Tanapon Srivongsa 2009: Rotor-Speed Control-System Design for Small Wind Turbine. Master of Engineering (Mechanical Engineering), Major Field: Mechanical Engineering, Department of Mechanical Engineering. Thesis Advisor: Mr. Withit Chatlatanagulchai, Ph.D. 68 pages.

Wind turbine technology has changed tremendously in the past twenty five years. Most of the wind turbines, which are currently designed or installed, have some rotor speed control systems as their significant components. The most popular control technique is rotor speed control by adjusting the blade's pitch angle. At low wind speed, good rotor speed control is important to obtain a specific rotor speed to generate as high electricity as possible for that specific wind speed. At high wind speed, good rotor speed control is important to maintain a constant rotor speed so that the resulting electricity is constant without any jerk. This will result in better-quality electricity. The rotor speed control system is mainly installed in large wind turbines only.

This research designs the rotor speed control system of a small wind turbine. A small-scaled wind turbine was designed and built with 1.14 meters in diameter. This wind turbine has the same structure and components as the regular wind turbine, but it cannot generate electricity. A mechanism to adjust the blade pitch angle was designed and installed without adding more weight to the rotor. As a result, the wind turbine can be operated at the same wind speed range but with higher efficiency.

The rotor speed control system was created from a PID controller, which is not complicated and is well-known in the industry. There are two cascading loops in the control system, namely the inner and the outer loops. The inner loop controls the pitch angle, and the outer loop controls the rotor speed. The experimental result has shown that the wind turbine was able to follow the desired speed closely and is able to robustly maintain the speed very well in the presence of the disturbance from the changing wind.

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