2025 ASSESSMENT REPORT
EDN315123 ENGINEERING DESIGN

General Comments

Student submissions, in this the third year of the course, were consistently improved over previous years. While there were some students that failed to submit, there were fewer student folios that were incomplete or of a very low standard. Examiners were impressed this year by the number of high quality and the diversity of the projects and folios.

The slight modifications and adjustment to the course that were recommended at the end of last year have made assessment distinctly clearer for examiners and improved marking consistency throughout the marking process. There may have been a few students though that may have still been working off the 2024 document and focused on and addressed certain elements that were no longer present. Teachers should ensure that they are using the latest course documents available at the time of their course delivery.

As mentioned last year, students again improved their presentation by more closely following the requested folio structure, format and headings that provided a clear documentation of the design process narrative. Examiners make every effort to find evidence of student achievement against every criterion being assessed and this allows for more clearer and consistent interpretation and marking of each project – though this is also dependant on the clarity of the folio and report. This is very clearly specified in the External Assessment Specifications including the criteria that are being assessed. Examiners can only assess what has been presented.

Many folios are still very verbose. More words do not correlate to better marks. The information, ideas, design process and documentation, etc… is more important. It should not be an essay with some visual elements and descriptions, but rather a technical report with design, data and analysis.

Examiners would also like to reiterate that requirements for submission are that files are first checked by the submitting staff member, to ensure there is nothing that can identify the student (name(s) or images) or provider. It should be saved as a .pdf file and zipped (with the video file if present) and then uploaded for submission. Many of these steps seem to have been missed for a few folios. This is a frustration for examiners who must then refer the documents to TASC for rectification, interrupting the marking process.

Staff have previously noted that finished projects from a Design and Production (DAP) or Engineering Design subject are indistinguishable from each other. While this may be true for the finished object, the process to get there will vary greatly. As the names suggest, Design and Production subjects focus on the design and then the production (the making) of the object, while engineering design students should have gone through a comprehensive engineering design process focusing on the research, design and making of a prototype and subsequent testing and modifying to demonstrate improvement. Students should be able to demonstrate this in their documentation in their folio report. The students that focus on the making of the final object/product and cannot demonstrate the aforementioned engineering design process stages

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will be awarded lower marks than one that does. As previously stated, project folios should focus more on the solving of the problem than the final project/product/object. The final projects and prototypes should be clearly able to be assessed against Engineering Design criteria. They must show an engineering design approach that applies knowledge and solves a clearly stated problem as well as following the engineering design process.

Criterion 1: apply critical and creative thinking to the design of a solution

This criterion has several elements that related directly to the problem and its solution through the design process.

Students should first set the scene by providing a background and context statement at the beginning of the folio. Students should be clear as to the overall information so that examiners (and anyone else reading the folio) will understand what is the problem that needs to be solved. Most students were able to articulate a design problem successfully. Typically, students who achieved a higher mark in this criterion had a simple and succinct problem statement that they were able to analyse in their brief and break down into aims that they would need to meet to solve the stated problem.

Students should consider between 3-6 open ended aims for the folio where 'open ended' denotes that there are many solutions open to the designer. An aim such as "the object should be able to roll" is much more 'open' than "the object must have 4 wheels". If the aims are met, then the problem should be solved. An important design consideration is what success criteria need to be met so that the aims will be met (more on this in Criterion 4).

It is recommended to number the aims and success criteria in a dot-point format. This will enable them to be referred to in a simple manner throughout the folio. This is a recommended approach as it not only addresses the problem solving and design considerations in this criterion but also makes Criteria 4 and 8 easier to identify and address with greater clarity. Some of the exceptional project folios did this very well and throughout their design process it was clear as to 'why they were doing what' due to justifying their design rationale against their aims and its clear progress towards an effective solution.

