

Short summary of the wind turbine contest 2014:

In 2014 we held the annual small wind turbine contest for the 2nd time. The goal was to design and build a small wind turbine, which had optimal power production in a wind regime of 4m/s average wind speed (distributed according to weibull 4.5m/s). The teams should also consider safety and cost efficiency in their designs, emergency brake systems were mandatory and monitoring of conditions of the turbine are preferable, of course they should also consider esthetics of the design. There were teams competing from 5 different universities from across Europe. The competing teams were: university of Sheffield(UK), Danish Technical University (DK), the university of applied sciences of Flensburg/Kiel(D), the university of applied sciences of NHL Hogeschool (NL) and the university of applied sciences of Bremerhaven (D).

The designs were tested in the wind tunnel in Delft (NL) at the Technical University of Delft, the designs were tested at different wind speeds and their power output at each wind speed was logged to get a power curve, before the tunnel testing the electronics and safety systems were inspected to be conform requirements before they could go enter wind tunnel test. The designs were very nice and diverse the designs and performance of each team is shortly mentioned below:

The Danish Technical University, they built a vertical axis small wind turbine, although it did eventually spin in the wind tunnel, it had to be powered to get moving and could not generate enough power to run itself. They had a disc break of a bike mounted to the main shaft to do mechanical emergency braking.

The university of applied sciences Bremerhaven, they built a two bladed horizontal axis small wind turbine which did because of electronics issues did not get a sufficient power production , but “at home” they tested it and they seemed to have enough potential to produce power. Sadly they did not manage to get power production. They had an electrical brake system also connected to a bike brake.

The university of Sheffield, they had a design based on very low cost production, they recycled a lot of components and came to a nice design of a three bladed horizontal axis small wind turbine. They also had the turbine spinning in the wind tunnel, but when the generator had to be powered the turbine stopped and sadly also did not get to produce any power in the tests. They had a bike disk brake as emergency braking system.

The university of applied sciences NHL Hogeschool, they had a custom designed generator with advantageous specifications to like low starting and clogging torque their turbine design was a three bladed horizontal axis wind turbine. They managed to get power production as the first team (peaks of 150W), they also had a three bladed horizontal axis small wind turbine. They had a bike disk brake as emergency braking system and could monitor rpm of the turbine.

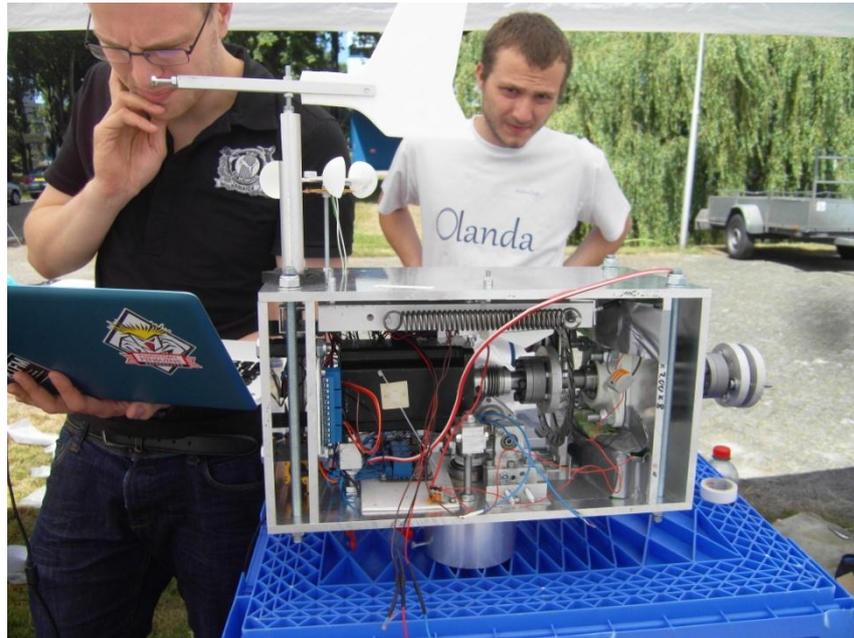
The university of Flensburg, they had a unique design with a four bladed horizontal axis turbine, the blades and hub were 3D printed and glued with reinforcements, a very slick design. They also had the highest power production because of the advantages they had with the blade surface they had a low startup wind speed relative to the other teams they had the highest power production (peaks of 250 W) across the wind regime for which the turbine had to be designed. They had a bike brake as emergency brake.

Further assessment of the teams was based on i.a. calculations, theoretical research, uniqueness of design, safety features, monitoring features, cost minimization of the production and esthetics. All these were weighted by the jury to form a final verdict. From which they declared the team of the University of Flensburg as winners. “Winning” factors: highest energy production and unique production method, esthetics, monitoring capabilities and very well-founded calculations and theoretical research.

A few pictures to get an impression of the contest:



Team Flensburg/kiel looking at their turbine



Team bremerhaven heavily thinking about an issue



Team NHL hogeschool, preparing for tunnel test



Team DTU posing with their turbine



Team sheffield preparing for tunnel test