

LEVEL 4 ASSESSMENT SPECIFICATION

Student name:		Student ID number:	
Programme:	PT Engineering Portfolio - BEngs Mechanical Engineering, Mechanical & Manufacturing Engineering, Manufacturing Systems Engineering, Materials Science, Advanced Manufacturing Operations, BSc Engineering Management. DA6ME, DA6MME, DA6MSE, DA6MTS, DA6AMO, DA6EMMA.		
Module:	Materials and Introduction to Processing		
Module code:	ACMA4000	Contribution to Overall Module Assessment (%):	50% (report + video)
Lecturer:	Dr Mohamed Gabr	Internal Verifier:	Dr A. Marotin
Assignment Title:	Manufacturing processes and defects	Word count (or equivalent):	1500 words
Submission deadline:	09/02/2026 (9am)	Return date of provisional marks & written feedback:	Within 20 working term time days of submission date
Submission method:	All written assessments, where practical and possible, must be submitted via Moodle unless otherwise instructed by the Lecturer. (Please DO NOT put this assessment specification into Turnitin or it will match many similarities with other students' submissions.) Alternative submission method (if applicable): N/A Late submission of the assessment will result in a late penalty mark: Work which is submitted up to 1 week late will be capped at 40% for the first attempt and will be awarded a mark of 0% for re-assessment. Late submission penalties may be lifted only if there is an approved extenuating circumstances claim. Work submitted more than 1 week late will be considered as a non-submission and will not be marked. The work may be considered as a submission for reassessment if offered by an Examining Board or if there is an approved extenuating circumstances claim.		
Academic honesty / referencing:	Academic honesty is required. In the main body of your submission you must give credit to authors on whose research and ideas your work is based. Append to your submission a reference list that indicates the books, articles, etc. that you have used, cited or quoted in order to complete this assessment.		

Module Learning Outcomes (from module syllabus)	
Upon the successful completion of this module, the student should be able to: • an understanding of the structure and properties of metals and polymers • Knowledge of the applications, advantages and limitations of different manufacturing processes and understanding of engineering materials and manufacturing process selection	
Engineering Council AHEP3 Learning Outcomes Assessed in this Module	
*SM3 b	Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline
EL4	Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate
P2	Knowledge of characteristics of particular materials, equipment, processes or products
*Only applies to Mechanical Engineering & Energy and Environmental Engineering programmes. You <u>MUST</u> demonstrate that the work submitted in completion of this assessment meets each of the AHEP3 learning outcomes listed above.	

TASK DESCRIPTION

Use of Generative AI in Assessment

(Lecturer to indicate Yes or Not against each element)

RESEARCH	For this assessment, you can use Generative AI to support you in research, including searching for bibliography, using tools to summarise, compare and interrogate materials.	Yes ☒ No ☐
STRUCTURE	For this assessment, you can use Generative AI to support you in structuring your submission, including creating a draft argument structure, identifying parts and headings, etc.	Yes ☒ No ☐
PROOFREADING	For this assessment, you can use Generative AI to check your own text/creation for grammatical and syntactical mistakes, including rephrasing of your own work within specific standards.	Yes ☒ No ☐
WRITING	For this assessment, you can use Generative AI to create text for submission.	Yes ☐ No ☒
CREATIVE	For this assessment, you can use Generative AI to create creative materials, such as images.	Yes ☐ No ☒
PROGRAMING	For this assessment, you can use Generative AI to create and check code.	Yes ☐ No ☒
NONE	For this assessment, you are not allowed to use any type of Generative AI support. This includes research support, structure support, writing/proofreading support and creative support.	Yes ☐ No ☒

Choosing the correct material for a product significantly influences its mechanical properties, weight, cost, ease of manufacture, durability, and environmental footprint. Some factors are more important than others, and part of an engineer's role is to evaluate trade-offs carefully. This coursework aims to help you practise systematic comparison and justification of materials and manufacturing processes, developing the ability to make informed engineering decisions.

