



Australian Government

Department of Education, Employment and Workplace Relations

MEM04022A Examine appropriateness of methoding for mould design

Release: 1

MEM04022A Examine appropriateness of methoding for mould design

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit of competency covers the skills and knowledge required to examine the methoding (gating, running and feeding of castings) for mould designs using basic metallurgical techniques and skills.
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Application of the Unit

Application of the unit	<p>This unit of competency applies to a foundry tradesperson who has to examine the appropriateness of own or others methoding for a mould design using basic metallurgical skills and techniques supported by normal empirical trade skills. Work is performed under the general supervision of a metallurgist.</p> <p>Band: B</p> <p>Unit Weight: 4</p>
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Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units		
Path 1	MSATCM304A	Interpret basic binary phase diagrams
	MEM04005C	Produce moulds and cores by

Prerequisite units		
		hand (jobbing)
	MEM09002B	Interpret technical drawing
	MEM18001C	Use hand tools

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. Identify specification requirements for required casting	1.1. Obtain all relevant job requirements and design specifications in accordance with workplace procedures 1.2. Identify and interpret drawing requirements and specifications
2. Evaluate proposed mould design for methoding requirements	2.1. Identify desired solidification process taking into account casting design, metal composition, mould design and specifications 2.2. Identify running, gating and feeding principles and techniques appropriate for the particular casting 2.3. Examine suitability of methoding if already selected including gating and the number, placement and sizing of feeders/risers 2.4. Where required, enter data to facilitate the generation of a computer simulation of methoding and casting process for later comparison to actual casting
3. Report results	3.1. Determine reporting requirements 3.2. Prepare reports in accordance with standard operating requirements 3.3. Circulate and file report to procedures 3.4. Communicate suggestions for improvements directly to other team members where appropriate

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE
This section describes the skills and knowledge required for this unit.
Required skills
Required skills include: <ul style="list-style-type: none"> • applying scientific principles to foundry mould design • examining mould designs using basic metallurgical skills and techniques to suit specific applications • calculating mould runner and feeding systems • selecting appropriate techniques and associated software and hardware

REQUIRED SKILLS AND KNOWLEDGE

technologies to suit specific applications in foundry mould design

- presenting methoding solution and any associated limitations to mould design referring to the original aim of the application and any relevant instructions from metallurgist

Required knowledge

Required knowledge includes:

- ability to perform calculations related to methoding and feeding including:
 - measuring dimensions of runner systems
 - calculating cross-sectional areas of sprue, runners and ingates
 - volumes and dimensions of feeders
- the effects on solidification of:
 - nucleation
 - growth mechanisms (crystal and interfacial)
 - dendrite coherency
 - constitutional undercooling
 - superheat - effects, control and minimisation of excess heat
 - eutectic and peritectic solidification
 - grain structure
- the principles underpinning the effective operation of running, gating and feeding systems including:
 - runner and gating principles (ratios)
 - determining type and placement of sprue, runners and ingates
 - inclusion control (slag and erosion)
 - calculations and effect of metal flow (lamellar and turbulent), velocity and temperature
 - calculation of feeder size
 - principles used in the determination of the location of feeders (end and feed zones, neighbourhood effect and feeding distances) including effect on solidification
 - exothermic and insulating feeding aids (sleeves and topping)
 - feeding mechanisms (liquid, mass, interdendritic, burst and solid)
 - use of computer packages (runner and feeder calculations and mould simulations) including benefits and limitations
 - yield calculations
- risk management strategies to minimise defect formation and the methods for minimising:
 - shrinkage
 - porosity

REQUIRED SKILLS AND KNOWLEDGE

- segregation
- hot tearing
- shear

Evidence Guide

EVIDENCE GUIDE	
<p>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.</p>	
Overview of assessment	<p>Evidence should be provided from the evaluation of a number of moulds. Evidence must be provided of manual calculations and compared to computer program results.</p>
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Assessors should ensure that candidates can competently and consistently:</p> <ul style="list-style-type: none"> • calculate manually and by use of computer programs runner and feeding systems for casting designs within defined design parameters • examine mould designs for suitability against job specifications • understand the interplay between moulds, cores, gating and feeding • examine the resulting casting for success of gating and feeding • compare casting results with computer simulated predictions.
Context of and specific resources for assessment	<p>Assessment may occur on the job or in an appropriately simulated environment. Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.</p> <p>Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.</p> <p>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.</p>
Method of assessment	<p>Assessment must satisfy the endorsed assessment guidelines of the MEM05 Metal and Engineering Training Package.</p> <p>Assessment methods must confirm consistency and accuracy of performance (over time and in a range of workplace relevant contexts) together with application of</p>

EVIDENCE GUIDE	
	<p>underpinning knowledge.</p> <p>Assessment methods must be by direct observation of tasks and include questioning on underpinning knowledge to ensure its correct interpretation and application.</p> <p>Assessment may be applied under project related conditions (real or simulated) and require evidence of process.</p> <p>Assessment must confirm a reasonable inference that competency is able not only to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.</p> <p>Assessment may be in conjunction with assessment of other units of competency where required.</p>
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

RANGE STATEMENT	
<p>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.</p>	
Codes of practice/standards	Where reference is made to industry codes of practice and/or Australian/international standards, it is expected that the latest version will be used
Size and number of feeder heads and gating	Calculation of the size of feeder heads and gating includes manual calculation and use of computer programs within defined design parameters

Unit Sector(s)

Unit sector	
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Co-requisite units

Co-requisite units		

Competency field

Competency field	Casting and moulding
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