Ocean Brick System

A proposal for usage as offshore wind turbine foundations

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Introduction

- The Ocean Brick Systems Ltd. present the Ocean Brick System (OBS) - a modular, flexible, fast and cost effective system for the erection and founding of artificial islands, large marine and inland infrastructure projects. OBS is based on advanced studies in Structural Morphology and consists of sophisticated hollow concrete precast modules, with built-in solid section of a tetra-hedron truss. The modules are interconnected to create a buoyant, stiff, light and strong superstructure.

- OBS is an environment friendly technology that cuts some 92% of filling material needed, and can serve the sea fauna as a habitat and an artificial reef

General application

In this presentation, the OBS is used as fundamental units which make up the foundation for a wind turbine.

The following presentation proposes building the wind turbine on land and towing the entire structure out to sea with a minimal amount of work at sea.

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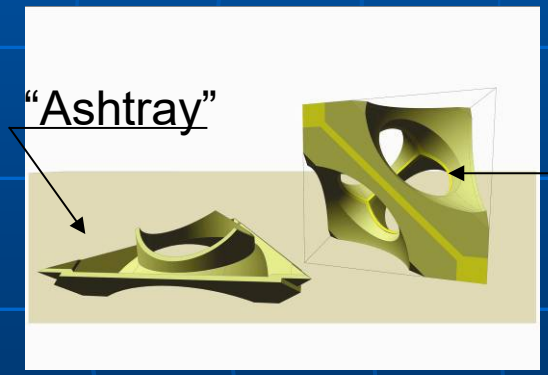
OBS erection on land

Each OBS unit is made up of 4 pre-cast "ashtrays", connected, forming a hollow concrete element with a width, length and height of 10 m.



Once connected, 16 OBS units are connected using in situ concrete, forming a 40x40x10 m "slab", suitable for shallow foundation (up to a water depth of 70 meters).

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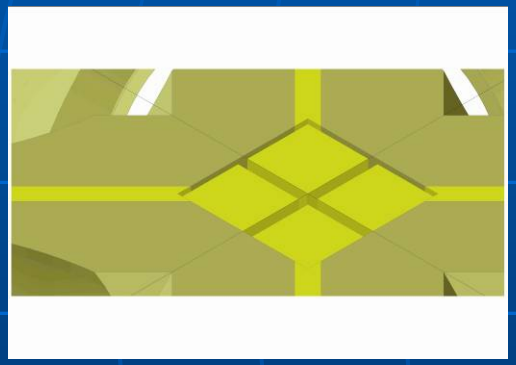
OBS erection on land

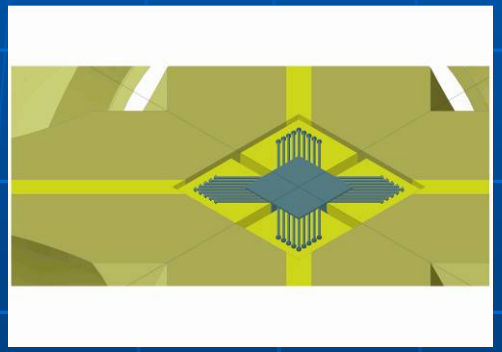
- The connection between the units and mono-pile should be executed at the shipyard or a dry dock on a platform able to set to sail the entire structure horizontally.