Criterion 2: apply an iterative design cycle to develop engineering design solutions

There was again an increase of students undertaking and 'completing' physical objects and prototypes compared with digital or software product projects from 2023 and 2024. There were some extremely impressive prototypes presented to examiners. Where movement was part of the functionality, a video was vital to demonstrate not only how it worked but that it actually worked.

Many of the weaker folios demonstrated that there were time management issues with both the production of the prototype and the folio (report). It is strongly recommended to staff and students that projects are carefully considered and decided based on the resources and skills available to the student and the school. Once decided and designed, students should closely work their way through the production proposal process so that they have a plan/timeline going forward and are able to organise what they need in a timely manner. Again, some of the weaker folios 'ticked the box' and provided some design specifications, a Gantt chart, risk assessment and costing without being overly convincing that they were actually used in a meaningful manner.

Successful folios not only successfully planned, organised and undertook their projects but also documented the process, not only did they describe the specialist tools and equipment (including skills, processes, materials and safety details) but also justified their use and the solutions they found when they encountered difficulties. Examiners do not wish to see a journal. Rather they would like to understand the production process and the engineering methodologies implemented in the prototype's production.

Successful projects were also prototypes that were able to be 'tested' (physically or in collaboration with others) and the feedback from these tests was able to be used on modifying the prototype to make it better and a more effective solution.

It was pleasing to note that there were very few folios that left the impression that they were a "solution in search of a problem" – that the student had an idea of what they wanted to make and had worked backwards to construct the scenario and problem to fit.

Criterion 4: use success criteria to review, reflect on and refine the design process

As the Criterion name suggests, the key here is success criteria. As mentioned last year, while there is again an improvement in this criterion, many students still fail to understand the need for clear and measurable success criteria and their direct relationship to particular aims that if met, will 'solve' the problem.

The aims need to be met so that one can claim to have successfully solved the problem. As mentioned in the feedback for Criterion 1, the aims need to be well considered and open ended and have success criteria associated to them that if met (or exceeded) will show that they have been achieved. The most successful aims are measurable (possibly numeric) in some way and achievable with the resources/time available.

The example given last year is still valid and worth repeating and reinforcing:

Context and Client: "*An elderly disability pensioner living at home with a physical impairment requires a method of hanging his washing and raising and lowering it to dry as he is unable to lift his arms over shoulder height.*"

Problem: *To design adjustable height clothes hanging system operable by an elderly person with additional physical needs.*

Aim 1: *It should be cheaper than what is available at Bunnings and of comparable quality.*

Success Criteria 1: *It should cost less than $150 and support 30kg*.

The aims and success criteria should be referred to throughout the document to show that consideration has been given in the design decisions that are being made. During the Research Analysis Essay, any information, precedents and/or examples researched should be evaluated against them and justified as to their compatibility. Information such as cost and materials would be relevant for the above example. Likewise, during the Design Development stage, while there isn't an actual prototype to physically test, the Design ideas and rationale should be tested and analysed against them and justified to show that not only there is development but also progression to a better solution.

Once a prototype has been constructed it would be possible to physically test that it meets the aims and success criteria. Will it support 30kg? How much more? How is it operated? Is it possible for an elderly person? Is it ethically possible to ask someone to test it and give feedback? As each project is different students will need to decide how they will test their prototype, what data they are collecting and how they can collate and present it so that it clearly shows the outcomes against the relevant success criteria. Depending on the outcomes and feedback from testing, within the Design Production phase/section, design modifications should be undertaken to the design and the prototype. This will allow for further testing and improvement to [hopefully] evolve and produce the best solution possible as presented in the Final Engineered design. In this section and the next, explicit mention should be made of the aims and success criteria, in the form of annotation and an Evaluation and Recommendations demonstrating (not just claiming) and justifying with evidence that they have been met and thereby the problem solved.

