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The Effects of Defects in Wind Turbine Blade Manufacturing

Current manufacturing techniques of wind turbine blades have been found to cause flaws in the forms of porosity, in-plane waviness, and out-of-plane waviness. Dr. Cairns' group is currently working on characterizing these defects and understanding their effects on the blades' lifespan. As a member of this group, I will be an active participant in each step in this process; manufacturing coupons, testing said coupons, and analyzing the results. We will be creating a polymer-matrix composite that models the material and manufacturing of wind turbine blades, allowing our tests to more accurately represent the actual results of stress upon the blades. These coupons will be tested under compression and tension, to create a damage progression curve. This will help us to create a model that is necessary to determining the overall effects these manufacturing flaws have on the blades' lifespans. With these results, the USDOE's Blade Reliability Collaborative can work towards potentially creating blades that are both cost-effective and defect free, allowing them to more efficiently fulfill the desired lifespan of 20 years, and be a more feasible means of energy.