Mining and Automotive Skills Alliance

Development of a Vocational Degree in Reliability Engineering – Phase 3

Request for Tender

December 2025

Contents

1.0 The Mining and Automotive Skills Alliance

The Mining and Automotive Skills Alliance (AUSMASA) is one of 10 Jobs and Skills Councils (JSCs) established by the Australian Government to provide industry with a stronger, more strategic voice in ensuring Australia's vocational education and training (VET) sector delivers better outcomes for learners and employers.

We are strengthening the role of the mining and automotive industries, empowering them to drive reforms to Australia's VET system, to ensure employers and individuals can access the right skills at the right time.

Fostering a culture of collaboration, we are the critical intersection between industry and education providers, leading to more effective training outcomes for learners and better workforce outcomes for employers.

By working together, industry and the education sector can help ensure Australia's workforce is competitive, innovative, and adaptable.

Our Vision

Our Vision is to empower industry to develop the essential workforce capabilities for today and tomorrow.

Our Mission

Our Mission is to strengthen leadership and engagement to deliver a responsive VET system and build a skilled and resilient workforce.

Our Values

- We believe that our values guide our actions, and that our actions guide our outcomes.
- Our values are people-focused.
- We strive to create an inclusive culture that encourages honest communication, participation, and innovation.
- We set ambitious goals and celebrate our successes.

2.0 Request for Tender conditions, confidentiality and clarifications

This Request for Tender (RFT) is issued by the Australian Mining and Automotive Skills Alliance Limited (AUSMASA) as part of our procurement process and is publicly available.

Tenderers are hereby notified that:

2.1 Permitted use of this Request for Tender

The RFT and any associated information are provided solely for the purpose of enabling prospective tenderers to prepare and submit a tender response. The RFT must not be used for any other purpose.

2.2 Confidentiality of tender submissions

Tenderers may include confidential or commercially sensitive information in their tender submissions. Any such information must be clearly identified by the tenderer at the time of submission. AUSMASA will take reasonable steps to treat tender submissions as confidential and to protect identified confidential information, subject to our legal, contractual, and policy obligations.

2.3 Disclosure and transparency

Tenderers acknowledge that AUSMASA is subject to transparency and accountability requirements and may be required to disclose information relating to this RFT or tender submissions in accordance with applicable laws, contractual obligations, government policies, or audit requirements.

No assurance is given that any information provided by a tenderer will remain confidential where disclosure is required or permitted.

2.4 Probity and fair process

To ensure a fair, equitable, and transparent procurement process, all communications in relation to this RFT must be conducted strictly in accordance with the instructions set out in this document. Tenderers must not seek to influence the process or gain an unfair advantage, including by engaging in unauthorised or informal communications with officers of AUSMASA.

2.5 Clarifications and addenda

Clarifications
Tenderers may submit requests for clarification where information in the RFT is unclear, incomplete, or appears inconsistent. Clarification requests must be submitted in writing to the email address specified in Section 6, clearly referencing the relevant section or clause, and received no later than **five (5) business days prior to the closing date specified in Section 6**. Clarification requests must not seek to amend the scope, requirements, or conditions of the RFT.

Addenda and publication of responses
AUSMASA may issue amendments to the RFT in the form of addenda. All addenda and responses to clarification requests issued prior to the closing date form part of the RFT and must be taken into account by tenderers. Responses and addenda will be published on the Tenders webpage of the AUSMASA website. Tenderers are responsible for reviewing the register and taking notice of any updates.

No amendment, addendum, or clarification response is valid unless issued in writing by AUSMASA. AUSMASA may decline to respond to clarification requests received after the specified timeframe or where responding would compromise the fairness or integrity of the procurement process.

2.6 No reliance

While AUSMASA has made reasonable efforts to ensure the accuracy of the information contained in this RFT, no warranty is given that the information is complete, current, or error-free. Tenderers are responsible for making their own enquiries.

2.7 Acceptance of conditions

By submitting a tender, the tenderer is taken to have accepted the conditions of this RFT.

Should you have any questions regarding this notice or require clarification on any aspect of the tender process, please contact us for assistance.

3.0 Background

3.1 The introduction of a new AQF Level 7 qualification

In response to skills and workforce shortages across the economy, the Australian Government, along with state and territory governments, is looking to flexible and innovative models of course delivery that meet industry needs and prepare workers for the jobs of the future. One such recent innovation is the establishment of Vocational Degrees and/or higher apprenticeships. In anticipation of such an innovation, in November 2024 AUSMASA commenced work to identify and scope the potential application of such a qualification for the mining or automotive sectors.

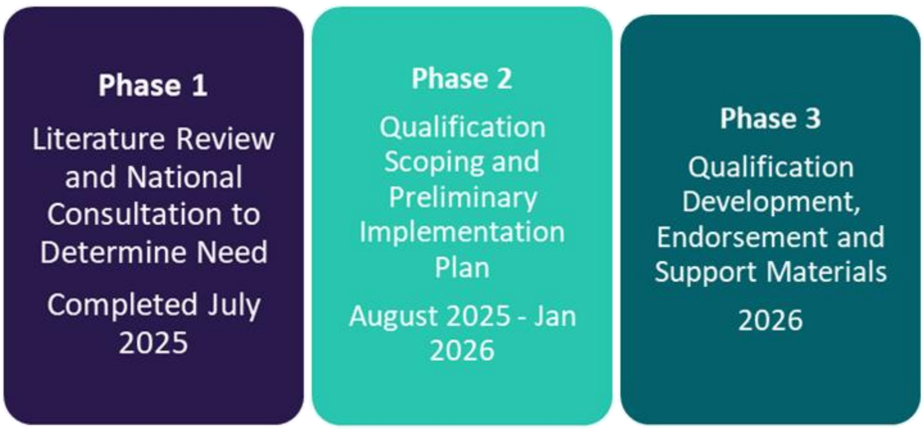
In 2025, Education and Skills Ministers endorsed updates to the AQF Issuance Policy and the AQF Glossary as an addendum to the AQF Second Edition 2013, supporting the introduction of Vocational Degree specifications.

For more information, see: Addendum No. 7 to AQF Second Edition January 2013 Vocational Degree Qualification.

3.2 Developing an AQF Level 7 qualification

AUSMASA commenced the first of a three phased project to identify, scope and develop an AQF Level 7 Vocational Degree for an industry-supported occupation in either the mining or automotive sector. Figure 1 shows the three project phases and timelines.

Figure 1 Project phases



Mining and Automotive Skills Alliance

Phase 1 of the work undertook a comprehensive review of existing research on vocational degrees and higher apprenticeships based on the following definition of a Vocational Degree:

“A technical qualification that provides learners with access to work-based learning opportunities at AQF Level 7, including learning that may be linked with a contract of training where the work-based learning component aligns with applicable standards for the associated industry”.

An analysis of current international models was undertaken and the potential for the different models to be applied in an Australian context was considered. Consultation across both the mining and automotive sectors revealed that current Certificate III and IV qualifications, while foundational, are no longer sufficient to meet the full scope of workforce needs. Meanwhile, university degrees often do not provide the applied or workplace-integrated experience needed for field-based technical roles. As a result, industries face a bottleneck in talent development that threatens productivity and innovation.

AUSMASA sought in this phase of work to explore opportunities where an AQF Level 7 Vocational Degree may help to redress critical and growing skills gaps affecting mid-level technical roles in the mining and automotive sectors. An opportunity assessment and feasibility analysis of key occupations across both sectors was undertaken across roles that could benefit from an AQF Level 7 Vocational Degree. Of the roles assessed, the reliability and testing engineer in the mining sector emerged as the most viable candidate for targeted qualification development.

A summary of the work undertaken, findings and recommendations arising from Phase 1 is available on the AUSMASA website: The Missing Middle - Investigating the Potential of Vocational Degree Models in the Mining and Automotive Sectors.pdf

Phase 2 commenced in August 2025 and will conclude in January 2026. This Phase has sought to:

1. Test and refine the discipline focus for the qualification ensuring current and emerging workforce requirements can be addressed.
2. Develop and validate a draft qualification structure with stakeholders.
3. Identify and assess industrial relations (IR) considerations.
4. Test the feasibility of delivering the qualification through a range of providers.

Overseen by a Project Steering Committee and with technical expertise contributed through consultations with an expert Discipline Panel and direct stakeholder engagement, the project has refined, validated, and substantiated the case for introducing a Vocational Degree in Reliability Engineering. The role of Reliability Engineer is one found across all major industrial sectors and is critical to improving operational efficiency, reducing downtime, and strengthening asset resilience.

Stakeholders consulted during this Phase of the project confirmed that:

- The role represents a clear gap in the existing qualification landscape.
- Employers are relying heavily on internal training, OEM short courses, or overseas recruitment to meet current demand.
- The role is central to national priorities in automation, clean energy, and critical minerals.
- The function requires broad technical knowledge, advanced diagnostic capability, autonomous judgement, and system wide thinking.

A Functional Analysis was conducted to fully understand the role and key functions of the Reliability Engineer. The findings of this analysis are presented in Appendix A Functional Analysis Reliability Engineer.

Informed through extensive consultation with industry, training providers, peak bodies, government and unions, Phase 2 has seen the development and validation of a draft qualification structure. The draft qualification structure and supporting background information is presented at Appendix B Draft Qualification.

Design Principles

The Design Principles of the draft qualification structure:

- Articulate the core requirements that underpin the structure and purpose of the vocational degree
- Ensure the qualification reflects industry expectations
- Support applied professional practice, and
- Meet the academic standards of AQF Level 7.

They include:

1. Work Integrated Learning as the Core Design Logic – Workplace learning and assessment is integral to curriculum, assessment, and progression, not an additional component.
2. Occupational and Industry Alignment – The qualification is purpose built for a specific applied professional role, directly shaped by industry needs, job functions, and national priorities.
3. Applied Technical Capability for Modern Industrial Complexity – The qualification focuses on reliability and asset performance, including electrification, automation, digital systems, decarbonisation, advanced diagnostics, and systems integration, reflecting the complexity of modern industrial operations.
4. Evidence Based and Co Designed with Industry – Design decisions are grounded in workforce data, functional analysis, and continuous engagement with employers, RTOs, regulators, Engineers Australia, unions, and professional bodies.
5. Integrated Cross Disciplinary Knowledge – Learners develop capability across mechanical, electrical, digital, business and data domains to operate effectively in complex industrial environments.
6. Authentic Assessment Reflecting Real Work – Assessment is applied, workplace based and aligned to the complexity of actual tasks undertaken in the role.
7. Accessible, Stackable, and Supportive Pathways – The qualification enables RPL, credit, modular progression, and learner support suitable for regional, FIFO, remote, and mid-career learners.
8. Equity, Inclusion, and Cultural Safety Embedded – The design supports diverse learners and ensures culturally safe, inclusive learning and assessment environments.
9. Provider and System Readiness within Workforce and Industrial Structures – Delivery requires providers to demonstrate academic governance, technical expertise, industry partnerships, and access to work integrated learning and assessment settings. The qualification aligns with industrial relations and workforce structures so that award classifications, accreditation requirements, and workforce planning shape how learners enter, progress, and are recognised on completion.

Phase 3 of the project is the subject of this RFT and is further outlined in section 4.0 Project Scope.

4.0 Project scope

Building on the strong foundations established in Phases 1 and 2, AUSMASA is seeking the services of an education consultant to co-design and develop with AUSMASA and key stakeholders, a new AQF Level 7 Vocational Degree in Reliability Engineering. Consultation will be mining specific however importantly the successful tenderer should ensure where appropriate, cross sector input into the design of the qualification.

