

WINDBOX: Advanced Test & Validation Centre to improve competitiveness in the wind power supply chain

PO.007

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Abstract

WINDBOX, Advanced Test & Validation Centre for the wind power supply chain, is an initiative launched in 2014 by a consortium of Basque companies composed by wind turbine manufacturers (GAMESA, ADWEN) and component manufacturers (ANTEC, ERREKA, GLUAL, HINE, LAULAGUN, WEC), coordinated by the Basque Energy Cluster, and with the support of the Basque Government.

WINDBOX is a private Association that aims to integrate and validate subsystems for multi-megawatt wind turbines by means of advanced testing. As the owner of the test-benches, it is under its responsibility the development of the infrastructure as well as its operation (tests and services provided to companies) and management. The infrastructure of WINDBOX is located in the IK4-TEKNIKER Research Centre in Eibar.

Objectives

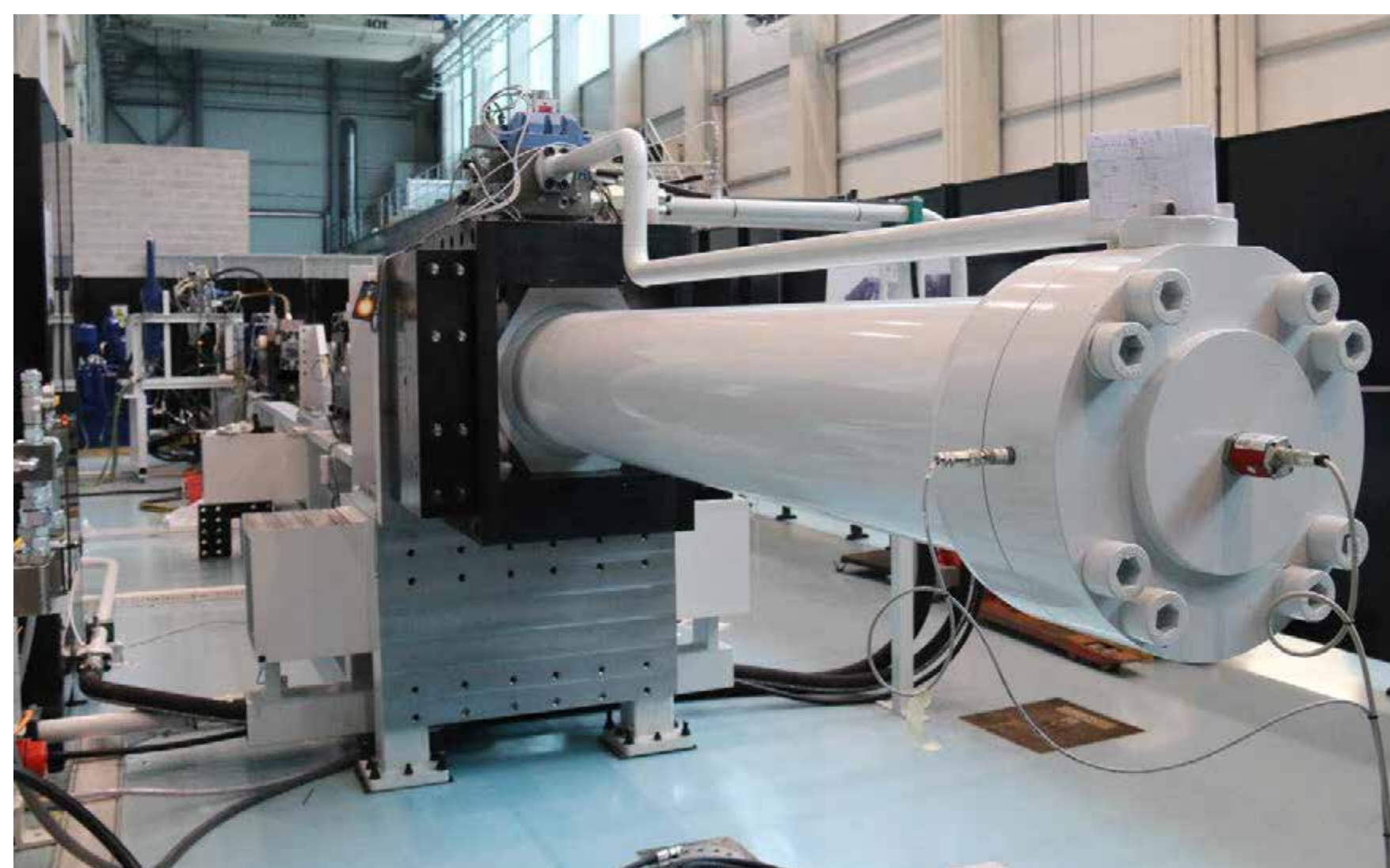
The main objective of WINDBOX is to facilitate the access of supplier companies to advanced testing equipment, offering them a competitive advantage in the development of products with optimal design and high reliability, as well as a differential positioning and credibility before OEMs. The infrastructure available at WINDBOX aims to increase the validation process value by providing operating conditions very close to reality (loads, temperature, humidity, vibrations), validation of integrated systems from different suppliers and independent assessment carried out by a third party validation body.

For that purpose, WINDBOX will provide fully equipped testing facilities to support wind turbine component manufacturers. A set of state-of-the-art test benches will allow critical wind turbine elements to be tested and validated at component and system level.

