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Cost Study for Large Wind Turbine Blades

WindPACT Blade System Design Studies

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ABSTRACT

The cost study for large wind turbine blades reviewed three blades of 30 meters, 50 meters, and 70 meters in length. Blade extreme wind design loads were estimated in accordance with IEC Class I recommendations. Structural analyses of three blade sizes were performed at representative spanwise stations assuming a stressed shell design approach and E-glass/vinylester laminate. A bill of materials was prepared for each of the three blade sizes using the laminate requirements prepared during the structural analysis effort. The labor requirements were prepared for twelve major manufacturing tasks. TPI Composites developed a conceptual design of the manufacturing facility for each of the three blade sizes, which was used for determining the cost of labor and overhead (capital equipment and facilities). Each of the three potential manufacturing facilities was sized to provide a constant annual rated power production (MW per year) of the blades it produced. The cost of the production tooling and overland transportation was also estimated. The results indicate that as blades get larger, materials become a greater proportion of total cost, while the percentage of labor cost is decreased. Transportation costs decreased as a percentage of total cost. The study also suggests that blade cost reduction efforts should focus on reducing material cost and lowering manufacturing labor, because cost reductions in those areas will have the strongest impact on overall blade cost.