In this assignment you will write a report and produce a video examining material selection and the choice of manufacturing processes for three day-to-day items. You should choose three commonly used items, each made from a different class of materials (e.g. one metal, one polymer, one ceramic or composite)

TASKS AND GUIDELINES

Task 1: Selection and Description of Objects (8%)

1. Choose three objects from your everyday environment, each made primarily from a different material category (metal, polymer, ceramic, or composite).
2. Focus on objects that are predominantly made of a single material. Small additional parts (e.g. screws, coatings) are acceptable.
3. Where possible, provide an estimate of the worldwide annual production of the object, and briefly outline how you think it is made.
4. For each object:
 - Provide a detailed explanation of why you chose the object and its material.
 - If multiple materials are present, identify the **primary material**.
 - Include pictures or illustrations of your selected objects to enhance clarity.

Notes:

- Be specific about each object's application and explain why the chosen material is suitable.
- Support your explanation with credible sources and relevant material properties (e.g. strength, weight, cost, ease of manufacture).
- Ensure your reasoning reflects both the advantages and limitations of the material in that application.

Task 2: Manufacturing Methods Comparison (10%)

1. Compare the manufacturing methods suitable for producing your chosen objects using different materials.
2. Focus on:
 - Complexity: How challenging is the process?
 - Rate of Production: How quickly can it be produced?
 - **Processing Cost**: What are the cost implications?

Notes:

- Use diagrams or flowcharts where possible to explain methods.
- Compare benefits and drawbacks of methods across different materials.
- Justify why certain methods are preferred based on material properties and product use.
- Refer to scholarly or industry sources for manufacturing processes to strengthen your arguments.

Task 3: Mechanical and Thermal Properties Comparison (8%)

1. Discuss how the mechanical properties (e.g. strength, ductility, formability) and thermal properties (e.g. heat resistance, melting temperature) differ for your chosen objects across materials.
2. Provide relative comparisons (e.g. higher, lower, similar).

Notes:

- Use a table or chart to summarise properties clearly.
- Highlight the impact of these properties on performance and application.
- Explain how the properties influence material suitability for the object.
- Support comparisons with data from credible and up-to-date sources.

Task 4: Lifespan and Cost Analysis (8%)

1. Compare the expected lifespan and costs of the objects, based on the selected materials.
2. Explain how the objects may change or degrade over their lifespan.
3. Discuss how the part will be disposed of at the end of its life. Can you envisage any environmental degradation associated with this?

Notes:

- Evaluate durability and wear resistance under typical conditions.
- Discuss cost-effectiveness, considering initial manufacturing and long-term maintenance.
- Address potential degradation mechanisms (e.g. corrosion, fatigue, thermal wear) and how these affect performance.
- Use case studies or real-world examples to illustrate your points.

Task 5: Material Selection and Alternative Choices (6%)

1. Provide a constructive critique of the material and process selection you have observed for each of your objects. Why do you think the designer chose this material/process? What other materials or processes may have been considered, and why?
2. Given complete freedom of choice:
 - Suggest a preferred material for each object.
 - Recommend a suitable manufacturing method based on that material.

VIDEO PRESENTATION (10%)

In addition to the report, you must record a five-minute video presentation. This is a summative component worth 10% of the module grade.

Provide a concise summary of your findings (not a repeat of the full report).

Content to include:

- Introduction of the three objects and their primary materials.
- Comparison of possible manufacturing processes.
- Key differences in mechanical and thermal properties.
- Main factors affecting durability and cost.
- Summary of material choices and possible alternatives.

Assessment focus:

- Technical content.
- Clarity and professionalism.
- Communication skills.

The word limit for the report is 1,500 words ($\pm 10\%$).

NOTES:

- You should include a properly formatted Table of Contents, list of Tables/Figures in the beginning of your assignment.
- You should properly cite others' work within the body of your assignment (use Harvard referencing system) and provide a list of cited references at the end of your assignment. Copying and pasting a text from others' work is not acceptable. You should rephrase the text in a way that suits your needs.
- Work must follow the required formatting guidelines (Arial, size 12, 1.5 spacing). Marks may be deducted for failure to comply with presentation requirements.
- You may include appendices at the end of your assignment and refer to them in the body of your assignment when required.
- You should also provide an abstract at the beginning of your assignment.
- You should use heading and sub-headings in your assignment.
- You should be very specific to include examples, if your examples are not relevant you will not be awarded any marks for it.
- See the generic assessment criteria included at the end of this brief. This will be strictly followed to mark your assignments.