Consultation must encompass industry, employers, training providers, government, regulators, peak bodies and associations and unions to produce a nationally accredited qualification. All feedback must be documented for the purposes of evidencing processes undertaken to develop the training products.

In fulfilling the requirements of the project, the successful tenderer will be required to be familiar with and adhere to the requirements of the Training Package Organising Framework (TPOF) which governs the development of nationally accredited training products. The tenderer is only required to fulfil the requirements of Steps 1–4 (inclusive) of the Training Product Development Process, this being up to and including the Senior Officials Check. The tenderer is expected to develop the training products to a high standard and adhere to the requirements of the TPOF and the AQF Descriptor for an AQF7 qualification.

AUSMASA will undertake quality assurance checks on deliverables, verify compliance with the TPOF, and review all documentation to ensure completeness and accuracy. Any feedback provided to the tenderer must be actioned within agreed timeframes and to the relevant standard.

The new qualification must align with any relevant professional accreditation or certification requirements for example by Engineers Australia at the engineering technologist level (Sydney Accord). Importantly, the qualification will provide an articulation pathway for experienced tradespeople and prior industry training and experience to be recognised, allowing a learner to enter at an appropriate stage without having to duplicate the fundamentals.

AUSMASA will play an active role across the project and act as an intermediary between the tenderer and key stakeholders, ensuring clear communication and alignment. This includes establishing and participating in meetings of the Technical Committee (TC) that will be stood up to provide strategic input and guidance into the project. For information on the Technical Committee see 4.3 Technical Committee.

AUSMASA will develop the necessary survey tools to gather stakeholder feedback and will assist with promotional activities to encourage engagement across industry participants. The successful tenderer will be required to review and analyse feedback received, to form recommendations for discussion with the technical committee and to implement agreed feedback into the draft training products.

The successful tenderer will attend regular meetings with AUSMASA to discuss and monitor progress, alongside joining site visits where appropriate to gain information relevant to developing the training products.

The successful tenderer will be responsible for managing the end-to-end development process of the training product including:

- Attending all meetings of the Technical Committee and providing updates as required.

- Consulting with subject matter experts to inform the development of draft training products.
- Technical writing and drafting of the Training Products (TP) and incorporating agreed stakeholder feedback.
- Finalising the training products.
- Maintaining a comprehensive consultation log that records stakeholder engagement activities and feedback received during the project. Noting the rationale for why any feedback was not incorporated into the draft training products.
- Delivering these activities in accordance with the agreed project plan.
- Supporting and enabling AUSMASA to prepare a training product submission to the Training Package Assurance Body (TPAB) that includes the finalised units of competency and qualification.

5.0 Objectives

5.1 Outcomes and deliverables

The key deliverables of the project include development of:

- A project plan and Consultation Strategy incorporating the requirements of the TPOF.
- A new AQF 7 Vocational Degree in Reliability Engineering as conceptualised and validated in Phase 2. This includes core, elective and specialisation units of competency written to the standard of skill and knowledge aligned with a qualification at AQF7.
- An updated Companion Volume Implementation Guide (CVIG) outlining requirements of the new qualification, updating mapping information where appropriate and providing guidance to training providers on the approach to delivery of the new qualification.
- Agendas and minutes of all meetings of the Technical Committee.

In scope

1. Develop a comprehensive project plan in collaboration with AUSMASA:

- Create a detailed project plan outlining key deliverables, milestones, and timelines, aligned with the timeframes outlined in Section 5.5 and compliant with the TPOF.
- Include mechanisms for project risk management, reporting, and stakeholder engagement.

2. Develop a stakeholder consultation plan in collaboration with AUSMASA:

- Develop a consultation plan detailing methods for engaging stakeholders and collecting, analysing, and responding to feedback. This plan must meet the requirements of the TPOF.

3. Review desktop research:

- Review the comprehensive desktop research into the role of Reliability Engineering from phase 2. Note that the final phase 2 report will be made available to the successful tenderer.

4. Engage in national consultation to inform training product development

- Facilitate consultation sessions (virtual or face-to-face) to:
  - confirm the scope of development of the qualification and units of competency

Mining and Automotive Skills Alliance

   - inform the content of the units of competency, qualification packaging rules and approach to delivery and assessment.

- Capture and document all feedback in a consultation log using AUSMASA's template, including rationale for any feedback not implemented.

5. Draft and revise training products

- Identify through a review of the phase 2 findings and through targeted consultation, the skills, knowledge and assessment requirements for the qualification.
- Develop a draft outline of the qualification including packaging rules that allow for selection of units within specialisations or other appropriate mechanisms to suit a range of training and workforce capability needs for reliability engineers.
- Develop the following units of competency using the approved TPOF template:

Core units of competency (total of 20 units):

Year 1 units

- Apply engineering principles and diagnostic reasoning within reliability contexts.
- Apply WHS and environmental protocols in engineering operations.
- Conduct supervised condition monitoring and data recording.
- Apply basic reliability and failure analysis techniques to routine tasks.
- Apply digital tools to record and track maintenance activities.
- Communicate technical findings in reliability teams.

Year 2 units

- Interpret complex technical documentation to support diagnostic reasoning.
- Conduct and document engineering risk assessments.
- Analyse condition monitoring data to inform asset reliability.
- Execute test procedures and coordinate structured failure investigations and reliability planning.
- Apply Enterprise Resource Planning (ERP) systems for asset prioritisation and work order management.
- Facilitate reliability reviews and communicate improvement recommendations.
- Evaluate emerging technologies for reliability application.

Year 3 units

- Lead diagnostic investigations to improve system reliability through engineering input.
- Apply compliance and regulatory assurance in reliability engineering projects.
- Design and lead a multi-method diagnostic program.

- Develop and validate system reliability strategies using digital tools.
- Apply AI tools and automation techniques for predictive reliability.
- Lead and undertake direct engagement with stakeholders across the mining and adjacent sectors to inform the development of the core and elective units of competency for the AQF 7 Vocational Degree in Reliability Engineering.
- Plan and deliver technical reviews and innovation projects in reliability contexts.

Elective units of competency (total of 14 units):

- Apply reliability and safety principles to renewable and energy storage systems.
- Apply reliability and engineering to energy and utilities systems.
- Apply simulation and digital twin methods for reliability assessment.
- Analyse asset health data and report reliability trends.
- Evaluation and integrate emerging technologies for reliability practice.
- Select and assess materials for reliable performance.
- Plan, execute and evaluate environmental and lifecycle tests.
- Coordinate failure analysis to eliminate defects and improve reliability.
- Apply reliability engineering techniques to mobile fleet systems.
- Apply reliability engineering techniques to fixed plant and processing systems.
- Collaborate with OEMs and customers to resolve reliability issues.
- Apply engineering finance to support reliability and asset decisions.
- Develop strategic asset and lifecycle plans.
- Implement commercial frameworks and procurement plans for technical projects.

Specialisation units of competency (total of 5 units):

- Plan and Conduct Environmental and Lifecycle Testing.
- Analyse and Interpret Test Data for Reliability Decision-making.
- Design and Execute Risk-Informed Verification Programs.
- Prepare and present traceable test documentation and validation reports.
- Apply digital simulation and automation tools for testing and validation.

6. Maintain consultation and quality documentation:

- Maintain an up-to-date consultation log that records:
    - all stakeholder interactions
    - summaries of issues raised

  - decisions and rationales for adopted/rejected feedback following discussion with the TC.

- Where appropriate, prepare mapping documentation to show changes to qualifications and units, supporting RTOs in transition planning.

7. Update the Companion Volume Implementation Guide

- Update the CVIG for the RII Training Package to:
  - reflect new training products in mapping information to assist users with transition and implementation where appropriate
  - highlight regulatory and safety considerations where relevant to Reliability Engineering
  - provide advice to training providers on the nature of the qualification, delivery and assessment strategies and the importance of the work integrated learning component of the qualification.

Out of scope

- Training products outside the Vocational Degree remit that do not directly impact the qualification being developed.
- Establishment of the Technical Committee (see 5.3 Technical Committee).
- Preparation of the Training Product Submission to the TPAB.

Note that AUSMASA will consider responses that respond to and address all or part of the technical writing requirements outlined above. This includes development of:

- the qualification and all core, electives and specialisation units of competency, or
- the core units of competency only
- the elective units of competency only
- the specialisation units of competency only.

5.2 Reporting

A summary of the reporting requirements for this project has been provided in Table 1.

Table 1: Reporting matrix

Requirement	Cadence	Format	Who
Project summary	Monthly	Written / Word	- Consultant
Project status meeting	Fortnightly	MS Teams	- Consultant - Project Lead - PMO
Project management and communication	Ongoing	Monday.com	- Consultant - Project Lead - PMO

5.3 Technical Committee

AUSMASA will form a Technical Committee (TC) comprised of subject matter experts (SMEs) who will guide stakeholder identification, advise on required skills and address implementation, regulatory and industrial relations considerations. The TC will be made up of:

- industry recognised subject matter experts and peak bodies
- employers
- training providers
- regulatory and licensing authorities and
- unions.

The expertise of the TC will be used to provide advice on:

- training design, delivery and assessment for practitioners.
- appropriate application of the Training Products
- the impact on learners and any implementation issues
- any licensing, regulatory and industrial relations implications
- additional stakeholders who should be included in the consultation strategy.

Frequency of meetings:

- TC meetings will occur monthly or at intervals required for the duration of the project.

The tenderer will be expected to:

- attend all TC meetings (most, if not all to be conducted virtually), providing project updates to members, responding to questions raised by members and providing advice to TC members on training product development requirements relevant to the work
- develop and distribute TC meeting Agendas, ensure meetings are minuted and distributed to members of the TC for approval
- provide information to the TC as relevant to the project.

TC papers will include:

- agenda and Minutes of meetings
- survey results and research findings
- drafts of training products including units of competency, unit(s) of competency and draft CVIG
- consultation logs.

5.4 Training Product Development

Using a variety of consultation approaches to inform the development of the training products the successful tenderer must:

- Undertake the technical writing of draft training products that adhere to the TPOF and to a standard appropriate for release to a national audience for feedback. It is anticipated that an iterative approach will be required to reflect feedback from a national stakeholder base.

- Implement revisions to draft training products as agreed to by the TC and update the consultation log for decisions made by the TC. In accordance with the TPOF this includes providing a rationale for stakeholder feedback that was not implemented.

- Identify and document the role and purpose of the workplace learning component of the AQF7.
- Update the CVIG to reflect the work undertaken in the project. This includes documenting unit mapping information sufficient for users to identify changes and assist in determining resourcing, impacts on training, and transition arrangements. Please refer to the TPOF for the requirements for CVIGs.
- Produce all final training products (qualifications, units of competency, skill sets) in the approved MS Word templates (to be provided by AUSMASA), ready to be proofread and edited.
- Liaise with and respond to feedback and comments raised through the editing and internal quality assurance process.

5.5 Timeframe

The project will commence following the selection and contracting of the successful tenderer and approval of the Project Plan by DEWR. It is anticipated the project will commence 2 March 2026.

