

Student Feedback & Marking Report

Student: Jac Palmer (2503836)

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: 15 / 20

The report uses a small but appropriate set of core sources, notably Ashby, Shercliff and Cebon (2018), to support general statements about material classes, properties and manufacturing suitability. This text is applied to justify material selection for tools, ceramics and polymer packaging, and the reference to manufacturing–property relationships demonstrates engagement with recognised academic literature. Additional sources are used for manufacturing process descriptions (e.g. ceramic forming, polymer moulding), which supports Tasks 1–3 of the brief.

However, the literature base is limited in breadth and depth. The report relies heavily on a single textbook for most theoretical justification, with very few peer-reviewed articles or authoritative datasheets used to support quantitative property values, lifecycle considerations, or environmental impact claims. Several figures are sourced from commercial websites without critical evaluation of their credibility. The sustainability and lifecycle sections are largely descriptive and would benefit from peer-reviewed lifecycle assessment (LCA) literature. There is limited synthesis of multiple sources into comparative arguments.

To improve this criterion, the student should incorporate additional academic or peer-reviewed sources for mechanical/thermal property ranges and environmental impact, and synthesise findings across multiple sources in the lifecycle section. A small comparative table drawing from at least two independent sources (e.g. indicative CO₂ footprint or recyclability rates for steel, ceramics and HDPE) would significantly strengthen literature engagement.

2. Knowledge and Understanding Skills

Mark Awarded: 18 / 25

The submission demonstrates sound foundational understanding of materials classes and manufacturing processes. The student correctly identifies chrome–vanadium or high-carbon steel for Allen keys and explains the relevance of hardness, toughness and heat treatment to tool performance. The ceramic mug section accurately describes slip casting, drying, firing and glazing, and links ceramic properties to thermal stability and chemical inertness. The HDPE bleach bottle section correctly identifies blow moulding as a suitable high-volume process and links polymer properties to chemical resistance and low cost.

The mechanical and thermal property tables are generally accurate and demonstrate understanding of key differences between metals, ceramics and polymers. The report also shows awareness of

process–property relationships, such as strain hardening during drawing and the role of heat treatment in steels.

However, explanations remain largely descriptive and could be more explicit in linking processing to microstructure and microstructure to performance. For example, the microstructural basis of steel strengthening (e.g. martensitic transformation or carbide strengthening) is not explained, and the polymer section does not clearly link chain mobility and crystallinity to toughness and chemical resistance. Some property values are presented without contextual explanation of their implications for design and service performance.

To enhance this criterion, the student should add short explanatory passages linking processing to microstructure and then to properties for each material class, supported by a simple schematic. This would strengthen conceptual understanding and move the work towards a higher band.

3. Cognitive and Intellectual Skills

Mark Awarded: 15 / 20

The report demonstrates emerging evaluative thinking through the comparison of original materials with alternatives. The discussion of aluminium and titanium as alternatives for Allen keys identifies trade-offs between weight, strength and cost. The ceramic mug alternatives (glass, stainless steel, polymers) are considered with reference to brittleness, thermal conductivity and heat resistance. The bleach bottle alternatives (PP, PET, glass) appropriately identify chemical resistance and brittleness as key decision factors. These sections show an understanding that material selection involves balancing multiple criteria.

However, the evaluation remains largely qualitative and descriptive. Trade-offs are stated but not structured within a formal comparison framework, and there is limited use of quantitative metrics to support judgements. The environmental implications of alternatives are mentioned only briefly and not critically analysed across the full lifecycle. There is no structured decision-making tool (e.g. decision matrix) to demonstrate systematic evaluation.

To improve this criterion, the student should adopt a simple decision matrix ranking original and alternative materials against weighted criteria such as performance, cost, manufacturability and environmental impact. Explicitly justifying why certain criteria are prioritised for each product would demonstrate stronger cognitive and intellectual skills.

4. Practical Application Skills

Mark Awarded: 18 / 25

The chosen products are appropriate everyday objects that allow application of materials and manufacturing theory to real-world contexts. The report links material properties to service requirements, such as wear resistance for Allen keys, thermal stability for ceramic mugs, and chemical resistance for bleach bottles. Manufacturing processes are described in practical terms, and process characteristics and limitations are compared in a summary table, which supports application of theory to industrial practice.

The practical application is strengthened by the inclusion of several figures and tables illustrating products and manufacturing routes. However, the use of visuals is uneven, with some figures lacking detailed captions or analytical commentary linking them explicitly to the discussion. The lifecycle and end-of-life considerations are described but not supported by dedicated lifecycle flow diagrams, and degradation mechanisms (e.g. ceramic chipping, polymer ageing) are not illustrated visually.

In line with the marking approach that rewards strong visual evidence, the moderate use and integration of photos, figures and tables constrains the mark. To significantly 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. Clear process flowcharts for drawing/heat treatment, slip casting and blow moulding would further strengthen practical application.

5. Transferable Skills for Life and Professional Practice

Mark Awarded: 7 / 10

The report is clearly structured with contents, logical sectioning aligned with the coursework tasks, and coherent academic writing. Tables are used effectively to compare manufacturing methods, properties and lifespan/cost, supporting professional communication of technical information. Figures are included and referenced, contributing to readability.

Minor weaknesses include inconsistent formatting of figure references, occasional repetition of URLs within captions, and limited interpretive commentary on what each figure demonstrates in relation to material choice or process suitability. The professional presentation would benefit from more consistent figure labelling and tighter integration of visuals into the analytical narrative.

To improve this criterion, the student should standardise figure captions, ensure each figure and table is explicitly discussed in the text, and include a concise summary table consolidating key trade-offs across all three products. This would enhance professional clarity and presentation quality.

VIDEO PRESENTATION MARKING (10%)

Video file reviewed: Yes (MP4 submitted)

Video Technical Content and Communication

Mark Awarded: 6 / 10

The video introduces the three products and correctly identifies their materials and manufacturing processes. The student explains key mechanical and thermal differences and mentions alternative materials. The delivery is generally clear and follows a logical structure, reflecting the report content.

However, the video remains largely descriptive and does not sufficiently emphasise comparative trade-offs or engineering judgement. Visual support is limited to basic imagery of the products, with little use of on-screen process diagrams or comparative tables to reinforce understanding. Sustainability and lifecycle considerations discussed in the report are only briefly referenced in the video.

Consistent with the marking approach that rewards visual reinforcement, the limited use of on-screen diagrams constrains the video mark. To improve, the student should incorporate simple process flow diagrams for drawing/heat treatment, slip casting and blow moulding, and a concise comparative table of properties or lifecycle impacts to support verbal explanations. Clearer signposting of sections and a stronger concluding synthesis would further improve communication quality.

Overall Summary

Report marks:

Engagement with Literature: 15/20

Knowledge and Understanding: 18/25

Cognitive and Intellectual Skills: 15/20

Practical Application: 18/25

Transferable Skills: 7/10

Video mark: 6/10