GUIDANCE FOR STUDENTS IN THE COMPLETION OF TASKS

NOTE: The guidance offered below is linked to the five generic assessment criteria overleaf.

1. Engagement with Literature Skills

Your work must be informed and supported by scholarly material that is *relevant* to and *focused* on the task(s) set. You should provide evidence that you have accessed an appropriate *range* of sources, which may be academic, governmental and industrial; these sources may include academic journal articles, textbooks, current news articles, organisational documents, and websites. You should consider the *credibility* of your sources; academic journals are normally highly credible sources while websites require careful consideration/selection and should be used sparingly. Any sources you use should be current and up-to-date, mostly published within the last five years or so, though seminal/important works in the field may be older. You must provide *evidence* of your research/own reading throughout your work, using a suitable referencing system, including in-text citations in the main body of your work and a reference list at the end of your work.

Guidance specific to this assessment: *Marks in this part of the assessment will be awarded if you can demonstrate the use of a wide range of recent and credible sources such as journal articles, textbooks, conference papers, industry reports and reliable websites. These should be applied directly to the tasks of this assessment, for example in supporting the choice of objects and materials in Task 1, in explaining and comparing manufacturing methods in Task 2, in providing data on mechanical and thermal properties in Task 3, in discussing lifespan and costs in Task 4, and in justifying material selection and alternatives in Task 5. All references must follow the Harvard system, and copying or pasting from online resources is strongly discouraged.*

2. Knowledge and Understanding Skills

At level 4, you should be able to demonstrate knowledge of the underlying concepts and principles associated with your area(s) of study. *Knowledge* relates to the facts, information and skills you have acquired through your learning. You demonstrate your *understanding* by interpreting the meaning of the facts and information (knowledge). This means that you need to select and include in your work the concepts, techniques, models, theories, etc. appropriate to the task(s) set. You should be able to explain the theories, concepts, etc. to show your understanding. Your mark/grade will also depend upon the *extent* to which you demonstrate your knowledge and understanding.

Guidance specific to this assessment: *Marks in this part of the assessment will be awarded if you can demonstrate clear knowledge and understanding of manufacturing processes and material properties, explained in your own words and **supported with diagrams**, tables or flowcharts where appropriate. You are expected to describe how processes work and why they are suitable for your chosen objects, to explain the key mechanical and thermal properties of the selected materials, and to highlight the relationship between structure, properties and performance. Clarity of explanation will be used as an indicator of understanding, and ambiguous or overly complex sentences should be avoided.*

3. Cognitive and Intellectual Skills

You should be able to present, evaluate and interpret qualitative and quantitative data, in order to develop lines of argument and make sound judgements in accordance with basic theories and concepts of your subject(s) of study. You should be able to evaluate the appropriateness of different approaches to solving

problems related to your area(s) of study and/or work. Your work must contain evidence of logical, analytical thinking. For example, to examine and break information down into parts, make inferences, compile, compare and contrast information. This means not just describing what! But also justifying: Why? How? When? Who? Where? At what cost? You should provide justification for your arguments and judgements using evidence that you have reflected upon the ideas of others within the subject area and that you are able to make sound judgements and arguments using data and concepts. Where relevant, alternative solutions and recommendations may be proposed.

Guidance specific to this assessment: *Marks in this part of the assessment will be awarded if you can demonstrate the ability to evaluate and compare manufacturing processes, properties and costs critically rather than descriptively. You are expected to explain not only the advantages and disadvantages of different processes and materials, but also the reasons why certain choices are made in practice, taking into account trade-offs such as performance versus cost or lifespan versus manufacturability. Evidence from credible sources must be used to justify your arguments, and marks will be reduced if only simple lists are presented without evaluation.*

4. Practical Skills

At level 4, you should be able to apply the basic underlying concepts and principles to evaluate and interpret these within the context of your area of study. You should be able to demonstrate how the subject-related concepts and ideas relate to real world situations and/or a particular context. How do they work in practice? You will deploy models, methods, techniques, and/or theories, in that context, to assess current situations, perhaps to formulate plans or solutions to solve problems, or to create artefacts. This is likely to involve, for instance, the use of real world artefacts, examples and cases, the application of a model within an organisation and/or benchmarking one theory or organisation against others based on stated criteria.