It is anticipated that the subcontractor will align with the following timelines:

Table 2: Timeframe

Activity	Indicative timeframe
Analysis, targeted consultation and drafting of training products ready for public and government consultation	7 April 2026 – 17 July 2026
TC attendance and preparation	Throughout the project
Public and Government Consultation (mandatory 1 month period)	20 July 2026 – 28 August 2026
Incorporate agreed feedback into the training products and produce the final draft of training products. Note additional time allocated to allow for further consultation and review if required.	31 August 2026 – 15 January 2027
Prepare training products for Senior Responsible Officer (SRO) review	January 2027
SRO Check	18 January 2027 – 19 February 2027
Respond and implement agreed feedback from SROs	19 – 22 February 2027
Submission of final documentation, including finalised training product documents and consultation log (AUSMASA role)	22 February – 2 April 2027

6.0 Request for Tender

6.1 Experience and capability

In reviewing responses, AUSMASA will look to ascertain the value of partnering with your organisation. As a minimum, value will be in the form of:

1. Experience developing and managing national consultation projects in VET contexts and stakeholder engagement including:
    a. experience in engaging industry, training providers, regulators, and unions to inform training package development
    b. undertaking consultation and developing nationally accredited training products in highly technical fields of work
    c. gaining consensus across a breadth of stakeholders with competing views.
2. Demonstrated understanding of AQF levels and VET Standards.
3. A demonstrated ability to write Training Package products that adhere to the TPOF and which can be implemented by Registered Training Organisations (RTOs).
4. Committee/Advisory group participation and facilitation with the ability to prepare agendas and minutes, record decisions, and guide expert discussions including:
    a. documentation and reporting
    b. maintenance of consultation logs and integration of consultation feedback.
5. Skills in the following:
    a. Collecting and interpreting data to inform the project deliverables.
    b. Applying a range of stakeholder consultation methods tailored to diverse audiences.
    c. Designing and facilitating engaging, feedback-driven workshops in a group online or face to face setting.
6. Project management capability to deliver within defined scope, timeframes, risk management approach and budget.
7. Understanding or capacity to develop an understanding of the role of reliability engineering sufficient to design a qualification that incorporates engineering principles with systems thinking, data analytics and performance optimisation strategies.
8. Knowledge of or ability to acquire knowledge of regulatory, safety and industry accreditation requirements (such as Engineers Australia) that relate to reliability engineering.
9. Demonstrated understanding of cross-training package relevance and the overlap with other packages.
10. Familiarity with benchmark qualifications, dual sector delivery models, pathway and cross-institutional opportunities.

As a Jobs and Skills Council, we are contractually required to provide your organisation name, ABN and the proposed contract amount ($) to the Department of Employment, Workplace Relations (DEWR). By submitting a proposal to this tender, we understand that you agree to this request.

6.2 Tender requirements

As part of the tender, the subcontractor must provide the following information:

- full name of subcontractor, including business name and registered address
- ABN/ACN
- type of subcontractor organisation
- details of all personnel allocated for the work including their qualifications, skills and experience as relevant to the project
- description of services with a breakdown of budget
- value for money considerations
- length of subcontracting arrangement proposed
- copy of insurance (including workers compensation (if applicable), public liability and professional indemnity)
- details of 2 referees AUSMASA could contact to verify the capabilities expressed in the response to tender.

6.3 Tender submission

Tenders must be submitted via the Tenders page on the AUSMASA website no later than **5.00pm AEST Monday 26 January 2026.**

6.4 Tender evaluation

Submissions will be assessed, and applicants will be informed of the outcome upon completion of the evaluation process.

Further information

AUSMASA will host an online webinar for tenderers and other interested parties, to learn more about the work undertaken to prepare for developing the AQF 7 Vocational Degree in Reliability Engineering. During this webinar, questions may be raised by tenderers related to this RFT. Although not mandatory to attend the webinar, AUSMASA strongly encourages tenderers to avail themselves of this opportunity.

For further information about this document or tender, please contact the Training Products team at projects@ausmasa.org.au.

Mining and Automotive Skills Alliance

Appendix A – Functional analysis: Reliability Engineer

This table details the key functions of the Reliability Engineer role and their application in the workplace. By aligning functions to Vocational Degree outcomes, the table highlights how applied knowledge, cognitive and technical analysis, practical application, communication, compliance, and collaboration skills are developed for the role, reflecting reliability practice. The last three columns of the table reflect content that may be included in a teaching and learning pathway to achieve a qualification.

Workplace focus		**Teaching and learning focus**		
Key functions	**Reliability Engineer application**	**Knowledge**	**Skills**	**Exposure to and experience with**
Vocational Degree Criteria 1: broad and coherent applied knowledge				
Function 1: Reliability Engineering Conduct Failure Mode and Effects Analysis (FMEA) to predict failure modes of components and processes. Optimise component and system uptime through the use of reliability-centred maintenance (RCM).	• Perform FMEA to determine possible failure modes of both components and processes of a system that could lead to downtime.	• Knowledge of structured FMEA methodology, criticality analysis, and ranking systems. • Understanding of component and process failure mechanisms in industrial systems. • Awareness of applied FMEA use cases in asset-intensive industries.	• Apply FMEA frameworks to identify and rank potential failure modes. • Document FMEA findings and link them to maintenance/test plans. • Facilitate cross-disciplinary FMEA workshops.	• Exposure to cross-functional FMEA workshops in operational environments. • Hands-on use of FMEA templates and criticality matrices. • Experience applying FMEA outcomes to real-world maintenance strategies.
	• Conduct risk assessments based on the outcome of FMEA and knowledge of wider systems to determine if potential failures pose additional risk to personnel or equipment.	• Knowledge of qualitative, quantitative, and semi-quantitative risk assessment methods. • Understanding of safety-critical risk management frameworks.	• Perform risk assessments informed by FMEA findings. • Incorporate likelihood and consequence factors into risk ranking.	• Exposure to operational risk workshops and hazard reviews. • Hands-on experience applying probabilistic risk assessment (PRA) techniques.

		• Knowledge of operational risk categories in mining and heavy industries.	• Identify risks to personnel and equipment from potential failure modes.	• Participation in site-based risk evaluations tied to FMEA outputs.
	• Create risk mitigation plans and implement engineering fixes to ensure the continued safe operation of assets.	• Knowledge of engineering risk mitigation strategies and reliability improvement methods. • Understanding of corrective and preventive action planning frameworks. • Awareness of applied RCM in asset-intensive industries.	• Develop risk mitigation plans integrated with asset management strategies. • Implement engineering solutions to address identified risks. • Document and communicate mitigation and corrective actions across stakeholders.	• Exposure to implementing engineering fixes in response to risk assessments. • Hands-on experience applying mitigation strategies to operational assets. • Participation in asset reliability reviews and continuous improvement cycles.
	• Utilise Reliability Block Diagrams (RBD) and other graphical methods to identify shortcomings of system redundancy and develop maintenance plans accordingly.	• Knowledge of reliability block diagrams and graphical modelling methods. • Principles of redundancy and system design optimisation. • Awareness of maintenance planning practices informed by reliability models.	• Construct RBDs to model system reliability and redundancy. • Analyse system vulnerabilities and propose redundancy improvements. • Translate model outputs into actionable maintenance strategies.	• Exposure to RBD modelling tools applied in industry project. • Hands-on practice with reliability software (e.g. Reliasoft, MATLAB). • Participation in maintenance planning based on RBD insights.
Function 2: Asset Strategy, Lifecycle Management and Sustainability Implement reliability strategies and	• Utilise operational data to verify that components are meeting their expected lifespan.	• Knowledge of data analytics methods for asset health monitoring. • Understanding of lifecycle performance benchmarks and degradation modes.	• Analyse operational datasets to confirm component life assumptions.	• Exposure to Computerised Maintenance Management System (CMMS) and asset performance data in live environments.

sustainable processes as part of wider asset life cycle approach.		• Awareness of site-based data collection practices for asset monitoring.	• Identify deviations in expected vs. actual performance. • Communicate insights for maintenance strategy adjustments.	• Hands-on analysis of operational datasets for lifecycle validation. • Experience presenting component lifespan findings to asset managers.
	• Develop lifecycle cost and total cost of ownership models for equipment.	• Knowledge of cost modelling principles including Net Present Value (NPV) and LCC. • Understanding of maintenance and replacement cost structures. • Awareness of cost modelling tools used in industry asset management.	• Build lifecycle cost and total cost of ownership models. • Integrate maintenance and replacement strategies into cost projections. • Communicate cost-benefit outcomes to decision makers.	• Exposure to lifecycle costing exercises in mining and industrial projects. • Hands-on development of cost models in spreadsheets/software. • Participation in financial reviews of asset lifecycle decisions.
	• Implement assumptions on component and system lifespans into maintenance plans.	• Knowledge of maintenance planning frameworks and lifecycle integration. • Understanding of RCM processes. • Awareness of site-based practices for lifespan-driven maintenance.	• Translate component/system lifespan assumptions into maintenance schedules. • Develop preventive maintenance tasks aligned to lifecycle predictions. • Adjust plans based on operational realities and environment.	• Exposure to RCM-based maintenance planning workshops. • Hands-on implementation of lifecycle-driven maintenance in CMMS. • Experience linking lifespan data to site-level maintenance strategies.

	• Utilise operational data to plan for component end-of-life and replacement before failures result in machine down time and excessive operational costing.	• Knowledge of predictive maintenance and end-of-life modelling methods. • Understanding of failure modes leading to unplanned downtime. • Awareness of operational cost impacts of asset failures.	• Analyse operational data to forecast component end-of-life. • Develop proactive replacement plans based on risk and cost impacts. • Communicate replacement schedules to operations teams.	• Exposure to predictive maintenance tools and data analysis. • Hands-on experience forecasting and scheduling proactive replacements. • Participation in replacement planning meetings with stakeholders.
	• Consider environmental risks of chemicals and processes utilised in machine maintenance works and develop mitigation strategies.	• Knowledge of environmental risk management principles and International Organisation for Standardisation (ISO) standards. • Understanding of chemical spill trendlines, handling and disposal requirements. • Awareness of sustainability frameworks in heavy industries. • Understanding of inspection and test plan requirements and quarantine processes.	• Identify and assess environmental risks in maintenance processes. • Analyse and interpret chemical spill data to identify trends and implement improved handling, containment and disposal practices. • Develop mitigation strategies for chemical and process risks. • Implement environmentally sustainable work practices. • Interpret Inspection and Test Plans (ITPs) and quarantine records to verify compliance and environmental risks.	• Exposure to environmental audits and risk assessments • Experience reviewing chemical spill records, contributing to incident investigations, and implementing updated control and disposal procedures. • Experience implementing mitigation measures in maintenance activities. • Experience reviewing ITPs and quarantine reports, contributing to corrective actions.

	• Implement sustainability focused reliability solutions such as recyclable/ serviceable components.	• Knowledge of sustainable design and circular economy principles. • Understanding of lifecycle extension through serviceable components. • Knowledge of legal requirements and practices for recycling and re-use in industrial environments.	• Integrate legal and organisational requirements into recycling and re-use strategies to optimise sustainability and compliance outcomes. • Identify opportunities for recyclable or serviceable component use. • Support the implementation and provide supplier assurance for sustainable materials and components.	• Experience developing and reviewing recycling and waste-management practices to meet legal and organisational requirements. • Exposure to projects trialling recyclable/serviceable parts. • Hands-on evaluation of components for serviceability and reuse. • Experience applying circular economy practices to asset strategies.
	• Develop sustainable operating strategies that reduce power consumption and undue machine wear.	• Knowledge of energy efficiency and sustainable operating principles. • Understanding of degradation drivers linked to operating practices. • Awareness of sustainability initiatives in operations.	• Analyse operating practices to identify energy and wear inefficiencies. • Develop strategies for sustainable operations. • Communicate energy-saving and wear-reducing practices to operators.	• Exposure to energy efficiency programs in industrial operations. • Hands-on implementation of operating strategies to reduce wear. • Participation in sustainability-focused operational planning.
Vocational Degree Criteria 2: Cognitive and Technical Analysis Skills.				
Function 3: Root Cause Analysis (RCA) Lead investigations into failure events using techniques such as 5 Whys, Fishbone, and fault tree analysis.	• Conduct thorough inspections of failed components and coordinate third-party metallurgical and chemical analysis.	• Knowledge of failure modes in mechanical, electrical, and chemical systems. • Understanding of metallurgical and chemical analysis methods.	• Inspect failed components using structured RCA approaches. • Coordinate third-party lab testing for metallurgical/chemic-al analysis.	• Exposure to field inspections of failed components. • Hands-on coordination with third-party testing labs. • Experience integrating metallurgical/chemical test results into RCA reports.