Test benches

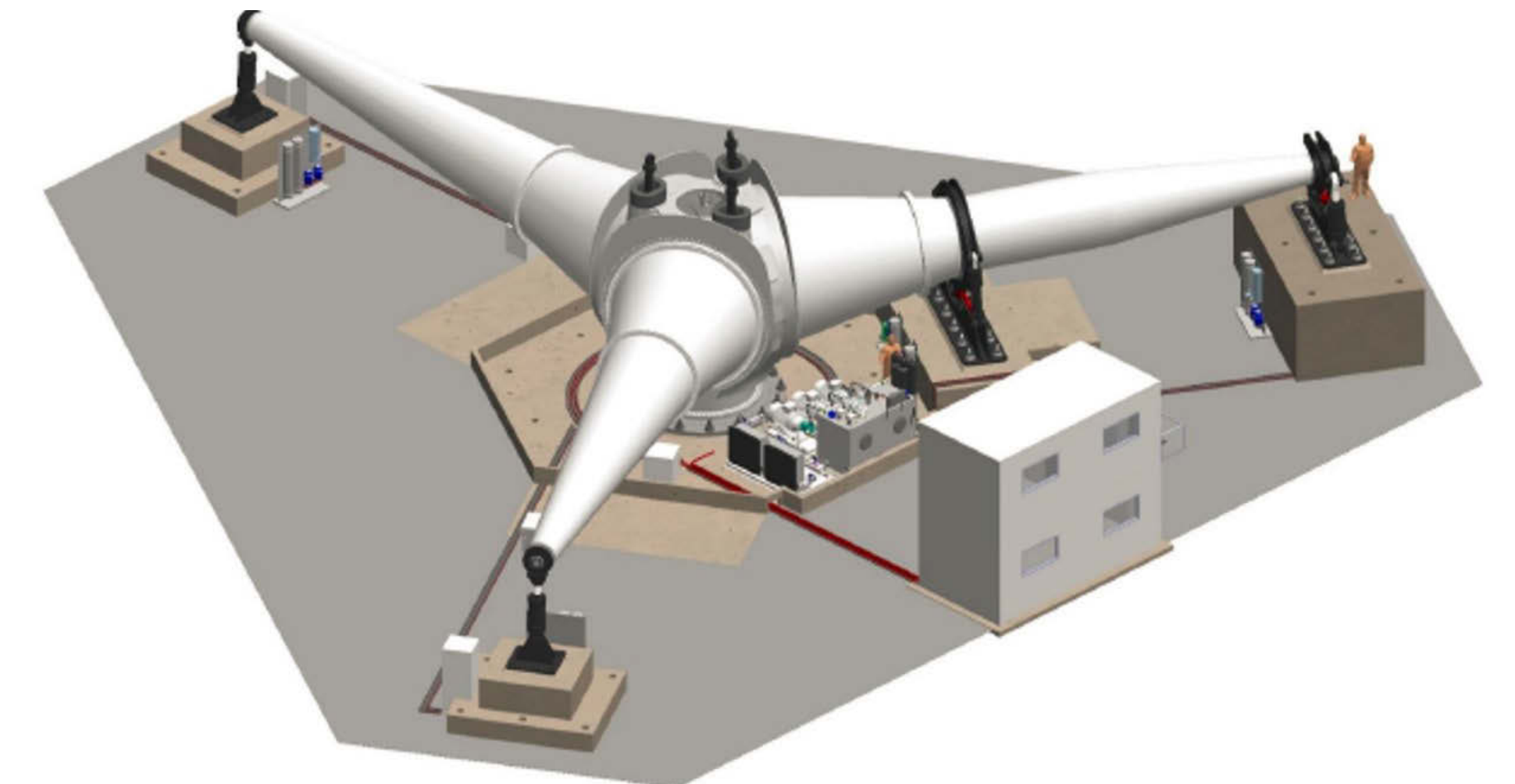
● HYDRAULIC PITCH TEST BENCH

- Aimed to test and optimize wind turbine pitch systems and their components in similar conditions to those of a wind farm.
- It allows functional, characterization, integrity, reliability and life testing (unit and integrated).
- Action: 1500 kN (Bench: 3000 kN). Up to 8MW.
- Blade inertia simulation.
- Temperature simulation [-20°C,+45°C].
- Fully operational. Ongoing tests on pitch cylinder and hydraulic group, part of a brand-new 8MW offshore wind turbine model.



● THREE BLADE TEST BENCH

- Aimed to conduct tests on the hub, the blade bearings and the blade-bearing and bearing-hub joints.
- Fatigue (35MNm) and extreme load (55MNm) testing on blade and hub bearings.
- Functional testing, model correlation, pre-load characterization, integrity.
- Three blade bearings under testing at the same time. One position for fatigue/extreme load testing.
- Range [2-8 MW].
- Under construction.



● SLIP RING GENERATOR TEST BENCH

- Targeted to test and validate wind power generator components (slip ring and brushes).
- Fatigue and extreme load testing in generator slip ring and brushes.
- Component testing up to 4MW, 50-60Hz.
- Characterization under different temperature and humidity conditions.
- Development completed. Tests to begin shortly.



● YAW TEST BENCH

- Targeted to test and validate the yaw system.
- Braking force characterization.
- Fatigue and extreme load testing on gear teeth.
- Range [2-3,3 MW].
- Variation of Mz and normal force on the gear rim.
- Under design.



Conclusions

WINDBOX is a clear example of fruitful public-private partnership, showcasing cooperation between the regional Administration (Basque Government) and private companies from the wind power value chain, in order to boost the creation of advanced manufacturing and validation facilities, thus improving the competitiveness of the industry.

WINDBOX, as a private service Center, is ready to receive testing demands and to offer collaboration to worldwide companies interested in using the test-benches available at WINDBOX to test and validate components and/or subsystems under specific requirements or conditions.

