

Student Feedback & Marking Report

Student: Gonçalo Gois Fonseca (2517833)

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 draws on a wide range of sources, including academic journal articles (e.g. Piqueras-Fiszman et al., 2012; Peantham and Varabuntoonvit, 2024), authoritative datasheets and textbooks (MatWeb; thyssenkrupp Materials), professional bodies (British Stainless Steel Association), and reputable industry and technical resources. The literature is applied to justify material grades (e.g. 304 stainless steel for spoons), processing routes (deep drawing, injection moulding, thermoforming, tempering), and performance claims such as PET/PP ductility, glass hardness (Mohs scale), and recycling potential of metals and glass. This indicates appropriate engagement with literature to support Tasks 1–5.

However, the engagement is often fragmented and source-by-source, with limited synthesis across multiple sources into coherent comparative arguments. Several claims rely on secondary web sources and commercial websites (e.g. retail platforms for cost and lifespan estimates) without triangulation against independent technical or lifecycle studies. The sustainability discussion would benefit from stronger use of peer-reviewed lifecycle assessment literature and clearer linkage between environmental claims and quantitative metrics.

To improve this criterion, the student should synthesise findings from at least two independent academic sources for each major claim in the sustainability and lifecycle sections, and consolidate evidence into comparative tables (e.g. indicative CO₂ footprint per functional lifetime for spoon, container and screen protector). This would strengthen critical engagement with the literature.

2. Knowledge and Understanding Skills

Mark Awarded: 18 / 25

The submission demonstrates sound foundational knowledge of materials classes and manufacturing processes. The student correctly identifies 304 stainless steel (18/8) for spoons and explains its corrosion resistance, ductility and suitability for food contact. Polypropylene grades (homopolymer vs copolymer) are correctly described in terms of stiffness, toughness and temperature performance, and tempered glass is accurately characterised in terms of hardness, tempering mechanisms and brittleness. The manufacturing methods selected—deep drawing/forging for spoons, injection moulding and thermoforming for PP containers, and CNC cutting followed by thermal tempering for glass protectors—are appropriate and described with reasonable clarity. The explanation of the tempering process (rapid quenching inducing surface compression) shows understanding of how processing affects glass performance.

Nevertheless, some explanations remain descriptive and would benefit from clearer structure–property–performance linkage. For example, the effect of deep drawing on stainless steel microstructure and work hardening is not explicitly linked to final spoon performance. In the polymer section, molecular structure and chain mobility are mentioned but not clearly tied to impact resistance and service temperature limits in food containers. The mechanical and thermal property table is helpful, but some values and terminology are presented without sufficient contextual explanation of their implications for design and service performance.

To enhance this criterion, the student should include brief microstructural explanations (e.g. FCC structure of austenitic stainless steel and its influence on ductility; chain orientation effects in injection moulding) and explicitly link these to the observed properties and product performance. A simple schematic linking processing to structure to properties for each material class would strengthen conceptual understanding.

3. Cognitive and Intellectual Skills

Mark Awarded: 13 / 20

The report includes evaluative comparison between original and alternative materials, particularly in the material selection and alternative choices section. The comparison between stainless steel and wooden spoons recognises trade-offs between durability, cost and disposability, and the PP versus glass container discussion highlights environmental and performance considerations. The tempered glass versus TPU film comparison acknowledges trade-offs between scratch resistance, impact protection and cost. The inclusion of a decision matrix with multiple criteria (strength, cost, manufacturability, environmental impact, lifespan) indicates an attempt to structure comparative evaluation.

However, the evaluative reasoning is not consistently rigorous. The decision matrix includes a mixture of qualitative judgements and market price data without a clear weighting or justification of criteria, limiting the analytical robustness. Some trade-offs are stated but not critically examined, for example the environmental benefits of wooden cutlery versus deforestation impacts, or the recyclability challenges of contaminated plastics versus glass. The analysis would benefit from more explicit engineering judgement and structured trade-off analysis.

