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It's All How You Spin It: Wind Generator Efficiency Based On Propeller Size And Shape

This experiment tested how rotor blade's size and shape affect the revolutions per minute (RPM) efficiency generated by airflow. It was hypothesized that both the shape and the size of the rotor blades would affect the RPM. Four blades of each shape, square, triangle, circle, and propeller (a semi-circle attached to a trapezoid) were constructed of cardboard using consistent surface areas among all shapes. Two surface area sizes of each shape were made; small and large. Three blades were then painted white and one painted red. A rotor hub was created to hold the four blades. The rotor hub was placed on a 3 volt generator shaft and spun from wind generated by a fan. The fan was placed at one end of the a wind tunnel and the 3 volt generator with the rotor blades was placed at the other end. A video recording was made of the rotor blade revolutions and imported into a video-editing program. Data observations were made using slow motion for recording RPM. The findings of this experiment indicated that the sizes of the rotor blades changed the RPM but the changes were irregular. Sometimes the larger sized shapes had a faster RPM and sometimes they had a slower RPM. Thus, the size did not consistently affect the RPM. However, when the sums of the sizes for each shape were analyzed, it appeared that the shape did matter more than size. It was found that the two best shapes were the square and the circle. The triangle and the propeller shape had lesser RPM.