		• Awareness of third-party laboratory testing and industry practices.	• Interpret and integrate external lab findings into RCA.	
	• Conduct structured interviews post-failure with maintenance personnel and operators who may have been involved at the time of failure.	• Knowledge of structured interview techniques and human factors in failures. • Understanding of communication frameworks for post-failure investigations. • Awareness of cultural and organisational dynamics in maintenance operations.	• Conduct structured post-failure interviews with maintenance and operations staff. • Document witness/operator insights accurately and impartially • Identify human factor contributions to failure events.	• Exposure to structured interviews as part of failure investigations. • Hands-on participation in human factor assessments post-failure. • Experience contributing operator/maintenance perspectives into RCA.
	• Lead failure analysis discussion exercises with project stakeholders, presenting data/ findings from investigations.	• Knowledge of RCA facilitation methods (5 Whys, Fishbone, FTA). • Understanding of stakeholder engagement and communication strategies. • Awareness of collaborative practices in multidisciplinary RCA reviews.	• Facilitate failure analysis discussions with cross-functional teams. • Present investigation findings using evidence-based RCA outputs. • Guide collaborative identification of corrective actions.	• Exposure to stakeholder workshops for failure investigations. • Hands-on experience facilitating multidisciplinary RCA sessions. • Participation in reporting and presenting failure investigation findings.
	• Document findings and recommend corrective actions/process changes, and engineering fixes to prevent the same failure from occurring again.	• Knowledge of corrective action planning frameworks.	• Draft RCA reports with findings, corrective actions, and recommendations.	• Exposure to corrective action planning in industrial contexts. • Hands-on preparation of RCA reports and recommendations.

		• Understanding of documentation standards for RCA reporting. • Awareness of continuous improvement practices in reliability engineering.	• Recommend engineering fixes and process improvements. • Communicate corrective action plans to site stakeholders.	• Experience embedding corrective actions into maintenance/test systems.
Function 4: Data Collection and Analysis Gather, interpret and report data from tests, sensors, and operational environments to support decision-making.	• Capture operational and test data via SCADA or PLC outputs and process the captured data so that it can be used for diagnostics and fault-finding purposes.	• Knowledge of SCADA/PLC data systems and industrial communication protocols. • Understanding of diagnostic data processing and condition monitoring principles. • Awareness of applied practices for capturing and using operational data.	• Capture and process operational/test data from SCADA/PLC systems. • Prepare data for use in diagnostics and troubleshooting. • Integrate captured data into maintenance workflows.	• Exposure to capturing and processing SCADA/PLC data in operational contexts. • Hands-on experience using diagnostic tools and monitoring platforms. • Participation in troubleshooting activities informed by real-time data.
	• Utilise data anomalies to predict potential failures.	• Knowledge of anomaly detection methods in time-series and operational data. • Understanding of predictive maintenance models and failure prediction principles. • Awareness of industry examples using anomalies for pre-emptive fault detection.	• Detect anomalies in datasets to predict failure modes. • Validate anomaly findings with equipment performance. • Report anomalies to maintenance teams for pre-emptive action.	• Exposure to anomaly detection case studies in reliability projects. • Hands-on use of anomaly detection methods in predictive maintenance. • Participation in maintenance planning using anomaly-based insights.

	• Use coding tools like Minitab, MATLAB, and Python for data analysis and automation of database queries (SQL).	• Knowledge of statistical analysis and coding tools (Minitab, MATLAB, Python, SQL). • Understanding of automation for database queries and data pipelines. • Awareness of coding applications in maintenance and test engineering.	• Use Minitab, MATLAB, and Python for statistical and engineering analysis. • Automate data queries using SQL and coding techniques. • Develop scripts for analysis of large operational datasets.	• Exposure to coding and analysis in engineering test environments. • Hands-on use of Minitab, MATLAB, and Python for operational data • Experience with SQL queries for automating database analysis.
	• Analyse data, recognising and reporting on patterns and trends in the data as key indicators of asset health.	• Knowledge of data analysis methods for trend recognition (Statistical Process Control (SPC), regression, time-series). • Understanding of asset health indicators and Key Performance Indicator (KPI) frameworks. • Awareness of industry practices linking trend data to decision-making.	• Identify and report trends in asset health through data analysis. • Apply SPC and regression analysis to detect degradation. • Communicate asset health insights to stakeholders.	• Exposure to trend analysis for asset health monitoring. • Hands-on application of SPC/time-series methods for data sets. • Participation in reporting asset health trends to stakeholders.
	• Utilise the data to pre-empt machine failures and put maintenance and rectification plans in place.	• Knowledge of failure prediction, reliability modelling, and preventive maintenance	• Translate data insights into preventive maintenance actions • Develop rectification strategies informed by predictive models	• Exposure to predictive maintenance systems in field operations. • Hands-on practice linking predictive data to rectification plans.

		• Understanding of how data insights feed into proactive maintenance strategies • Awareness of industry adoption of predictive analytics for machine health.	• Collaborate with operations to implement maintenance changes.	• Experience implementing data-driven maintenance adjustments.
	• Locate key system information such as specifications and setpoints in drawings, supplier documentation and existing maintenance logs to assist in and troubleshooting system issues, Failure analysis and process adjustments.	• Knowledge of technical documentation, system specifications, and engineering drawings. • Understanding of how design and supplier data informs troubleshooting. • Awareness of maintenance record-keeping practices in industry.	• Extract specifications and setpoints from technical drawings and documents. • Use supplier documentation and maintenance logs for troubleshooting. • Incorporate historical data into failure analysis and process improvements.	• Exposure to use of supplier documentation and drawings in troubleshooting. • Hands-on application of extracting key information from technical sources. • Participation in maintenance investigations using historical data.
Function 5: Technology Utilisation and Research Conduct technical research to identify potential product and/or process improvements through new and emerging technologies.	• Conduct research into new and emerging diagnostic technologies, materials and coatings that could improve process efficiency and system reliability.	• Knowledge of diagnostic technologies, advanced materials, and protective coatings. • Understanding of how emerging technologies improve process. efficiency and reliability. • Awareness of industry adoption of new technologies in mining and heavy industry.	• Evaluate new diagnostic technologies and materials for applicability. • Assess coatings for durability and efficiency improvements. • Prepare reports summarising potential technology benefits.	• Exposure to projects trialling new diagnostic technologies and coatings. • Hands-on evaluation of prototype technologies in industrial settings. • Participation in industry workshops on advanced materials.

	• Identify technical shortcomings and assess readily available solutions that can be implemented.	• Knowledge of gap analysis and technical benchmarking methods. • Understanding of readily available engineering solutions and retrofit options. • Awareness of industry practices for assessing technology shortcomings.	• Identify gaps in current systems and processes. • Research and propose feasible engineering solutions. • Conduct feasibility assessments for rapid adoption.	• Exposure to gap analysis processes in maintenance/reliability projects. • Hands-on assessment of retrofit engineering solutions. • Experience validating off-the-shelf solutions in live operations.
	• Collaborate with research institutions and suppliers in the development of new technologies.	• Knowledge of collaborative research frameworks and supplier partnerships. • Understanding of technology readiness levels (TRLs) and validation processes. • Awareness of partnerships between industry and research bodies.	• Collaborate with universities and suppliers to test emerging technologies. • Contribute to joint development projects and trials. • Communicate outcomes of collaborative trials to stakeholders.	• Exposure to collaboration with suppliers and research partners. • Hands-on participation in pilot studies and joint trials. • Experience aligning research outcomes with operational needs.
Vocational Degree Criteria 3: Application of Knowledge				
Function 6: Test Planning & Execution Develop and execute structured testing protocols for new and existing systems under simulated and real conditions.	• Utilise FMEA and past RCA studies as tools in creating requirements for ongoing testing as part of a systems-level approach to asset reliability.	• Knowledge of FMEA and RCA methodologies for system reliability improvement. • Understanding how historical failure analysis informs ongoing testing requirements.	• Integrate FMEA and RCA findings into test planning. • Translate historical failure data into current testing requirements.	• Exposure to linking FMEA/RCA outcomes to test campaigns. • Hands-on experience applying RCA/FMEA to define test requirements.

		• Awareness of applied case studies using FMEA and RCA in industry.	• Facilitate systems-level reviews linking RCA/FMEA outcomes to test planning.	• Participation in system-level reviews for ongoing reliability improvements.
	• Design test plans with clear acceptance criteria and testing methods. Test data required should be called out in the test plan. Failure criteria should also be outlined in the test plan, with immediate remedial action suggested to prevent equipment damage.	• Knowledge of test planning frameworks and acceptance. criteria development. • Understanding of how to define failure thresholds and remedial actions. • Awareness of industry practices in writing test plans.	• Write test plans with clear acceptance and failure criteria. • Define immediate remedial actions in case of equipment failure. • Ensure traceability of test requirements to design and safety standards.	• Exposure to preparing detailed test plans with acceptance/failure criteria. • Hands-on writing and executing test plans. • Experience implementing immediate remedial action procedures during tests.
	• Set up instrumentation and data acquisition systems.	• Knowledge of sensors, Data Acquisition (DAQ) hardware/software, and calibration principles. • Understanding of signal processing, accuracy, and noise reduction. • Awareness of instrumentation practices in industrial test contexts.	• Install, configure, and calibrate instrumentation and DAQ systems. • Integrate sensors with PLC/SCADA systems for data acquisition. • Verify data integrity and system operability before testing.	• Hands-on setup of DAQ systems in prototype and field test environments. • Exposure to commissioning processes requiring sensor/DAQ configuration. • Experience troubleshooting instrumentation and data channels on site.
	• Co-ordinate with site operations teams to facilitate the resourcing for conducting tests.	• Knowledge of site operations structures and resourcing requirements. • Awareness of safety and compliance frameworks relevant to test execution.	• Engage with site operations to align test scheduling and resourcing. • Plan for equipment, manpower, and	• Exposure to site-based test execution requiring cross-team coordination. • Hands-on experience organising resourcing for prototype/field tests.

		• Understanding of logistics planning for testing in live industrial environments.	site access needed for tests • Ensure test activities comply with operational standards and safety protocols.	• Participation in operational planning meetings before testing.
	• Lead risk assessment exercises for conducting tests and suggest risk mitigation strategies.	• Knowledge of risk assessment methods (qualitative, quantitative, PRA). • Understanding of risk mitigation planning in testing contexts. • Awareness of site-based risk management frameworks.	• Facilitate risk assessment workshops specific to planned tests. • Develop mitigation strategies for identified risks. • Communicate risk outcomes and mitigations to stakeholders.	• Participation in risk assessments for site testing activities. • Hands-on application of PRA models to simulate test risks • Experience leading risk mitigation planning for live test environments.
	• Conduct environmental, stress, and lifecycle testing.	• Knowledge of environmental, stress, and lifecycle testing methodologies. • Understanding of accelerated life testing (ALT) principles. • Awareness of sustainability considerations in testing.	• Perform environmental, stress, and lifecycle testing on assets. • Document results of accelerated and lifecycle testing. • Evaluate test findings for alignment with design expectations.	• Exposure to conducting environmental and lifecycle tests in applied contexts. • Hands-on execution of stress and accelerated life tests. • Experience evaluating environmental test results for asset reliability.
	• Consider and manage testing risks associated with the human factor, such as measurement error and operator inconsistency.	• Knowledge of human reliability analysis (HRA) and error modes.	• Identify potential human factor risks in test execution.	• Exposure to lessons-learned reviews highlighting human factor risks.

