

Edition 2014-2015

In 2015 we organized the 3rd International Small Wind turbine Contest. The contest was again organized by the Lectureship Wind energy of NHL.

Within the contest the students have to build a innovative, cost efficient (low costs per KWh) small wind turbine for urban environments. The teams should also consider safety and condition monitoring in their turbines so that they can make sure that their turbine is running under safe conditions, aspects which could be monitored are for example rotational speeds, temperatures, wind directions and outputs. The main goal is to build a turbine which can produce much power as possible from the specified wind regime for which the turbines have to be designed, which is an average wind speed of 4m/s.

In this edition, 6 teams from different universities from across Europe were participating. The competing teams were: Sheffield University(UK), Danish Technical University (DK) HAWT,), Danish Technical University (DK) VAWT, Flensburg University of applied sciences (D), NHL University of applied sciences (NL) and Bremerhaven University of applied sciences(D).

Like in the previous editions, the International Wind Turbine Contest started at the TU Delft. Where the small wind turbines were tested in the Open Jet Facility. Despite the fact that we had some issues with the test setup and some issues with the Open Jet Facility operation. We had a great three days in Delft. All the teams which had also competed last year, improved their performance of previous year, it was also for the first year that all turbines which were built by the competing teams produced power, and they could all run safely within the prescribed wind regime. Some information about the teams designs and performance:

University of Sheffield: This team had an improved design, based upon their previous design. The blades were completely rebuilt using 3d printing techniques and carbon rod reinforcements. The team also improved the aerodynamic shape of the generator housing. Eventually the turbine produced 45 Watts at its peak.

Danish Technical University (DTU) HAWT: The completely new Horizontal Axis Wind Turbine from the DTU , was very high tech. The team used very light high grade carbon aramid material to manufacture the blades. They also had the turbine equipped with active as well as passive pitch systems to optimize power production at different wind speeds. The team had also a very extensive monitoring system and eventually produced up to 350 Watts of power.

Danish Technical University (DTU) VAWT: The Vertical Axis Wind turbine from the DTU was optimized from the previous edition. The turbine is the only vertical axis turbine in the competition. Compared to last year they had optimized their design, blade angles and startup algorithm. Because of laminar winds in the wind tunnel it is notoriously hard to get a vertical axis wind turbine running (vertical axis turbines normally perform better in turbulent wind environments) therefore the turbine has to be spun up to speed. This requires very precise timing and is very difficult as it proved last year when they could not get the turbine running, but this year they did succeed it was a great success and the vertical axis wind turbine managed to produce power of up to 95 Watts.

Flensburg, University of applied sciences: This team designed a completely new four bladed turbine. It had active pitch systems as well as a very simplified production method for the blades CNC hot wire cut foam with glass fiber reinforcement. This production method significantly reduced manufacturing costs of the design up to 90% which require more expensive complex manufacturing techniques, this cost reduction was achieved with only 1% efficiency loss of the blade profile. The turbine produced up to 500 Watts of power.

NHL University of applied sciences: This team redesigned the turbine with which they competed last year, the aerodynamic shape of the hub and generator housing was improved significantly. Also the blades were redesigned making use of 3D printing techniques. Finally they also had a great extension in their monitoring capabilities with a wireless monitoring program which they developed. Eventually the peak power production was around 300 Watts

Bremerhaven University of applied sciences: Last but not team Bremerhaven, this team came up with a completely new design, their design philosophy was keep it simple. The team was composed of students without engineering background, so they had a lot to learn during the project. Eventually they came up with a two bladed turbine design with blades made from aluminum plate, which was bent into a specified profile. An extraordinary performance was that they managed to make a working turbine, which was very robust. Their peak energy production was 40 Watts.

On the final day of the contest, there was a symposium at NHL University of applied sciences in Leeuwarden. The teams presented their designs and a international independent jury of wind experts reviewed the designs, together with the tunnel performance this was combined in to a final score for each time. The winner of this years competition was Flensburg University of applied sciences. Congratulations! You can see the teams which were present at the symposium on the picture below. Team Sheffield is in light blue, team Bremerhaven in mixed outfits, team NHL in orange, and team Flensburg in dark blue. Sadly the teams of DTU could not physically be present at the symposium they were present through a live-stream connection.

