

Wind Turbine Characterization and Design of High-Efficiency DC Motors

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This Capstone Design project designed a movable gurney flap for a wind turbine. The flap needed to be capable of being actuated in 0.25s or less. Maintenance of wind turbines is difficult because of their height and accessibility. For this reason, one project constraint was that there be little to no additional mechanical parts to create the flap. It was determined that the gurney flap needed to be driven directly by a DC motor. The project team selected an LRPX 32 motor from Electrocraft. The wind load on the flap opening to 90° was simulated to achieve a motor a moment arm of 20 in-lb. When the flap was in the 0° position the torque on the motor would be close to zero. Several systems of attaching the flap to the motor shaft were compared. It was ultimately decided that the system involving bolting a steel shaft to one side of the flap, coupling it to the motor shaft, and mounting the steel shaft on both ends in bearings was the simplest and most cost effective to perform. The final flap design was assembled and able to rotate under direct DC power.

