

Vertical Axis Wind Turbine for Urban Utility

Capstone Team Project – Department of Mechanical Engineering



CONFIGURATION 1

Unique Design

- Designed to maximize energy output in urban, and inhabited areas
- A vertical-axis wind turbine with a twist made of expanded polyurethane (PU)

Product Advantages

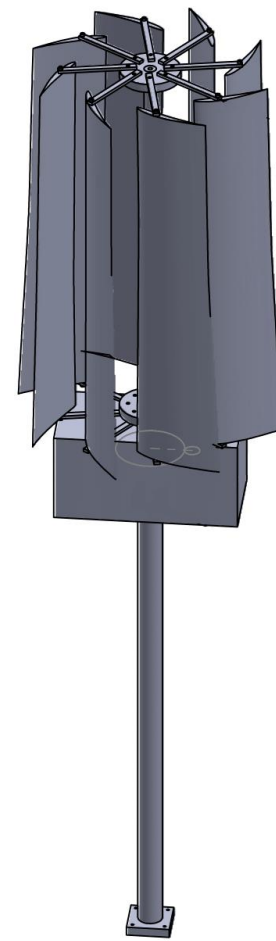
- No startup system needed
- Minimal maintenance
- Safety
- Noiseless
- Aesthetic visual integration in urban and rural locations
- Bird friendly

Applications

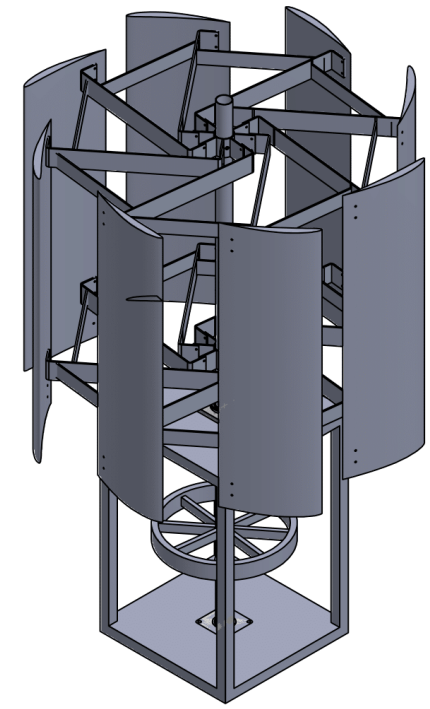
- Power generation system best suited for private residences, public areas, industrial areas, and other places
- Blades provide an excellent platform for branding and advertising

Manufacturing Constraints:

- Expanded Polyurethane:
 - 1) Availability: not available in TRNC
 - 2) Cost: expensive to order from abroad
 - 3) Machining: needs a 6-axis CNC machine
- Gearbox:
 - 1) Cost: expensive (470 tl)



Configuration 1



Configuration 2

Wind Turbine Assembly Components

- Vertical axis wind turbine rotor blade
- Gear box [IEC 61400-4:2012]
- Tower
- Three-phase Permanent Magnet Generator
- Battery
- Bearings [ISO 3290-1:2014]

Wind Turbine Dimensions

- Rotor's diameter: 60 cm
- Shaft's length: 165 cm
- Tower's height: 150 cm
- Blade's height: 130 cm

Wind Turbine Yields

- Nominal power: 5.5 W (Theoretical)
- Start up speed: 1.5 m/s
- Maximum rotation speed: 70 rpm

Standards

- ISO: 9001
- AWEA 9.1

CONFIGURATION 2

- Manufactured because of the manufacturing constraints.

