



# Test & Monitoring infrastructure OWI-lab

## Testing for design validation & structural health monitoring for offshore structures

**The OWI-lab offers monitoring hardware and analysis services for offshore testing and structural health monitoring.**

OWI-lab's data-acquisition systems and dedicated sensors allow identifying those parameters that are crucial:

- to minimize construction and installation costs
- to extend the lifetime of offshore structures
- to reduce operation and maintenance costs

### Testing for design validation

A lot of design parameters are very difficult to predict by numerical tools and therefore performing dedicated tests on existing offshore structures is vital to verify the existing design assumptions. To increase power generation and limit weight, offshore wind turbines are becoming structurally more flexible, thus an accurate prediction of their dynamic behavior is mandatory. Underestimating the stiffness and the damping of offshore structures in the design phase inevitable results in the use of more

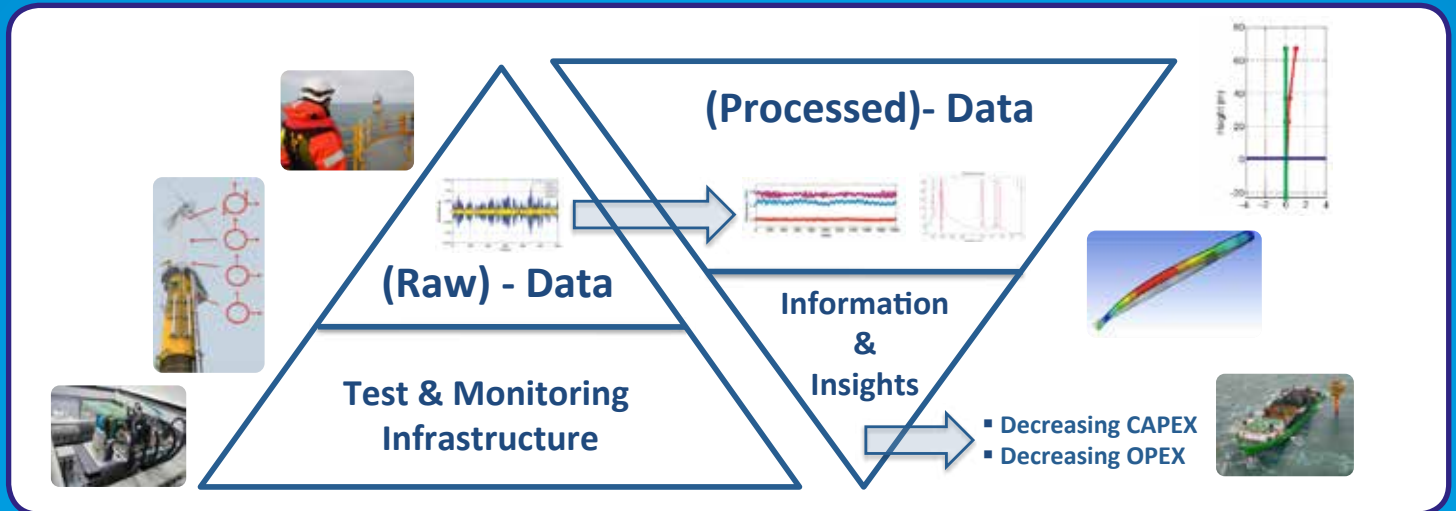
steel and thus higher constructions and installation costs. Underestimating the dynamic loads or the corrosion rates on the other hand can result in reduced lifetime of the offshore structures and increased maintenance costs.

### Structural health monitoring

A way to minimize O&M costs is early detection or even prediction of a reduced structural integrity. Structural health monitoring is a key-expertise within the OWI-lab. Structural health monitoring involves damage detection and characterization of structures through the observation of the system over time using measurements from an array of sensors. Damage in this context can be a change in material and/or geometric properties of the structural system. When it comes to offshore structures, scouring, corrosion and reduction in foundation and grout integrity over time can be problematic. Continuous monitoring will therefore help to prevent failures and make better decisions on when to plan maintenance activities.

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### Offering OWI-lab



OWI-lab offers data-acquisition systems, dedicated sensors and analysis services for offshore testing and structural health monitoring. This allows gaining the insights that are crucial to minimize construction and installations costs, extend the lifetime of offshore structures and reduce their operation and maintenance costs.

### Ongoing Monitoring Campaigns at Belwind

Currently the OWI-lab is performing several monitoring campaigns at the offshore wind farm Belwind, which consists of 55 Vestas V90 3MW wind turbines placed on monopile foundations. The wind farm is located in the North Sea on the Bligh Bank, 46 km off the Belgian coast.

**Dynamic monitoring:** consists of the continuous monitoring of the vibration levels, resonant frequencies and damping values of the fundamental modes of the wind turbine and its foundation structure.

**Grout monitoring:** consists of the continuous monitoring of the loads taken by the grout connection and the relative displacement between the monopile and the transition piece.

**Corrosion monitoring:** consists of the continuous monitoring of the corrosion rates, corrosion potential and oxygen concentration inside the monopile foundation.