		• Understanding of measurement uncertainty and error propagation. • Awareness of operator training and competency frameworks in testing.	• Design procedures and training to minimise operator variability. • Implement cross-checking and redundancy to mitigate measurement errors.	• Hands-on experience in calibrating instruments to reduce operator error. • Participation in human factors risk assessments during test planning.
Function 7: Continuous Improvement Drive improvements to product reliability, testing efficiency, and lifecycle performance through structured improvement initiatives.	• Track reliability KPIs (e.g. Mean Time Between Failures (MTBF), Mean Time To Repair (MTTR), failure rate).	• Knowledge of reliability KPIs such as MTBF, MTTR, and failure rate. • Understanding of KPI calculation methods and statistical underpinnings. • Awareness of applied KPI tracking practices in asset-intensive industries.	• Calculate and track KPIs like MTBF, MTTR, and failure rate. • Prepare reports on reliability performance for stakeholders. • Communicate KPI results to operations and maintenance teams.	• Exposure to KPI reporting in asset reliability projects. • Hands-on practice calculating KPIs with real data. • Participation in KPI review meetings with stakeholders.
	• Contribute to Six Sigma or Lean reliability projects.	• Knowledge of Lean and Six Sigma methodologies (Define, Measure, Analyse, Improve, Control (DMAIC), SPC.) • Awareness of industry adoption of Lean reliability programs.	• Apply Lean/Six Sigma tools to reliability challenges. • Lead or support reliability improvement projects.	• Exposure to Lean/Six Sigma projects in asset-intensive industries. • Hands-on application of DMAIC methods.
	• Benchmark performance and identify production and process bottlenecks.	• Knowledge of benchmarking frameworks and comparative performance methods.	• Conduct benchmarking studies against industry or internal peers. • Analyse production data to identify bottlenecks.	• Exposure to performance benchmarking exercises in operations. • Hands-on experience analysing bottlenecks in production processes.

		• Understanding of production flow and bottleneck analysis. • Awareness of site-level practices for process benchmarking.	• Communicate bottleneck findings and improvement needs to leadership.	• Participation in benchmarking studies with peer organisations.
	• Define improvement targets and develop improvement plans to achieve them.	• Knowledge of target-setting frameworks and performance improvement strategies. • Understanding of how to translate data insights into action plans. • Awareness of management practices for continuous improvement.	• Set realistic reliability and performance targets. • Develop structured plans to achieve improvement targets. • Facilitate team discussions to align around improvement goals.	• Exposure to improvement target-setting workshops. • Hands-on development of reliability improvement plans. • Experience monitoring progress towards defined reliability goals.
	• Take on feedback from operations and maintenance crews to improve ease of use and manage human factor risks that arise from procedural shortcuts.	• Knowledge of human factors in reliability and maintenance. • Understanding of procedural compliance risks and shortcuts. • Awareness of operational realities faced by crews in field environments.	• Gather and incorporate feedback from operations and maintenance crews. • Assess human factor risks arising from shortcuts. • Recommend process improvements based on crew feedback.	• Exposure to human factor issues identified in field operations. • Hands-on experience incorporating crew feedback into reliability plans. • Participation in discussions on reducing procedural risks.
Function 8: Systems Integration and Digitalisation	• Utilise digital twin and hardware in the loop studies to identify and troubleshoot issues within system architecture. Where physical	• Knowledge of digital twin and hardware-in-the-loop (HIL) methods.	• Build/apply digital twins for reliability analysis.	• Exposure to digital twin/HIL environments in industry.

Integrate advanced computation and simulation methods to increase visibility of system reliability reduce the requirement of physical testing	hardware may be at risk from conducting a real test.	• Awareness of digital approaches replacing physical risk-heavy tests.	• Conduct HIL studies for risk mitigation.	• Hands-on troubleshooting using simulation environments.
	• Utilise simulation and Computer-Aided Engineering (CAE) processes to assess potential failure modes in RCA studies.	• Knowledge of simulation methods and computer-aided engineering (CAE) tools. • Understanding of integrating CAE results into RCA studies. • Awareness of industry adoption of simulation in reliability contexts.	• Perform simulation studies to assess failure modes. • Integrate CAE outputs into structured RCA investigations. • Develop reports linking simulation findings to system-level.	• Exposure to CAE and simulation software in reliability projects. • Hands-on use of simulation data in RCA investigations. • Participation in workshops applying simulation tools to failure analysis.
	• Utilise Internet of Things (IoT) strategies for condition monitoring to improve system reliability and visibility of machine performance.	• Knowledge of IoT systems, sensors, and data integration for condition monitoring. • Understanding of reliability-focused IoT strategies for predictive maintenance • Awareness of real-world applications of IoT for asset monitoring.	• Implement IoT-enabled condition monitoring systems. • Use IoT data for predictive. maintenance planning • Support teams in applying IoT insights for asset reliability.	• Exposure to IoT deployment for asset monitoring. • Hands-on experience integrating IoT sensor data into maintenance planning. • Participation in projects implementing IoT reliability solutions.
	• Utilise AI driven reliability tools for failure pattern recognition and reporting purposes.	• Knowledge of AI and machine learning methods applied to reliability engineering. • Understanding of algorithms for failure	• Apply AI-based tools for detecting failure patterns. • Automate reliability reporting using AI analytics.	• Exposure to AI-driven reliability applications in field projects. • Hands-on practice using AI analytics for failure recognition.

Mining and Automotive Skills Alliance

		pattern recognition and predictive analytics. • Awareness of case studies using AI-driven reliability tools.	• Communicate AI-driven insights for proactive maintenance planning.	• Experience presenting AI-based reliability insights to leadership.
Vocational Degree Criteria 4: Communication				
Function 9: Reporting and Documentation Produce technical reports, validation protocols, and recommendations for design or process improvements.	• Write detailed testing maintenance and testing plans.	• Knowledge of test and maintenance planning frameworks. • Understanding of aligning maintenance/test plans with asset strategies. • Awareness of industry practices in preparing detailed maintenance/testing plans.	• Draft detailed maintenance and testing plans. • Align maintenance/testing documentation with lifecycle requirements. • Communicate testing requirements to site teams.	• Exposure to drafting maintenance/testing plans in industrial projects. • Hands-on experience aligning test plans to lifecycle goals. • Participation in reviews of maintenance/testing documentation.
	• Write Site Acceptance Test (SAT) plans.	• Knowledge of SAT frameworks and standards. • Understanding of acceptance criteria for system validation. • Awareness of applied SAT practices in commissioning.	• Write SAT plans aligned with validation criteria. • Define pass/fail conditions for acceptance testing. • Coordinate SAT execution with site stakeholders.	• Exposure to SAT planning and commissioning environments. • Hands-on experience developing SAT criteria. • Participation in SAT execution with multidisciplinary teams.

Mining and Automotive Skills Alliance

	• Write test procedure documents.	• Knowledge of test procedure development principles. • Awareness of applied documentation practices in reliability/testing.	• Draft step-by-step test procedure documentation. • Ensure consistency and compliance of test documentation.	• Exposure to writing test procedure documentation. • Hands-on preparation of procedural documents.
	• Write technical reports, test summaries, and reliability predictions for the quality team.	• Knowledge of technical reporting and reliability prediction methods. • Understanding of statistical reliability analysis for reporting. • Awareness of reporting expectations for quality teams.	• Prepare technical reports and test summaries. • Perform reliability predictions using statistical tools. • Deliver quality-focused reporting for stakeholder use.	• Exposure to preparing technical reports and summaries. • Hands-on preparation of reliability predictions. • Experience reporting to quality teams.
	• Maintain logs of component failure rates and generate failure maps.	• Knowledge of failure rate analysis method. • Understanding of component log management and failure mapping. • Awareness of record-keeping practices for component reliability.	• Maintain logs of failure events. • Generate visual failure maps for trend analysis. • Use logs to support RCA and continuous improvement.	• Exposure to maintaining failure logs and databases. • Hands-on generation of failure maps. • Participation in component reliability analysis.
	• Maintain testing logs as a tool for assisting with data analysis and troubleshooting activities.	• Knowledge of test logging and troubleshooting frameworks.	• Maintain structured test logs during campaigns.	• Exposure to maintaining structured test logs.

		• Understanding of data structuring for test analysis. • Awareness of applied testing documentation in maintenance contexts.	• Link test log data to troubleshooting processes. • Support analysis by recording detailed test conditions.	• Hands-on practice linking logs to data. • Experience using test logs to troubleshoot issues.
	• Write RCA reports.	• Knowledge of RCA reporting standards and documentation frameworks. • Understanding of structuring RCA findings into reports. • Awareness of continuous improvement through RCA documentation.	• Document RCA findings clearly in report format. • Recommend corrective actions in RCA reports. • Communicate RCA outcomes to relevant teams.	• Exposure to RCA report writing in reliability projects. • Hands-on drafting of RCA documentation. • Participation in corrective action planning based on RCA outcomes.
	• Write detailed component teardown and inspection reports.	• Knowledge of inspection and teardown documentation methods. • Understanding of linking teardown findings to RCA outcomes. • Awareness of applied practices in inspection reporting.	• Write inspection and teardown reports. • Link findings to engineering or RCA reports. • Support lessons-learned activities through reporting.	• Exposure to inspection/teardown documentation. • Hands-on writing of teardown and inspection reports. • Experience contributing to lessons-learned documentation.

	• Present findings to engineering, quality, and executive teams.	• Knowledge of communication strategies for technical presentations. • Understanding of tailoring reliability findings for different audiences. • Awareness of cross-disciplinary communication in reliability engineering.	• Prepare and deliver presentations to cross-functional audiences. • Summarise technical results for executive stakeholders. • Facilitate discussions of findings with engineering and quality teams.	• Exposure to technical presentations in reliability projects. • Hands-on presenting technical results to diverse audiences. • Experience facilitating feedback sessions with executives/quality teams.
	• Write detailed handover notes.	• Knowledge of documentation methods for project handovers. • Understanding of traceability and continuity in handover reporting. • Awareness of industry handover practices between project phases.	• Write clear and complete handover notes. • Ensure testing continuity through detailed documentation. • Transfer knowledge effectively at project closeout.	• Exposure to writing handover notes for project closeout. • Hands-on preparation of detailed documentation for handover. • Experience ensuring continuity through detailed project records.
Function 10: Standards & Compliance Ensure compliance with quality, safety, and performance standards (e.g. ISO, United States	• Interpret and apply relevant standards, particularly quality and asset management standards ISO-9001 and ISO-55000 and risk management standard AS-4024.	• Knowledge of ISO-55000 for asset management (RE focus). • Awareness of compliance practices in industry including ESG and ISO 14001.	• Interpret and apply relevant standards to testing/reliability. • Integrate asset management standards into reliability practice.	• Hands-on experience applying ISO-55000 in asset-focused contexts.

