



Australian Government

MEM23124 Measure and analyse noise and vibration

Release: 1

MEM23124 Measure and analyse noise and vibration

Modification History

Release 1. Supersedes and is equivalent to MEM23124A Measure and analyse noise and vibration.

Application

This unit of competency defines the skills and knowledge required to monitor, measure and analyse noise and vibration. It includes equipment calibration and use, analysis of data, adherence to standards for exposure limits along with consideration of work health and safety (WHS) and mitigation measures.

It applies to machinery and equipment-generated noise and vibration, including mechanical shock generated in commercial and industrial environments.

It is suitable for people working as asset maintenance technicians or noise and vibration specialists, for people working as technicians in engineering or related industries and for those pursuing careers and qualifications in engineering or related disciplines.

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

Pre-requisite Unit

MEM23004 Apply technical mathematics

Competency Field

Engineering science

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>
1. Determine scope of investigation into noise or vibration	1.1 Follow standard operating procedures (SOPs) and comply with WHS requirements at all times 1.2 Identify machinery and equipment to be investigated for noise and vibration measurement and analysis 1.3 Determine stakeholders to be consulted on analysis tasks 1.4 Determine software required for the analysis of the task 1.5 Determine regulatory, standards and risk management noise and

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	vibration compliance requirements 1.6 Investigate sustainability implications of noise and vibration 1.7 Apply systems-thinking, continuous improvement, problem-solving and constraint and contingency management 1.8 Determine available sources for any required technical and professional assistance
2. Prepare for noise measurement and analysis	2.1 Identify noise exposure limits appropriate to the equipment, process and employee, community and environmental context 2.2 Review and identify available sound measuring equipment and components, and their suitability for required measurements 2.3 Select sound measuring equipment 2.4 Select and use appropriate personal protective equipment (PPE)
3. Measure and analyse sound data	3.1 Set up and site sound measurement equipment for desired measurements 3.2 Calibrate sound measurement equipment 3.3 Take sound measurements using appropriate techniques for application and environment 3.4 Process, analyse and interpret noise data 3.5 Relate data to plant and equipment performance 3.6 Review options for noise elimination, mitigation and protection measures 3.7 Prepare report and make recommendations based on analysis
4. Prepare for vibration measurement and analysis	4.1 Identify vibration exposure limits appropriate to the equipment, process and employee, community and environmental context 4.2 Review and identify available vibration measuring equipment and components, and their suitability for required measurements 4.3 Select vibration measuring equipment

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
5. Measure and analyse vibration and shock data	5.1 Set up and site or mount vibration and shock measurement equipment 5.2 Calibrate equipment 5.3 Take accurate measurements 5.4 Process, analyse and interpret vibration and shock data 5.5 Relate data to plant and equipment performance 5.6 Review options for vibration and shock elimination or damping and isolating 5.7 Prepare report and make recommendations based on analysis
6. Investigate and report	6.1 Investigate developments in acoustic, vibration and shock measurement 6.2 Investigate the use of condition monitoring in predictive maintenance programs 6.3 Record and report results of review, measurement, analysis and recommendations 6.4 Provide documentation including calculations, data records, analysis and assessments

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

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.

Sound measuring equipment includes:	• microphones • cables and connectors • meters
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	• recorders • analysers • computer and software.
Set-up and measurement techniques include:	• microphone positioning • meter time constants • frequency filter settings.
Purpose for sound measurements includes:	• simple sound level or spectrum • limited or full frequency band • standards to be met • impulsive or consistent noise.
Vibration includes:	• continuous • sporadic • whether or not associated with noise • mechanical shock.
Vibration and shock measuring equipment includes:	• accelerometer • impedance heads • cables • mounting media • calibrators • preamplifier • meters • filters • recorders • analysers • computer and software.
Appropriate technical and professional assistance includes:	• technical support and advice relating to elements which have intrinsic dangers • professional support for technologies.
WHS, regulatory requirements and enterprise procedures includes:	• WHS acts, regulations and 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.
Continuous improvement includes one or more of the following techniques:	• balanced scorecard • current and future state mapping • measuring performance against benchmarks • process improvement, problem-solving and decision-making • data management, generation, recording, analysing, storing and use of software

	• training for improvement systems participation • technical training.
Constraints and contingencies include one or more of the following:	• financial • organisational • procedural • cultural • physical (resources, access or logistical limitations).

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM23124A Measure and analyse noise and vibration.

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 MEM23124 Measure and analyse noise and vibration

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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 and include:

- determining compliance with work health and safety (WHS), regulatory and risk management requirements with an emphasis on automation safety
- reviewing the physics of sound and vibration, effects of noise, vibration and shock on humans
- determining measuring equipment and options for mitigation measures
- identifying noise and vibration, noise dose and vibration exposure limits
- selecting appropriate measuring equipment for measuring task
- calibrating, siting and setting up equipment prior to use
- measuring and recording noise and vibration on at least two occasions
- analysing and interpreting measurement results
- relating data to plant and equipment performance
- recommending noise and vibration elimination, mitigation and protection measures on at least two occasions
- applying systems thinking, continuous improvement, problem-solving, constraint and contingency management
- investigating sustainability implications, developments in acoustic, vibration and shock measurement, and condition monitoring in predictive maintenance programs
- reporting and documenting results of reviews, measurement, data, analysis, calculations, interpretations and recommendations.

Note: Where a volume and/or frequency is not specified, demonstration must be provided at least once.

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:

- characteristics and measurement of noise and vibration, and sources of noise and vibration
- purpose of noise and vibration measurement
- noise and vibration concepts and terminology
- International Standards Organisation (ISO) and other vibration severity standards
- limitations of broadband vibration and trend analysis

- principles of using vibration analysis as an indicator of machine and equipment condition
- causes and effects of vibration and noise in industrial and commercial equipment, including damaged product, limited processing speeds and catastrophic machine failure
- typical engineering components subject to vibration
- relevant WHS and regulatory requirements, codes of practice, standards, risk minimisation and registration requirements
- calculations, formulae and laws relating to vibration and sound measurement, including allowable exposure using AS 2670.1 Evaluation of human exposure to whole-body vibration, Part 1: General requirements
- range and capacity of equipment for measuring vibration and sound
- noise measurement and testing techniques and equipment for different environments and sound characteristics in vibration measurement and testing
- acoustic emission in vibration measurement and testing
- shock testing, including applications requiring laboratory testing
- vibration trend analysis
- noise and vibration concepts including vibration, noise, transmission of noise and vibration and harmonic excitation
- common sources of noise generation
- noise mitigation and protection measures including:
 - isolation
 - insulation
 - personal hearing protection
 - exposure limitation policies
- vibration and shock control equipment and techniques
- community noise
- noise and vibration measurement and analysis applications including:
 - condition monitoring for plant
 - acoustic emissions for fault detection
 - modal analysis of dynamic properties of structures or room acoustics
 - correlation of modal analysis with finite element analysis (FEA)
 - statistical energy analysis
- safe work practices and procedures and use and application of personal protective equipment (PPE)
- hazards and control measures associated with measuring and analysing noise and vibration, including housekeeping.
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Assessment Conditions

- Assessors must:
 - have vocational competency in measuring and analysing noise and vibration 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 that 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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Links

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