

ACMA6000 Coursework Feedback

Student	Gethin Dyer Davies
Student ID	2307576
Assessment	Manufacture of Wind Turbine Blade
Final mark	82 / 100

1. Engagement with Literature Skills — 17/20

The submission demonstrates extensive independent research across aerodynamic profiles, wind-turbine dimensions, material behaviour, environmental conditions, manufacturing, cost and structural performance. Importantly, the literature is not used merely to repeat lecture examples. Several aerofoil profiles are compared and published comparative evidence is used to justify the eventual NACA 2412 choice. The reference list includes journal literature, technical reports, government sources and recognised texts, including recent research on ceramics, fatigue, wind-turbine design and manufacturing. This is particularly strong evidence of the independent research expected at Level 6. The mark is limited by some uneven source quality and occasional referencing and presentation inconsistencies rather than lack of research depth.

2. Knowledge and Understanding Skills — 24/30

The submission demonstrates very strong breadth across aerodynamics, blade geometry, material selection, manufacturing, cost and structural performance. The aerodynamic profile is independently justified rather than copied directly from the lecture example, with the report explaining that NACA 2412 offers favourable lift-to-drag performance across the considered operating range. This is a positive feature because the alternative profile is researched, sourced and justified. The report also addresses metals, ceramics and polymer composites and contains distinct sections on casting, extrusion, ceramic manufacture and composite processing. Mechanical analysis considers normal and extreme wind conditions and uses independently sourced aerodynamic and site data. The remaining limitations concern some simplifying assumptions and places where the engineering explanation could be more precise.

3. Cognitive and Intellectual Skills — 17/20

This is a particularly strong part of the submission because decisions are repeatedly justified through comparison rather than asserted. The student independently compares aerofoil profiles before selecting NACA 2412, uses a weighted decision matrix for materials, evaluates manufacturing processes by cost, time and scalability, and then integrates structural, environmental and cost evidence into the final recommendation. The final comparative analysis recognises that CFRP has higher cost and poorer recyclability but argues that its strength, fatigue performance and calculated safety margins justify its selection for this application. The work also identifies limitations in the simplified structural model rather than overstating certainty. A higher mark would require still stronger quantitative sensitivity analysis or a completed optimisation cycle.

4. Practical Application Skills — 17/20

The submission contains substantial practical engineering evidence. It includes blade sizing, chord calculations, five spanwise airfoil profiles, camber and thickness calculations, material-selection calculations, manufacturing comparisons, raw-material cost calculations, manufacturing-cost considerations, lift and drag calculations, bending and torsional stress calculations, safety-factor calculations, CAD modelling and engineering drawings. The cost work is notably design-linked: CAD volume is used to estimate material quantity and raw-material cost for one blade and a set of three. Structural calculations are also performed under both operating and extreme wind conditions. The CAD requirement is satisfied by the proposed blade geometry and sectional profile drawings; there is no deduction for not modelling detailed internal blade

structures. The main limitation is that some results remain based on simplified geometry and assumptions, which the report appropriately acknowledges.

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

The report is comprehensive and logically structured, with clear progression through literature, specification, material selection, manufacturing, cost, mechanical analysis, comparison, CAD drawing and conclusion. The conclusion successfully brings together aerodynamic design, material selection, manufacturing and structural results and clearly identifies sensible future work in FEA, fatigue, laminate optimisation, prototyping and sustainability. The professional standard is reduced by frequent grammatical errors, awkward phrasing and some inconsistent figure and table presentation. More careful proofreading and document control would improve the overall professional quality substantially.

Mark Summary

Assessment category	Maximum mark	Mark awarded
Engagement with Literature Skills	20	17
Knowledge and Understanding Skills	30	24
Cognitive and Intellectual Skills	20	17
Practical Application Skills	20	17
Transferable Skills for Life and Professional Practice	10	7
Total	100	82

Overall Feedback

This is a very strong engineering submission with particularly good independent research, justification and integration of evidence. The strongest aspects are the researched selection of the aerodynamic profile, broad comparison of materials and manufacturing routes, design-linked cost calculation using CAD volume, structural analysis under both operating and extreme wind conditions, and the final integration of cost, mechanical performance, manufacturability and sustainability. The main limitations are not missing engineering work, but rather the simplified assumptions inherent in the preliminary analysis and the weaker professional presentation caused by grammatical and formatting issues. The most important improvement would be to refine the technical presentation and use the strong existing analysis to carry out a more explicit optimisation or sensitivity study.