Successful students undertook testing, collected and collated data and then analysed and explained this in a clear manner in their folios. They then fed their findings and understandings into the production modifications that improved the design to better solve the problem. This was well documented. Some students undertook comprehensive testing but did not document or present their testing and information in a clear manner and examiners were unable to award marks that they might feel that they were deserving of. Students should be encouraged to document testing, and staff should check that it is included. What is not there or unclear cannot be marked.

Weaker students presented little in the form of testing of the justification for design decisions and modifications based on the success criteria and aims. It was unclear as to why they made design decisions or their considerations (C1E2&3) and their refinement to reach a solution (C4E4). Some seemed to be arbitrary and lacked justification, but most seemed to be affected by a lack of planning and running out of time.

Criterion 5: communicate for technical and non-technical audiences

While this year fewer students achieved A's (16 compared to 24), there was a significant improvement at the lower end with much better communication overall. Examiners were impressed with the quality and consistency of the folio presentations finding some to be exemplary.

Students who achieved the highest ratings demonstrated a full suite of communication skills throughout their folio to explain their designs and document the processes that they undertook.

The main critique of student folio presentation (as mentioned last year) was the use of A4 Landscape formats with huge blocks of unbroken text. This can be difficult for examiners to read. Students should break up pages into columns and use headings, subheading and illustrations or, even better, edit the text so that it is more succinct.

The use of correct technical (engineering) terms and concepts is encouraged in student's folios, provided they are explained and used correctly. Folios that were awarded higher ratings applied this well while lower ratings were awarded to folios that might have mentioned a concept or quoted a formula but not used it correctly or consistently. Also, due to the breadth of engineering and the depth of certain student's specialisations for their individual projects there are instances where the examiners may not have the prerequisite background knowledge to fully comprehend the subject matter before them without students clearly explaining the project and their understanding of the concepts and content. It is recommended that some students include an appendix or addendum to clarify terms, formula, concepts or information, such as explaining what a particular coefficient number signifies and why it is being used.

Examiners were impressed with the CAD drawings and models presented but would also like to see design sketches leading up to the CAD work demonstrating a development of the ideas and design.

Some students were marked down due to poor referencing. In some cases, referencing is not only used to differentiate between the student's own work and external sources, but also to highlight the input of stakeholders and clients. In one case this may have been the difference between a "C" and an "A" due to not referencing and identifying the stakeholder's input/advice/feedback supporting changes made to designs and prototypes rather than the assumption that it was student's decision. Encourage students to reference personal communications and advice clearly and correctly (it is recommended to use a reputable referencing generator) so that they can also be used as part of the testing and feedback of the design process (especially in the case of prototypes that are difficult to physically test).

Students must remember to correctly reference all graphics, modelling and analytical software used. As AI develops further this will become much more important to show where AI is used as a tool and where it is working as a partner in the design process.

As mentioned last year, links to information or videos should not be embedded – they will not be accessed due to both a security risk as well as possibly allowing an unfair advantage to those students between submission and marking (and their ability to update links after the submission date).

When developing the folio, markers encourage students to consider the following:

1. Follow the structure and outline detailed in the External Assessment Specifications.
2. Use clear headings and subheadings.
3. Address all relevant points explicitly: make it clear to the examiners what they have done to address them and why.
4. Analyse the research and testing done rather than just report and comment.
5. Use sketches and illustrations to explain design rationale. Use sketches and/or cartoons/storyboards to explain software planning.
6. Use technical drawings (orthographic, axonometric, CAD drawings, CAD models, CNC/3D printed CAM) and diagrams (data representations, code, matrices, graphs, charts) to present and use dimensions and annotations to explain.
7. Use CAD models and prototypes to test.
8. Computer based projects must show iterations (document the progression of the design) and annotate/analyse why changes/modifications were made to improve the proposed solution. Show where there were mistakes in the coding and how it was rectified and improved.
9. Testing should collect, collate and present data directly related to the success criteria and then analyse it to indicate possible improvements and modifications.
10. The Evaluation and Recommendations should draw the entire process together and communicate the process and how the problem has been solved and what could be done to make it even more successful.