Wind Turbine Assembly Components

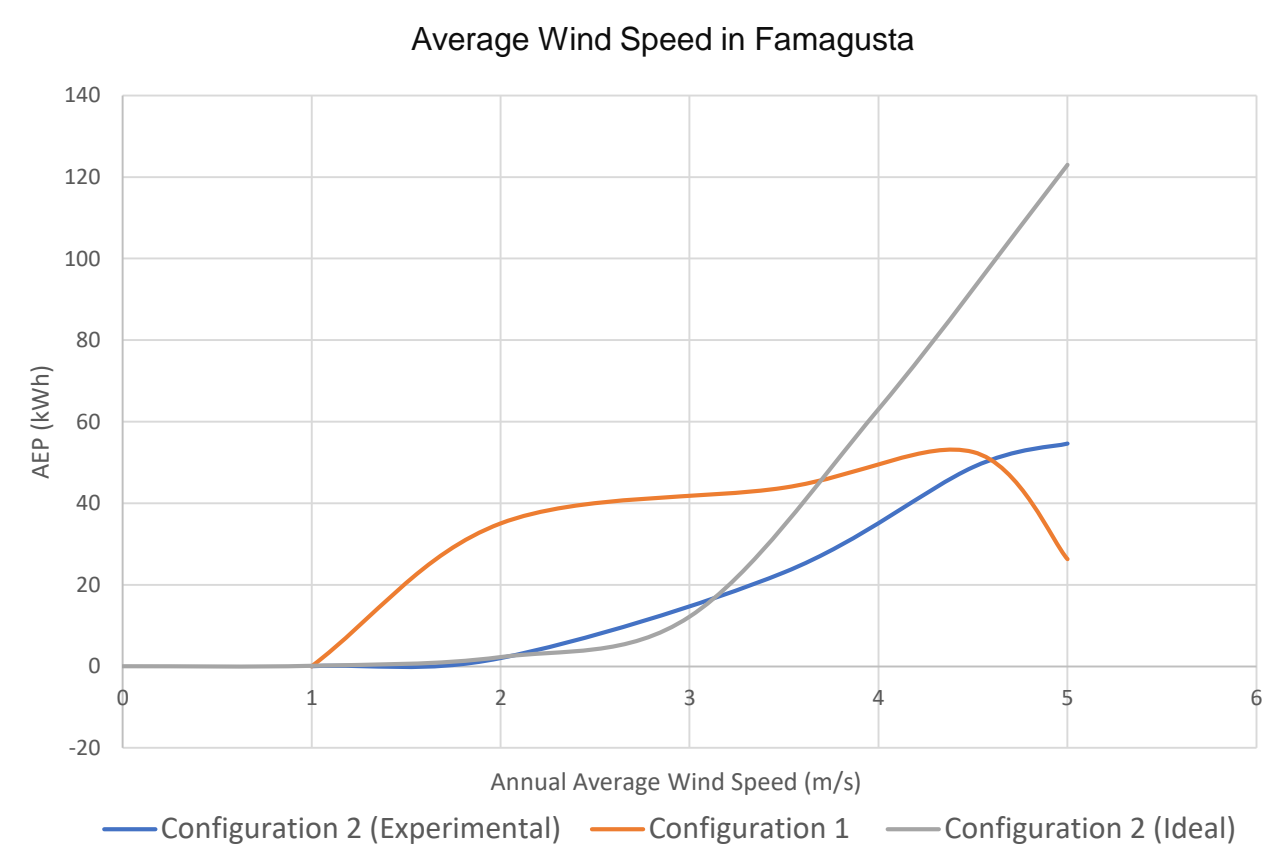
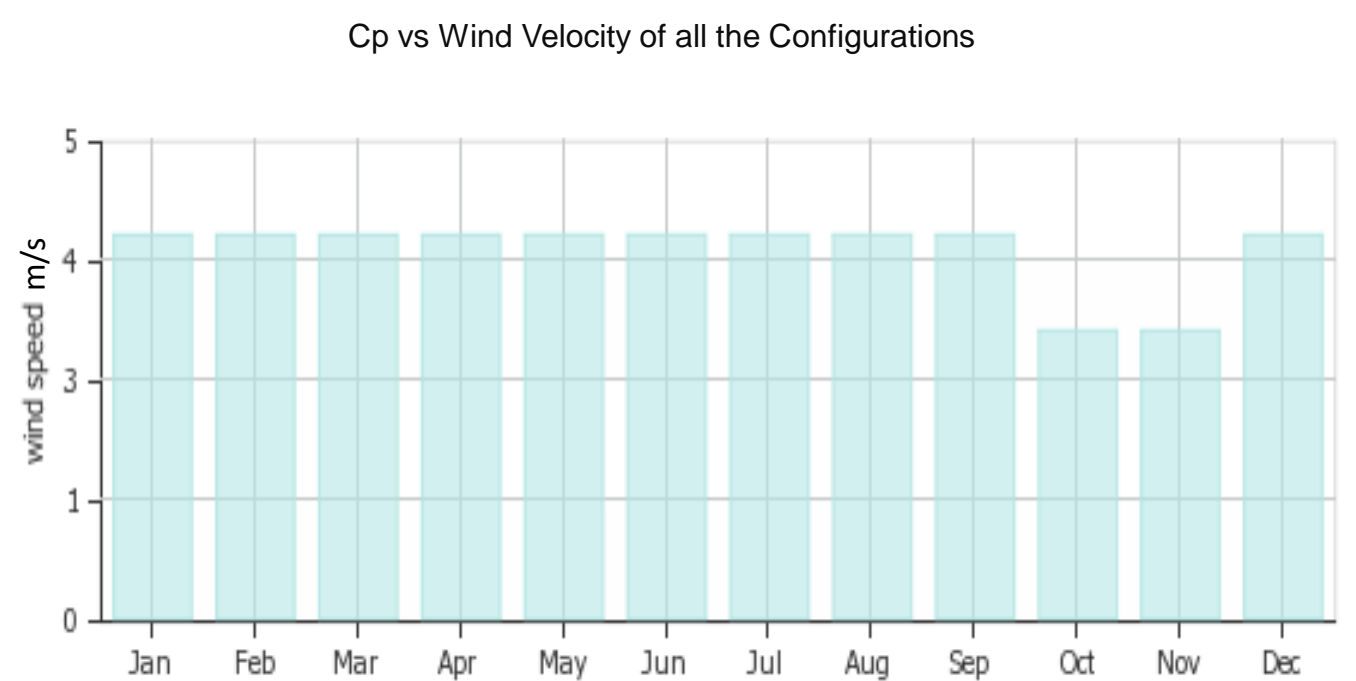
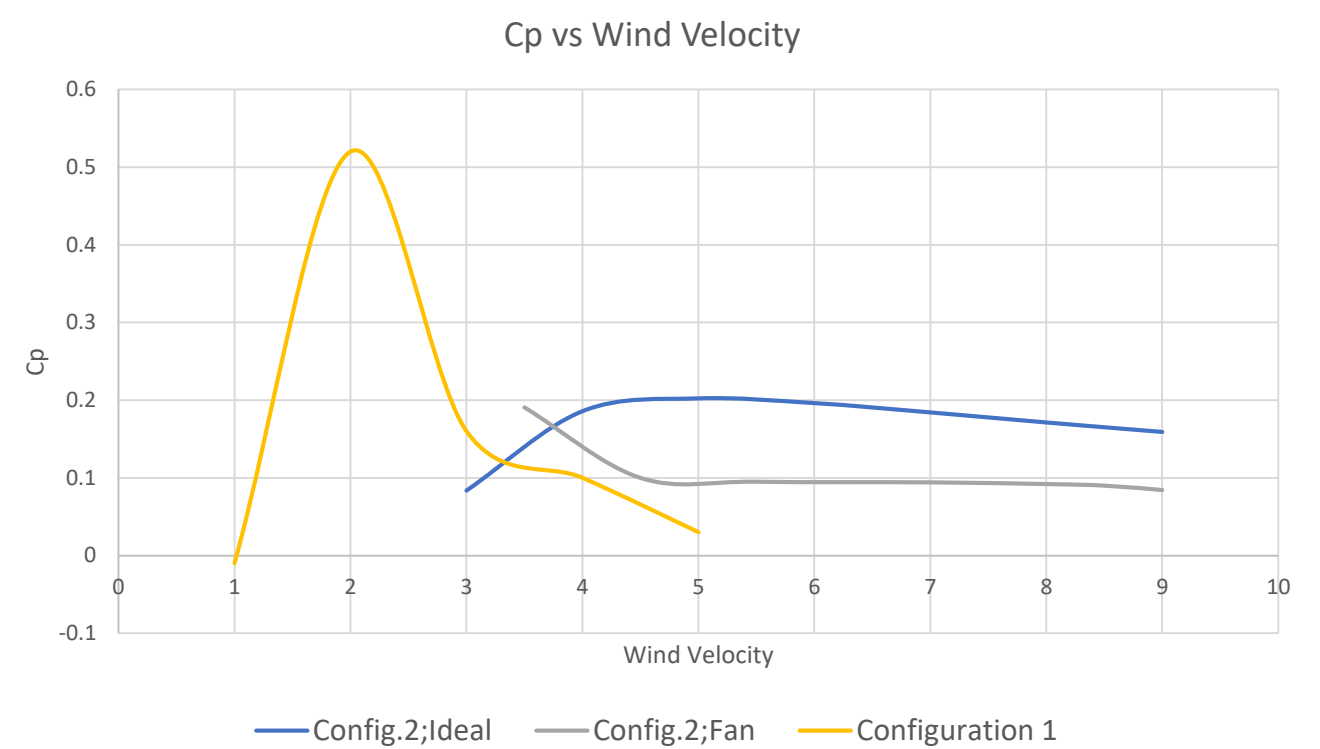
- Vertical axis wind turbine rotor blade
- Wheel
- Base
- Dynamo
- Bearings [ISO 3290-1:2014]

Wind Turbine Dimensions

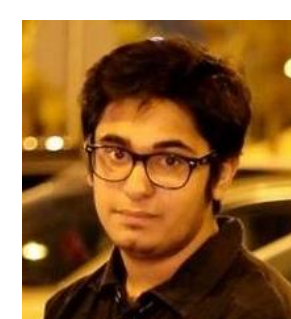
- Rotor's diameter: 105 cm
- Long Shaft's length: 150 cm
- Small Shaft's length: 22cm
- Base's height: 71 cm
- Blade's height: 100 cm

Wind Turbine Yields

- Nominal power: 2.63 W (Experimental)
- Start up speed: 3 m/s (Theoretical)
- Maximum rotation speed: 15 rpm



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