

Student Feedback & Marking Report

Student: Thomas Evans (2516473)

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 engagement with a broad range of web-based technical and industry sources to support material choice, manufacturing routes, mechanical and thermal property data, and market context. The student draws on sources such as AZoM and MakeltFrom for material property ranges, Sehar et al. (2022) for composite lay-up context, and industry articles for investment casting and injection moulding. The references are used consistently across Tasks 1–5, and the report shows awareness of production scale and industrial practice through the inclusion of market statistics for golf clubs, bicycles and phone cases.

However, the literature base is dominated by web and industry sources, with limited use of core academic textbooks (e.g. Callister, Ashby) or peer-reviewed journal articles beyond a single composites paper. Several references are market blogs and commercial websites, which limits academic robustness. The sustainability and lifecycle discussion relies on general web sources rather than independent lifecycle assessment studies. The literature is applied to support individual statements but is not synthesised into comparative arguments, particularly in the environmental evaluation.

To strengthen this criterion, the student should integrate authoritative academic sources for materials science fundamentals and include at least one peer-reviewed lifecycle assessment study for metals, composites and polymers, synthesising findings into a comparative paragraph or table.

2. Knowledge and Understanding Skills

Mark Awarded: 18 / 25

The submission demonstrates sound technical understanding of materials classes and manufacturing processes. The selection of stainless steel for golf club heads and investment casting as a manufacturing route is appropriate, and the explanation of investment casting's ability to produce complex geometries with good surface finish is accurate. The carbon fibre bicycle frame section correctly describes lay-up processes and links fibre orientation to strength-to-weight ratio and stiffness. The silicone phone case section appropriately explains injection moulding and links elastomeric properties to impact resistance and flexibility. The mechanical property values quoted for stainless steel, carbon fibre and silicone are broadly within realistic ranges and used to justify suitability for the chosen applications. The inclusion of stress–strain curves supports understanding of material class differences.

The thermal property discussion contains some over-generalisation. The statement that carbon fibre can withstand temperatures up to 3000 °C is misleading in practical polymer-matrix composites, where the matrix degrades at much lower temperatures. The claim that stainless steel retains full mechanical performance up to 925 °C is also overstated, as significant strength loss occurs well below this temperature. The polymer thermal performance discussion is broadly correct but would benefit from clearer distinction between service temperature and degradation temperature.

To improve this criterion, the student should refine thermal property claims to reflect realistic service temperature ranges and clearly distinguish fibre properties from composite system limitations. Adding brief structure–property explanations (e.g. bonding types and microstructural features) would strengthen conceptual depth.

3. Cognitive and Intellectual Skills

Mark Awarded: 15 / 20

The report demonstrates sound evaluative reasoning in material selection and alternative choices. The comparison between stainless steel and titanium for golf club heads appropriately weighs strength-to-weight ratio against manufacturing cost and machinability. The comparison of carbon fibre frames with aluminium frames identifies trade-offs between cost, recyclability and performance. The comparison of silicone with polycarbonate for phone cases recognises differences in impact behaviour, thermal sensitivity and longevity. These discussions show awareness that material selection involves trade-offs between performance, cost and sustainability rather than optimisation of a single property.

However, the evaluation remains largely qualitative and is not supported by a structured decision-making framework. Trade-offs are clearly stated but not prioritised, and environmental considerations are discussed without consistent lifecycle metrics. The reasoning is coherent but could be strengthened by more explicit justification of why certain criteria are prioritised in each application context.

To enhance this criterion, the student could introduce a simple decision matrix ranking original and alternative materials against weighted criteria (performance, manufacturability, cost, sustainability) and briefly justify the weighting.

4. Practical Application Skills

Mark Awarded: 21 / 25

The application of materials and manufacturing theory to real-world products is strong. The chosen objects are realistic and the report links properties to functional requirements, such as toughness and corrosion resistance for golf club heads, high strength-to-weight ratio for bicycle frames, and flexibility and impact absorption for phone cases. Manufacturing processes are described in practical industrial terms, and the advantages of investment casting, composite lay-up and injection moulding are clearly related to production volume, geometric complexity and surface finish. Lifespan and cost analysis contextualises material choice within real-world economic and durability constraints.

The report makes good use of photos, process diagrams and property tables to support understanding of manufacturing routes and material behaviour. In line with the marking approach, the presence of multiple labelled figures and tables justifies a generous mark in this criterion. The stress–strain and thermal property charts are well integrated into the discussion and support comparative analysis.

To further enhance this criterion, the student could include explicit lifecycle flow diagrams for each product showing raw material extraction, manufacture, use and end-of-life pathways, which would strengthen sustainability contextualisation.

5. Transferable Skills for Life and Professional Practice

Mark Awarded: 8 / 10

The report is well structured with a clear abstract, contents page, lists of figures and tables, and logically organised sections aligned with the coursework tasks. Figures and tables are labelled and referenced, and the writing is coherent and technically appropriate for Level 4. The referencing is generally consistent, and the report demonstrates professional presentation of engineering information.

Minor weaknesses include duplication of figure captions, some formatting inconsistencies, and occasional grammatical issues. The reference list contains several web sources of variable academic quality, and citation formatting is inconsistent in places. These issues slightly detract from professional polish but do not undermine overall clarity.

To improve this criterion, the student should proofread for minor errors, standardise figure captions, and ensure consistent referencing format.

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 mirrors the written report, demonstrating good understanding of why each material–process combination is used in practice. The student articulates trade-offs between performance, cost and manufacturability.

The video would benefit from stronger visual reinforcement. While processes are discussed verbally, the inclusion of simple on-screen process flow diagrams or a concise comparative table of properties or lifecycle impacts would further strengthen technical communication. A clearer concluding synthesis of trade-offs would elevate the presentation to the highest band.

Overall Summary

Report marks:

Engagement with Literature: 16/20

Knowledge and Understanding: 18/25

Cognitive and Intellectual Skills: 15/20

Practical Application: 21/25

Transferable Skills: 8/10

Video mark: 7/10