

ACMA5002 Coursework Feedback

Student: Oliver Thomas

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Selected topic/product/project: Injection-Moulded TPU iPhone 13 Housing

Final mark: 77/100

1. Engagement with Literature Skills — 12/15

The report is supported by relevant engineering literature covering injection moulding, runner and gate design, polymer processing, material selection, simulation and machine selection. Recognised technical texts by Beaumont, Bryce, Baird and Collias, Kennedy and Zheng are used, and the literature directly supports several practical decisions concerning sprue geometry, TPU processing, gate sizing and moulding-machine requirements. Granta evidence is also included extensively within the appendices. The source base is technically relevant, but literature integration is uneven across the report and some important claims concerning tolerances, cooling performance, recyclability and defect acceptance are not referenced directly. Wider use of current peer-reviewed studies and recognised standards, together with more consistent in-text citation, would support a higher mark.

2. Knowledge and Understanding Skills — 24/30

The submission demonstrates very good understanding of DFM, DFA, injection moulding, polymer selection, feed-system design and high-volume production. The component applies an approximately 2 mm wall thickness, draft, rounded corners, fillets, functional openings and integrated retention features. The report also demonstrates useful manufacturing knowledge through the selection of an appropriate injection-moulding machine and calculations for the sprue, runner and gate. TPU, silicone and TPV are compared using fatigue strength, impact resistance, yield strength, mouldability and cost, leading to a well-reasoned selection of TPU. Sustainability, machine utilisation and product lifecycle are also considered. Greater technical precision is required in the gate calculation, which does not match the stated 50–75% wall-thickness rule, and in the inconsistent use of 3.75 mm and 3.5 mm as the initial sprue diameter.

3. Cognitive and Intellectual Skills — 24/30

The QFD identifies wall thickness, material strength, gate position and cooling as important design variables, while the FMEA evaluates manufacturing risks and presents reduced RPN values after proposed actions. The eight-run DOE compares wall thickness, gate location and cooling time and records effects on warpage, weld lines and air traps. The analysis is then linked to simulation-led development: the central gate reduces fill time from 0.42 to 0.21 seconds, while improved wall uniformity and cooling reduce predicted warpage from 1.8 to 0.9 mm. The report also evaluates trade-offs between thickness, quality, cooling time, material usage and production cost. However, the DOE results are not supported by a full set of clearly traceable simulation outputs, and claims concerning redesigned cooling channels, venting and elimination of major weld lines are stronger than the visible evidence. The acceptance of 0.9 mm warpage also requires a defined dimensional tolerance.

4. Practical Application Skills — 10/15

The submission demonstrates good practical application of Fusion 360, Granta EduPack and manufacturing calculations. The CAD evidence includes sketches, multiple component views, functional openings, retention geometry, draft, fillets and a dimensioned drawing. Plastics analysis addresses filling, temperature distribution, weld lines, air traps, sink marks, shrinkage and warpage, with evidence of comparison between initial and revised gate arrangements. The machine, sprue, runner, gate, cycle-time and costing calculations provide further practical manufacturing evidence. The principal limitation is that no completed FEA results are

presented, although structural validation through stress and deformation analysis is explicitly required by the brief and is claimed in the introduction. There is also no numerical tolerance analysis, and several reported process improvements are discussed without clearly displaying corresponding before-and-after outputs.

5. Transferable Skills for Life and Professional Practice — 7/10

The report is comprehensive and follows a logical sequence from requirements and analytical tools through design, materials, simulation, cost and sustainability. It includes a detailed contents page, CAD and simulation figures, calculations, summary tables, discussion, recommendations, bibliography and extensive appendices. The economic section is clearly communicated and presents production time, labour, equipment, tooling, unit cost, profitability and break-even quantity. The discussion also recognises simulation limitations and recommends prototype, fatigue and drop testing. Professional presentation is reduced by the absence of a completed title page containing the student details, no abstract, repeated or unsupported claims, inconsistent terminology between Fusion and SolidWorks Plastics, and several grammatical and equation-formatting issues. More rigorous proofreading and clearer evidence-to-claim traceability would improve the report.

Mark summary

Assessment category	Maximum mark	Mark awarded
Engagement with Literature Skills	15	12
Knowledge and Understanding Skills	30	24
Cognitive and Intellectual Skills	30	24
Practical Application Skills	15	10
Transferable Skills for Life and Professional Practice	10	7
Total	100	77