Guidance specific to this assessment: *Marks in this part of the assessment will be awarded if you can demonstrate practical application of theory to real-world objects. You are expected to choose three everyday objects that are realistic and relevant to the assignment, and to use them effectively in applying concepts from the literature. Appropriate examples should be used to illustrate how manufacturing processes, costs, durability and sustainability affect the chosen objects. Irrelevant or poorly justified examples will not be considered and no marks will be awarded for them.*

5. Transferable Skills for Life and Professional Practice

Your work must provide evidence of the qualities and transferable skills necessary for employment requiring the exercise of some personal responsibility. This includes demonstrating: that you can communicate the results of your study/work accurately and reliably, and with structured and coherent arguments; that you can initiate and complete tasks and procedures, whether individually and/or collaboratively; fluency of expression; clarity and effectiveness in presentation and organisation. Work should be coherent and well-structured in presentation and organisation.

Guidance specific to this assessment: *Marks in this part of the assessment will be awarded if you can demonstrate the ability to present your report in a clear, professional and well-structured manner. This includes the use of the required format (abstract, table of contents, introduction, task-based sections, conclusion and references), correct referencing, and effective presentation of diagrams, tables and figures. The writing must be coherent, grammatically correct and technically accurate, with a professional style. Reports that are poorly formatted, unclear or exceed the word limit will lose marks.*

- i. *Different assessments have varying word lengths specified for them; it is important that the student keeps to the word length specified for each assessment at all times on the following grounds:*
 - *To encourage succinct and clear writing by students.*
 - *To ensure equity between all the students doing that particular assessment*
- ii. *If the specified word limit for an assessment has been exceeded, the following penalties would normally apply. The penalty cannot take the work into the fail category.*

	Up to 10% over	10-25% over	25-50% over	50%+ over
Word Count	1500-1650	1651-1875	1876-2250	2251
Deduction (to 40% Cap)	0%	5%	10%	Mark capped to 40%

STUDENT FEEDBACK FORM

This section details the *extent* to which the assessment criteria are demonstrated by you, which in turn determines your mark. The marks available for each category of skill are shown. Lecturers will use the space provided to comment on the achievement of the task(s), including those areas in which you have performed well and areas that would benefit from development/improvement.

Generic Assessment Criteria	Marks available	Marks awarded
1. Engagement with Literature Skills		
	20	
2. Knowledge and Understanding Skills		
	25	
3. Cognitive and Intellectual Skills		
	20	
4. Practical Application Skills		
	25	
5. Transferable Skills for Life and Professional Practice		
	10	

Assessment Mark (Assessment marks are subject to ratification at the Exam Board. These comments and marks are to give feedback on module work and are for guidance only until they are confirmed.)	Late Submission Penalties (tick if appropriate)		%
	Up to 1 week late (40% Max)		
	Over 1 week late (0%)		

GENERIC ASSESSMENT CRITERIA

Level 4

In accordance with the Framework for Higher Education Qualifications, at the end of Level 4 students will be expected to have demonstrated knowledge of the basic underlying concepts and principles of a subject, and an ability to evaluate and interpret these within the context of that area of study. They should be able to present, evaluate and interpret qualitative and quantitative data in order to develop lines of argument and make sound judgements in accordance with basic theories and concepts of their subject(s) of study. They will have learned how to evaluate different approaches to solving problems, and will be able to communicate the results of their study/work accurately and reliably, and with structured and coherent arguments. They will be able to undertake further training and develop new skills within a structured and managed environment and will have the qualities and transferable skills necessary for employment requiring the exercise of some personal responsibility.

