Design and Analysis of a Magnetic Axial Flux Transmission and Generator for Wind Turbines

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This study investigates the development of a more efficient transmission and generator system for wind turbines. Current mechanical transmissions in turbines suffer energy losses from friction in gears and bearings. To minimize these internal losses, we developed and tested a magnetic axial-flux transmission. Tests revealed a limited torque output in the prototype, obstructing its use with generators that demand higher mechanical input to start. To address this, we also built and evaluate a generator suited for low-torque operation. Both parts were evaluated separately and together. The transmission hit speeds up to 7,200 rpm, while the generator delivered about 3 volts using 10 coils (100 turns each). These outcomes prove that a magnetic transmission can minimize contact-based losses and pair with a matching generator. The tests outlined performance boundaries and promise, paving the way for new transmission-generator setups in wind energy systems.

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