



Australian Government

MEM21022 Manufacture watch and clock components

Release: 1

MEM21022 Manufacture watch and clock components

Modification History

Release 1. Supersedes and is equivalent to MEM21022A Manufacture watch and clock components

Application

This unit of competency defines the skills and knowledge required to manufacture replacement watch and clock components using general and specialist machines and engineering techniques as required. It applies when replacement parts are not available and there is a need to manufacture a suitable replacement.

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

Band: B

Unit weight: 6

Pre-requisite Unit

MEM06007	Perform basic incidental heat/quenching, tempering and annealing
MEM07005	Perform general machining
MEM09002	Interpret technical drawing
MEM11011	Undertake manual handling
MEM12023	Perform engineering measurements
MEM12024	Perform computations
MEM13015	Work safely and effectively in manufacturing and engineering
MEM14006	Plan work activities
MEM16006	Organise and communicate information
MEM18001	Use hand tools
MEM21017	Service and repair clock timepieces
MEM21019	Service and repair clock striking mechanisms
MEM21020	Service and repair clock chiming mechanisms

MEM21021

Restore clockwork mechanisms

Competency Field

Horology

Elements and Performance Criteria

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

1	Determine servicing requirements and liaise with customer	1.1	Follow standard operating procedures (SOPs)
		1.2	Comply with work health and safety (WHS) requirements at all times
		1.3	Identify the need for a replacement component
		1.4	Establish that replacement parts are not available and advise customer of the need to manufacture in-house
		1.5	Prepare written and verbal quotations
		1.6	Agree with customer on recommended procedures to remedy faults, including servicing requirements
		1.7	Prepare watch or clock for handover
		1.8	Record and document repair process
		1.9	Source material for manufacture of parts
2	Plan and organise the project	2.1	Select and use appropriate personal protective equipment (PPE) in accordance with SOPs
		2.2	Prepare working drawings of replacement parts
		2.3	Plan suitable method of production
		2.4	Select materials suitable for manufacture
		2.5	Perform marking out of components
		2.6	Select appropriate equipment and tools to undertake process

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

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|---|---|-----|---|
| 3 | Produce components using a watch and clockmaker's lathe | 3.1 | Set up and mount the material to be turned in appropriate chuck |
| | | 3.2 | Select and prepare the appropriate cutting tool for the turning operation |
| | | 3.3 | Perform turning or drilling operation to produce replacement parts |
| | | 3.4 | Undertake measurements to task tolerances |
| 4 | Produce components using milling attachments on a clockmaker's lathe or bench-mounted mill | 4.1 | Set up and mount the material to be milled in appropriate fixture or chuck |
| | | 4.2 | Select and prepare the appropriate tool or cutter for milling operation |
| | | 4.3 | Perform milling operation to produce replacement parts |
| | | 4.4 | Undertake measurements to task tolerances |
| 5 | Produce wheels and pinions | 5.1 | Select the index head and appropriate index plate to produce the required tooth count, as appropriate |
| | | 5.2 | Set up gear blank in dividing head |
| | | 5.3 | Select appropriate gear cutter and mount in milling spindle ensuring cutter is on centre |
| | | 5.4 | Machine teeth to correct depth |
| 6 | Finish manufactured components | 6.1 | Cross out wheel to match original component |
| | | 6.2 | Remove any burrs and finish with appropriate media |
| | | 6.3 | Carry out heat treatment to suit function of replacement part |
| | | 6.4 | Verify function of manufactured component |

Foundation Skills

This section describes those required skills (reading, writing, oral communication and numeracy) that are essential to workplace performance in this unit of competency.

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.

Record and document repair includes one (1) or more of the following:

- date and extent of repair
- cost of replacement part
- time spent on procedure

Working drawings include one (1) or more of the following:

- sketch
- illustration by hand, including dimensions

Appropriate chuck includes one (1) or more of the following:

- collet
- three jaw
- four jaw

Appropriate cutting tool includes one (1) or more of the following:

- graver
- cutting tool angle
- parting off tool

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM21022A Manufacture watch and clock components

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>

Assessment Requirements for MEM21022 Manufacture watch and clock components

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria on at least two (2) occasions and include:

- following work instructions, standard operating procedures (SOPs) and safe work practices
- identifying the need for replacement component parts, liaising with customer and determining costs
- interpreting watch and clock working drawings, manuals and other documentation that provide information on part design and tolerances
- setting up and mounting the material to be turned using appropriate chuck and manufacturing, finishing and fitting replacement watch or clock components to original tolerances using a watch and clockmaker's lathe
- performing milling operations using indexing and milling attachments on the lathe or bench-mounted milling machine to dimension and tolerances
- selecting and preparing appropriate tool or cutter to produce replacement parts
- producing replacement parts, including wheels and pinions with their teeth machined to the correct depth
- finishing manufactured components and recording and documenting repairs.

Knowledge Evidence

Evidence required to demonstrate the required knowledge for this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include knowledge of:

- safe work practices and procedures and use of personal protective equipment (PPE)
- typical materials used in watch and clockmaking
- types of watch and clockmakers' lathes and attachments
- lathe accessories and tooling
- set up and safe operation of watch and clockmakers' lathes and attachments
- documentation requirements
- set up and safe operation of milling machines and attachments
- calculate speeds, feeds and indexing requirements
- surface finish requirements for clock and watch parts
- heat treatment requirements for replacement parts

- milling procedures.

Assessment Conditions

- Assessors must:
 - have vocational competency in manufacturing watch and clock components at least to the level being assessed with relevant industry knowledge and experience
 - satisfy the assessor requirements in the *Standards for Registered Training Organisations 2015* or its replacement and comply with the *National Vocational Education and Training Regulator Act 2011*, its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires
- Where possible assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions. This must cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

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