Australian Government

Department of Education, Employment and Workplace Relations

UEPMNT406B Install and maintain a steam turbine

Release: 1

UEPMNT406B Install and maintain a steam turbine

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit deals with the skills and knowledge required to install HP, IP, LP, SFPT, cylinders, rotors and steam units.

Application of the Unit

Application of the Unit **2)**

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to Occupational Health and Safety and where applicable contracts of training such as apprenticeships and the like.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.
Where pre-requisite pathways have been identified. All competencies in the Common Unit Group must be have been completed.
Common Unit Group

Unit Code	Unit Title
UEPMNT402B	Conduct Complex Levelling and Alignment
MEM18009B	Perform levelling and alignment of machines and engineering components
MEM09002B	Interpret technical drawing
MEM12023A	Perform Engineering Measurements
MEM18001C	Use hand tools
MEM18002B	Use power tools/hand held operations
MEM18003C	Use tools for precision work
MEM18055B	Dismantle, replace and assemble engineering components
MEM18006C	Repair and fit engineering components

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following levels. A description of what each level entails is provided in Section 2.3.1 Language, Literacy and Numeracy.

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan and prepare for the work	1.1 Work requirements are identified from request/work orders or equivalent and clarified/confirmed with appropriate parties or by site inspection
	1.2 Occupational Health and Safety standards, statutory requirements, relevant Australian standards, codes of practice, manufacturer specifications , environmental requirements and enterprise procedures are identified, applied and monitored throughout the work procedure
	1.3 Resources required to satisfy the work plan are identified, obtained and inspected for compliance with the job specifications
	1.4 Relevant plans, drawings and texts are selected and interpreted in accordance with the work plan

ELEMENT		PERFORMANCE CRITERIA	
		1.5	Correct size, type and quantity of materials/components are determined, obtained and inspected for compliance with the job specifications
		1.6	Work is planned in detail including sequencing and prioritising and considerations made, where appropriate, for the maintenance of plant security and capacity in accordance with system/site requirements
		1.7	Co-ordination requirements, including requests for isolations where appropriate, are resolved with others involved, affected or required by the work
		1.8	Potential hazards are identified and prevention and/or control measures are selected in accordance with the work plan and site procedures
		1.9	Work area is prepared in accordance with work requirements and site procedures
		1.10	Where appropriate, the teams and individuals roles and responsibilities within the team are identified and, where required, assist in the provision of on-the-job training
2	Disassemble turbine	2.1	Required isolations are confirmed where appropriate in accordance with enterprise/site procedures
		2.2	Turbine is disassembled in accordance with manufacturer specifications and work requirements
		2.3	Turbine components are removed in appropriate priority in accordance with manufacturer's specification and work requirements
		2.4	Disassembly is carried out in a manner that will facilitate assembly in accordance with the work plan
		2.5	Components are measured and clearances taken to determine conformity to manufacturer's

ELEMENT		PERFORMANCE CRITERIA	
			limits, and to ensure assembly is in accordance with manufacturer specifications
		2.6	Measurements and clearances are recorded in accordance with manufacturer specifications and work requirements.
3	Inspect turbine components	3.1	Components are cleaned and inspected in accordance with the work plan
		3.2	Faults are identified and recorded in accordance with the work plan
		3.3	New components are inspected for compliance to manufacturer specifications and work requirements
		3.4	Components are prepared for assembly in accordance with the work plan
4	Repair turbine/components	4.1	Repairs are carried out in accordance with the work plan
		4.2	Repairs are tested and results analysed to ensure conformance to specifications and in accordance with the work plan
		4.3	Data from testing is recorded in accordance with the work plan and enterprise/site procedures
5	Reassemble turbine	5.1	Site is prepared for re-assembly of turbine in accordance with the work plan and site procedures
		5.2	Components are refitted in accordance with the work plan and manufacturers specifications
		5.3	Turbine is assembled in accordance with the work plan and manufacturer specifications
		5.4	Turbine is test run and operating characteristics are monitored to ensure compliance with manufacturer specifications and enterprise requirements

ELEMENT	PERFORMANCE CRITERIA	
6 Complete the work	6.1	Work is completed and appropriate personnel notified in accordance with site/enterprise requirements
	6.2	Work area is cleared of waste, cleaned, restored and secured in accordance with site/enterprise procedures
	6.3	Plant, tools and equipment are maintained and stored in accordance with site/enterprise procedures
	6.4	Work completion details are finalised in accordance with site/enterprise procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the Essential Skills and Knowledge and their level, required for this unit.
Evidence shall show that knowledge has been acquired of installing and maintaining a steam turbine.
All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.
The extent of the Essential Knowledge and Associated Skills required follows:
KS01-PM406B A steam turbine
T1 Evidence shall show that knowledge has been acquired for safe working practices of:

