

BLADE DESIGN

blade technology

PROVEN
PROVEN ENERGY

Award Winning Proven Blade Technology

The Proven Flexible Blade System provides an answer to the age-old problem for any wind turbine. We must capture all the power available in light winds but spill the destructive amounts of power in high winds. It does this by means of two mechanisms described below.

Proven Zebedee Furl

A flexible hinge near the root of the blade flexes in response to rotor rpm. As the rotor rotational speed increases, blades are thrown outwards by centrifugal force flexing the Zebedee hinge. The action of the flex is to change the aerodynamic pitch of the blade towards stall - you can try this with a folded piece of paper to see the principle in action!

Pitching to stall reduces the lift from the blade airfoils and therefore the driving force. As speed reduces the opposite will happen. In high winds there is a dynamic balance between the rpm and pitch of the airfoil. The effect is that in high winds the Proven rotor will run up to a certain speed and then no faster. Even in storm force winds of up to 150mph you can enjoy close to rated output from your Proven Wind turbine.

The Zebedee spring is used to control at what rpm/power the pitch control happens. It is possible to tweak the power output on any Proven Wind Turbine by adjusting the spring's settings but Proven recommend that settings be left at the factory pre-sets.

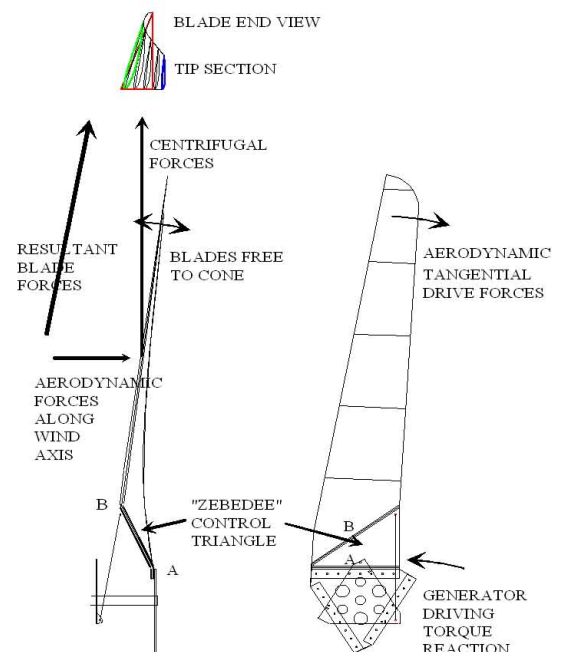
Proven Zebedee Cone

Proven Zebedee cone refers to the reaction of the flexible rotor to severe gusts or storm force winds. In these scenarios the blades "cone" down wind away from the tower. A normal cone angle is around 5 degrees in light winds. Hurricane force winds can give cone angles of up to 45 degrees.

This is an important self-protection mechanism as the swept area of the rotor is halved at 45 degrees. Zebedee Cone allows the turbine to dissipate the large mechanical loads experienced in gusts and to reduce the swept area or power of the rotor in extreme conditions.



- Extremely robust
- Works well even in turbulent air
- Automatically limits power in high winds
- Turbine can run disconnected without damage
- Turbine output is still close to rated even in storms



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