

ACMA5002 Coursework Feedback

Student: Thomas Evans

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Selected topic/product/project: Injection-Moulded TPU Mobile Phone Case

Final mark: 82/100

1. Engagement with Literature Skills — 12/15

The report uses a strong and relevant range of sources covering DFMA, injection moulding defects, QFD, FMEA, material selection, simulation, cost and sustainability. Literature is generally integrated into the technical reasoning, particularly when discussing wall-thickness control, cut-out geometry, gate position, warpage, recyclability and the limitations of simulation. Granta data is used systematically rather than as isolated screenshots, and the chosen material is supported by measurable properties. The work also distinguishes between high-volume injection moulding and alternative processes. Some sources are general web or software guidance, and stronger peer-reviewed or standards-based evidence would be valuable for the drop-loading assumptions, dimensional tolerances and acceptance of moulding defects.

2. Knowledge and Understanding Skills — 25/30

The submission demonstrates very good understanding of DFM, DFA, injection moulding, flexible polymer behaviour and high-volume production. The design is treated appropriately as both a protective component and a flexible assembly that must stretch during installation and recover its shape. The report recognises the effects of wall thickness, raised lips, corners, cut-outs, gate location, venting and cooling on sink marks, weld lines and warpage. Material selection is particularly well developed, reducing 75 candidates to 13 through defined limits before selecting an ether-based TPU using strength, elongation, tear resistance, hardness, price and mouldability. Greater depth is needed through a consolidated manufacturing process plan covering material preparation, moulding, trimming, inspection and recycling, together with clearer numerical tolerances and final quality-control requirements.

3. Cognitive and Intellectual Skills — 25/30

The analytical stages are well linked. QFD identifies material behaviour, wall thickness, corner geometry, cut-outs, cooling and gate location as priorities, while the FMEA converts these into targeted actions for warpage, tearing, corner impact, sink marks and weld lines. Two gate locations are compared quantitatively: Gate B reduces sink-mark faces from 11 to 2 and warpage from 1.259 mm to 1.187 mm, while Gate A provides a faster fill and fewer weld lines. The final decision is therefore based on a balanced trade-off rather than one favourable result. Cost and cooling sensitivity are also evaluated clearly. The principal limitations are the absence of a formal multi-factor DOE and the fact that both gate options remain outside the software warpage tolerance, meaning the optimisation cycle is not fully completed.

4. Practical Application Skills — 12/15

The submission demonstrates very good use of Fusion 360, Granta EduPack and engineering calculations. The CAD model includes functional camera, button, speaker and charging openings, rounded corners, a raised perimeter and a mono-material construction. The plastics analysis provides clear numerical comparisons for fill time, sink marks, weld lines and maximum warpage, supported by readable simulation images and summary tables. The simplified impact calculation estimates an 895 N equivalent corner load and is used to establish a demanding FEA condition. Importantly, the report correctly identifies that the minimum safety factor of 1.355 does not meet the stated target of 2.0 and recommends local reinforcement. A higher mark would require numerical stress and displacement results, mesh and constraint documentation, a revised corner

design and repeat FEA, and re-simulation of the geometry modifications proposed to reduce warpage and weld lines.

5. Transferable Skills for Life and Professional Practice — 8/10

The report is very clearly organised and includes an abstract, comprehensive contents pages, lists of figures and tables, numbered sections, numerous summary tables, calculations, discussion, recommendations and conclusion. The structure provides strong traceability from customer requirements through QFD, FMEA, material selection, simulation, cost and sustainability. The comparison tables for gates, customer requirements, cooling sensitivity and design trade-offs are particularly effective and make the engineering decisions easy to audit. The writing is generally professional and appropriately cautious, especially where requirements were not fully achieved. Minor weaknesses include some repeated figure descriptions, occasional formatting inconsistencies and limited inclusion of fully dimensioned engineering drawings and final revised-design evidence.

Mark summary

Assessment category	Maximum mark	Mark awarded
Engagement with Literature Skills	15	12
Knowledge and Understanding Skills	30	25
Cognitive and Intellectual Skills	30	25
Practical Application Skills	15	12
Transferable Skills for Life and Professional Practice	10	8
Total	100	82