Level 4	FAIL	MARGINAL FAIL	SATISFACTORY (3 rd / Pass)	GOOD (2.2 / Pass)	VERY GOOD (2.1 / Merit)	EXCELLENT (1 st / Distinction)	EXCEPTIONAL (1 st / Distinction)
Category	0-29%	30-39%	40-49%	50-59%	60-69%	70-84%	85-100%
Engagement with literature (including reading, referencing, academic conventions and academic honesty)	Little or no evidence of reading and/or reliance on inappropriate sources. Views and findings mostly unsupported and non-authoritative. Referencing conventions used incoherently or largely absent.	Poor engagement with essential reading. No evidence of wider reading. Reliance on inappropriate sources, and/or indiscriminate use of sources. Heavily reliant on information gained through class contact. Inconsistent and weak use of referencing.	Engagement with a limited range of mostly relevant and credible sources but with some reliance on information gained through class contact. Some omissions and minor errors. Referencing conventions evident though not always applied accurately or consistently.	Engagement with an appropriate range of literature, including sources retrieved independently. Some over-reliance on texts rather than other sources. Referencing may show minor inaccuracies or inconsistencies.	Engagement with a wide range of literature, including sources retrieved independently. Selection of relevant and credible sources. Generally sound referencing, with no/very few inaccuracies or inconsistencies.	Engagement with an extensive range of relevant and credible literature. Consistently accurate application of referencing.	Exceptional engagement with an extensive range of relevant and credible literature. High-level referencing skills consistently applied.
Knowledge and understanding (Knowledge of the basic underlying concepts and principles of a subject.)	Major gaps in knowledge and understanding of the basic underlying concepts and principles of the subject matter.	Gaps in knowledge of the basic underlying concepts and principles, with flawed or superficial understanding.	Limited knowledge and understanding of the basic underlying concepts and principles within the subject area.	Knowledge of the basic underlying concepts and principles is accurate with a good understanding of	Competent knowledge of the basic underlying concepts and principles. Exhibits very good understanding.	Excellent knowledge and understanding of the basic underlying concepts and principles of the subject.	Exceptional, detailed knowledge and understanding of the basic underlying concepts and principles

Level 4	FAIL	MARGINAL FAIL	SATISFACTORY (3 rd / Pass)	GOOD (2.2 / Pass)	VERY GOOD (2.1 / Merit)	EXCELLENT (1 st / Distinction)	EXCEPTIONAL (1 st / Distinction)
Category	0-29%	30-39%	40-49%	50-59%	60-69%	70-84%	85-100%
	Inclusion of irrelevant material. Substantial inaccuracies.	Some significant inaccuracies and/or irrelevant material.	Some elements may be missing.	the field of study but lacks depth and/or breadth.			
Cognitive and intellectual skills (Evaluate underlying concepts and principles of a subject and interpret qualitative and quantitative data in order to develop lines of argument and make sound judgements.)	Wholly or almost wholly descriptive work. Little or no evaluation of the underlying concepts and principles. Failure to develop arguments, leading to illogical or invalid judgements. Minimal or no use of evidence to back up views.	Largely descriptive work, with superficial evaluation of the underlying concepts and principles. Weak interpretation of data, flawed development of arguments and judgements. Information accepted uncritically, uses generalised statements made with scant evidence and unsubstantiated opinions. Ideas sometimes illogical and contradictory.	Limited attempt at evaluation of the underlying concepts and principles, tending towards description. Can interpret qualitative and quantitative data but with some errors. Some evidence to support emerging arguments and judgements but these may be underdeveloped or with a little inconsistency / mis-interpretation.	Good evaluation of the underlying concepts and principles. Can interpret qualitative and quantitative data, with minor errors. An emerging ability to use evidence to support the argument. Mostly valid arguments and logical judgements.	Sound evaluation of the underlying concepts and principles. Can interpret qualitative and quantitative data accurately. Ability to devise arguments using evidence to make mostly appropriate and valid judgements.	Excellent evaluation of the underlying concepts and principles. Can interpret qualitative and quantitative data accurately and with some insight. Excellent ability to devise arguments using evidence and make appropriate and valid judgements.	Exceptional evaluation of the underlying concepts and principles based evidence. Outstanding interpretation of qualitative and quantitative data. Exceptional ability to devise arguments using evidence and make wholly appropriate and valid judgements.
Practical skills (Different approaches to solving problems in particular contexts.)	Limited or no use of taught, basic methods, materials, tools and/or techniques. Little or no appreciation of the context of the application. Very weak evidence of	Rudimentary application of taught, basic methods, materials, tools and/or techniques but without consideration and competence. Flawed	An adequate awareness and mostly appropriate application of basic methods, materials, tools and/or techniques. Basic appreciation of	A good and appropriate application of basic methods, materials, tools and/or techniques. Clear appreciation of the context of the application.	A very good application of a range of basic methods, materials, tools and/or techniques. Very good consideration of the context of the application. Very good	An advanced application of a range of taught, basic methods, materials, tools and/or techniques. The context of the application is well considered, and insightful.	Exceptional levels of application and deployment skills in particular practical contexts. Outstanding identification of problems in particular

