

Student Feedback & Marking Report

Student: Thomas James (2424817)

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 engages with a broad set of sources covering production volumes, manufacturing methods and material properties, including International Aluminium (2023) for market context, Tiwari et al. (2021) for deep drawing, Link-Tech Machinery (2024) for ISBM, Britannica for ceramic vitrification, and Direct Plastics datasheets for PET properties. These sources are used to support key claims across Tasks 1–5, particularly in the manufacturing methods and property comparison sections. The inclusion of a peer-reviewed paper for deep drawing strengthens the academic base.

However, the literature base is dominated by industry and web sources, with limited use of core materials science textbooks (e.g. Callister, Ashby) or peer-reviewed materials property reviews. Several sources (Amazon product pages, LinkedIn market posts, Biopineoe) are not academically robust and weaken the evidential basis for lifespan and sustainability claims. The sustainability discussion relies on NGO and web sources rather than independent lifecycle assessment studies. The literature is used largely to support isolated statements rather than synthesised into coherent comparative arguments.

To strengthen this criterion, the student should incorporate authoritative materials science textbooks for structure–property explanations and at least one peer-reviewed lifecycle assessment study comparing aluminium, PET and ceramics, synthesising findings into a concise comparative paragraph or table.

2. Knowledge and Understanding Skills

Mark Awarded: 19 / 25

The submission demonstrates sound technical understanding of materials and manufacturing processes. The description of deep drawing and ironing for aluminium cans is accurate and linked to high-volume, low-waste production. The ISBM description for PET bottles correctly identifies the multi-stage stretching and blowing process and links it to cost-effective mass production. Slip casting for porcelain mugs is correctly described, including vitrification temperatures and alternative ceramic forming routes. The mechanical and thermal property discussion includes realistic ranges for aluminium ductility and thermal conductivity, PET tensile strength and melting point, and ceramic porosity and bending strength, supported by datasheets and technical references. The stress–strain comparison is used appropriately to distinguish metals, polymers and ceramics.

There are, however, some technical inaccuracies and oversimplifications. The claim that PET has “higher tensile strength” than aluminium in certain contexts is misleading when comparing bulk

materials. The thermal shock resistance values for porcelain are reported without clear units or context, and the implication that aluminium cans are suitable primarily because of thermal conductivity could be more clearly linked to user experience (rapid cooling) rather than performance necessity. The structure–microstructure–property relationships are present but not explicitly explained (e.g. why aluminium is ductile at the microstructural level; why ceramics are brittle).

To improve this criterion, the student should refine comparative property statements for technical accuracy and explicitly link processing to microstructure and microstructure to properties for each material class.

3. Cognitive and Intellectual Skills

Mark Awarded: 14 / 20

The report demonstrates evaluative reasoning in material selection and alternatives. The comparison of aluminium cans with steel cans identifies trade-offs between puncture resistance, magnetic sorting and heat tolerance. The PET bottle alternative of glass is appropriately discussed in terms of CO₂ impermeability, recyclability and temperature resistance. The alternative of polystyrene for cups is compared with porcelain in terms of mass, logistics and impact resistance. These sections show awareness that material selection involves balancing multiple criteria.

However, the evaluation remains largely qualitative and sometimes simplistic. Trade-offs are stated but not prioritised or supported by structured comparison. Environmental considerations are mentioned but not framed within a consistent lifecycle assessment approach. The reasoning would benefit from clearer justification of why certain criteria (e.g. cost vs recyclability vs durability) dominate decision-making for each product.

To enhance this criterion, the student should introduce a simple decision matrix ranking original and alternative materials against weighted criteria and briefly justify the weighting based on application requirements.

4. Practical Application Skills

Mark Awarded: 20 / 25

The application of materials and manufacturing theory to real-world products is good. The chosen objects are realistic and the report links properties to functional requirements, such as aluminium ductility for can forming, PET processability for bottle manufacture, and ceramic non-porosity and chemical resistance for mugs. Manufacturing methods are described in practical industrial terms, and cost and lifespan analysis contextualises material choice within real-world constraints.

The report is supported by multiple figures (product images and process diagrams) and a stress–strain graph. In line with the marking approach, the presence of these visuals supports a generous mark for practical application. However, the figures are largely illustrative and not always analytically integrated into the discussion. Lifecycle and end-of-life pathways are discussed textually but not visualised with flow diagrams, and degradation/defect mechanisms (e.g. can denting, PET creep, ceramic chipping) are not illustrated.

To further enhance this criterion, the student should include explicit lifecycle flow diagrams for each product and at least one figure illustrating typical defects or degradation mechanisms, with brief analytical commentary.

5. Transferable Skills for Life and Professional Practice

Mark Awarded: 8 / 10

The report is well structured with a contents page, list of figures, logically organised sections aligned with the coursework tasks, and a coherent narrative. Figures are labelled and referenced, and the writing is generally clear and professional in tone. The inclusion of property data, process descriptions and lifespan/cost analysis supports professional technical communication.

Minor weaknesses include formatting inconsistencies, occasional grammatical issues, and variable quality of references. Some figures could be more explicitly interpreted in the main text to guide the reader. Overall, the presentation is professional and appropriate for Level 4.

VIDEO PRESENTATION MARKING (10%)

Video file reviewed: Yes (MP4 submitted)

Video Technical Content and Communication

Mark Awarded: 7 / 10

The video introduces the three products and explains their materials and manufacturing processes clearly. The student demonstrates understanding of why each material–process combination is used and references cost and sustainability considerations. The delivery is structured and aligns with the written report.

The video would benefit from stronger visual reinforcement. While processes are described verbally, the inclusion of simple on-screen process flow diagrams (deep drawing, ISBM, slip casting) or a concise comparative table of properties or lifecycle impacts would strengthen technical communication. A clearer concluding synthesis of trade-offs would further enhance evaluative clarity.

Overall Summary

Report marks:

Engagement with Literature: 16/20

Knowledge and Understanding: 19/25

Cognitive and Intellectual Skills: 14/20

Practical Application: 20/25

Transferable Skills: 8/10

Video mark: 7/10