



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **MEM234032A Manage fluid power related technologies in an enterprise**

**Release: 1**

## **MEM234032A Manage fluid power related technologies in an enterprise**

### **Modification History**

New unit

### **Unit Descriptor**

This unit of competency covers the skills required to provide a technical leadership role in the installation, maintenance and productivity, quality enhancement of fluid-related technologies in an enterprise.

It includes awareness of current options and trends in fluid power design, interpreting manufacturer specifications, production requirements, implications of relevant regulations, internal or external client brief, liaison with designers and ensuring that team members are aware of technical and performance requirements.

### **Application of the Unit**

This unit applies to a technician who is providing technical leadership in the installation, maintenance and quality, productivity enhancement of fluid-related technologies in an enterprise, including fluid power control systems; hydraulic systems, including hydrostatic transmissions, proportional and servo valve control; and programmable logic controller (PLC) control.

The unit covers the fluid power technologies in equipment, such as robotics; fluid power drives; mobile equipment using fluid power; such as earthmoving equipment, compressors, pumps, and compressed air distribution systems across all forms of manufacturing and engineering.

The unit applies to individuals who are required to provide high level technical leadership to other members in the installation, commissioning or modification team. The other members of the team will normally include engineering tradespersons and may also include technicians and production personnel.

The unit complements the more general technical leadership and management skills found in MEM234001A Plan and manage engineering-related projects or operations. Informal technical or engineering advice situations are covered by the unit MEM234030A Provide specialised technical and engineering guidance to other technical employees.

This unit does not supply all technical skills and knowledge required for fluid power related tasks. The required technical skills will depend on the particular task and will normally be covered through the combined skills and knowledge of the team. However, the unit presumes engineering skill and knowledge to at least Advanced Diploma level.

## Licensing/Regulatory Information

Not applicable.

## Pre-Requisites

Not applicable.

## Employability Skills Information

This unit contains employability skills.

## 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.

## Elements and Performance Criteria

1	Identify scope of fluid power related systems installation	1.1	Review machine and equipment drawings, manufacturer manuals and other technical data for fluid power systems specifications
		1.2	Determine performance and production requirements expected from fluid power equipment
		1.3	Determine if any commissioning or modification of fluid power systems are required to ensure production requirements are met
		1.4	Determine relevant regulatory requirements
		1.5	Inspect site and equipment to confirm or determine suitability, availability of other services and control requirements
		1.6	Produce or review fluid power management schedule, including any required installation, commissioning, modification or maintenance requirements

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| 2 | Brief team on fluid power work requirements   | 2.1 | Distribute and discuss drawings, schedules, and major materials and equipment with team  |
|   |   | 2.2 | Arrange for request for further information (RFIs) with designers, where required  |
|   |   | 2.3 | Brief team on key compliance and risk factors, including regulatory, occupational health and safety (OHS) and environmental requirements |
|   |   | 2.4 | Agree with team on critical control points and reporting requirements  |
| 3 | Commence installation, commissioning, modification or maintenance tasks             | 3.1 | Supervise machine and equipment shutdowns required for task  |
|   |   | 3.2 | Confirm availability of equipment components and materials for scheduled fluid power tasks   |
|   |   | 3.3 | Check and determine that supply of services to work are adequate for task commencement   |
|   |   | 3.4 | Ensure all tradespersons have correct drawings   |
| 4 | Monitor progress and deal with contingencies  | 4.1 | Establish procedures to ensure assembly and connections are against drawing specifications   |
|   |   | 4.2 | Ensure electrical, fluid power and control systems and circuits are consistent with specifications and regulations                       |
|   |   | 4.3 | Identify problems and contingencies and establish and rectify root cause   |
| 5 | Finalise fluid power installation, commissioning, modification or maintenance tasks | 5.1 | Conduct final check to ensure completed work is consistent with drawings, manufacturer manuals and any regulatory requirements           |
|   |   | 5.2 | Conduct test run of equipment and system   |
|   |   | 5.3 | Identify and correct any malfunctions or errors in required output   |

- 6 Conduct handover and finalise documentation
  - 6.1 Brief client and operators on machine or equipment operation after installation
  - 6.2 Prepare and submit any required reports on installation, commissioning or modification

## Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

### Required skills

Required skills include:

- performing responsibilities in priority order in accordance with implementation schedules
- investigating and validating performance analysis, modelling and simulation software
- interpreting fluid power design and detailed drawings
- identifying sustainability and environmental issues and implications for the fluid power system
- selecting and using software and validation techniques, including 2-D and 3-D modelling
- identifying situations and issues that require additional technical or professional assistance
- evaluating solutions for feasibility against the installation, commissioning, modification or maintenance criteria, including relevant engineering and financial calculations and analysis
- establishing budget and control measures for team, and incorporating within installation, commissioning or modification project control plan
- delegating roles, responsibilities and levels of authority, as appropriate, to team members
- communicating, negotiating and reviewing with stakeholders and team members throughout duration of installation, commissioning or modification project

### Required knowledge

Required knowledge includes:

- current options and trends in fluid power modelling and simulation software, including underpinning programme techniques and software validation techniques
- research and investigations methods
- principles of fluid power systems
- dimensions, capacity and position of system components
- electrical and mechanical behaviours of fluid power systems and system responsiveness
- hydraulics and hydraulics components
- applications and characteristics of servo valves
- electronic controllers for proportional and servo valves
- sensor/transducer/amplifiers:
- pneumatics and designing with pneumatic components
- multiple actuator control circuits
- compressed air system design
- OHS and regulatory requirements, codes of practice, standards, risk minimisation and registration requirements

