Small Modular Shrouded Wind Turbine for Urban Application

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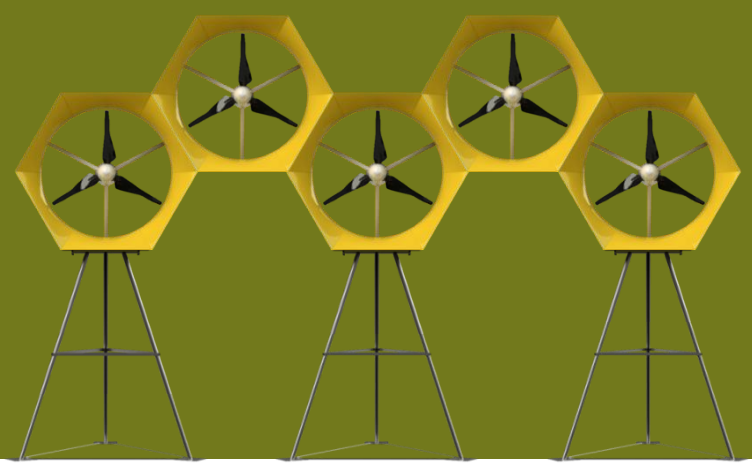
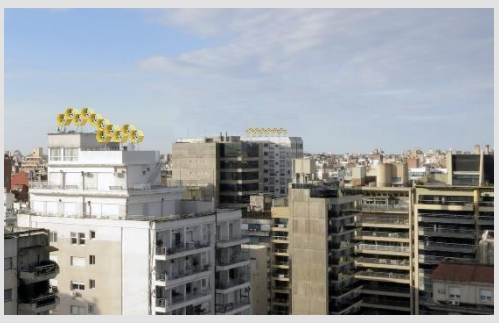


Specification

Rated Power	410 W
Rated Wind Speed	12 m/s
Optimum TSR	6
Type	Variable Speed
Energy Storage	Grid Feed-in
Rotor Diameter	1.2 m
Shroud Swept Area	1.95 m^2

Application

The Honeycomb turbine is installed on rooftops of buildings to produce decentral power while using dead space and improving the “green image” of the owner.



Measurements of the micro siting at the field test location have shown that more than 90% of the available wind energy at the edge of the building has a direction of ±35° vertically to the front.

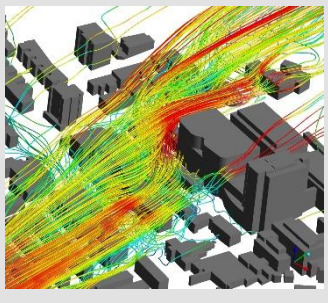


Fig. 2. Wind streamlines around buildings[1]

Manufacturing

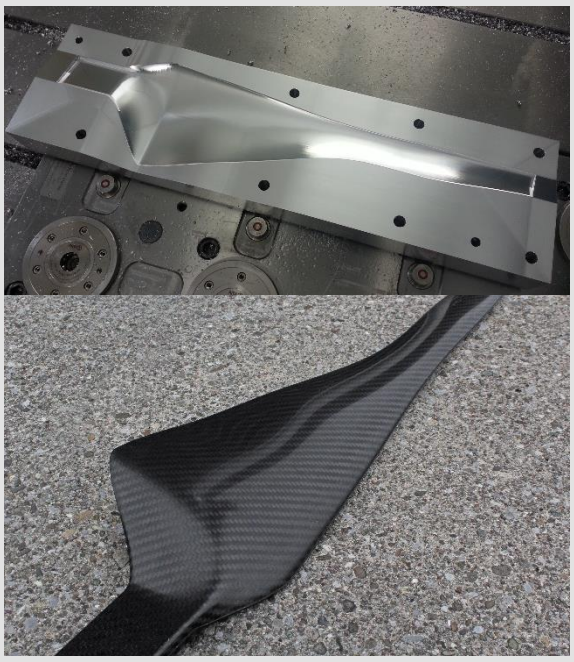
This wind turbine is designed to be assembled and transported by the customer with every single part fitting in a standard European elevator while all assemblies have a weight lower than 20 kg to carry at the time.

Rotor Blades

Lightweight and robust blades are key for starting and producing power at low wind speeds while withstanding storms and being safe in an inhabited area.

Shroud

The shroud fulfills apart of the aerodynamic requirements a noise reduction thanks to it’s hollow structure complemented with damping material as a core in the composite structure.



Mount

The turbine has a fixed direction on the mount and can therefore be produced for much lower costs than when included an expensive yaw system for multiple turbines that meets safety requirements.

Results of Wind Tunnel Testing

Power Output Increased by 59%

The main benefit of the shroud is that the power output of the rotor can be increased by 59%. Furthermore the continuity in respect of deviation of tip speed ratio is increased by the shroud.

Shrouded Turbine performs better at yaw

Comparing the performance of the shrouded turbine with the open turbine shows a much better performance at yawed position of 9.5% at 10° yaw with 8 m/s wind speed.

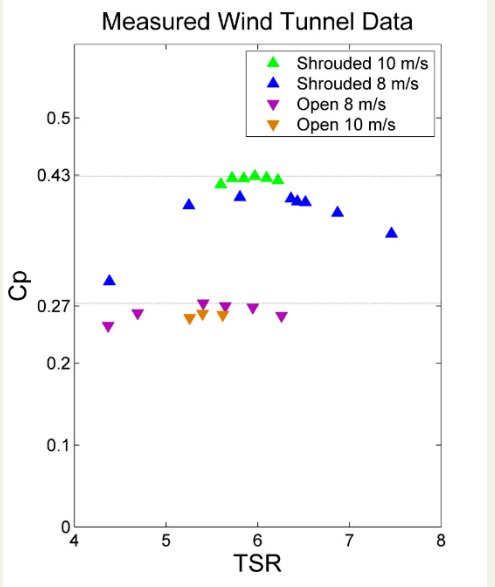


Fig. 3. Measurement results of wind tunnel testing

6 References

1. **General Fluid Dynamics Consulting Services, [Online], Available: http://wildeanalysis.co.uk/cfd/consulting/fluid-dynamics [20.05.2014].**

Partners