# Shaking table

## - simulates waves on the offshore wind turbine or wind on a bridge

When large buildings, long bridges or future offshore wind turbines are designed, advanced computer models are used to examine if the relevant construction will be able to resist strains from wind, waves or earthquakes. In the event of more complicated or local impacts, which are not necessarily included in the mathematical models, experimental tests of these effects on smaller scale models will be required. For this purpose, the COWI Foundation has financed a compact shaking table which can also be placed in a vertical position as a vibrator on a pedestrian bridge or as a cable pendant actuator device on a larger construction in the experimental hall at DTU. Thus, the shaking table constitutes an important component in future research projects and can be used as demonstrator in educational situations.

### Development of digital sensors

In a coming research project at DTU, a digital sensor has been designed which, by use of incorporated oscillatory circuit, is expected to be able to identify the dynamic properties of the structure. In connection with the development of the sensor, the sensor must be tested on smaller models that the shaking table can damage in such a way that it simulates how, for example, a wave affects an offshore wind turbine. These shaking table tests examine the accuracy of the sensor, the longevity and electricity consumption which are some of the key parameters that decide if it can be installed in the wings of future offshore wind turbines.

### Dimmers on cables

To reduce vibrations in slender structures, dimmers are often mounted that can convert vibrational energy into heat. A future collaboration with COWI includes dimming of vertical cables on suspension bridges that may start swinging during certain weather conditions. In this project, the shaking table is used to test the properties of the so-called Stockbridge dimmers, and to examine how they act outside of their normal operational area. In this case, the shaking table can be positioned in its vertical vibration position to simulate the mounting of the dimmer on a vertical cable the best way possible.

### Dynamic lessons

The theory for oscillations and the dynamics of construction may seem heavy, inaccessible and a bit dry to many students. This is a shame, as oscillations have a great impact on the design of many modern constructions. The new shaking table may, due to its compact size, be brought to the classroom where simple tests can substantiate the theoretical hypotheses. Thus, it will be possible to demonstrate an amplitude, realise a dynamic stiffening, illustrate a dimming or visualise modal shapes. Abstract and technical terms will suddenly become tangible and seem less distant. Thus, the shaking table can make the lessons lively and relevant by which engineers are educated with a better understanding of dynamics and oscillations.