

ACMA5002 Coursework Feedback

Student: Charlie Gallagher

Student ID: 2416608

Selected topic/product/project: Mobile Phone Case Optimisation

Final mark: 79/100

1. Engagement with Literature Skills — 12/15

The report demonstrates strong engagement with relevant literature covering DFM, DFA, injection moulding, manufacturing defects, QFD, FMEA, DOE, materials, sustainability and cost modelling. Recognised textbooks and journal sources are used, including Boothroyd and Dewhurst, Groover, Malloy, Rosato and recent manufacturing research. Literature is generally integrated into the design reasoning and supports decisions concerning wall thickness, draft, gate location, recyclability, material behaviour and dimensional stability. Figures and external information are usually referenced, and the reference list is extensive. Some technical assumptions, particularly the proposed PC-TPU material combination and processing compatibility, require stronger direct evidence. Greater use of standards, specific material-grade data and more critical comparison between sources would justify a higher mark.

2. Knowledge and Understanding Skills — 24/30

The submission demonstrates very good understanding of DFM, DFA, injection moulding, defects, material selection and high-volume production. The principles are applied directly through uniform wall thickness, fillets, draft angles, snap-fit geometry, Poka-Yoke features and consideration of ejection and gate positioning. The report also provides useful additional manufacturing knowledge through the discussion of nozzle, sprue and gating arrangements and the sprue-dimension calculations. Material selection compares PC and TPU in terms of stiffness, strength, flexibility, cost, thermal behaviour and assembly requirements. The discussion of tolerances, recyclability, process efficiency and design trade-offs is also relevant. The main limitation is that the proposed PC-TPU blend is not fully justified as a specific commercially compatible material or manufacturing route, and the required step-by-step manufacturing process plan is not clearly presented.

3. Cognitive and Intellectual Skills — 24/30

A strong range of analytical methods is used and connected logically. The product specification and QFD establish measurable customer and engineering priorities, while the FMEA identifies relevant failure modes and includes revised RPN scores after proposed actions. A weighted decision matrix is used to compare two initial concepts, providing a clear rationale for the selected design. The DOE investigates wall thickness, gate location and processing temperatures, and the results are linked to pre- and post-modification simulation evidence. The report shows that sink marks were removed and weld lines and warpage were reduced, while also recognising the possible negative effects of thinner walls and higher processing temperatures. Cost, production rate, break-even and additive-manufacturing comparisons are detailed. Further improvement would require clearer numerical DOE comparisons, stronger validation of the material assumption and a more rigorous structural loading analysis.

4. Practical Application Skills — 12/15

The submission demonstrates very good practical application of Fusion 360, Granta and engineering calculation methods. The CAD model incorporates functional openings, drafted features, fillets, snap-fit retention and a raised protective camera edge. Particularly good evidence of iterative design development is shown through the comparison of alternative gate locations, the wall-thickness modification from 1.5 mm to 1 mm and the pre- and post-change plastics simulation images. The work also includes useful calculations for sprue dimensions, production time, equipment cost, labour cost, tooling and unit cost. The structural analysis

is less developed: only a 1 N moment is applied, numerical stress, deformation and safety-factor results are not clearly reported, and the analysis does not represent the drop-test condition specified in the brief. Fuller simulation settings, engineering dimensions and a more realistic FEA study would raise the mark.

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

The report is comprehensive, logically sequenced and generally presented in a professional engineering format. It contains an abstract, contents page, list of figures, numbered sections, equations, tables, technical illustrations, recommendations and a clear conclusion. The progression from design requirements and analytical tools through CAD development, simulation, cost and sustainability is coherent. Recommendations concerning a post-mould cooling jig, improved material separation and more advanced simulation show independent judgement and awareness of limitations. However, the document contains several presentation weaknesses, including broken bookmarks in the contents page, repeated page numbering, small text in some figures, grammatical errors and inconsistent equation formatting. More careful proofreading and document formatting would improve the overall professional quality.

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	12
Transferable Skills for Life and Professional Practice	10	7
Total	100	79