OBS erection on land

- Connection of OBS elements

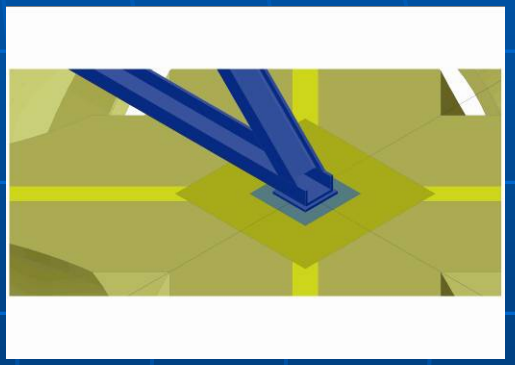


1. 4 OBS units are brought together

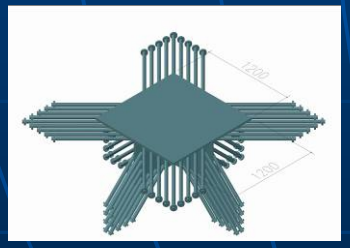


2. A square plate welded to a large number rebar is placed in the corner gap of the OBS

The plates serve as a base connecting trusses to the mono-pile

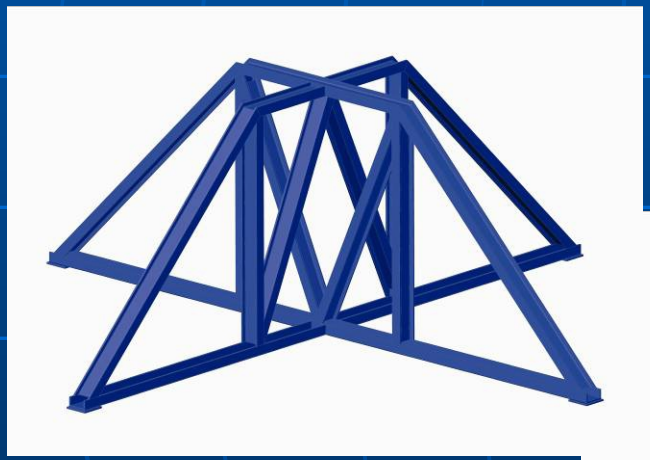


3. Later, the gaps are filled with in situ concrete

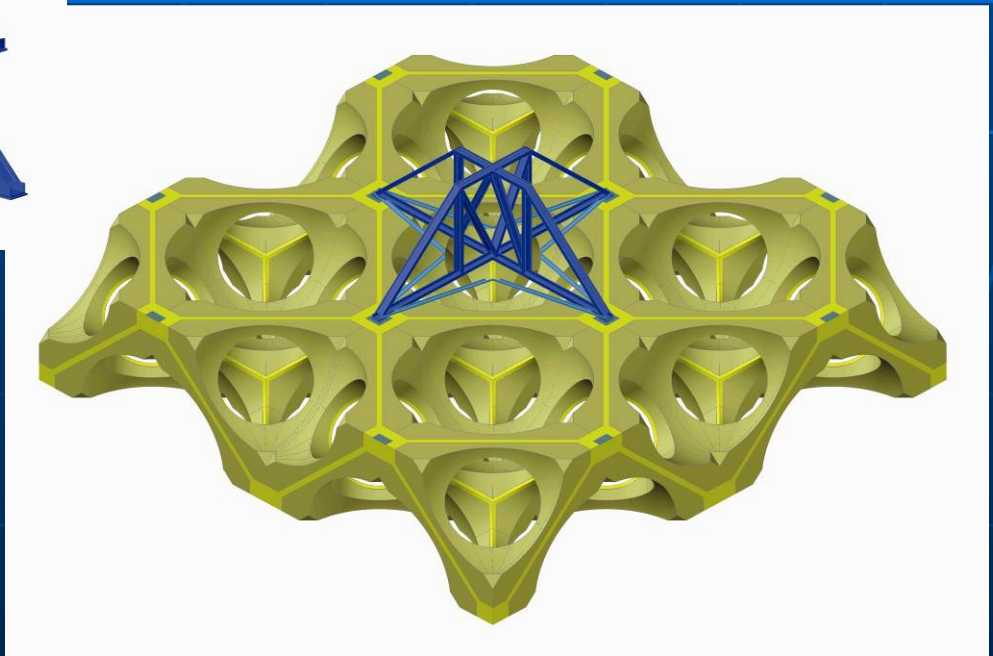


OBS erection on land

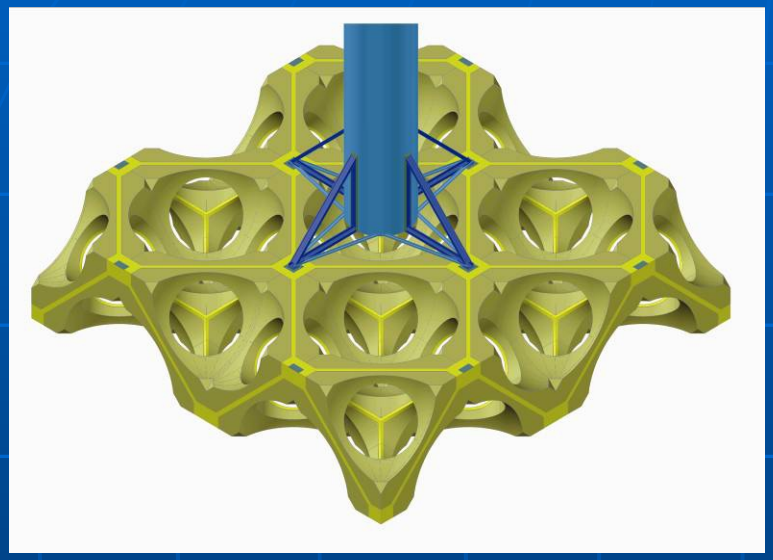
Two trusses are used for the connection of the mono-pile to the OBS “slab”.



