

Student Feedback & Marking Report

Student: Joshua Hadden (2206081)

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 demonstrates engagement with a range of industry and technical sources, including Statista and Global Market Insights for market size and production context, IndustrialPhysics for historical context of can development, Misa Pack for glass bottle production methods, UnneedPM for metal property ranges, and Get It Made for injection moulding cost estimates. These sources are used to contextualise production scale, cost, and general process selection for ABS bottles, aluminium cans, and glass bottles. The bibliography is complete and sources are cited throughout the report.

However, the literature base is dominated by market reports and web-based technical sources, with no use of core academic textbooks or peer-reviewed journal literature to support materials science concepts, property values, or lifecycle/environmental impact claims. Several sources are commercial blogs rather than authoritative academic or professional publications, and some references (e.g. IndustrialPhysics link) appear mismatched to the stated content. The literature is used largely to support isolated statements rather than synthesised to build comparative or evaluative arguments, particularly in the sustainability and lifecycle sections.

To improve this criterion, the student should incorporate core materials science textbooks (e.g. Callister, Ashby) and at least one peer-reviewed or authoritative academic source on lifecycle assessment of plastics, aluminium and glass. Synthesising findings across multiple sources into a comparative lifecycle paragraph or table would significantly strengthen engagement with literature and raise the mark.

2. Knowledge and Understanding Skills

Mark Awarded: 14 / 25

The submission demonstrates basic understanding of materials classes and manufacturing processes, with correct identification of injection moulding for ABS water bottles, pressing for aluminium cans, and glass blowing for glass bottles. The descriptions of injection moulding cycle times, cavity numbers and basic cost considerations show awareness of industrial production constraints. The explanation of aluminium's low density and malleability in relation to pressing processes is broadly correct, and the glass blowing description accurately outlines gob formation, primary and secondary blowing stages.

However, there are several technical inaccuracies and misconceptions that limit the mark in this criterion. The claim that PP has "high" production cost compared to ABS and PET is not supported and is misleading in the context of commodity polymers. The mechanical and thermal property table

contains unrealistic or oversimplified values, for example stating ABS has “low ductility” and aluminium has “medium heat resistance” without clear definitions or reference to service temperature ranges. The statement that aluminium is “often alloyed with steel” is incorrect; aluminium is alloyed with elements such as Mg, Si, Cu and Zn, not steel. The polymer section confuses thermal resistance percentages and does not clearly distinguish between glass transition temperature and melting temperature. These inaccuracies indicate limited depth of materials science understanding.

To improve this criterion, the student should correct technical errors, clearly distinguish between polymer glass transition temperature and melting temperature, use realistic and referenced property values, and provide clearer structure–property–process explanations. Incorporating a simple schematic linking processing to microstructure and properties would also strengthen conceptual understanding.

3. Cognitive and Intellectual Skills

Mark Awarded: 12 / 20

The report demonstrates some comparative reasoning, particularly in the comparison of ABS, PP and PET for water bottles, aluminium versus steel and titanium for cans, and polymer versus glass alternatives. The student identifies trade-offs between cost, transparency, heat resistance and production efficiency, and articulates why aluminium is preferred for cans due to low density and malleability. The alternative materials discussion shows awareness that material selection involves balancing multiple criteria.

However, the evaluative reasoning is inconsistent and sometimes undermined by technical inaccuracies. For example, the justification that aluminium is “ideal” for single-use products due to low ductility is conceptually flawed, and the claim that PP has higher cost than ABS is not supported. Environmental trade-offs are mentioned but not systematically analysed or supported by evidence. The analysis remains largely qualitative and lacks a structured decision-making framework.

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

4. Practical Application Skills

Mark Awarded: 18 / 25

The selection of everyday objects is appropriate and allows application of manufacturing and materials theory to real-world products. The report links material properties to service requirements, such as low cost and formability for bottles, malleability for aluminium cans, and heat resistance for glass bottles. Manufacturing processes are described in practical terms, with realistic discussion of production rates (e.g. cans per hour) and tooling costs for injection moulding and pressing. The inclusion of production rate calculations for injection moulding demonstrates application of theory to industrial throughput.

The practical application is supported by a strong number of figures and tables, including product images, process flow diagrams, mechanical property tables, and lifespan/cost analysis tables for each product. In line with the marking approach, the extensive use of photos, tables and process diagrams justifies a more generous mark in this criterion. However, the figures are largely descriptive and not always analytically integrated into the discussion. Lifecycle and end-of-life pathways are discussed textually but not visualised using lifecycle flow diagrams, and defect mechanisms (e.g. denting of cans, shattering of glass) 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. Integrating short analytical commentary explaining what each figure demonstrates about manufacturability or durability would also strengthen practical application.

5. Transferable Skills for Life and Professional Practice

Mark Awarded: 8 / 10

The report is well structured with a contents page, list of figures, clear section headings aligned with the coursework tasks, and coherent academic writing. The extensive use of tables and figures supports professional communication of technical information, and the formatting is generally clear. The inclusion of production rate calculations and cost breakdowns demonstrates good professional presentation of engineering data.

Minor weaknesses include occasional grammatical and spelling errors, some repetition in phrasing, and limited interpretive commentary for several figures and tables. Some references in the bibliography are not fully consistent in formatting, and one or two web links appear mismatched to the stated content. These issues slightly detract from professional polish but do not undermine overall clarity.

To improve this criterion, the student should proofread for minor errors, ensure consistent reference formatting, and provide brief interpretive commentary for each figure and table to guide the reader's understanding.

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 provides basic justification for material selection. The delivery is clear and follows a logical structure broadly aligned with the report.

However, the video remains largely descriptive and mirrors the written content without strong comparative framing or explicit engineering trade-off analysis. Visual reinforcement is limited, with

little use of on-screen process flow diagrams or comparative tables to support verbal explanations. Sustainability and lifecycle considerations are only briefly mentioned.

In line with the marking approach that rewards visual evidence, the limited use of on-screen diagrams constrains the video mark. To improve, the student should incorporate simple on-screen process diagrams for injection moulding, pressing and glass blowing, and include a concise comparison table of properties or lifecycle impacts. Clearer signposting of sections and a more explicit concluding synthesis of trade-offs would also strengthen technical communication.

Overall Summary

Report marks:

Engagement with Literature: 15/20

Knowledge and Understanding: 14/25

Cognitive and Intellectual Skills: 12/20

Practical Application: 18/25

Transferable Skills: 8/10

Video mark: 6/10