## Evidence Guide

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>Critical aspects for assessment and evidence required to demonstrate competency in this unit</p>	<p>Assessors must be satisfied that the candidate can competently and consistently:</p> <ul style="list-style-type: none"> <li>• interpret plans, specifications and other documentation to determine features and performance characteristics and requirements of fluid power systems</li> <li>• advise other technicians, tradespersons and production personnel on fluid power installation, modification, commissioning, operation and maintenance</li> <li>• determine adequacy of standard operating procedures for fluid power systems and adjust, if required</li> <li>• check fluid power systems for safe operation, including automation safety</li> <li>• determine situations that require other technical and professional assistance</li> <li>• research sustainability implications and current industrial design techniques</li> <li>• determine OHS, regulatory and risk management requirements.</li> </ul>
<p>Context of and specific resources for assessment</p>	<ul style="list-style-type: none"> <li>• This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is, the candidate is not in productive work, then a simulated working environment must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team.</li> <li>• Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.</li> <li>• 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.</li> </ul>

Method of assessment	<ul style="list-style-type: none"> <li>• Assessment must satisfy the endorsed Assessment Guidelines of the MEM05 Metal and Engineering Training Package.</li> <li>• Assessment methods must confirm consistency and accuracy of performance (over time and in a range of workplace relevant contexts) together with application of underpinning knowledge.</li> <li>• Assessment methods must be by direct observation of tasks and include questioning on underpinning knowledge to ensure its correct interpretation and application.</li> <li>• Assessment may be applied under project-related conditions (real or simulated) and require evidence of process.</li> <li>• 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.</li> <li>• Assessment may be in conjunction with assessment of other units of competency where required.</li> </ul>
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

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.

<b>Sustainability</b>	<p>Sustainability may include:</p> <ul style="list-style-type: none"> <li>• resources and energy</li> <li>• social and economic</li> <li>• life cycle design of product raw material, solids and hazardous waste, and production by-products</li> <li>• contamination of land, air and stormwater pollutants, and discharge to sewerage</li> <li>• climate change</li> </ul>
<b>Appropriate software</b>	Appropriate software may include software for:



	<ul style="list-style-type: none"> <li>• computer-aided design (CAD)</li> <li>• circuit design and analysis</li> <li>• animation</li> <li>• simulation</li> <li>• modelling</li> <li>• performance analysis</li> </ul>
<b>Validation techniques</b>	<p>Validation techniques include:</p> <ul style="list-style-type: none"> <li>• comparison of traditional solutions for simple design problems with software solutions to the same design problems</li> <li>• review of previously implemented designs which were completed using the software</li> <li>• use of failure modes and effects analysis (FMEA)</li> </ul>
<b>Fluid power related technologies</b>	<p>Fluid power related technologies refers to:</p> <ul style="list-style-type: none"> <li>• hydraulic and pneumatic systems used for industrial and mobile equipment applications</li> </ul>
<b>Fluid power system maintenance</b>	<p>Fluid power systems maintenance refers to maintenance fluid power systems for fitness for purpose and includes:</p> <ul style="list-style-type: none"> <li>• safety and integrity of the system</li> <li>• adequacy and correct operations of controls</li> <li>• automation safety</li> <li>• adequacy of standard operating procedures for users</li> <li>• safe integration with mechanical and electrical equipment</li> </ul>
<b>OHS requirements</b>	<p>OHS requirements may include:</p> <ul style="list-style-type: none"> <li>• OHS Acts and regulations</li> <li>• relevant standards</li> <li>• industry codes of practice</li> <li>• risk assessments</li> <li>• registration requirements</li> <li>• safe work practices</li> <li>• state and territory regulatory requirements</li> </ul>
<b>Standards</b>	<p>Standards may include:</p> <ul style="list-style-type: none"> <li>• AS 4024.1-2006 Series Safety of machinery</li> <li>• AS/NZS ISO 31000:2009 Risk management – Principles and guidelines</li> <li>• NOHSC:1010 National standard for plant</li> <li>• NOHSC:1014 National standard for the control of major hazard facilities</li> <li>• AS 61508.1-2011 Functional safety of</li> </ul>

	electrical/electronic/programmable electronic safety-related systems – General requirements
<b>Sequence and mode control methods for multi-actuator circuit</b>	<p>Sequence may include:</p> <ul style="list-style-type: none"> <li>• sequential operations with or without conditional jumps</li> <li>• optimisation techniques</li> <li>• functions such as: <ul style="list-style-type: none"> <li>• timing, counting, stop start, cycle selection and boundary conditions</li> </ul> </li> </ul> <p>Control methods may include:</p> <ul style="list-style-type: none"> <li>• pneumatic and electrical relay cascade control.</li> <li>• pneumatic and electrical relay step-sequenced control</li> <li>• PLC control</li> <li>• microcontrollers for special purpose machines</li> </ul>
<b>Stand alone and network control</b>	<p>Options for stand alone and network control of fluid power systems may include:</p> <ul style="list-style-type: none"> <li>• compressor control and application control</li> <li>• fluid powered machine control, including proportional-integral-derivative (PID) parameter control from remote host controller</li> <li>• communications bus systems, serial systems</li> <li>• distributed control systems (DCS)</li> <li>• system control and data acquisition (SCADA)</li> <li>• computer-interated manufacture (CIM) options</li> </ul>

## Unit Sector(s)

Engineering practice

## Custom Content Section

Not applicable.