

ACMA5002 Coursework Feedback

Student: Kieran Allen

Student ID: 2417341

Selected topic/product/project: Heat-Resistant Polycarbonate Mobile Phone Housing

Final mark: 92/100

1. Engagement with Literature Skills — 14/15

The report demonstrates excellent engagement with relevant academic, standards-based and industrial literature covering DFMA, injection moulding, QFD, FMEA, DOE, polymer-flow analysis, FEA, costing and sustainability. Recognised sources such as Boothroyd and Dewhurst, Ashby, Malloy, Rosato, Stamatis and SAE J1739 are used to support the methodology and individual engineering decisions. Literature is applied directly to wall thickness, ribs, draft, gate configuration, material constraints, failure risks, tolerances and process planning rather than remaining as general background. The work also distinguishes clearly between design and process FMEA and recognises the limitations of simulation assumptions. Only minor improvement would come from slightly greater use of recent peer-reviewed evidence for the specific process settings and market-based cost inputs.

2. Knowledge and Understanding Skills — 27/30

The submission demonstrates excellent knowledge of DFM, DFA, injection moulding, material behaviour, structural performance and high-volume manufacturing. The design applies a near-uniform 1.5 mm wall, controlled transitions, fillets, a retaining lip, functional port openings and clear ejection and draft considerations. Granta selection is particularly rigorous, reducing a large material database to eight viable grades before comparing toughness, stiffness, density, service temperature, price, processability and recyclability. The final heat-resistant polycarbonate choice is directly linked to the QFD and the highest-risk FMEA mode. The detailed manufacturing process plan covers material drying, conveying, preheating, injection, packing, cooling, ejection and quality control. The principal limitation is that several recommended production features, including full draft and local camera-aperture reinforcement, remain specified for further development rather than fully implemented in the final CAD model.

3. Cognitive and Intellectual Skills — 28/30

The analytical process is exceptionally well connected. The QFD produces quantified priorities and identifies wall thickness as the highest-leverage design variable. The DFMEA then converts the principal risks into specific design actions, particularly around camera-aperture cracking and cooling warpage. Six flow simulations compare gate position, melt temperature, local geometry and wall thickness, with results tabulated for fill confidence, fill time and warpage. The simplified DOE provides a clear and useful finding: increasing the back wall to 2.0 mm increased warpage by 28%, demonstrating that wall uniformity was more important than increased stiffness. Three structural load cases are evaluated critically, including acknowledgement that the unsupported bare housing fails the torsional case and must be assessed at assembly level. Higher achievement would require physical validation or an assembly-level torsional model, but the critical interpretation and honesty concerning limitations are excellent.

4. Practical Application Skills — 14/15

The submission demonstrates excellent practical application of Fusion 360, Granta EduPack and manufacturing calculations. CAD evidence includes isometric, internal, sectional and plan views, while the appendices contain further dimensional and simulation evidence. The plastics study documents mesh refinement, material assumptions, process temperatures, gate development and six iterative runs, improving easy-fill regions from 64.8% to 98% and eliminating unlikely-to-fill zones. FEA is unusually comprehensive,

with stated material properties, mesh sizes, restraints and three clearly defined loading cases. Stress, displacement and safety factors are interpreted rather than merely reported. The cost model is transparent and includes material, labour, equipment, tooling, cycle time and break-even calculations, followed by comparison with CNC machining and thermoforming. The residual 0.567 mm warpage above the solver tolerance and the need for assembly-level structural validation prevent the highest possible practical mark.

5. Transferable Skills for Life and Professional Practice — 9/10

The report is very professionally structured and includes an abstract, contents page, lists of figures and tables, logically numbered sections, detailed tables, technical images, appendices, recommendations and a clear conclusion. Traceability is particularly strong: customer requirements lead to QFD priorities, which inform FMEA, material selection, DOE, CAD, simulation and final recommendations. Tables summarising the candidate materials, manufacturing process, simulation iterations, FEA results and costing make the submission easy to audit. The writing is formal, clear and appropriately critical, especially where solver peaks, unrealistic restraints and remaining design risks are discussed. Minor repetition and the density of some technical sections slightly reduce readability, but the overall communication standard is excellent.

Mark summary

Assessment category	Maximum mark	Mark awarded
Engagement with Literature Skills	15	14
Knowledge and Understanding Skills	30	27
Cognitive and Intellectual Skills	30	28
Practical Application Skills	15	14
Transferable Skills for Life and Professional Practice	10	9
Total	100	92