



Australian Government

FWPCOT4225 Apply principles of pneumatics and hydraulics to analyse potential equipment failures

Release: 1

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Modification History

Release	Comments
Release 1	This version released with FWP Forest and Wood Products Training Package Version 8.0.

Application

This unit of competency describes the skills and knowledge required to apply the basic principles and applications of hydraulic and pneumatic systems and components of forest and wood products equipment to analyse potential pneumatic and/or hydraulic failures for supporting maintenance processes.

The unit applies to saw technicians and other technical experts who are responsible for the operation of saw shops, production lines and other forestry equipment and are required to have a working understanding of hydraulic and pneumatic principles and contribute to the identification of plant and equipment failures in order to communicate effectively with maintenance and engineering teams.

All work must be carried out to comply with workplace procedures, according to state/territory health and safety regulations, legislation and standards that apply to the workplace.

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

Pre-requisite Unit

Nil

Unit Sector

Common Technical (COT)

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>

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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. Identify basic principles and applications of pneumatic power	1.1 Identify purpose and advantages of pneumatic power transmission over mechanical and hydraulic power transmission 1.2 Review key terminology and concepts used in pneumatic systems 1.3 Identify applications and operational features of pneumatic power system in relevant forest or wood products equipment 1.4 Identify mechanical, electrical and electronic components from simple pneumatic power system diagrams for relevant forest or wood products equipment 1.5 Determine risk associated with pressure in pneumatic power systems, and preventative actions 1.6 Identify potential personal injury hazards associated with pneumatic power systems, and appropriate prevention or mitigation measures
2. Identify basic principles and applications of hydraulic power	2.1 Identify purpose and advantages of hydraulic power transmission over mechanical and pneumatic power transmission 2.2 Review key terminology and concepts used in hydraulic systems 2.3 Distinguish between atmospheric gauge and absolute pressures and their use in hydraulic systems 2.4 Identify applications and operational features of hydraulic power system in relevant forest or wood products equipment 2.5 Identify mechanical, electrical and electronic components from simple hydraulic power system diagram for relevant forest or wood products equipment 2.6 Determine risk associated with pressure in hydraulic power systems, and preventative actions 2.7 Identify potential personal injury hazards associated with hydraulic power systems, and appropriate prevention or mitigation measures

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
3. Analyse potential pneumatic and/or hydraulic failures of forest or wood products equipment	3.1 Identify hydraulic and/or pneumatic system components of site equipment and determine their function(s) 3.2 Read maintenance records and analyse mean time between equipment failures or malfunctions related to hydraulic and/or pneumatic components 3.3 Read and analyse pneumatic and/or hydraulic performance data of site equipment 3.4 Identify potential failures and/or faults for each hydraulic and/or pneumatic component of site equipment that may affect proper functioning of site equipment 3.5 Identify root causes for potential failures and/or faults of hydraulic and/or pneumatic components 3.6 Determine effects associated with each potential failure and/or fault on site equipment if they occur 3.7 Assess likelihood of occurrence, potential severity, and ease of detection of potential failures and/or faults, and determine a relative failure risk rating 3.8 Select and recommend preventive pneumatic and/or hydraulic maintenance processes to reduce the risk of equipment failures or malfunctions

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential for performance in this unit of competency but are not explicit in the performance criteria.

Skill	Description
Reading	Interpret basic technical references relevant to hydraulic and pneumatic systems and components
Oral communication	Use appropriate vocabulary and technical language, to describe hydraulic and pneumatic systems and components
Numeracy	Interpret numeric and graphical information relevant to the operation of hydraulic and pneumatic systems and components

Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status
FWPCOT4225 Apply principles of pneumatics and hydraulics to analyse potential equipment failures	Not applicable	The unit has been created to address a skill or task required by industry that is not covered by an existing unit	Newly created

Links

Companion Volumes, including Implementation Guides, are available at VETNet: -
<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=0d96fe23-5747-4c01-9d6f-3509ff8d3d47>

Assessment Requirements for FWPCOT4225 Apply principles of pneumatics and hydraulics to analyse potential equipment failures

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Performance Evidence

An individual demonstrating competency must satisfy all of the elements and performance criteria in this unit.

