Inventions & Innovation Project Abstract

Hi-Q Rotor

The Hi-Q Rotor is a new kind of rotor for wind turbines based on a “single strip geometry” that is stronger and more stable than conventional 3-blade devices. The invention has been found to have high value for collecting wind at low speeds where standard turbines are ineffective. Comprised of an elongated strip whose one end is twisted three times, the rotor has a symmetric, threefold, three-dimensional shape with radial symmetry and can turn on a horizontal or vertical axis. An important feature of the technology is its ability to spin under the slightest flow of air. When dropped from a height the device spins quickly and naturally stabilizes. Moreover, the open hub confers a jet-stream effect that organizes the air and reduces turbulence.

The invention was developed to harvest wind sites that have a high percentage of “low wind days.” These include Class 2, 3, and 4 Wind Sites, and sites where the wind speed is broken by physical features such as mountains, buildings, and trees. Little has changed in the design of the wind turbine for the last hundred years. Although the standard 3- blade rotor has been improved with stronger and longer blades, advances in composites, and aerodynamic controls, the essential design of the rotor (a hub with blades) has remained unchanged. According to Wind Power Today, the wind industry is currently built on winds generated in the high wind speed areas (Class 6 and 7 wind sites) which comprise the smallest geographic area. Yet “our nation also enjoys an abundance of lower-wind-speed resources.” To meet the goals set out by DOE in wind energy development over the next ten to fifteen years, it is critical that innovative new technologies be developed that can harvest this abundant resource. The Hi-Q Rotor addresses this need.

In this study, the investigators will examine more than 60 variations of the invention– seeking an optimal version for residential and commercial use. This will be accomplished by refining optimal efficiency with computer models-- and by building scale model prototypes for testing at the University of Kansas Wind Tunnel. Once an optimized model is found, the team will build a FULL SCALE (8' diameter blade) model that will be operated on a windy Kansas plain. Concurrently a standard wind turbine of equal size will be set up side by side to find out which system generates more power. This investigation will determine if the Hi-Q Rotor has commercial potential and if successful, a plan will be presented to exploit the technology over a ten-year period.

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