Military Standards (MIL-STD), AS/NZS)	• Locate and utilise application-specific standards such as AS-3000 for electrical installations.	• Knowledge of application-specific standards such as AS-3000. • Understanding of compliance requirements in specialised engineering domains. • Awareness of applied compliance practices in industry.	• Locate and apply application-specific standards. • Integrate AS-3000 and similar standards into project plans. • Support operations with compliance requirements in specialised areas.	• Exposure to applying AS-3000 and domain-specific standards. • Hands-on practice integrating standards into design/testing. • Experience supporting compliance during audits.
	• Apply engineering best practice for applications that are not specifically covered by a single standard.	• Knowledge of engineering best practices beyond formal standards. • Understanding of how to apply general engineering principles to unique problems. • Awareness of case studies requiring best practice applications in non-standardised areas.	• Apply best practice engineering principles where standards are not specific. • Evaluate solutions for alignment with general engineering best practice. • Document best practice applications for continuous improvement.	• Exposure to projects requiring best practice approaches in non-standard areas. • Hands-on application of engineering judgement to fill standardisation gaps. • Experience documenting best practices for lessons learned.
	• Audit systems for compliance, ensuring systems and processes stay relevant as standards evolve.	• Knowledge of auditing frameworks for compliance. • Understanding of how standards evolve and how to keep systems aligned. • Awareness of industry audit and compliance.	• Conduct compliance audits of systems and processes • Identify gaps in compliance and recommend updates • Support continuous alignment with evolving standards.	• Exposure to auditing systems for compliance. • Hands-on experience aligning systems with updated standards. • Participation in compliance workshops or audits.

	• Maintain document traceability for inspection and test records and procedures.	• Knowledge of document traceability systems and requirements. • Understanding of how to maintain compliance records for inspection and testing. • Awareness of documentation and record-keeping practices.	• Maintain traceable documentation for inspection and testing. • Develop record-keeping systems to support compliance. • Communicate traceability requirements to operational teams.	• Exposure to document traceability systems. • Hands-on experience maintaining inspection/ testing records. • Experience contributing to compliance traceability reviews.
Function 11: Cross-functional Collaboration Liaise with design, manufacturing, operations, and maintenance teams to ensure reliability objectives are integrated	• Participate in design reviews and change control boards.	• Knowledge of design review processes and change management frameworks. • Understanding of cross-disciplinary communication during design reviews. • Awareness of industry practices in design change governance.	• Participate effectively in design review sessions. • Contribute to discussions on change control and design modifications. • Provide clear documentation of review outcomes.	• Exposure to participating in design reviews and change boards. • Hands-on involvement in design change assessments. • Experience documenting and tracking design modifications.
	• Support supplier assurance processes and interpret documentation to confirm compliance with organisational and contractual requirements.	• Knowledge of supplier assurance frameworks and reliability standards. • Understanding of contractual and certification compliance requirements. • Awareness of supplier performance monitoring processes.	• Interpret and analyse supplier certificates of assurance, contracts and agreements for reliability, safety and environmental compliance. • Provide assurance input and recommendations to internal stakeholders.	• Exposure to supplier assurance reviews and compliance audits. • Experience verifying supplier documentation and contributing to assurance reporting.

Mining and Automotive Skills Alliance

	• Support commissioning and handover to operations.	• Knowledge of commissioning practices and handover frameworks. • Awareness of cross-disciplinary involvement during handover.	• Support commissioning validation activities. • Prepare documentation to support handover.	• Exposure to commissioning projects. • Hands-on support during project handover.
	• Work closely with external partners (OEM/customer organisations to develop effective upgrade packages and maintenance processes for equipment.	• Knowledge of collaboration frameworks with OEMs and customer organisations. • Understanding of upgrade package design and maintenance planning. • Awareness of external partnership models for reliability improvements.	• Collaborate with OEMs to develop upgrade strategies. • Support customers in implementing maintenance processes. • Communicate effectively with external partners for reliability outcomes.	• Exposure to collaboration with OEMs and customer organisations. • Hands-on involvement in developing upgrade packages. • Experience supporting the implementation of maintenance processes with partners.

Mining and Automotive Skills Alliance

Appendix B – Draft qualification structure

Vocational Degree in Reliability Engineering

This three-year program is an AQF Level 7 Vocational Degree in Reliability Engineering. The qualification is structured into capability themes that reflect real-world workplace functions, and learning is a mix of Training Provider-based and work-integrated learning (WIL), potentially in an employment context.

This applied approach aligns with the AQF 7 vocational degree descriptors by emphasising broad, coherent technical knowledge and complex problem-solving in an industrial context. It has strong industry backing for its focus on work-readiness, site-based learning, and co-designed content. The program also aligns with Engineers Australia's Stage 1 Engineering Technologist competencies (knowledge base, engineering application, and professional skills), preparing graduates for recognition as Engineering Technologists. Importantly, it also provides a pathway for experienced tradespeople (e.g. electricians, mechanics, condition monitoring specialists), with prior industry training and experience to be recognised, allowing them to enter at an appropriate stage without having to duplicate the fundamentals.

Graduate profile

Graduates of the *Vocational Degree in Reliability Engineering* are applied professionals who combine engineering principles, diagnostic reasoning, and workplace experience to improve the reliability, safety, and performance of industrial assets. They draw on knowledge of real-world maintenance practices and engineering system behaviour to analyse failures, implement corrective actions, and optimise asset performance. Their applied approach integrates technical, digital, and organisational perspectives to achieve sustainable and reliable operations.

Graduates are typically employed as Reliability Engineers, Reliability Technologists, Asset Engineers, Testing and Validation Specialists, or Asset Performance Analysts within industries such as mining, manufacturing, transport, utilities, Defence and energy. They work autonomously and collaboratively in roles that require technical leadership, diagnostic capability, and the capacity to manage technical and organisational change across the asset lifecycle.

Graduate outcome statement

Graduates of the *Vocational Degree in Reliability Engineering* will be able to apply engineering, scientific, and financial principles to enhance the reliability, safety, and sustainability of complex industrial systems. They will integrate technical, digital, and organisational knowledge to lead improvement, manage change, and exercise professional judgement within multidisciplinary environments.

Graduates will be able to:

1. Apply and adapt engineering principles to design, test, and implement reliability and defect-elimination solutions based on broadly defined technical concepts, standards, and regulatory requirements.

2. Integrate field, laboratory, and digital data to diagnose performance issues, determine root causes, and inform system improvement, maintenance, and lifecycle planning.
3. Use systems thinking to analyse interdependencies across technical, operational, and organisational interfaces, anticipating the implications of innovation and change on people, processes, and performance.
4. Evaluate financial, risk, and sustainability factors in engineering decisions, preparing business cases and lifecycle cost analyses that support responsible investment and continuous quality improvement.
5. Communicate and collaborate professionally across multidisciplinary teams, using influence, facilitation, and structured communication to support the adoption of new reliability practices, technologies, and processes.
6. Lead and contribute to projects that apply reliability methodologies, testing programs, and digital tools to improve safety, efficiency, and organisational outcomes through managed change.
7. Demonstrate professional judgement, integrity, and accountability consistent with the standards of practice expected of an applied engineering technologist and reliability professional.

Mining and Automotive Skills Alliance

Core Units

Students will complete 20 Core Units.

Capability Theme	Year 1	Year 2	Year 3
Capability Theme 1: Engineering Foundations and Technical Communication Develops the foundational knowledge of materials, mechanics, and systems used in reliability engineering, alongside the ability to interpret technical documentation. Students apply engineering science and use technical drawings, OEM manuals, and standards to investigate and resolve equipment performance problems. They develop introductory proficiency in AutoCAD and related CAD platforms to read, annotate, and update engineering drawings, ensuring that documentation reflects current asset configurations and supports traceable maintenance and reliability records. This theme includes engagement with upstream engineering documentation and design intent, supporting early influence on system reliability through collaborative design reviews and interpretation of lifecycle parameters.	**Potential Unit: Apply Engineering Principles and Diagnostic Reasoning in Reliability Contexts** Students develop foundational knowledge in mechanics, materials, and electrical systems. They interpret technical documentation (e.g. schematics, standards, OEM manuals) to identify performance deviations and fault conditions. Through guided investigations and case-based scenarios, they begin to apply structured problem-solving methods and recognise how subsystems interact within asset lifecycles.	**Potential Unit: Interpret complex technical documentation to support diagnostic reasoning** Students develop diagnostic reasoning skills through hands-on experience with applied physics and materials behaviours in the field. They interpret multi-source documentation (drawings, datasheets, compliance codes) to support fault investigations and engineering modifications.	**Potential Unit: Lead diagnostic investigations to improve system reliability through engineering input** Students lead performance improvement initiatives by integrating engineering calculations, condition data and design documentation. They advise on system upgrades or design adjustments based on failure trends.
Capability Theme 2: Safety, Risk and Environmental Compliance Covers the identification of hazards, application of Work Health Safety (WHS) legislation, and	**Potential Unit: Apply WHS and environmental protocols in engineering operations**	**Potential Unit: Conduct and document engineering risk assessments**	**Potential Unit: Apply compliance and regulatory assurance in reliability engineering projects**

environmental obligations in engineering workplaces. Includes participation in structured inspections, reporting, and compliance documentation. Students apply formal risk frameworks, including Hazard and Operability (HAZOP), SIL, and criticality analysis. This theme incorporates the strategic application of standards and regulations in design, test planning, and operations, including the interpretation of ISO, AS, and site-specific regulatory frameworks.	Students are introduced to WHS legislation, hazard identification, and inspection processes. They support workplace safety practices by contributing to basic risk assessments and interpreting procedural requirements.	Students apply advanced risk assessment tools such as HAZOP, SIL and JSEA to case scenarios and contribute to safety audits. They examine the regulatory basis for maintenance interventions.	Students lead site-level safety evaluations and prepare compliance documentation for external audits. They assess complex regulatory implications for project or system changes.
Capability Theme 3: Condition Monitoring and Diagnostics Focuses on the practical application of data-collection tools and diagnostic techniques, including vibration analysis, thermography, oil analysis, and NDT. Students develop proficiency in identifying patterns, trends, and anomalies using advanced instrumentation, monitoring platforms, and digital visualisation tools. Students use AutoCAD and digital plant models to locate monitored assets, record sensor positions, and link diagnostic findings to equipment schematics and layout drawings, reinforcing the connection between analytical data and physical systems. The theme includes structured approaches to failure investigation (e.g. Weibull analysis and failure-inspection protocols) and incorporates advanced instrumentation methods for asset-	**Potential Unit: Conduct supervised condition monitoring and data recording** Students begin data collection tasks using basic instrumentation (vibration meters, thermal sensors, oil sampling tools) and record observations under supervision. They develop an understanding of equipment condition indicators.	**Potential Unit: Analyse condition monitoring data to inform asset reliability** Students independently conduct diagnostic testing using multiple methods (oil analysis, thermography, vibration signature comparison). They interpret results using trend analysis and baseline data.	**Potential Unit: Design and lead a multi-method diagnostic program** Students design condition monitoring regimes using multiple technologies. They coordinate testing programs, review diagnostic data and validate failure hypotheses through inspection and analysis.

health diagnostics. The theme also examines how condition-monitoring data supports sustainable asset management by extending equipment life, reducing waste, and enabling circular-economy approaches to component reuse and material recovery within reliability practice.			
Capability Theme 4: Reliability Methods and Failure Prevention Develops capability in the planning, documentation, and execution of RCM, FMEA, and test campaigns. Includes maintenance-strategy selection and development of test procedures aligned to lifecycle objectives. The theme includes advanced simulation methods, including system-level block modelling, reliability prediction, and digital-twin-informed performance validation. Partnership-based design approaches for failure elimination with OEMs and other stakeholders are included. The theme also builds competence in change management, work-management and planning practices that translate reliability strategies into effective field execution. Students apply task-prioritisation, scheduling, and coordination methods to integrate reliability activities with operational plans, ensuring maintenance resources are aligned to asset criticality, safety, and performance targets.	**Potential Unit: Apply basic reliability and failure analysis techniques to routine tasks** Students are introduced to preventive and predictive maintenance concepts. They explore common failure modes and contribute to basic reliability analyses using simplified FMEA structures.	**Potential Unit: Execute test procedures and coordinate structured failure investigations and reliability planning** Students participate in planning and executing test procedures, including setting test conditions and defining pass/fail criteria. They complete structured root cause analyses (5 Whys, Fishbone) and prepare technical findings. They also contribute to small-scale improvement actions arising from investigations, applying basic change-control processes to ensure modifications are documented, approved, and communicated across teams	**Potential Unit: Develop and validate system reliability strategies using digital tools** Students design and implement full RCM strategies, incorporating data, failure modes, and performance criteria. They use simulation tools (e.g. block modelling, digital twin environments) to validate improvements. They apply structured change-management practices to plan, communicate, and embed reliability improvements, ensuring that new maintenance strategies, procedures, or technologies are adopted effectively and sustain performance gains across the organisation.

