



**Australian Government**

# **MEM234005 Design hydrodynamic pumping systems**

**Release: 1**

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## Modification History

Release 1. Supersedes and is equivalent to MEM234005A Design hydrodynamic pumping systems.

## Application

This unit of competency defines the skills and knowledge required to design new or modified hydrodynamic pumping systems across all forms of manufacturing and engineering. Designs consist of the layout, choice of motor and pumps, pipes and valves; the fluid source and delivery requirements of the system and incorporate sustainability implications, work health and safety (WHS) and regulatory requirements.

Design activities can be reverse engineering, design rectification or modifications of an existing design. It applies to pumping system designers and maintenance personnel, and those pursuing engineering or related qualifications and careers.

The client may be internal or external to the designer's organisation.

Individuals completing this work either already have or are developing skills and experience in scientific principles, evaluation of hydrodynamic systems, mathematics and computer software and file handling.

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

## Pre-requisite Unit

Nil

## 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. Clarify the design brief and elaborate the specification	1.1 Establish required features and performance parameters of hydrodynamic pumping system 1.2 Confirm technical, commercial and environmental parameters of the brief or contract

<b>Elements</b>	<b>Performance Criteria</b>
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	<p>1.3 Determine stakeholders to be consulted in design process</p> <p>1.4 Assess WHS, regulatory, sustainability or environmental issues relevant to the design task</p> <p>1.5 Confirm design brief, including budget and schedule, and provide preliminary advice on feasibility</p>
2. Evaluate design analysis and prepare concept proposals	<p>2.1 Appraise initial qualitative and quantitative analysis of the design task</p> <p>2.2 Carry out required detailed modelling and calculations using appropriate software and validation techniques</p> <p>2.3 Generate solutions to the design brief, including choice of equipment, layout, fluid source and delivery</p> <p>2.4 Check feasibility and evaluate solutions against design criteria, ensuring conformity to standards and codes, technical, economic and WHS requirements</p> <p>2.5 Determine social and sustainability implications of solutions</p> <p>2.6 Present concept proposals to client</p>
3. Design hydrodynamic pumping system	<p>3.1 Evaluate concept proposals with client and select preferred solution</p> <p>3.2 Ensure that design solution is optimised with respect to the system specifications</p> <p>3.3 Finalise selected design, comprising equipment, layout, fluid source and delivery, and other features desired by client</p> <p>3.4 Ensure preparation of all required documentation, drawings, specifications and instructions</p> <p>3.5 Consult with client and stakeholders to obtain sign-off on design</p> <p>3.6 Monitor installation and commissioning with stakeholders and make any necessary adjustments to design</p>

## 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

<p>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.</p>	
<p>Parameters of the design brief include:</p>	<ul style="list-style-type: none"> <li>• design of new equipment or fault analysis, rectification or modification to an existing design</li> <li>• determination of the degree of innovation and creativity expected by the client</li> <li>• design process limits and budgets</li> <li>• product cost limits and budgets</li> <li>• performance specification</li> <li>• equipment availability, capacities and restrictions</li> <li>• specified administrative, communication and approval procedures</li> <li>• other special features and limits in the design brief.</li> </ul>
<p>WHS, regulatory, sustainability and environmental issues include:</p>	<ul style="list-style-type: none"> <li>• WHS acts, regulations and relevant standards</li> <li>• industry codes of practice</li> <li>• risk assessments</li> <li>• registration requirements</li> <li>• safe work practices</li> <li>• minimising ecological and environmental footprint of process, plant and product</li> <li>• maximising economic benefit of process plant and product to the organisation and the community</li> <li>• minimising the negative WHS impact on employees, community and customer</li> <li>• state and territory regulatory requirements.</li> </ul>
<p>Solutions include those which:</p>	<ul style="list-style-type: none"> <li>• satisfy the technical requirements of the design brief</li> <li>• are within budget</li> <li>• are able to be manufactured</li> <li>• meet any regulatory requirements</li> <li>• minimise environmental and sustainability impacts.</li> </ul>
<p>Pumping system specifications include:</p>	<ul style="list-style-type: none"> <li>• pump types</li> <li>• system head requirements, pump performance requirements</li> <li>• duty point, flow rates</li> <li>• cavitation issues and control</li> <li>• power and efficiency</li> <li>• energy cost of pumping</li> <li>• valves for flow control</li> </ul>

	<ul style="list-style-type: none"><li>• component layout.</li></ul>
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## Unit Mapping Information

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## Links

Companion Volume Implementation Guides are available on VETNet - <https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>