- Relevant Environmental, Occupational Health and Safety legislation and regulations
- Relevant plant and equipment, its location and operation
- Technical drawings and manufacturers manuals
- Introduction to and typical arrangements of power production plant
- Hand and portable power tools
- Precision measuring equipment
- Rigging and lifting equipment
- Specialised tools and jigs
- Advanced levelling and aligning techniques
- Diagnostic and testing techniques
- Gaskets and seals
- Bearings (white metal and pad tilting)
- Impulse and reaction blading principles
- Turbine auxiliary systems
- Turbine thermal/mechanical operation
- Thermal and differential expansion principles
- Quality assurance/quality control
- Transmissions
- Couplings
- Hazardous materials
- Optical fibre scope equipment
- Non-destructive testing
- Valves
- Pipe work
- Torqueing techniques
- Data recording techniques

T2 Specific skills needed to achieve the Performance Criteria:

- Apply Relevant Environmental, Occupational Health and Safety legislation and

REQUIRED SKILLS AND KNOWLEDGE

regulations

- Interpret Technical drawings and manufacturers manuals
- Use hand and portable power tools
- Use precise measuring equipment
- Use rigging and lifting equipment
- Use specialised tools and jigs
- Apply advanced balancing, levelling and aligning techniques
- Diagnose and test equipment
- Manufacture gaskets and seals
- Inspect, scrape and blue-check bearings
- Identify hazardous materials
- Identify components
- Recognise worn, damaged or faulty components
- Sequentially assemble and disassemble
- Work to fine tolerances
- Apply non-destructive testing
- Apply torqueing techniques
- Apply maintenance techniques
- Communicate effectively.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the competency standard unit and must be read in conjunction with the Performance Criteria and the Range Statement of unit and the Training Package Assessment Guidelines.
The Evidence Guide forms an integral part of this competency standard unit and shall be used in conjunction with all components parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment	**9.1)**
	Longitude competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the

normal work environment or in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and regulatory policy. Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.
The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment. Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all pre-requisites shall be met.
Evidence for competence in this unit shall be considered holistically. Each element and associated Performance Criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UEP12". Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the Performance Criteria and Range Statement

- Apply sustainable energy principles and practices as specified in the Performance Criteria and Range Statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in ‘of this unit
- Demonstrate an appropriate level of employability skills
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - The knowledge and application of relevant sections of: Occupational Health and Safety legislation; Statutory legislation; Enterprise/site safety procedures; Enterprise/site emergency procedures
  - Preparation and planning of work
  - Disassembly techniques
  - Inspection and fault diagnosis techniques and procedures
  - Repair and maintenance techniques and procedures
  - Re-assembly techniques
  - Completion of work procedures
  - Dealing with an unplanned event by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

Competency Standards should be assessed in the workplace or simulated workplace and under the normal range of workplace conditions.
Assessment of this unit will be supported with documentary evidence, by means of endorsement stating type and application of work.
In addition to the resources listed above in Context of assessment’, evidence should show competency working, in limited spaces, with different types of plant and equipment as well as different

structural/construction types and methods and in a variety of environments.

Method of assessment **9.4)**

This unit shall be assessed by methods given in 1.3.00 Assessment Guidelines.
Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units **9.5)**

There are no recommended concurrent assessments with this unit, however in some cases efficiencies may be gained in terms of learning and assessment effort being concurrently managed with allied competency standard units where listed.
UEPMNT402B Conduct complex levelling and alignment.

Range Statement

RANGE STATEMENT

10) This relates to the competency standard unit as a whole providing the range of contexts and conditions to which the Performance Criteria apply. It allows for different work environments and situations that will affect performance.
Turbines will be steam driven.
Assembly may entail complex/advanced levelling and aligning procedures.
Components may include white metal bearings, tilting pad bearings, roller bearings, thrust bearings lubrication system components, governor system components, cooling systems components, control oil components, sealing components, transmissions and couplings.
Test equipment may include optical fibre scope, gas analysers, pressure recorders and vibration monitors.
Work completion details may include plant and maintenance records, job cards, check sheets, on device labelling updates and reporting and/or documenting equipment defects.
Work site environment may be affected by nearby plant or processes, e.g. chemical, heat, dust, noise, gas and oil.
Isolations can refer to electrical/mechanical or other associated processes.
Generic terms are used throughout this Training Package for vocational standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms are given in Section 2.1 Preliminary Information and Glossaries.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Maintenance.