Capability Theme 5: Digital Systems, Data and ERP Integration Students develop technical fluency in using CMMS, SCADA, and ERP systems to monitor asset condition, manage work orders, and track asset history. Inclusions highlight the strategic application of ERP tools (e.g. SAP) to prioritise maintenance through asset-criticality filtering, targeted scheduling, and data-driven decision-making. Students will also explore introductory scripting and coding to support data transformation, automation, and integration across platforms. Exposure to artificial decision-making tools for maintenance planning is introduced. The theme emphasises cross-functional collaboration and communication with OEMs, suppliers, and operations teams, supporting the translation of reliability insights into practical operational improvements across sectors and organisational contexts.	**Potential Unit: Apply digital tools to record and track maintenance activities** Students gain experience with CMMS platforms and SCADA interfaces to log faults, retrieve equipment histories and support work order tracking. Digital literacy and system navigation are introduced.	**Potential Unit: Apply ERP systems for asset prioritisation and work order management** Students begin to use ERP tools (e.g. SAP) to access asset hierarchies, generate reports, and apply criticality filters to prioritise maintenance. They are introduced to automation and AI features in ERP workflows.	**Potential Unit: Apply AI tools and automation techniques for predictive reliability** Students write and test scripts (e.g. Python) for asset data processing, use AI-driven platforms to predict failures, and generate maintenance plans. They build dashboards integrating ERP data feeds.
Capability Theme 6: Professional Practice, Collaboration and Influence Students develop applied professional skills in collaboration, documentation, and communication across engineering teams. This includes the preparation of structured reports, technical proposals, and the facilitation of RCA sessions. The theme includes frontline facilitation, team-development models, influence and direction-	**Potential Unit: Communicate technical findings in reliability teams** Students contribute to team discussions, record structured observations, and assist in documenting findings from technical work. They are introduced to technical writing and communication standards,	**Potential Unit: Facilitate reliability reviews and communicate improvement recommendations** Students prepare reports and briefings, contribute to team-based improvement projects, and facilitate small-group RCA sessions. They learn how to influence others through technical	**Potential Unit: Lead and influence cross-functional teams in reliability decision-making** Students lead interdepartmental teams on applied projects, present business cases to management, and refine technical recommendations based on stakeholder input. They apply

giving, and the preparation of technical and business cases. Students build commercial and financial literacy through applied study of budgeting, cost estimation, variance analysis, and life-cycle cost evaluation, enabling them to link reliability decisions to organisational performance and total cost of ownership. They interpret and communicate financial and performance metrics, using dashboards and key indicators to support evidence-based decision-making. Commercial awareness is developed through contextualised case studies involving contracts, supplier agreements, and warranty conditions relevant to reliability practice. The theme also develops understanding of commercial change and implementation contexts, preparing students to apply leadership and communication strategies that support adoption of new reliability processes, technologies, and organisational improvements. Ethical conduct and professional integrity are reinforced as essential elements of leadership and decision-making, with frameworks such as Tuckman's model used to strengthen teamwork, collaboration, and accountability within multidisciplinary engineering environments.	developing skills in clarity, traceability, and professional presentation of data. Students begin to understand how accurate and transparent reporting supports maintenance planning, cost control, and compliance within reliability programs.	clarity and evidence-based reasoning. The unit builds understanding of financial and performance metrics used in reliability reporting, enabling students to translate technical outcomes into business language that supports decision-making. Students interpret dashboards and KPIs to communicate the organisational impact of engineering improvements.	budgeting, cost-benefit, and life-cycle cost analysis to justify reliability initiatives, linking engineering outcomes to asset value and organisational objectives. Ethical reasoning and professional integrity guide their decision-making, ensuring that recommendations balance technical feasibility, financial responsibility, and regulatory compliance. The unit develops professional judgement in leadership, influence, and accountable decision-making within multidisciplinary environments.
Capability Theme 7: Technical Review and Assessment, Innovation and Systems Thinking This theme develops students' capability to evaluate emerging technologies, lead structured technical reviews, and manage the		**Potential Unit: Evaluate emerging technologies for reliability application** Students investigate innovation drivers in reliability engineering and develop foundational technical	**Potential Unit: Plan and deliver technical reviews and innovation projects in reliability contexts** Students undertake a capstone project involving technical

implementation of innovation and change within reliability and testing contexts. Students assess new materials, coatings, digital platforms, and diagnostic technologies through evidence-based feasibility studies, performance trials, and supplier collaboration. They learn to evaluate both the technical and organisational implications of adopting new technologies, applying structured change-management processes to plan, communicate, and embed improvements effectively. Systems thinking is advanced through simulation, modelling, and reliability-improvement frameworks that enable students to analyse interactions across complex engineering systems and anticipate the impact of innovation on people, processes, and performance. These capabilities are demonstrated through capstone workplace projects and integrated work-integrated learning experiences, where students lead or contribute to innovation and change initiatives that deliver measurable reliability and operational improvements.		review and assessment literacy. They evaluate emerging technologies, such as advanced coatings, sensor systems, or battery chemistries, through structured methods including literature review, supplier consultation and laboratory trials. Comparative feasibility analyses are conducted to assess technical viability, implementation risk and performance potential in applied contexts.	review and assessment, innovation implementation, change management and evaluation. They manage project scope, methodology, data analysis and reporting. A capstone could also be: • an integrated WIL model across multiple units with a final synthesis task. • a multi-unit project stream culminating in an applied workplace project • a substantial final-year applied review or innovation task.

Electives

Students will complete 5 Elective Units over the qualification. Electives can be drawn from any elective theme. Students may import up to two units from any other AQF level 7 qualification from a cognate discipline where the units contribute to the workplace outcome.

Elective theme	Unit description	Unit description	Unit description
Energy Systems and Sustainability Students develop applied capability in the design, testing, and reliability assurance of hydrogen, battery, and industrial energy systems that underpin sustainable mining and manufacturing operations. The theme integrates technical, regulatory, and environmental perspectives to prepare students for work in energy transition and decarbonisation contexts. Students learn to analyse system performance, assess safety and compliance risks, and apply reliability engineering methods to optimise asset integrity across hydrogen, battery, and utility networks. The theme emphasises applied science, regulatory literacy, and systems thinking in alignment with national clean energy and net zero strategies.	**Potential Unit: Apply reliability and safety principles to renewable and energy storage systems** Students develop applied expertise in the design, operation, and reliability assurance of renewable and storage technologies, including hydrogen, battery, solar, and hybrid energy systems. They examine the characteristics and risks of hydrogen and electrochemical systems, photovoltaic performance, and integration of renewable sources into industrial and remote-site operations. The unit introduces relevant Australian and international standards governing energy generation, storage, and distribution, with emphasis on system safety, compliance, and environmental sustainability. Students analyse system performance and degradation, assess storage and conversion	**Potential Unit: Apply reliability Engineering to energy and utilities systems** Students apply reliability and asset management principles to industrial energy and utility systems, including power generation, water, compressed air, and process-support infrastructure. They identify critical components, assess failure modes, and design preventive and predictive maintenance strategies to ensure operational continuity and efficiency. The unit integrates energy efficiency, system optimisation, and condition monitoring within the context of industrial decarbonisation and sustainability targets. Students use reliability-centred maintenance frameworks to improve the resilience and sustainability of energy and utility systems supporting heavy industry and remote operations.	

	efficiency, and apply reliability frameworks to optimise energy availability, safety, and lifecycle outcomes across mining, manufacturing, and clean-energy applications.		
Digital and Data-Driven Reliability Students develop the capability to use advanced digital tools, analytics, and simulation techniques to enhance reliability decision-making across complex industrial systems. The theme integrates computational modelling, digital twin development, and data analytics for predictive maintenance and continuous improvement. It includes exposure to AI-driven diagnostics, predictive analytics, and data-automation platforms that support evidence-based reliability decisions. Students learn to extract insights from asset data, assess the performance of emerging technologies, and translate digital evidence into actionable engineering and business outcomes. Emphasis is placed on automation, data integrity, and cross-functional communication between engineering, IT, and operations teams.	**Potential Unit: Apply simulation and digital twin methods for reliability assessment** Students use computer-aided engineering (CAE) and digital-twin platforms to model and predict asset reliability under real and simulated operating conditions. They apply finite-element, thermal, and dynamic analysis methods to assess stress, fatigue, and failure risk across systems. The unit develops skills in configuring simulation environments, validating model outputs against empirical data, and using simulation to optimise design and maintenance strategies. Students apply AI-assisted optimisation or machine-learning models to refine simulations and predict asset performance under variable conditions. Students explore the integration of digital models with live data	**Potential Unit: Analyse asset health data and report reliability trends** Students analyse time-series and process data to monitor asset health and detect emerging reliability issues. They apply SPC, regression analysis, and statistical inference techniques to detect significant trends, identify deviations, and forecast failures with defined confidence levels. The unit includes visualisation and communication of analytical results using digital dashboards and data-driven storytelling. Students are introduced to AI-assisted analytics and predictive algorithms that automate trend detection and failure forecasting. Students learn to align analytical findings with operational priorities and communicate reliability insights effectively across teams.	**Potential Unit: Evaluate and integrate emerging technologies for reliability practice** Students evaluate new technologies, tools, and methods that enhance reliability and asset management. They develop frameworks for assessing technical feasibility, cybersecurity, interoperability, and cost-benefit performance. The unit builds capability in implementing digital and sensor-based innovations, including AI diagnostics, condition-monitoring platforms, and automation systems. Students prepare business cases and implementation plans to integrate emerging technologies into existing operations.

	systems to support continuous reliability improvement.		
Materials, Testing and Innovation Students explore the relationship between materials, environment, and performance in the context of reliability and asset life. The theme integrates advanced materials science, environmental testing, and laboratory analysis to support failure prevention and innovation in mining, manufacturing, and transport systems. Students learn to select appropriate materials, design accelerated testing programs, and interpret laboratory results to inform design, maintenance, and remediation decisions. The theme encourages innovation through the application of sustainable materials and modern testing technologies.	**Potential Unit: Select and assess materials for reliable performance** Students examine material properties, degradation mechanisms, and the impact of environmental conditions on performance and reliability. They analyse wear, corrosion, fatigue, and embrittlement processes and explore the use of advanced alloys, composites, and coatings in harsh industrial contexts. The unit emphasises the selection and testing of materials based on lifecycle performance and sustainability criteria. Students assess material reliability through both experimental and analytical methods, integrating results into reliability engineering frameworks.	**Potential Unit: Plan, execute and evaluate environmental and lifecycle tests** Students design and conduct accelerated testing to assess material and component reliability under stress, temperature, and environmental exposure. They apply methods such as thermal cycling, salt-spray, vibration, and accelerated aging to evaluate durability and performance. The unit develops capability in test planning, instrumentation, and data interpretation for lifecycle validation. Students learn to use test outcomes to refine maintenance schedules and improve design robustness.	**Potential Unit: Coordinate failure analysis to eliminate defects and improve reliability** Students coordinate laboratory-based analysis of failed components to inform root-cause investigations and reliability improvement. They interpret metallurgical, chemical, and microscopic results, linking laboratory findings to field data and operational contexts. The unit covers laboratory coordination, sample management, and technical reporting. Students produce integrated reports combining analytical evidence and engineering judgement for defect elimination and reliability assurance.
Industry Applications and Collaboration Students apply reliability principles to real-world mining and industrial systems and develop the collaboration and communication skills required for effective industry partnerships.	**Potential Unit: Apply reliability engineering techniques to mobile fleet systems** Students apply reliability engineering techniques to heavy mobile equipment such as haul trucks, excavators, and shovels. They assess component failure	**Potential Unit: Apply reliability engineering techniques to fixed plant and processing systems** Students apply reliability analysis to fixed and process equipment, including conveyors, mills, crushers, and pumping systems. They use condition monitoring,	**Potential Unit: Collaborate with OEMs and customers to resolve reliability issues** Students develop skills to collaborate effectively with OEMs, suppliers, and customers on reliability improvement and product validation. They learn