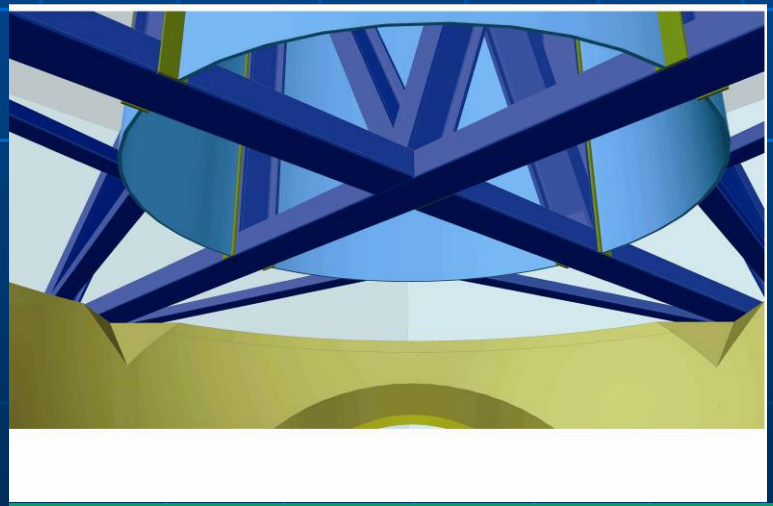
Additional profiles are connected at the base of the trusses to receive torsion effects.



Connection of OBS to mono-pile



With the trusses in place the telescopic mono-pile may be connected



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Preparation of the site at sea

Dredgers are to form at the location, a leveled area of at least 1600 Square meters, 2 meters beneath the current seabed level.

Soon after the dredging is completed the wind turbine structure is to be towed out to sea and brought to the required location

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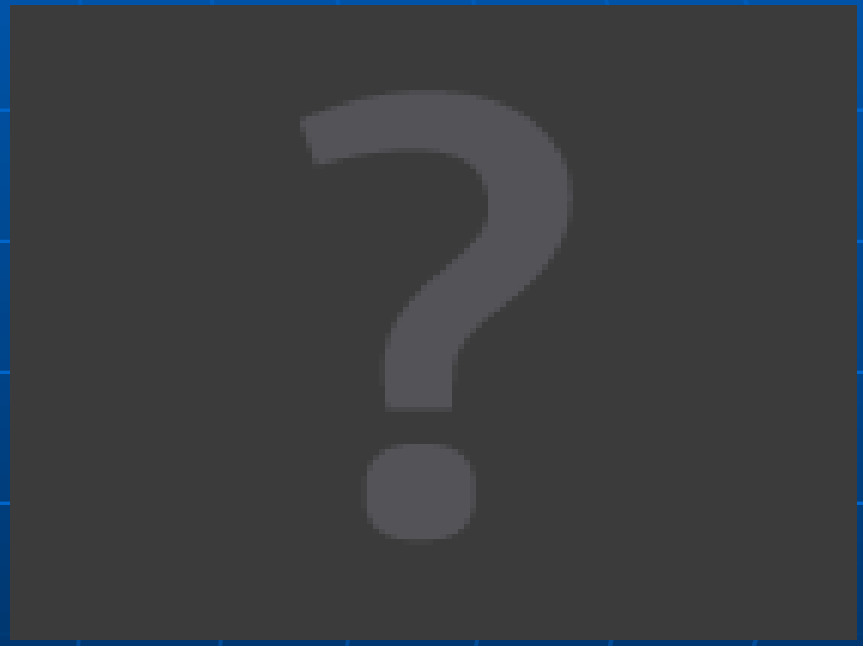
Erection at sea

Air pumps are to be connected to the top of the OBS units. Air is pumped to prevent water entry in the case of a leakage.