Finally, students should check the spelling and the grammar of the folio. Students should ensure they have edited it before submission. There are few excuses as to why headings and subheadings are not capitalised, are simple spelling mistakes, or American English is used, or Imperial measurements are out of context.

Criterion 8: analyse the interrelationships between engineering projects and society

The results that students achieved in this criterion show a significant improvement over the last two years. Examiners have suggested that this is both the refinement of the elements of Criterion 8 and a better understanding of what is being assessed by staff, students and examiners.

While still a broad criterion, most students were able to address most of the elements successfully. Depending on the project and focus, examiners applied the most relevant parts of Element 3 to best assess the work submitted. In some cases, one or two parts of this element were discounted as they were not relevant to the project. Examiners felt that it was better that students focus on the most relevant aspects rather that ‘pay lip service’ to all of them with pointless text and jargon so that they could ‘tick the box’ without actually saying anything pertinent to the project.

The first three elements of the criterion were particularly weighted in the assessment of the Research Analysis Essay and Design Development while The Final Engineered Solution and the Evaluation and Recommendations weighted Element 4 more heavily than the other three when assessed against this criterion.

Students should attempt to focus on addressing the elements succinctly and explicitly using their aims and associated success criteria to justify their design decisions leading to their solution as well as the stages along the way.

A few students included references to professional engineering standards and associated ethics. This may have been due to students or staff using last year’s course document (Professional standards element was moved to Criterion 6).

Many of the comments from last year titled: “General Observations of the Folios”, are still applicable but have not been reproduced here for the sake of brevity. It is suggested that interested parties re-read this section from the 2024 report.

2025 Marking Tool

FOLIO #: _________ **TASC ID:** _______________ **DATE:** _________ **PROJECT:** ________________________________

Criterion	Ratings	Consensus rating
C1. apply critical and creative thinking to the design of a solution		
C2. produce prototypes to develop engineering design solutions		
C4. use success criteria to review, reflect on and refine the design process		
C5. communicate for technical and non-technical audiences		
C8. respond to problems and identified aims.		

COMPONENT	EXPLANATION	C1	C2	C4	C5	C8
Design brief	☐ statement of problem(s) ☐ description of main aims(s) and objectives(s) ☐ the potential user, target audience, or intended client ☐ constraints and limitations ☐ success criteria	C1			C5	C8
Research analysis essay (1500 – 2000 words)	☐ review of previous work/research ☐ evidence of stakeholder engagement ☐ STEM concepts ☐ identification of professional standards in relation to ethics in engineering design practice and consumer rights ☐ social, ethical, economic, and environmental issues related to technology, materials selected, processes used, and solution design	C1		C4	C5	C8
Design development	☐ articulation of the engineering design process (diagrams, sketches, photographs, annotations) ☐ consideration of alternative solutions ☐ production drawings and plans. ☐ analysis of planning and design ideas, including positive and negative aspects, against the design brief / needs.	C1	C2	C4	C5	C8
Production proposal	☐ design specifications ☐ resource requirements (materials, tools, equipment, etc.) ☐ risk assessment ☐ budget/costing ☐ identification of potential collaborations	C1	C2		C5	
Design production	☐ photographs/screen grabs with annotations that explain the production process ☐ prototype(s) development and selection. ☐ testing methodology/experimental design ☐ methods for obtaining stakeholder feedback ☐ evidence of data collection and data analysis ☐ evidence of refinement of solution		C2	C4	C5	
Final engineered design	☐ annotated photos ☐ video file (3:00 – 3:30)		C2	C4	C5	C8
Evaluation and recommendations	☐ evaluation of the product against the project's stated purpose and needs ☐ reflect on what has been achieved and what may not have been achieved. ☐ recommendations for further research, testing, improvements, or redesign.	C1	C2	C4	C5	C8
References	☐ in-text referencing throughout the paper ☐ reference list				C5	