

Student Feedback & Marking Report

Student: Corey Smith (1352007)

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: 17 / 20

The report demonstrates strong engagement with a range of appropriate academic and technical sources. Peer-reviewed journal articles are used to support ceramic processing and microstructure (Efilena Baseta et al., 2025; Flynn and Stachurski, 2006), polymer processing and biodegradable alternatives (Barletta et al., 2019), and materials performance (Davey, 2018). Authoritative industry and professional sources (British Plastics Federation; LD Forge; ENZE) are used to contextualise industrial practice and material grades. The literature is integrated throughout the report to justify material selection, manufacturing routes and property–performance relationships for the hammer, PET bottle and stoneware mug.

The sustainability discussion is supported by industry and journal literature, but would benefit from inclusion of at least one independent lifecycle assessment (LCA) study comparing metals, PET and ceramics to strengthen critical evaluation of environmental trade-offs. While the literature is used effectively to support individual claims, synthesis across sources into a unified comparative lifecycle argument is limited.

To improve this criterion further, the student could integrate one peer-reviewed LCA study and synthesise findings into a concise comparative paragraph or table contrasting environmental impact across the three products.

2. Knowledge and Understanding Skills

Mark Awarded: 21 / 25

The submission demonstrates strong technical understanding of materials classes, manufacturing processes and structure–property–performance relationships. The description of die forging for medium-carbon steel hammers is accurate and appropriately linked to the need for a balance between hardness and toughness through heat treatment. The explanation of injection blow moulding for PET bottles correctly describes preform manufacture, reheating, biaxial stretching and blowing, and links molecular orientation to impact resistance and pressure tolerance. The slip casting description for stoneware mugs is technically sound, correctly explaining plaster mould water absorption, wall thickness control, drying and firing.

The mechanical property comparison is generally accurate and appropriately interpreted, particularly the discussion of Young's modulus, tensile strength and hardness across metals, polymers and ceramics. The thermal properties discussion correctly identifies that thermal behaviour is more critical during processing for steel and PET, while thermal shock resistance and low thermal

expansion are key for ceramic mugs in service. The link between hardness and brittleness in ceramics is well articulated.

Minor scope for improvement lies in refining the interpretation of tensile strength for ceramics (which are strong in compression but weak in tension) and in explicitly linking microstructural features (e.g. graphite morphology in steels, vitrified microstructure in stoneware) to macroscopic behaviour. These are refinements rather than major gaps. Overall, the level of understanding is high for Level 4.

3. Cognitive and Intellectual Skills

Mark Awarded: 16 / 20

The report demonstrates clear evaluative reasoning in material selection and alternative choices. The comparison of medium-carbon steel with high-carbon steel for hammers appropriately balances hardness against brittleness risk and heat-treatment sensitivity. The evaluation of PLA as an alternative to PET bottles shows awareness of sustainability trade-offs, processing challenges and cost implications, and the discussion of earthenware and porcelain as alternatives to stoneware appropriately weighs porosity, firing temperature, cost and durability. These comparisons demonstrate an understanding that material selection involves trade-offs between performance, manufacturability, cost and environmental considerations.

The evaluative reasoning is coherent and supported by literature, but remains largely qualitative. The analysis could be strengthened by structuring trade-offs within a simple decision matrix to make prioritisation of criteria (e.g. durability versus sustainability for bottles) more explicit.

4. Practical Application Skills

Mark Awarded: 22 / 25

The application of materials and manufacturing theory to real-world products is a major strength. The chosen objects are appropriate everyday items, and the report consistently links properties to functional requirements and service environments, such as impact resistance and wear for hammers, pressure containment and transparency for PET bottles, and thermal shock resistance and hygiene for ceramic mugs. Manufacturing processes are described in realistic industrial terms, and the comparison section correctly identifies commonalities and differences in forming principles across forging, blow moulding and slip casting.

The report is well supported by multiple figures and tables, including labelled images of each product and comprehensive mechanical and thermal property tables. In line with the marking approach, the strong use of photos, tables and process descriptions justifies a generous mark for practical application. The discussion of degradation and lifespan is well contextualised, particularly the contrast between the durability of steel tools and the short service life but long environmental persistence of PET bottles.

To reach the very highest band, the report could include a consolidated lifecycle flow diagram for each product showing raw material extraction → manufacture → use → end-of-life pathways. However, the current practical application is strong.

5. Transferable Skills for Life and Professional Practice

Mark Awarded: 9 / 10

The report is professionally structured with a clear abstract, contents page, lists of figures and tables, logically ordered sections aligned with the coursework brief, and a coherent conclusion. Academic writing is clear and technically appropriate, and referencing is comprehensive and generally well formatted. Figures and tables are clearly labelled and integrated into the narrative, supporting professional communication of engineering information.

Minor improvements could be made in formatting consistency and proofreading (e.g. minor grammatical errors and spacing). Overall, the transferable skills demonstrated are excellent.

VIDEO PRESENTATION MARKING (10%)

Video submitted: No

Mark Awarded: 0 / 10

No video presentation was submitted. In line with the assessment brief, the video component cannot be awarded marks in the absence of a submission.

Overall Summary

Report marks:

Engagement with Literature: 17/20

Knowledge and Understanding: 21/25

Cognitive and Intellectual Skills: 16/20

Practical Application: 22/25

Transferable Skills: 9/10

Video mark: 0/10 (not submitted)