The theme emphasises contextualised practice across mobile, fixed, and processing systems and explores how reliability engineering supports productivity, safety, and asset longevity. Students learn to engage with original equipment manufacturers (OEMs), suppliers, and clients to co-develop technical solutions and continuous-improvement initiatives.	modes, data-logging systems, and maintenance strategies for large-scale mobile fleets. The unit integrates digital diagnostics, telematics, and condition monitoring to predict and prevent downtime. Students develop improvement plans that enhance availability, reduce cost, and extend fleet life in demanding operational environments.	failure analysis, and reliability-centred maintenance to optimise uptime and throughput. The unit builds capability in assessing bottlenecks, modelling criticality, and integrating reliability strategies within production planning. Students link technical findings to asset-management and operational-risk frameworks.	structured approaches for problem resolution, upgrade planning, and technical negotiation. The unit emphasises evidence-based communication, documentation, and shared learning across organisational boundaries. Students facilitate joint reviews and continuous-improvement activities to strengthen supplier and customer relationships.
Commercial and Strategic Management in Engineering Operations Students develop business and analytical capability to manage the financial, strategic, and contractual dimensions of reliability and asset-management functions. The theme connects technical performance with organisational value through cost modelling, lifecycle planning, and ethical commercial practice. Students learn to evaluate investment decisions, manage supplier performance, and align engineering activities with corporate strategy and governance frameworks.	**Potential Unit: Apply engineering finance to support reliability and asset decisions** Students apply financial and statistical tools to evaluate engineering investments and asset strategies. They perform cost-benefit analysis, capital budgeting, and risk-adjusted return calculations using real industry data. The unit develops decision-making skills for balancing reliability improvement, lifecycle cost, and operational risk. Students prepare business cases and present financial recommendations for engineering projects.	**Potential Unit: Develop strategic asset and lifecycle plans** Students develop strategies for long-term asset management, including zero-based budgeting (ZBB), asset renewal forecasting, and lifecycle optimisation. They analyse asset data to inform planning horizons, replacement schedules, and sustainability objectives. The unit integrates financial, technical, and environmental considerations to produce data-driven renewal and optimisation plans. Students align asset planning with organisational strategy and performance metrics.	**Potential Unit: Implement commercial frameworks and procurement plans for technical projects** Students explore the commercial and governance frameworks that underpin major technical and infrastructure projects. They examine contract structures, supplier performance metrics, negotiation strategies, and ethical procurement principles. The unit builds understanding of risk allocation, stakeholder engagement, and contract compliance in complex engineering contexts. Students use and evaluate procurement plans that ensure value, accountability, and

			transparency in technical projects.

Specialisation

A student wishing to hold a testing and validation specialisation would complete all electives for the specialisation. The testamur would indicate that the specialisation had been achieved by including (Testing and Validation) in the qualification title.

Specialisation Description	Unit Description	Unit Description	Unit Description	Unit Description	Unit Description
Specialisation: Testing and Validation Students develop applied expertise in the planning, execution, and evaluation of tests that verify and validate the reliability and performance of engineered systems across mining, automotive, and advanced manufacturing environments. The specialisation builds proficiency in environmental and lifecycle testing, risk-informed verification, and digital test	**Potential Unit: Plan and conduct environmental and lifecycle testing** Students design and conduct environmental and lifecycle tests to validate equipment performance under simulated field conditions. They apply methodologies such as Highly Accelerated Life Testing (HALT), thermal cycling, vibration, and shock testing to assess reliability limits. The unit develops capability in configuring and calibrating data-acquisition systems, selecting sensors, scheduling test cycles, and	**Potential Unit: Analyse and interpret test data for reliability decision-making** Students process and interpret test data to support reliability and lifecycle decisions. They clean and automate datasets using analytical platforms such as Python, MATLAB, and Minitab, and apply statistical models including Weibull and lognormal analysis to determine reliability performance and confidence intervals.	**Potential Unit: Design and execute risk-Informed verification programs** Students apply FMEA, HAZOP and Hazard Identification (HAZID) to define verification scope, acceptance criteria, and traceability. They develop V&V test plans, integrate supplier compliance data, and use digital simulation to optimise physical test effort. Human-factors considerations and cross-disciplinary review are embedded to ensure robust, safety-focused verification outcomes.	**Potential Unit: Prepare and present traceable test documentation and validation reports** Students prepare and maintain complete, auditable test documentation to demonstrate compliance and performance assurance. They develop Factory Acceptance Test protocols, verification matrices, and close-out	**Potential Unit: Apply digital simulation and automation tools for testing and validation** Students explore digital approaches to testing and validation through simulation, modelling, and automated data processing. They use finite-element analysis, digital-twin, and HIL platforms to predict performance and

automation. Students learn to design structured verification and validation (V&V) programs, apply data acquisition and analytics tools, and produce traceable documentation that meets regulatory, customer, and audit requirements. The specialisation emphasises systems thinking, safety, and digital literacy through the integration of simulation platforms, automated data pipelines, and advanced analytics for predictive decision-making.	managing test environments. Students interpret outcomes to confirm design robustness and contribute to lifecycle validation planning.	The unit strengthens analytical reasoning and supports predictive maintenance, lifecycle projection, and statistical assurance within integrated reliability frameworks.		reports that link evidence to defined requirements. Emphasis is placed on structured test logs, data visualisation, and stakeholder briefings that communicate validation outcomes clearly and professionally across engineering, supplier, and client interfaces.	identify design risks. Automation of test pipelines and the use of AI-enabled systems to manage large datasets are introduced, supporting efficiency, reproducibility, and informed engineering decisions in complex testing environments.

Workplace learning

Workplace exposure and experience	Year 1	Year 2	Year 3
Workplace Learning Workplace learning is a central and compulsory component of the Vocational Degree in Reliability Engineering. It provides the structured, applied, and progressive experience required for students to demonstrate the autonomy, professional judgement, and integration of theory and practice expected at AQF Level 7. Across all three years, students undertake supervised and assessed workplace activities in operational environments that reflect authentic industry conditions. The purpose is to ensure that graduates are work-ready, capable of applying engineering principles, and able to contribute meaningfully to reliability, testing, and improvement functions within complex industrial systems.	**Structured Exposure and Guided Observation** In Year 1, students engage in structured workplace experiences that focus on observing maintenance and reliability practices under supervision. Their activities include shadowing technicians and engineers during inspections, condition monitoring rounds, and routine maintenance tasks. Students collect and record technical data (e.g. vibration readings, equipment logs), interpret basic technical documentation, and begin applying structured problem-solving frameworks (e.g. 5 Whys) in controlled environments. The emphasis is on building familiarity with plant operations, understanding asset contexts, and recognising how engineering systems function in real industrial settings. Examples include: Observing condition monitoring tasks such as thermography and lubricant sampling (Function 1).	**Applied Practice and Supervised Contribution** Year 2 workplace experience shifts towards active participation in diagnostic and improvement tasks. Students independently collect and analyse equipment performance data, conduct structured condition monitoring activities, and support root cause investigations. They may assist in planning maintenance strategies, interpreting fault trends, and contributing to asset health reviews. Through exposure to CMMS/ERP systems RCM processes, students begin to apply engineering judgement in recommending or evaluating maintenance interventions. While supervised, they take on increased responsibility for documentation, analysis and communication within multidisciplinary teams. Examples include: Conducting vibration, thermography or oil analysis and interpreting trends (Function 1).	**Integrated Application and Professional Judgement** By Year 3, students undertake extended workplace-based projects where they apply the full scope of their technical, analytical and professional capabilities. Working with real operational data and under limited supervision, they lead the investigation of complex equipment performance issues, trial reliability improvement strategies, or evaluate emerging technologies for site application. They engage directly with stakeholders, contribute to business case development, and document findings in professional reports aligned to organisational and regulatory requirements. The Year 3 experience is designed to demonstrate readiness for entry-level engineering technologist roles, meeting the application and autonomy expectations of AQF Level 7 and Engineers Australia accreditation. Examples include:

The design of workplace learning follows a staged model that moves from observation to independent application, ensuring that learning is cumulative and aligned with both Engineers Australia accreditation expectations and the applied professional outcomes of the qualification. Activities are directly mapped to the 11 core job functions identified in the Functional Analysis, ensuring consistency between academic study, industry practice, and professional capability development.	Recording maintenance work in a CMMS and reviewing work history (Function 2). Observing informal failure inspections and basic fault isolation (Function 3). Participating in toolbox talks and site inspections with WHS officers (Function 10). Reviewing engineering drawings, schematics and manuals alongside technicians (Function 11). Reviewing or updating component drawings in AutoCAD under supervision to confirm equipment configurations and assist with documentation control (Function 11). Witnessing the development of basic inspection reports or checklists (Function 9). Exposure to supplier presentations or informal briefings on new tools or materials (Function 5).	Contributing to asset criticality reviews and tactic development workshops (Function 2). Participating in formal root cause investigations and supporting report preparation (Function 3). Reviewing work order history and helping define reliability KPIs (Function 4). Contributing to the preparation of test plans, including risk assessments and acceptance criteria (Function 6) Researching new materials or diagnostic tools and supporting lab trials or evaluations (Function 5). Using digital tools to extract ERP maintenance data for analysis or reporting (Function 8). Supporting compliance checklists or assisting in internal audit preparation (Function 10). Drafting sections of inspection reports or technical documentation under supervision (Function 9). Attending supplier meetings or observing commissioning of small-scale systems (Function 11). Using AutoCAD or digital plant models to support asset mapping, inspection planning, or modification proposals (Function 11).	Delivering a reliability improvement project and presenting findings to stakeholders (Function 7). Preparing test documentation, executing acceptance testing, and analysing results (Function 6). Conducting compliance documentation reviews and preparing materials for regulator submission (Function 10). Using ERP data to track performance and support decision-making on maintenance investments (Function 8). Coordinating with suppliers to trial or evaluate new materials, coatings, or instrumentation (Function 5). Authoring full inspection and improvement reports aligned with traceability standards (Function 9). Contributing to equipment commissioning or participating in cross-functional review panels (Function 11). Framing project scope and methodology through applied research and feasibility work (Function 4 and 5). Applying engineering principles to justify design modifications or upgrades based on performance analysis (Function 1 and 4).

Mining and Automotive Skills Alliance

The Mining and Automotive Skills Alliance (AUSMASA)
is a Jobs and Skills Council funded by the
Australian Government Department of Employment and Workplace Relations.