To improve this criterion, the student should refine the decision matrix by clearly defining criteria, assigning relative weights, and explaining how scores are derived. Explicitly linking trade-offs to product requirements (e.g. impact resistance for containers, scratch resistance for screen protectors) would strengthen the cognitive and intellectual depth of the evaluation.

4. Practical Application Skills

Mark Awarded: 16 / 25

The chosen products (spoon, food container, screen protector) are appropriate everyday items that allow application of materials and manufacturing theory to real-world contexts. The report links material properties to practical requirements, such as corrosion resistance and heat tolerance for cutlery, impact resistance and food safety for containers, and scratch resistance and transparency for

screen protectors. The manufacturing process descriptions are grounded in industrial practice, with recognition of production speed, equipment cost and energy intensity, particularly in the tempering of glass.

However, the practical application would benefit from stronger use of visual and process-based evidence. While some tables are included, the report contains relatively few process flow diagrams, lifecycle schematics or defect illustrations compared with higher-performing submissions. End-of-life and sustainability discussions are present but are not supported by clear lifecycle flow diagrams or process visuals, which limits the depth of real-world contextualisation. Design-for-manufacture and design-for-recycling considerations are mentioned but not illustrated or developed in detail.

In line with the stated marking approach, the limited use of photos, process flow diagrams and lifecycle schematics constrains the mark in this criterion. To significantly enhance the practical application score, the student should include clear manufacturing process flowcharts for each product, a lifecycle diagram for end-of-life pathways (reuse, recycling, landfill), and at least one illustrative figure per product showing typical defects or degradation mechanisms (e.g. corrosion on cutlery, plastic creep or cracking, glass fracture patterns).

5. Transferable Skills for Life and Professional Practice

Mark Awarded: 6 / 10

The report is logically structured with clear sections corresponding to the coursework tasks, and the writing is generally coherent and technically appropriate. Referencing is present and broadly consistent, and the inclusion of tables (e.g. mechanical and thermal properties, decision matrix) supports communication of technical information.

However, presentation quality is uneven. Formatting is inconsistent in places, figure and table labelling is limited, and there is relatively sparse use of well-integrated visuals compared with stronger submissions. Several figures are implied (e.g. process descriptions and lifecycle references) but not presented as clearly captioned diagrams embedded within the narrative. This limits the professional clarity and visual communication of the work.

To improve this criterion, the student should present all comparative data in clearly labelled tables, embed process flow diagrams and lifecycle schematics within the report, and ensure each visual is explicitly referenced and interpreted in the text. A concise summary table consolidating key properties, costs and environmental impacts across all three products would significantly improve professional presentation.

VIDEO PRESENTATION MARKING (10%)

Video file reviewed: Yes (MP4 submitted)

Video Technical Content and Communication

Mark Awarded: 5 / 10

The video introduces the three products and correctly identifies their materials and general manufacturing processes. The student explains key differences in mechanical and thermal properties and mentions alternative materials. The delivery is clear and understandable, indicating basic professional communication skills.

However, the video remains largely descriptive and mirrors the report content without strong comparative framing or explicit trade-off analysis. Visual support is limited, with little use of on-screen diagrams, process schematics or comparative tables to reinforce understanding. The structure could be clearer, with more explicit signposting of sections (materials, processes, properties, alternatives) and a stronger concluding synthesis of why certain materials are preferred in practice.

In line with the marking approach that rewards visual evidence, the limited use of visuals constrains the video mark. To improve, the student should include simple on-screen process flow diagrams for each product and a small comparative table of properties or lifecycle impacts to support verbal explanations. Explicitly articulating design trade-offs would also strengthen the technical content.

Overall Summary

Report marks:

Engagement with Literature: **15/20**

Knowledge and Understanding: **18/25**

Cognitive and Intellectual Skills: **13/20**

Practical Application: **16/25**

Transferable Skills: **6/10**

Video mark: 5/10