropriate questions to determine the required information. Consistent performance should be demonstrated. In particular look to see that: • several scenarios requiring the selection of different processes have been completed successfully
Relationship to other units	This unit may be assessed concurrently with other relevant units.
Assessment method and context	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

EVIDENCE GUIDE	
	would normally be available in the workplace. The method of assessment should be discussed and agreed with the assessee prior to the commencement of assessment.
Resource implications	This section should be read in conjunction with the range of variables for this unit of competency. Resources required include suitable access to a situation where moulds are used. A bank of case studies/scenarios and questions will also be required to the extent that they form part of the assessment method. Questioning may take place either in the workplace, or in an adjacent, quiet facility such as an office or lunchroom. No other special resources are required.

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.	
Codes or practice/standards	Where reference is made to industry codes of practice, and/or Australian/international standards, it is expected the latest version will be used.
Context	This competency applies to metallurgical technicians working in a foundry who may be required to make a recommendation of an appropriate joining process for a metal product. The appropriate process may, or may not be one conducted in a foundry.

Unit Sector(s)

Unit Sector	Metallurgy

Competency field

Competency Field	

Co-requisite units

Co-requisite Units		