

Student Feedback & Marking Report

Student: Leighton Williams (2418806)

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: 18 / 20

The report demonstrates strong and appropriate engagement with academic and technical literature across polymers, metals and ceramics. Core materials science texts (Callister & Rethwisch; Brydson & Gilbert; Ashby), classical ceramics references (Kingery, Bowen & Uhlmann), and peer-reviewed journal articles (Li et al. on automotive sheet steels; Železný et al. on LCA of ceramic tableware; Assel Darkhan et al. on RAM pressing optimisation) are integrated to justify material choice and manufacturing routes. The literature is used to support process selection (injection moulding for TPU cases, cold stamping for mild steel panels, RAM pressing for stoneware) and to underpin property–performance claims. The sustainability discussion is supported by LCA literature for ceramics (Železný et al.) and corrosion protection mechanisms for steel, which aligns well with the brief's requirement to evidence Tasks 1–5.

Minor limitations arise where some sources are industry websites (e.g. Tata Steel UK; Denby) used for illustrative figures and market context rather than analytical evidence. While appropriate at Level 4, greater synthesis across multiple academic sources in the sustainability section (e.g. comparative lifecycle impacts of polymers vs metals vs ceramics) would further strengthen critical engagement. Overall, the literature base is strong and well-applied.

2. Knowledge and Understanding Skills

Mark Awarded: 23 / 25

The submission demonstrates very strong technical understanding of materials classes, processing routes and structure–property–performance relationships. The report correctly explains TPU behaviour (high ductility and impact resistance for drop protection in phone cases) and links this to injection moulding suitability and low thermal conductivity for electronics housings. The mild steel body panel section accurately describes cold stamping and correctly links strain hardening during forming to improved dent resistance, supported by literature (Li et al., 2003). The ceramics section correctly characterises stoneware dinnerware in terms of high hardness, thermal stability and brittleness, and appropriately justifies RAM pressing over slip casting for high-volume, dense ceramic bodies.

The mechanical and thermal property comparisons (Tables 4 and 5 on pages 12–13) are technically sound and correctly interpreted in the narrative, distinguishing tensile behaviour, ductility and thermal conductivity across polymers, metals and ceramics. The explanation of thermal service temperatures and heat retention for ceramics versus metals is accurate and clearly related to user performance. The report demonstrates clear understanding of process–structure–property links across all three material classes.

Minor scope for improvement lies in expanding microstructural explanations (e.g. explicitly linking metallic bonding and dislocation motion to ductility, and ionic/covalent bonding to ceramic brittleness). These are refinements rather than gaps. Overall, the level of technical understanding is high.

3. Cognitive and Intellectual Skills

Mark Awarded: 17 / 20

The report demonstrates strong evaluative reasoning in material selection and alternative choices. The student compares TPU with silicone, polycarbonate and metal phone cases, weighing impact protection, manufacturability, recyclability and signal interference. For automotive panels, aluminium and composites are compared with mild steel, with appropriate discussion of trade-offs between weight reduction, processing cost, recyclability and high-volume manufacturability. For dinnerware, polymers and metals are considered as alternatives to ceramics, with a clear explanation of why ceramics provide the best balance of thermal stability, wear resistance and cost despite brittleness. These comparisons demonstrate an understanding that material selection is a compromise between competing requirements rather than optimisation of a single property.

The evaluation is generally well supported by property data and manufacturing considerations. The reasoning is coherent and aligned with engineering decision-making. To strengthen this criterion further, the analysis could be structured into a more formalised decision framework (e.g. a weighted decision matrix) to make prioritisation of criteria more explicit. Nevertheless, the level of evaluative judgement is strong.

4. Practical Application Skills

Mark Awarded: 24 / 25

The application of materials and manufacturing theory to real-world products is a major strength of this submission. The chosen objects are realistic and the report consistently links material properties to functional requirements and service environments. Manufacturing methods are described in industrially realistic terms, with clear justification for injection moulding, cold stamping and RAM pressing based on production volume, surface finish and dimensional consistency. The inclusion of detailed manufacturing method comparison tables in the appendices (Appendices 1–3) demonstrates strong practical understanding of process selection constraints.

The report makes extensive and effective use of photos, process schematics and comparative tables throughout (e.g. Figures 7–12 showing injection moulding, cold stamping and RAM pressing on pages 10–11). In line with the marking approach, this strong visual and tabular support significantly enhances clarity and practical application. The lifespan and cost analysis (page 14) is contextualised with realistic corrosion protection mechanisms for steel and degradation pathways for polymers, demonstrating applied engineering thinking.

The only minor enhancement would be the inclusion of a single, consolidated lifecycle flow diagram for each product showing raw material extraction → manufacturing → use → end-of-life to further visualise sustainability considerations. Otherwise, the practical application is excellent.

5. Transferable Skills for Life and Professional Practice

Mark Awarded: 9 / 10

The report is professionally structured with a clear abstract, contents, list of figures and tables, logically ordered sections aligned with the coursework tasks, and comprehensive referencing. Figures and tables are well integrated into the narrative and clearly labelled, supporting professional technical communication. The writing is coherent, technically appropriate and presented to a high standard for Level 4. The appendices demonstrate good professional practice in collating comparative process data.

Minor improvements could be made by tightening phrasing in a few sections and ensuring absolute consistency in formatting across tables and captions. Overall, the professional presentation and communication skills demonstrated are excellent.

VIDEO PRESENTATION MARKING (10%)

Video file reviewed: Yes (MP4 submitted)

Video Technical Content and Communication

Mark Awarded: 8 / 10

The video clearly introduces the three products and accurately explains their materials, manufacturing processes and key mechanical and thermal differences. The structure mirrors the report and demonstrates strong understanding of why each material–process combination is used in practice. The student articulates trade-offs between performance, manufacturability and sustainability in a coherent manner, indicating evaluative understanding rather than simple description.

Visual support in the video is present and generally effective, though the inclusion of more explicit on-screen process flow diagrams or a concise comparative table (similar to those in the report) would further strengthen technical communication. A more explicit concluding synthesis of trade-offs would elevate the presentation to the highest band.

Overall Summary

Report marks:

Engagement with Literature: 18/20

Knowledge and Understanding: 23/25

Cognitive and Intellectual Skills: 17/20

Practical Application: 24/25

Transferable Skills: 9/10

Video mark: 8/10