

ACMA6000 Coursework Feedback

Student	Shanjidah Ahmed
Student ID	2309702
Assessment	Manufacture of Wind Turbine Blade
Final mark	75 / 100

1. Engagement with Literature Skills — 16/20

The report demonstrates a strong range of independent research across blade aerodynamics, NACA 4412 performance, materials, manufacturing, cost and composite behaviour. The source base includes recent journal papers, academic books, technical literature and relevant industrial material. Sources are actively used to establish numerical assumptions and justify engineering choices rather than merely appearing in the reference list. The report therefore demonstrates good independent engagement beyond the lecture material. The mark is limited by some inconsistent source quality, occasional awkward referencing and a few sources whose relevance to the specific technical point is less convincing. More consistently authoritative primary literature and tighter referencing would move this criterion higher.

2. Knowledge and Understanding Skills — 22/30

The submission demonstrates very good understanding across aerodynamic geometry, material selection, manufacturing and composite behaviour. NACA 4412 is developed through calculated chord, camber and thickness data, with the blade divided into multiple spanwise sections before being transferred into CAD. The material-selection process closely reflects the methodology taught in the lectures: translation, screening, ranking and supporting information are explicitly applied through Ansys Granta. Manufacturing coverage is also broad, including aluminium-based processing, silicon-carbide sintering and composite vacuum/RTM routes. The main technical limitation is that the mechanical-properties section calculates lift and drag and discusses structural loading and safety factors, but does not develop design-specific bending-stress and torsional-stress calculations to the same level as the stronger submissions.

3. Cognitive and Intellectual Skills — 15/20

There is substantial evidence of engineering decision-making. The Granta selection process uses explicit constraints and objectives, including minimising mass, maximising fatigue resistance and fracture toughness, and maintaining appropriate cost. The subsequent performance index compares several materials, and the final decision is supported by additional comparisons of density, price, fatigue, stiffness, manufacturing route and production cost rather than relying solely on one ranking result. This demonstrates the justified selection approach expected in the module. The mark is limited because the calculated aerodynamic loads are not carried through into a complete stress-based verification or a subsequent design iteration.

4. Practical Application Skills — 15/20

The submission contains substantial evidence of completed practical work. It includes power and blade-sizing calculations, chord calculations, extensive NACA 4412 coordinate calculations, multiple dimensional airfoil graphs, Granta screening charts, weighted material calculations, lift and drag calculations, comparative manufacturing analysis and CAD development. The report shows several CAD views of the blade, and the calculated external NACA geometry is clearly translated into the model. This fully satisfies the intended CAD requirement, and no internal blade structure is required. A technical drawing is also provided. The principal limitation is the absence of completed bending-stress and torsional-stress calculations for the actual proposed blade. The discussion demonstrates awareness of structural requirements, but this does not replace a design-specific stress calculation.

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

The report is comprehensive and logically organised, progressing through design specification, material selection, manufacturing, cost, mechanical analysis, comparative analysis, CAD and conclusion. Figures, Granta charts, calculation tables, airfoil graphs and CAD images provide strong visual support to the written analysis. The conclusion clearly identifies the numerical basis for the material choice, preferred manufacturing route and aerodynamic assumptions. The professional standard is reduced by frequent grammatical errors, some awkward technical expression, inconsistent terminology around vacuum bagging and vacuum infusion, and occasional formatting issues.

Mark Summary

Assessment category	Maximum mark	Mark awarded
Engagement with Literature Skills	20	16
Knowledge and Understanding Skills	30	22
Cognitive and Intellectual Skills	20	15
Practical Application Skills	20	15
Transferable Skills for Life and Professional Practice	10	7
Total	100	75

Overall Feedback

This is a strong submission with particularly good evidence of independent research, Granta-based material selection, extensive NACA 4412 geometry calculations, manufacturing comparison and CAD blade development. The material-selection process is one of the strongest aspects because the work follows a clear translation-screening-ranking approach and then supplements the numerical ranking with manufacturing, cost and performance considerations. The principal limitation is the mechanical-analysis stage: lift and drag are calculated and structural behaviour is discussed, but the analysis does not continue into design-specific bending and torsional stress calculations. The strongest improvement would therefore be to use the existing aerodynamic force results to complete the stress evaluation and show quantitatively whether the selected material and geometry provide an adequate design margin.