Small vertical axis wind turbines

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The technology for traditional horizontal axis wind turbines (HAWTs) have been in development for more than a hundred years. This technology includes blades and their manufacturing, gear boxes and their manufacturing technology, pitch angle devices and their technology, and so on. The technologies are very mature. Betz"s Law, which defines the maximum amount of energy that a HAWT can extract from the wind, is based on a single disk (the rotor) moving in a two-dimensional space.

The SAWT, a vertical axis design, solves the three technical problems in the vertical axis wind turbine industry. One designer has produced a small vertical wind turbine that sold over 4,000 units in around 60 countries since 2007, and used patents to set up technical barriers.

Though many other turbine manufacturers are developing medium and large VAWT, they have adopted the design approach from small VAWTs by simply proportionally enlarging a small turbine to become a "medium or large VAWT". They do not truly understand the characteristics of a VAWT.

It is well known that a VAWT is quiet, safe, and does not need a tall tower. However, hardly any commercialized large VAWT have been launched despite of the efforts of countless engineers. The reasons are obvious: the problems of aerodynamic efficiency, self-starting, structural stability, and safe braking remain unsolved. The problems have to be solved for any type of wind turbine.

The core of this technology is to adjust blade angles on a spinning turbine. The device was tested on a 1-m tall x 1.36-m wide VAWT in a wind tunnel at a wind speed of 2 m/s. The measured torque was 0.9 to 1 Nm at 44 rpm. The conversion rate of wind energy to mechanical energy reaches 68%, surpassing the limit of 59.3% by Betz Law. This is not to say the Betz law is wrong. In this theory, a HAWT uses a single disk rotating in a two-dimensional space while the VAWT is a multiple disk rotation in a three-dimensional space. This makes the VAWT equivalent to two HAWTs.

The bending moment on the wind mill can be extremely large when the rotor diameter is sufficiently large. That means the main shaft must have a large and strong diameter, which makes commercialization more difficult. Our solution uses a hollow truss as a main shaft inside because the truss structure is strong and relatively light, meeting the requirements for the main shaft on medium and large VAWTs, as well as the demand for commercialization.

The Vestas Sailrocket 2 set a world record for sail boats in Walvis Bay of Namibia in 2012. The craft reached 64.78 knots (119.95 km/h) in a wind of just 25 knots (46.3 km/h). Its average sailing speed reached 59.23 knots (109.65 km/h) in a 500m straight channel. This sail boat was propelled by the lifting force resulting from Bernoulli"s principle.

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Over ten years of R& D in the VAWT industry has led to the Super Turbine, a type of large wind turbine. The Super Turbine, developed by 2014, has low power-generation costs, and easy installation and maintenance. At its core is an extension of the “active real-time pitch attack angle regulation” technology which has been verified by experiments. We think it could lead a revolution in current large, wind-turbine industry.

The design is an extension and further application of "active real-time attack angle regulation" technology. In a circular orbit, driven by the wind, the blades at different locations will produce the driving force with different magnitude and direction.A modified track has additional advantages. For instance, where the driving force is greatest, cut the circular track at this location and extend it into a straight line, which is a prototype of super turbine. Like a sailing boat, it is fastest in a straight line.

Because of these advantages, the design will change the shape of current large wind turbine industry. The design simplifies the manufacturing of large wind turbines because it does not need large blades, large gear boxes, large generators, or huge towers.

Hello, I"m not sure of the design type "Tesup Atlas 2.0" is the make and model. It has a 11m/s start (48 volt model) is what I"m looking at, primarily for my garage for lighting, in an urban setting but hoping to use it in combination with solar on my boat. Thoughts? Mark