There must be evidence that the individual has:

- used a simple system diagram to describe the operation of:
 - one pneumatic system of an item of equipment used in forest or wood products operations
 - one hydraulic system of an item of equipment used in forest or wood products operations
- conducted basic failure modes, effects and root causes analysis on hydraulic or pneumatic components of an item of equipment used in forest or wood products operations
- provided one recommendation for reducing the risk of equipment failure or malfunction as part of preventative maintenance.

Knowledge Evidence

An individual must be able to demonstrate the knowledge required to perform the tasks outlined in the elements and performance criteria of this unit. This includes basic knowledge of:

- key concepts of pneumatic power systems in worksite forest or wood products equipment, machines or plant, including:
 - purpose and advantages of pneumatic power transmission
 - terminology used in pneumatic power systems, including prime movers: linear, rotary, radial; pressure, flow, orifice flow, force, torque, holding pressure, load, lift, stroke
 - atmospheric, gauge and absolute pressure
 - vacuum
 - Pascal's law application to pneumatic power transmission
 - formulae for pressure, force
 - measurement units

- pneumatic power system operation in worksite forest or wood products equipment, machines or plant, including:
 - purpose of components, including mechanical, electrical and electronic components
 - types of gases
 - contamination
 - precision control
 - operational response rate
 - performance characteristics
 - difference between air production and air consuming systems
 - risks of pressure in hydraulic power systems, including actuator stopped or stalled, stored energy
 - hazards, including crushing and pinch points, sudden shoot out, presence of carbon monoxide in system, exposure to compressed air, split tube or pipe
 - types of frequent malfunctions during operations
- key concepts of hydraulic power systems in worksite forest or wood products equipment, machines or plant, including:
 - purpose and advantages of hydraulic power transmission
 - terminology used in hydraulic power systems – pressure, flow, force, torque, holding pressure, linear movement, rotary movement, load, lift
 - atmospheric, gauge, and absolute pressure
 - Pascal’s law application to hydraulic power transmission
 - formulae – pressure, force
 - measurement units
- hydraulic power system operation in worksite forest or wood products equipment, machines or plant, including:
 - purpose and function of components, including mechanical, electrical and electronic components
 - types of fluids
 - contamination
 - pressure and flow control
 - performance characteristics
 - components, including reservoir, gauge, filter, control valves, pressure relief valves, pump, actuator, regulator
 - risks of pressure in hydraulic power systems, including pump running, pump stopped, stored energy
 - hazards, including crushing and pinch points, burns from hot oil at high pressure, fire from oil leaks, flailing hydraulic lines, injection of oil into the skin, oil leaks on floor, skin exposure to oil
 - types of frequent malfunctions during operations, including pressure fluctuation, fluid leakage and excessive temperature, overheating, excessive noise, insufficient power
- techniques for determining ‘mean time between failures’ (MTBF)

- techniques for undertaking failure modes, effects and root causes analysis on hydraulic and pneumatic components of worksite forest or wood products equipment, machines or plant.

Assessment Conditions

Assessment of the skills in this unit of competency must take place under the following conditions:

- physical conditions:
 - skills must be demonstrated in a forest or wood products work environment or an environment that accurately represents workplace conditions
- resources, equipment and materials:
 - basic technical references relevant to hydraulic and pneumatic systems and components
- specifications:
 - workplace procedures and manufacturer specifications relevant to hydraulic and pneumatic power systems and components in forest and wood products equipment, machines and plant.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volumes, including Implementation Guides, are available at VETNet: - <https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=0d96fe23-5747-4c01-9d6f-3509ff8d3d47>