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Category	0-29%	30-39%	40-49%	50-59%	60-69%	70-84%	85-100%
	different approaches to problem-solving in particular contexts.	appreciation of the context of the application. Weak evidence of different approaches to problem-solving in particular contexts.	the context of the application. Can identify problems in particular contexts and propose basic alternative approaches or solutions though there may be errors.	Good evidence of different approaches to problem-solving in particular contexts and proposes mostly appropriate solutions.	evidence of different approaches to problem-solving in particular contexts and proposes appropriate solutions.	Excellent evidence of different approaches to problem-solving in particular contexts and proposes appropriate solutions.	contexts and formulation of wholly appropriate, thoughtful solutions / different approaches.
Transferable skills for life and professional practice (Communicate the results of their study/work accurately and reliably, and with structured and coherent arguments; the qualities needed for employment requiring the exercise of some personal responsibility within a structured and managed environment.)	Work is poorly structured, disorganised, inaccurate and/or confusingly expressed. Very weak use of language and/or very inappropriate style. Failure to work effectively individual or as part of a group. Little or no evidence of the skills for employment requiring the exercise of some personal responsibility.	Work is poorly presented in a disjointed manner. It is loosely, and at times incoherently, structured, with information and ideas often poorly expressed. Weak use of language and/or inappropriate style. Flawed approach to individual or group work, meeting only partial obligations to others. Limited evidence of the skills for employment requiring the exercise of some	Mostly ordered presentation and structure in which relevant ideas / concepts are reasonably expressed. Work may lack coherence and/or accuracy in places. Can work as part of a group, meeting most obligations to others but perhaps with limited involvement in group activities. Demonstrates the basic skills for employment requiring the exercise of some personal responsibility, with some areas of minor weakness.	Mostly coherent, organised and accurate work, in a suitable structure and is for the most part clearly expressed. Can work effectively independently and/or as part of a team, with clear contribution to group activities. Demonstrates the skills for employment requiring the exercise of some personal responsibility, with some areas of strength and some of minor weakness.	Work is accurate, coherent, fluent, well-structured and organised. Can work effectively independently and/or as part of a team, with very good contribution to group activities. Demonstrates very good skills for employment requiring the exercise of some personal responsibility, with just occasional minor weakness.	Work is coherent, very fluent and is presented professionally. Can work effectively independently and/or as part of a team, with an excellent contribution to group activities. Demonstrates excellent skills for employment requiring the exercise of some personal responsibility with an appetite for further development.	Work is accurate, exceptionally coherent, very fluent and presented well. Can work effectively independently and/or as part of a team, with an exceptional contribution to group activities. Demonstrates exceptional skills for employment requiring the exercise of some personal responsibility with an appetite for further development.

Level 4	FAIL	MARGINAL FAIL	SATISFACTORY (3 rd / Pass)	GOOD (2.2 / Pass)	VERY GOOD (2.1 / Merit)	EXCELLENT (1 st / Distinction)	EXCEPTIONAL (1 st / Distinction)
Category	0-29%	30-39%	40-49%	50-59%	60-69%	70-84%	85-100%
		personal responsibility.					