

ACMA5002 Coursework Feedback

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Selected topic/product/project: Injection-Moulded ABS iPhone 15 Case

Final mark: 81/100

1. Engagement with Literature Skills — 11/15

The report uses a relevant range of engineering literature covering injection moulding, DFM, DFA, CAD, FEA and material selection. Recognised textbooks and software sources are used to explain the manufacturing process and support the design methodology, while Apple accessory guidance provides an appropriate basis for the dimensional requirements. Literature is generally linked to the selected product and supports decisions concerning wall thickness, material properties, manufacturability and structural validation. The source base is nevertheless relatively narrow, with limited recent journal research and few standards or authoritative sources addressing polymer defects, sustainability, tolerances and feed-system design. Several design and cost assumptions would benefit from more direct technical referencing and critical comparison between sources.

2. Knowledge and Understanding Skills — 24/30

The submission demonstrates very good understanding of DFM, DFA, injection moulding, material selection, dimensional compatibility and high-volume manufacturing. The design applies a mainly uniform wall thickness, large radii, smooth transitions, protective camera and screen features, functional openings and single-piece construction. Material selection is well structured, progressing from benchmarking to screening criteria and Ashby-chart analysis before selecting ABS through consideration of stiffness, density, strength, impact performance, cost, mouldability and recyclability. The report also demonstrates useful manufacturing knowledge through the runner, sprue and gate calculations. Greater depth is needed in formal tolerance specification, inspection planning, cooling and ejection considerations, and a complete step-by-step manufacturing process plan. Sustainability is considered during material selection but is not developed into a full lifecycle and process assessment.

3. Cognitive and Intellectual Skills — 25/30

The analytical work is well connected and demonstrates genuine design improvement. The QFD identifies wall thickness, impact performance and dimensional accuracy as priorities, while the FMEA identifies warpage as the highest-risk failure mode and records reduced RPN values following mitigation. Granta screening uses defined limits and several Ashby charts to compare candidate materials. The strongest analytical evidence is the comparison between the initial and revised gate locations: easy-to-fill regions improve from 85.82% to 100%, fill time reduces from 0.85 to 0.74 seconds, and maximum warpage reduces slightly from 0.388 to 0.383 mm. The report also recognises the trade-off that weld-line faces increased from 17 to 26. Further achievement would require a formal DOE involving multiple controlled variables, clearer acceptance limits for warpage and weld lines, and fuller evaluation of alternative materials or manufacturing routes.

4. Practical Application Skills — 13/15

The submission demonstrates very good practical use of SolidWorks, Fusion 360, Granta EduPack and engineering calculations. CAD evidence includes isometric and side views, thickness analysis, mass properties and functional features based on the iPhone 15 geometry. The initial and revised plastics simulations provide clear numerical evidence of simulation-led optimisation, including filling, defects and warpage. Structural analysis is also documented appropriately, with ABS assigned to the model, internal surfaces constrained and a 20 N lateral load applied. The reported maximum stress of 5.95 MPa, displacement of 1.746 mm and

minimum safety factor of 3.36 provide useful quantitative validation. A higher mark would require fuller mesh documentation, more representative drop or impact analysis, explicit engineering tolerances and further redesign addressing the remaining sink marks and increased weld-line count.

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

The report is logically organised and includes an abstract, detailed contents page, numbered sections, QFD and FMEA evidence, CAD and simulation images, calculations, comparison tables, a break-even chart, conclusion and references. The progression from customer requirements through materials, design, simulation and economics is clear. The initial-versus-revised simulation summary on page 30 is particularly effective because it allows the design improvement and remaining trade-offs to be assessed directly. The cost calculations are detailed and lead to a clearly stated estimated unit cost and break-even volume. Presentation is reduced by repeated figure numbering, grammatical errors, inconsistent symbols and several calculation inconsistencies, including different production-time values used in the production-rate and unit-cost sections. More careful proofreading and checking of numerical consistency would improve the professional reliability.

Mark summary

Assessment category	Maximum mark	Mark awarded
Engagement with Literature Skills	15	11
Knowledge and Understanding Skills	30	24
Cognitive and Intellectual Skills	30	25
Practical Application Skills	15	13
Transferable Skills for Life and Professional Practice	10	8
Total	100	81