Australian Government

MEM23115A Evaluate fluid power systems

Release: 1

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

MEM23115A Evaluate fluid power systems

Modification History

Release 1 - New unit. Replaces MEM23081A, but not equivalent.

Unit Descriptor

This unit of competency covers the evaluation of hydraulic and pneumatic systems and components, including automated fluid power applications characterised by two or three actuators requiring digital control of valves and preset flow and pressure control.

Application of the Unit

This unit applies to the evaluation of manual and automated fluid power systems and components. The evaluation may be undertaken as part of a design or system selection process or to assess system condition, sustainability or efficiency.
It is suitable for people working as fluid power technicians or system designers, draftspersons and maintainers, and those pursuing careers and qualifications in engineering or related disciplines.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

MEM23004A	Apply technical mathematics
MEM23006A	Apply fluid and thermodynamics principles in engineering

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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.

Elements and Performance Criteria

1	Determine scope of fluid power system evaluation	1.1	Determine fluid power systems and components to be evaluated
		1.2	Identify stakeholders to be consulted on the evaluation
		1.3	Confirm that appropriate support, including technical and professional assistance, is available
		1.4	Determine relevant work health and safety (WHS) and regulatory requirements, risk management and organisational procedures
		1.5	Investigate sustainability implications of fluid power applications
2	Identify principles and techniques required for evaluation of fluid power systems and components	2.1	Review features and functions of pneumatic systems and components for relevance to evaluation
		2.2	Review features and functions of hydraulic systems and components for relevance to evaluation
		2.3	Determine fluid power principles and techniques required to evaluate systems and select and optimise components
		2.4	Determine appropriate analysis techniques, software and software validation techniques

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3	Evaluate fluid power systems and components	3.1	Assess fluid suitability, compatibility, and treatment relative to systems
		3.2	Assess features, functions and suitability of hydraulic systems and components for applications
		3.3	Assess features, functions and suitability of pneumatic components for applications
		3.4	Assess suitability of fluid power system and components in automated power applications using two or three actuator hydraulic or pneumatic circuits with digital fluid and electrical/electronic control elements
4	Report results	4.1	Record outcomes of evaluation
		4.2	Provide documentation, such as calculations, component and system layouts, and functional diagrams and fluid power process, and control signal diagrams

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Required Skills and Knowledge

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

Required skills

Required skills include:

- determining parameters and context of fluid power systems
- identifying WHS and regulatory requirements
- identifying risk management and organisational procedures
- investigating and reviewing sustainability implications, features and functions of fluid power systems and components
- identifying fluid power principles and techniques, analysis techniques, including use of software and software validation techniques
- evaluating fluid suitability, compatibility and treatment, features and functions of hydraulic and pneumatic components and systems both automated and non-automated, digital fluid and electrical/electronic control elements
- reporting and documenting results of scoping, principles and techniques identification, evaluation of applications, calculations, component and system layouts, functional diagrams and fluid power process and control signal diagrams

Required knowledge

Required knowledge includes:

- WHS and regulatory requirements, codes of practice, standards, risk management requirements
- availability of professional and technical assistance
- current options and trends in performance analysis software, including underpinning program techniques and software validation techniques
- common applications for pneumatics and hydraulics
- comparative advantages of fluid power over mechanical and electrical power for particular applications
- characteristics and properties of pneumatic and hydraulic fluids and relative compressibility of air and hydraulic fluid
- applications and selection criteria for mineral, synthetic and fire-resistant fluids and compatibility of fluids with system materials
- fluid power fundamental principles and calculations for system components, including:
  - conservation of energy
  - energy measurement and units
  - energy forms
  - hydraulics fundamentals, such as pressure, temperature and flow rate relative to actuator

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force
    - pneumatic fundamentals, such as gas laws, pressure difference and flow rate, and flow to atmosphere
- features and functions and selection criteria of fluid power components in applications, including:
    - pumps
    - valves electrical circuits and control elements actuators
    - accumulators
    - compressors (pneumatics)
    - reservoirs
    - gauges and instrumentation
    - hoses, pipes, filters and fittings
- types and requirements for fluid and electrical circuits maintenance requirements for fluid power systems
- methods of circuit presentation, standard symbols, circuit sequence and signal condition diagrams for multi-actuator circuits

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.

Overview of assessment	A person who demonstrates competency in this unit must be able to evaluate fluid power systems both automatic and non-automated for safety, economy and fitness for purpose, including selection of components.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessors must be satisfied that the candidate can competently and consistently: • determine parameters and context of evaluation task • determine WHS and regulatory requirements, risk management and organisational procedures • investigate and review sustainability implications, features and functions of fluid power systems and components • identify fluid power principles and techniques analysis techniques, software and software validation techniques • evaluate fluid suitability, compatibility and treatment, features and functions of hydraulic and pneumatic components and systems, digital fluid and

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	electrical/electronic control elements • report and document results.
Context of and specific resources for assessment	• 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, 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. • Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability. • 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.
Method of assessment	• Assessment must satisfy the endorsed Assessment Guidelines of the MEM05 Metal and Engineering Training Package. • 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. • Assessment methods must be by direct observation of tasks and include questioning on underpinning knowledge to ensure correct interpretation and application. • Assessment may be applied under project-related conditions (real or simulated) and require evidence of process. • Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstance, but is able to be transferred to other circumstances. • Assessment may be in conjunction with assessment of other units of competency where required.
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.

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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.

Hydraulic applications	Hydraulic applications may include: • mobile vehicles and plant • equipment for moving and positioning heavy loads • industrial machinery (e.g. presses for punching, drawing and forging) • industrial and mobile braking systems
Pneumatic applications	Pneumatic applications may include: • transfer mechanisms for moving and positioning light loads • medium load clamping and stamping operations • compressed air distributed systems
Sustainability	Sustainability is used to mean the entire sustainable performance of the organisation/plant, including: • meeting all regulatory requirements • conforming to all industry covenants, protocols and best practice guides • 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

Appropriate licensed technical and professional assistance	Appropriate licensed technical and professional assistance may include:
	• technical support and advice relating to elements which have intrinsic dangers, such as:
	  • high pressure
	  • energised fluid vessels
	  • high temperatures and heat energy capacity
	  • wiring with high current control voltages above extra low voltage
	• professional support for technologies, such as:
	  • specialist electric motor drives and controllers
	  • specialist materials, plastics, metal alloys and nano materials
	  • special processes, foundry, alloy welding, heat treatment,

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	sealing and fastening
WHS, regulatory requirements and enterprise procedures	WHS, regulatory requirements and enterprise procedures may include: • WHS Acts and regulations • relevant standards • codes of practice from Australian and overseas engineering and technical associations and societies • risk assessments • registration requirements • safe work practices • state and territory regulatory requirements
Standards and codes	Standards and codes refer to all relevant Australian and international standards and codes applicable to a particular fluid power system task

Unit Sector(s)

Competency field

Unit sector Engineering science

Custom Content Section

Not applicable.

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