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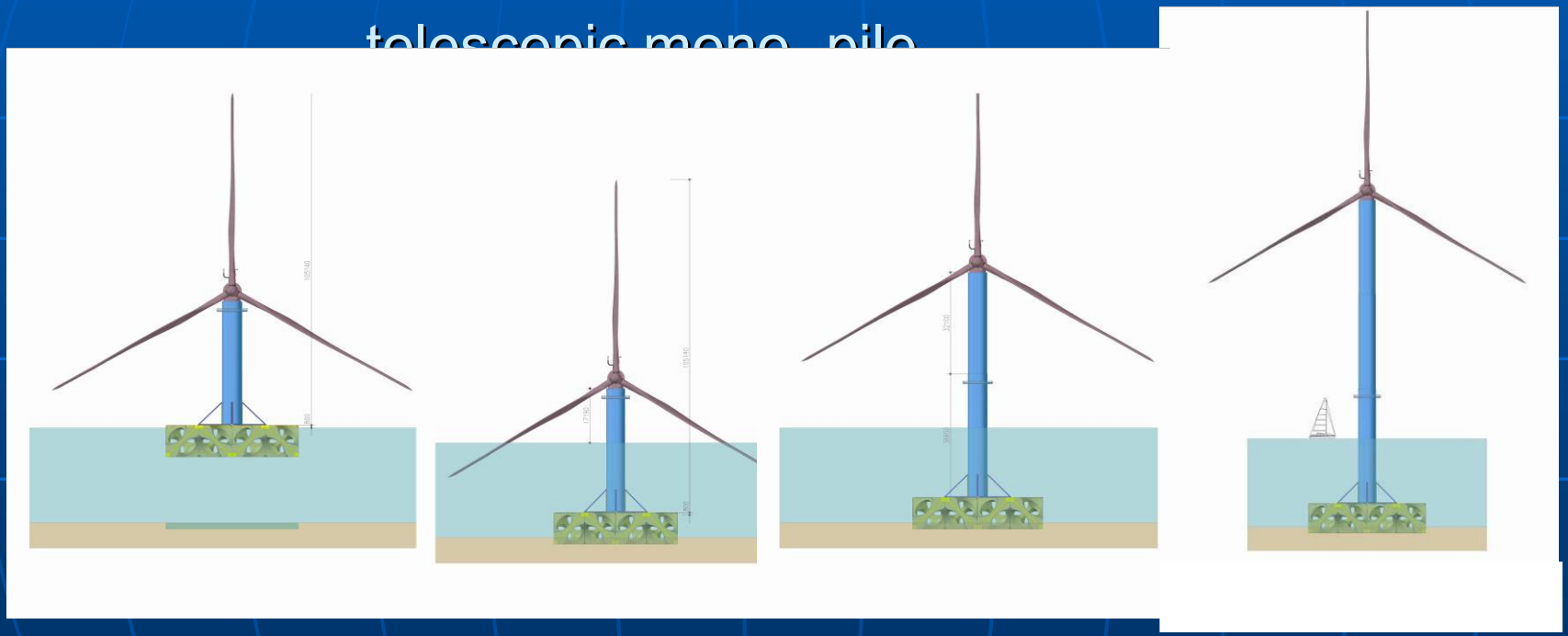
Construction at sea

