



Australian Government

MEM234013 Plan and design engineering-related manufacturing processes

Release: 1

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Modification History

Release 1. Supersedes and is equivalent to MEM234013A Plan and design engineering-related manufacturing processes.

Application

This unit of competency defines the skills and knowledge required to plan and design engineering-related manufacturing processes. It includes consideration of client requirements, process control, sustainability, lean systems, product manufacturability, system maintainability, facilities, services, plant and tooling requirements, supply chains, material and product flow, continuous improvement and constraint and contingency management, work health and safety (WHS) and regulatory requirements.

It applies to the design of manufacturing processes across all forms of manufacturing and engineering and design activities can also include design rectification or modifications of an existing engineering-related manufacturing process. It is suitable for manufacturing system designers or manufacturing operations personnel, and for those pursuing engineering or related qualifications and careers.

Individuals completing this work either already have or are developing skills and experience in production control techniques, product and process improvement techniques, manufacturing plant and processes and evaluation of business performance, computing technology and mathematics.

The unit does not apply to technical leadership in project, operational or engineering management. Where these skills are required see unit MEM234001 Plan and manage engineering-related projects or operations.

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
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<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Clarify client brief or contract requirements	1.1 Clarify product performance objectives and specifications with client 1.2 Determine and research planning and design parameters of the brief or contract 1.3 Determine WHS, regulatory, sustainability and environmental issues relevant to the proposed manufacturing process 1.4 Establish required technical and professional assistance based on project scope 1.5 Confirm client's production system capability and provide initial advice on feasibility 1.6 Discuss 'time to market' issues with the client and establish timelines 1.7 Decide, in conjunction with client, whether the proposed project should fit with an existing production system or a new or redesigned process to be established for the product 1.8 Prepare a product development flow chart that provides sufficient information to guide the planning and design process
2. Develop manufacturing process design options and prepare concept proposals	2.1 Identify and analyse relevant production systems 2.2 Generate and validate manufacturing process design solutions using current design methodologies and automated design tools 2.3 Evaluate and rank options against client criteria for quality, cost, and application of automation, maintainability and regulatory requirements 2.4 Determine social and sustainability implications of solutions 2.5 Document and present concept proposals to client 2.6 Provide feedback on product manufacturability 2.7 Evaluate concept proposals with client and select preferred process
3. Design manufacturing process	3.1 Determine manufacturing process control, maintenance management, human resources and continuous improvement systems implications for final design 3.2 Finalise manufacturing process design, including material and product flow, logistics, transfers, new or modified facilities, services, plant and tooling layout 3.3 Ensure preparation of all required documentation, drawings, specifications and instructions 3.4 Consult with client and stakeholders to obtain sign-off on design. 3.5 Monitor installation and commissioning of manufacturing process

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	with stakeholders and make any necessary adjustments to design

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 related to: • high pressure • energised fluid vessels • high temperatures and heat energy capacity • wiring or devices with high current or voltages above extra low voltage • professional support for technologies related to: • specialist electric motor drives and controllers • specialist materials, plastics, metal alloys and nano materials • special processes, foundry, alloy welding, heat treatment, sealing and fastening • professional services for: • finance, accounts and tax • insurance and legal • training and human resources (HR).
Parameters of the brief include:	• the design of new manufacturing processes or fault analysis, rectification or modification to an existing design • daily and seasonal production rates • requirements for shift work • provisions for increasing or reducing production rates • expected quality levels

	• other special features and limits in the design brief.
WHS, regulatory, sustainability and environmental issues include:	• WHS acts, regulations and relevant standards • industry codes of practice • risk assessments • registration requirements • safe work practices • 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 • state and territory regulatory requirements.
Production systems include:	• suppliers • materials handling systems • manufacturing processes • labour force capability • distribution systems.
Design methodologies include:	• design for assembly and automated assembly • design for manufacturability • design for quality and maintainability • concurrent engineering.
Automated design tools include:	• computer-aided design (CAD) • computer-aided engineering (CAE) • solid modelling • finite element analysis • group technology (GT) • computer-aided process planning (CAPP) • expert system tools • cost analysis and financial modelling tools.
Design for product manufacturability includes:	• enhancement by concurrent product and process design • consideration of manufacturing processes and plant in the product design process including the use of group technologies.
Continuous improvement implementation includes:	• changes to plant, products, processes, systems or services, including design, development, implementation or manufacture, commissioning, operation or delivery and maintenance Plus 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.
Planning and design parameters include:	• facilities • services • plant • tooling and process • process control system.
Planning and design parameters requiring research include:	• manufacturing process design techniques • product manufacturability • process design • layout and automation options • lean systems • supply chain value analysis.
Engineering manufacturing process design requirements include one or more of the following:	• software options • facilities and services • plant and tooling requirements of products • stock control • warehousing • buffer and emergency stock • material and product flow • transfer operations • information flow and manufacturing process control • process maintenance management • labour requirements and skills distribution.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM234013A Plan and design engineering-related manufacturing processes.

Links

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