

Student Feedback & Marking Report

Student: Kelly Jenkins (2510063)

Module: ACMA4000 – Materials and Introduction to Processing

Assessment: Manufacturing Processes and Defects (Report 40% + Video 10%)

REPORT MARKING (40%)

1. Engagement with Literature Skills

Mark Awarded: 16 / 20

The report demonstrates good engagement with a broad range of relevant sources, including peer-reviewed journal literature on ceramics (Fernie et al., 2009), lifecycle assessment of lunch boxes (Cui et al., 2025), and openLCA comparative studies of ceramic versus paper cups, alongside authoritative technical references on stainless steel (Lula, 1985; SteelPro; TUSPIPE) and polymer properties. The sources are used to justify material choice, manufacturing processes, and environmental considerations across all three products, which aligns well with the coursework requirement to support Tasks 1–5 with literature. The inclusion of lifecycle-focused sources strengthens the sustainability discussion and demonstrates awareness of end-of-life implications.

However, some references are general web sources (e.g. product websites, blog-style technical pages) that are used for property values and advantages/disadvantages without critical appraisal of data reliability. In places, sources are cited to support broad claims but are not synthesised into comparative arguments, particularly in the sustainability and alternatives sections. The reference to generative AI as a source is inappropriate in an academic context and should not appear in the reference list.

To improve this criterion, the student should prioritise peer-reviewed or authoritative standards-based sources for property data, synthesise findings across multiple sources into comparative lifecycle statements or tables, and remove non-academic references. A short paragraph triangulating LCA findings for ceramics, metals and polymers would strengthen critical engagement with literature.

2. Knowledge and Understanding Skills

Mark Awarded: 20 / 25

The submission demonstrates strong foundational understanding of materials classes and manufacturing processes. The explanation of slip casting for ceramic mugs correctly identifies moisture absorption by plaster moulds and subsequent firing and glazing. The deep drawing process for metal water bottles is accurately described, including plastic flow of sheet metal into a cylindrical geometry. Injection moulding for polypropylene lunch boxes is correctly explained in terms of melting, cavity filling, cooling and ejection. The mechanical and thermal property comparison and the stress–strain diagram are used appropriately to distinguish ceramics, metals and polymers in terms of strength, ductility, toughness and heat resistance.

The structure–property–performance relationships are generally well articulated, particularly in linking ceramic brittleness to impact sensitivity, metal ductility and toughness to durability in bottles, and

polymer ductility and low melting temperature to suitability and limitations for lunch boxes. The report shows awareness of thermal shock resistance and chemical inertness in relation to functional requirements.

Minor weaknesses include occasional over-generalisation of property ranges and limited microstructural explanation of why ceramics are brittle or why metals combine strength and ductility. The polymer section could more explicitly link polypropylene's semi-crystalline structure to toughness and heat sensitivity.

To reach the highest band, the student could add brief microstructural explanations (e.g. ionic/covalent bonding in ceramics, metallic bonding and dislocation motion in metals, chain mobility and crystallinity in polymers) to strengthen conceptual depth. Nonetheless, the level of technical understanding is strong.

3. Cognitive and Intellectual Skills

Mark Awarded: 15 / 20

The report demonstrates sound evaluative reasoning through comparison of original and alternative materials. The comparison of ceramic mugs with paper cups identifies trade-offs between durability, thermal performance and waste generation. The comparison of metal water bottles with plastic bottles appropriately weighs durability, potential chemical leaching and environmental impact. The comparison of polypropylene lunch boxes with bamboo alternatives considers sustainability, moisture resistance, brittleness and heat resistance. These sections show that the student recognises material selection as a multi-criteria decision involving trade-offs between performance, cost and environmental considerations.

However, the evaluation remains largely qualitative. Trade-offs are clearly stated but not structured within a formal decision-making framework, and environmental comparisons are discussed without consistent quantitative metrics. The reasoning would benefit from more explicit prioritisation of criteria (e.g. why durability is prioritised over cost for bottles, or why moisture resistance outweighs sustainability for lunch boxes in certain contexts).

To improve this criterion, the student could introduce a simple decision matrix ranking original and alternative materials against weighted criteria such as performance, manufacturability, cost and sustainability, and briefly justify the weighting. This would demonstrate stronger evaluative judgement and structured comparison.

4. Practical Application Skills

Mark Awarded: 22 / 25

The application of materials and manufacturing theory to everyday products is a clear strength of the submission. The chosen objects are realistic and allow meaningful linkage between properties and service conditions, such as thermal stability and chemical inertness for ceramic mugs, durability and corrosion resistance for metal bottles, and low density and impact resistance for plastic lunch boxes. Manufacturing processes are described in practical industrial terms, and their advantages and

limitations are compared in Table 4. Lifespan and cost analysis tables for each product further contextualise material choice within real-world design constraints.

The practical application is strongly supported by extensive and relevant use of photos, process diagrams, comparative tables and a stress–strain schematic. In line with the marking approach, the breadth and quality of visual evidence justify a generous mark in this criterion. The figures are generally well integrated into the narrative and support understanding of process complexity and material behaviour.

To further enhance this criterion, the student could add explicit lifecycle flow diagrams for each product, showing raw material extraction, manufacturing, use and end-of-life pathways. However, the current level of practical application and visual support is high.

5. Transferable Skills for Life and Professional Practice

Mark Awarded: 8 / 10

The report is professionally structured with a clear abstract, contents, lists of figures and tables, and well-organised sections aligned with the coursework tasks. The extensive use of tables and figures supports professional communication of technical information, and the writing is generally clear, coherent and appropriately academic in tone. The inclusion of original photographs demonstrates engagement with the chosen objects and enhances authenticity of the work.

Minor weaknesses include formatting inconsistencies in the contents and page numbering, occasional grammatical issues, and some redundancy in figure captions. The reference list contains a few inappropriate or weak sources and inconsistent formatting. These issues slightly detract from professional polish but do not undermine overall clarity.

To improve this criterion, the student should refine formatting consistency, proofread for minor language issues, and ensure all references are academically appropriate and consistently formatted.

VIDEO PRESENTATION MARKING (10%)

Video file reviewed: Yes (MP4 submitted)

Video Technical Content and Communication

Mark Awarded: 7 / 10

The video clearly introduces the three products and accurately explains their materials, manufacturing processes and key mechanical and thermal differences. The delivery is structured and coherent, reflecting the organisation of the written report. The student demonstrates good understanding of why each material–process combination is used and mentions sustainability considerations and alternatives.

The video would benefit from stronger visual reinforcement of process and comparison content. While products and processes are discussed verbally, the inclusion of simple on-screen process flow diagrams (e.g. slip casting, deep drawing, injection moulding) or a concise comparative table of

properties or lifecycle impacts would strengthen clarity and technical communication. The concluding synthesis of trade-offs could be more explicit to demonstrate evaluative judgement.

To reach the highest band, the student should incorporate one or two clear on-screen diagrams and explicitly summarise engineering trade-offs between original and alternative materials.

Overall Summary

Report marks:

Engagement with Literature: 16/20

Knowledge and Understanding: 20/25

Cognitive and Intellectual Skills: 15/20

Practical Application: 22/25

Transferable Skills: 8/10

Video mark: 7/10