The different stages of sinking and of opening the telescopic mono- pile



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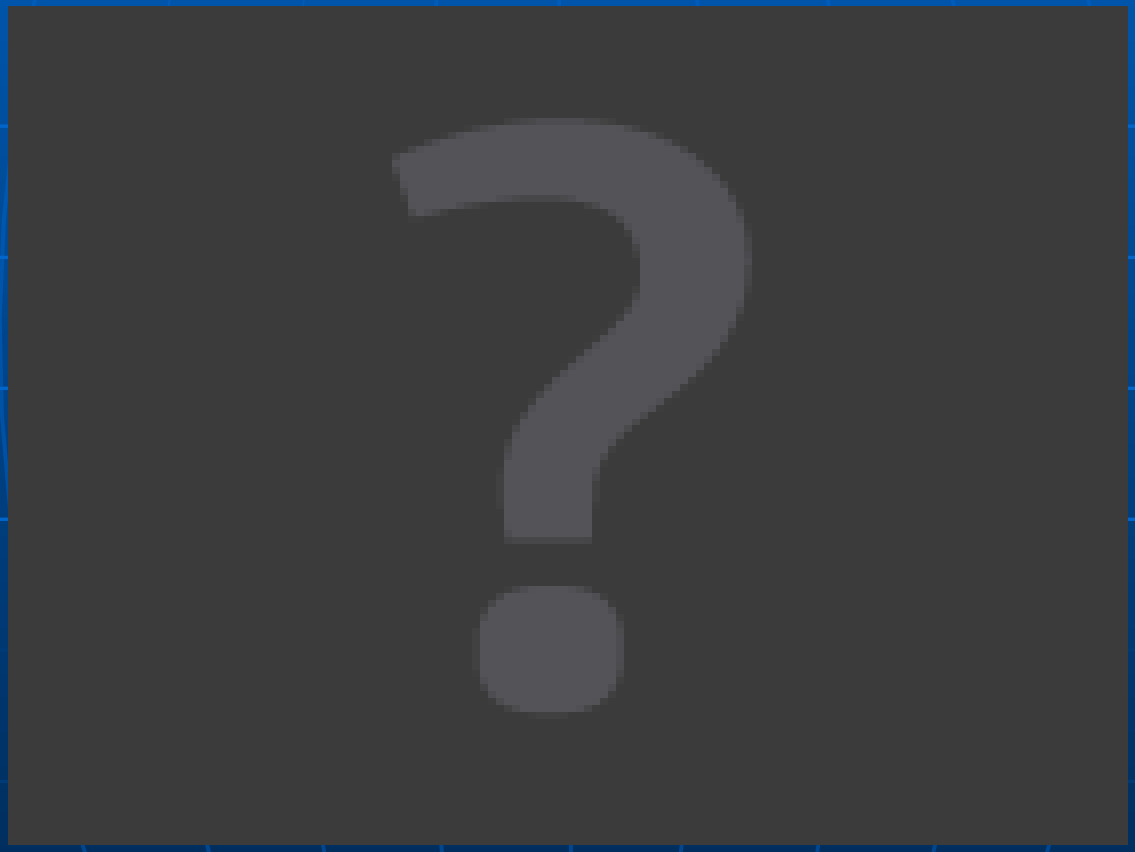
Final view of wind turbine at sea

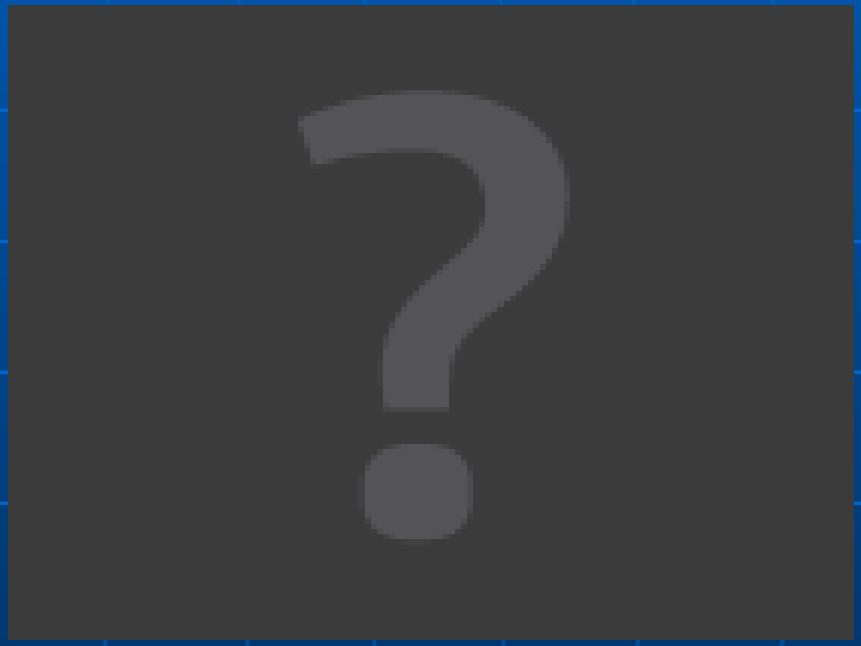


Stability against design wave

- The stability of the OBS and mono-pile structure was examined in a wave flume by LWI (Leichtweiss – Institut fur Wasserbau), Technical University of Braouncshweig, Germany, conducted by Prof. Dr.-Ing. H. Oumeraci .
- In accordance with the results presented in the LWI report, our calculations have been modified, and the following steps are to be insured after the placing of the structure .

Stability against design wave

- To ensure the stability of the structure, sand is to be pumped into the OBS units, this to provide a heavier structure against structure sliding.
- Later, sand is to fill the remaining “holes”, 2 meters beneath the mean sea bed, in the area covered by the OBS “slab”. Eventually the ground should be at the initial seabed level.



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Stability against design wave

- A ring of rock boulders is to be formed around the OBS “slab”, this to prevent scouring at the toe of the foundation.