OWI-Lab's Large climatic test chamber
Arctic or desert conditions on demand

The wind power industry is rapidly expanding in windy and remote areas where turbines have to work under extreme conditions. Onshore and offshore wind turbines are usually designed to operate in temperatures ranging from -10°C to +40°C, but in locations like Finland, Canada, Mongolia, and other cold climate regions temperatures drop to as low as -40°C. On the other hand, turbines located in hot regions, like some parts of India for example, can be exposed to temperatures of up to 55°C.

These hostile weather conditions form a huge challenge to the equipment itself and to maintenance and repair teams. Repairs may have to be postponed because of restricted access caused by weather conditions, clearly impacting on turbine availability and profitability. That is why the industry needs cost-effective, robust, validated components capable of withstanding extreme conditions.

In response to this need, OWI-Lab has built a dedicated test facility at the Port of Antwerp featuring a large climatic chamber for wind turbine component testing in a wide range of temperatures. Mechanical, hydraulic and electrical turbine components weighing up to 150 tonnes or more, such as gearboxes, transformers, generators, pitch & yaw systems, etc. can be tested in temperatures ranging from -60°C to +60°C.

Typical prototype testing activities in this facility include design verification testing and component validation.

Dedicated R&D tests are supported by providing all required auxiliaries such as a flexible set of power supplies (up to 2MVA). To perform cold soak and cold start-up tests of gearboxes, generators and other rotating equipment, a dedicated no-load test bench with 10.000Nm brake away torque has been built.

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OWI lab
Offshore Wind Infrastructure Application Lab

FACTS

OWI-Lab's large climatic test chamber

Extreme temperature testing & wind turbine component validation

Main purpose
Testing and validating large and heavy wind turbine components under extreme temperatures: gearboxes, transformers, yaw & pitch systems, hydraulic units, hydraulic drive trains,... Other components from different industries can also be tested: heavy industry applications; aerospace components, power aggregates, radar systems, wave and tidal converters, etc.
Although OWI-Lab focuses on wind energy related testing, the facility is also available for other industries: heavy machinery, off-highway, automotive, etc.

Location
The large climatic test chamber is embedded in the OWI-Lab test facility located at the Port of Antwerp , near the Zuid-Natie breakbulk terminal. All logistics are available on site to handle large, heavy machinery. The quay has a load capacity of 45 tonnes/m².

Maximum dimensions of test specimen
Length: 10m
Width: 7m
Height: 8m
Test area space: 560m³

Temperature test range -60°C to +60°C

Temperature accuracy approx. 1K after stabilisation time

Total installed electrical power of machinery 408kW

Air speed at the cooling outlets 5-7 m/s

Maximum weight of test specimen 150 tonnes

Maximum floor load of climate chamber 30 tonnes/m²

Cooling rate approx. 0,022K/min
(+20°C to -60 °C in 60 hours for 100 tonnes of steel)
(1 hour to cool down the empty chamber from +60°C to -40°C)

Heating up rate ± 0,028 K/min
(-60°C to + 20°C in 48 hours for 100 tonnes of steel)

Maximum cooling capacity at -60°C 40 kW (250 kW at -20°C)

Maximum cooling capacity at +60°C 150 kW

Main entrance test specimen 7m x 8m (width x height) double wing door

Entrance lock gate 0.9m x 2m (width x height)

Available
- Surface-heated operator window to monitor tests
- Adaptive cable penetration up to 90mm in diameter for cables and sensors (multi-diameter module system)
- NI data-acquisition equipment (RTD, thermocouple,...)
- Necessary protective clothes to enter the climatic chamber at extreme temperatures
- Auxiliaries needed for setting up a full test campaign can be provided on demand: electrical power supply (400V to 22kV ; 50Hz / 60Hz and up to 6MVA); load banks up to 6MVA, additional air heaters and coolers for system tests, hot water supply for testing cooling systems, thermal camera,...
- 315kW no-load testbench with a maximum break-away torque of 10kNm in order to cope with cold start-up tests of rotating machinery like gearboxes, hydraulic transmissions and generators

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