



Australian Government

PMC556031 Design structural/mechanical components

Release: 1

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Modification History

Release 1. Supersedes and is equivalent to PMC556031C Design structural/mechanical components.

Application

This unit of competency covers the skills and knowledge required to design a new product/component which has a significant structural or mechanical requirement and which is to be made from manufactured mineral products. It applies to large and small components, such as:

- critical load bearing structural components requiring significant design, such as columns and beams
- critical mechanical components transmitting power/forces, such as shafts, gears and bearings
- component joints/joins
- components with a critical rigidity/flexural specification
- individual components
- integrated structural components.

This unit of competency applies to advanced technologists, technical experts or those in similar roles who are required to apply significant depth and breadth of theoretical materials, product and process knowledge in order to determine the design requirements, select the materials to be used, design the components, supervise product testing/trials and finalise specifications for the new component.

Where the design is being undertaken by a design team the technologist will perform a lead technical role. The technologist is not required to demonstrate 'hands on' operation of equipment as part of this competency.

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

Pre-requisite Unit

PMC555031 Choose materials for an application

Competency Field

Technical

Unit Sector

Not applicable

Elements and Performance Criteria

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

1	Determine mechanical/structural design requirements	1.1	Determine stress/strain requirements of end use
		1.2	Determine flexural/rigidity requirements of end use
		1.3	Determine required physical properties (such as size, shape and density) of end use
		1.4	Determine environmental requirements (physical, chemical and radiation) of end product
		1.5	Identify how component fits with entire end product
		1.6	Develop mechanical design brief and verify with appropriate people
2	Select materials and additives, including reinforcing, appropriate for the design brief	2.1	Select material/combination of materials with appropriate physical properties
		2.2	Select material/combination of materials with appropriate chemical properties
		2.3	Select material/combination of materials with appropriate radiation resistance/transmission properties
		2.4	Arrange for compounding and testing of possible materials as appropriate
		2.5	Determine relevant properties of selected material/shortlisted materials
3	Undertake mechanical design of component	3.1	Calculate size and shape/profile of component to meet design brief
		3.2	Liaise with product developer to also deliver required aesthetic aspects

- 3.3 Liaise with product developer/production to ensure efficiency in manufacture
 - 3.4 Suggest modifications to materials/compound as required
- 4 **Design jointing/joining/other product interfaces**
 - 4.1 Liaise with designers of other components
 - 4.2 Agree on interface requirements/joints/joining as appropriate
 - 4.3 Design suitable interfaces
 - 4.4 Check interface design to ensure it meets the end use requirements without sacrificing integrity
- 5 **Finalise design**
 - 5.1 Check internal consistency of design
 - 5.2 Check overall design meets end use requirements
 - 5.3 Ensure issues identified in the hazard analysis for both end use safety requirements and manufacturing requirements are addressed in the final design
 - 5.4 Write component specification
 - 5.5 Liaise with product developer/production to write production specification/procedures
 - 5.6 Supervise manufacture and testing of prototypes/manufacturing trials as appropriate
 - 5.7 Finalise specifications and manufacturing processes, and complete all reports
 - 5.8 Ensure project records are complete and all required reports have been completed and submitted
 - 5.9 Archive records according to company procedures

Foundation Skills

This section describes those required skills (language, literacy and numeracy) 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.

Regulatory framework The latest version of all legislation, regulations, industry codes of practice and Australian/international standards, or the version specified by the local regulatory authority, must be used.

Applicable legislation, regulations, standards and codes of practice include:

- health, safety and environmental (HSE) legislation, regulations and codes of practice relevant to the workplace, materials and processes being used and products being made
- Australian/international standards relevant to the materials being used and products being made
- any relevant licence and certification requirements.

All operations to which this unit applies are subject to stringent HSE requirements, which may be imposed through state/territory or federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and such requirements the legislative requirements take precedence.

Procedures All operations must be performed in accordance with relevant procedures.

Procedures may be written, verbal, visual, computer-based or in some other form. They include one or any combination of:

- test procedures
- technical specifications
- technical drawings
- emergency procedures
- work instructions
- standard operating procedures (SOPs)
- safe work method statements (SWMS)
- formulas/recipes
- batch sheets
- temporary instructions
- any similar instructions provided for the smooth running of the plant.

Unit Mapping Information

Release 1. Supersedes and is equivalent to PMC556031C Design structural/mechanical components.

Links

MSA Training Package Implementation Guides - <http://mskills.org.au/training-packages/info/>