DTU

Welcome to

Test Centre Høvsøre and Test Centre Østerild

Test Centre Havsøre

Test Centre Østerild

Test Centre Høvsøre and Test Centre Østerild are both located on the West coast of Jutland

Offshore wind turbines are tested on shore

The story dates back to 2000, when the Danish Parliament decided to build a wind turbine test centre in the municipality of Lemvig. Today, we know that test centre as Test Centre Høvsøre, which was officially opened in 2002. Ten years later, in 2012, Østerild Test Centre was established.

DTU Wind Energy runs both test centres where the industry tests offshore wind turbines.

In 2018, an expansion of the two test centres came into place. This means that it is now possible to test 16 wind turbines at the two test centres. The expansion means that it is possible to test seven wind turbines in Høvsøre and nine wind turbines in Østerild.

WHY ARE OFFSHORE WIND TURBINES TESTED ON SHORE?

The reason why manufacturers test their offshore wind turbines on shore is that there is always direct access to the wind turbines when the technicians during the test period need to change components, maintain, and service the turbines. Offshore, there are long periods where it is not possible to work on the turbines and it is unrealistic to test prototype wind turbines at sea.

LOAD MEASUREMENTS

Along with the foundation, a wind turbine consists of thousands of construction details in fiberglass and steel, including many bolts and welds. It is important to know exactly which loads each small part will experience in order to be able to dimension all components for a minimum of 20 years of life. In the design phase, a detailed load basis for the turbine is calculated with advanced computer models, and on this basis, the prototype is designed and built. Subsequently, it is important to verify the load base by measuring the loads on the prototype turbine, and this verification is part of the turbine's certification. The loads on the turbine depend primarily on wind speed, turbulence and wind shear (wind speed depending on height). When verifying load models measurements and calculations are compared at identical wind conditions. Therefore, it is important to know the inflow during the measurements in detail so that the model can calculate loads under the same conditions. In this way, a good verification that the load model is correct is obtained.

NOISE MEASUREMENTS

An important parameter in the assessment of a wind turbine's environmental impact is how much noise it generates. Therefore, noise measurement is an important test in connection with the certification of a new type of turbine. In Denmark, wind turbines must comply with the binding noise limits that are at both (6 m/s) and (8 m/s) wind.

The noise limits are laid down in the Ministry of Environment and Food of Denmark's Executive Order no. 1518 of 14 December 2006 on noise from wind turbines.

All wind turbines emit a weak but characteristic noise from the movement of the blades through the air and from the turbine's machinery. However, developers have in recent years increased their focus on reducing noise from wind turbines, with the result that modern wind turbines, in relation to size, emit considerably less noise than turbines erected in the 1970s, the '80s and the '90s. Both the design of the blades and the insulation of the machine housing are important for the noise emission of the turbine.

DID YOU KNOW?

That in 2018 Danish wind turbines produced electricity corresponding to 40,7% of the total Danish electricity use? In 2017, Denmark broke the record with an electricity production from wind turbines corresponding to 43,4% of the total consumption.

Test Centre Høvsøre

DTU Wind Energy runs Test Centre Høvsøre on the West coast of Jutland. At the seven testing stands, international companies test their wind turbine concepts and collect data from tests carried out on the turbines. It is possible to test and document safety, the turbine's performance and noise emission.

At Høvsøre, the wind from the North Sea blows almost undisturbed to the turbines on the test centre, and the wind thus reaches a strength corresponding to the conditions for turbines erected offshore. The flat terrain west of the test centre means that the wind conditions at the turbines are very well-documented.

A measuring mast has been erected west of each turbine and a meteorological mast south of the turbine row. There are also two 165-metre light masts east of the turbine row.

TALLER WIND TURBINES IN THE FUTURE
From 2019, it has been possible to test seven offshore wind turbines at test centre Høvsøre after the Danish Government decided to expand the test centre with two additional test stands.

After the expansion of the test centre, it is possible to test taller wind turbines. Before the expansion, it was possible to test wind turbines of up to 165 metres in height - measured from the ground to the upper blade tip. After the expansion, it is possible to test offshore wind turbines of up to 200 metres.

BELOW, YOU WILL FIND THE DIFFERENT COMPANIES USING THE TEST STANDS:

1. Siemens Gamesa Renewable Energy
2. Vestas
3. Siemens Gamesa Renewable Energy
4. Nordex Energy GmbH
5. Siemens Gamesa Renewable Energy
6. Siemens Gamesa Renewable Energy
7. GE Renewable Energy

Since the turbines at Høvsøre are test turbines, they are updated from time to time.
Read more about the wind turbines here:
http://www.vindenergi.dtu.dk/english/test-centers/hoevsoere_uk

Test Centre Østerild

Østerild is one of the best places to test large wind turbines in Denmark due to the fact, that the test centre is close to the coast with lots of wind. In order to test the large wind turbines, a mean wind speed at 100 metres height of at least eight metres per second is needed.

At Test Centre Østerild it is possible to test nine wind turbines. Recently, two new test stands have been added, after the Danish Government decided to expand the test centre.

With the expansion of the test centre, it is possible to test taller wind turbines. Before the expansion, it was possible to test wind turbines up to 250 metres in height - measured from the ground to the upper blade tip. After the expansion, it is now possible to test offshore wind turbines of up to 330 metres in five of the test sites.

VISITOR CENTRE
About 30.000 guests annually make their way to Østerild because they want to learn more about wind turbines, nature, etc.

In order to accommodate the many visitors, a visitor centre opened in 2017 at the test centre.

In the visitor centre, visitors can get the latest knowledge about wind and wind power in Denmark, answers on how a wind turbine is built, and see different wind turbine models.

Just outside the visitor centre is an observation tower. It is made of a bottom section from a wind turbine, which gives an insight into how a wind turbine looks inside.

OWNER AND LESSEE
There are nine testing stands in Østerild. Vestas Wind Systems is the owner of two of the test stands, as is Siemens Gamesa Renewable Energy. DTU Wind Energy is the operator of the remaining five stands.

DID YOU KNOW?

That the construction of the test centre in 2012 meant that 245 hectares of plantation were cleared. Instead, 393 hectares of new forest were erected around Denmark.

BELOW, YOU WILL FIND THE DIFFERENT COMPANIES USING THE TEST STANDS:

1. EDF GE-Alstrom
2. Vestas
3. Vestas
4. Vestas
5. Envision Energy
6. Siemens Wind Power
7. Siemens Wind Power
8. Siemens Gamesa Renewable
9. Envision Energy

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Read more about the wind turbines here:
http://www.vindenergi.dtu.dk/english/test-centers/oesterild

DTU Wind Energy is one of the world's largest knowledge centres for wind energy research, where more than 250 employees of 36 different nationalities work with research, innovation, research-based consultancy and education. The research runs across disciplines and is organised into strategic research programmes that collaborate with Danish and international universities, research institutions and organisations, as well as the wind industry nationally and globally.

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