

# Novel Suction Caisson Foundation Anchor

A novel suction caisson design for improved stability to accommodate larger offshore structures, such as wind turbines.



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## IP Status

Patent application submitted, Provisional patent

## Seeking

Development partner, Commercial partner, Licensing

## About **University of Birmingham**

At the University of Birmingham our research leads to new inventions and fuels innovation and business growth.

# Background

The size of offshore structures such as wind turbines is limited by the rotational and lateral stability of the foundation the structure is mounted on.

Foundations for offshore wind turbines and other structures are subjected to various loadings; vertical, horizontal and rotational moment loads or combinations of all of these. In particular they experience large overturning moments due to the significant horizontal wind pressures acting high above the foundation level. These overturning moments offer the biggest challenge for designers.

The foundations for offshore wind turbine projects can account for up to 40% of the project cost and determine the financial viability of a project.

## Tech Overview

Suction caissons are a relatively new design concept used for offshore structures offering considerable reductions in the cost of foundations for structures such as wind turbines. The suction caisson structure is made of steel in the shape of an inverted 'bucket' and is installed into the seabed by creating pressure difference within the caisson cavity, thereby drawing the caisson into the seabed to provide relatively quick placement and removal.

Our novel design provides a suction caisson with T-wings that extend from the central caisson "inverted bucket" body to provide additional surface area which can react with the seabed to help resist rotation and lateral forces which act on the caisson.

The behaviour of the T-wing caisson, installed in sand, has been investigated through experimental and numerical modelling to assess the moment-rotation performance and showed significant improvements over existing designs.

The T-wing caisson design is suitable for use in a single or tripod configuration depending on the anchor requirements.

## Benefits

- **Stability:** Increased overturning capacity can accommodate larger structures.
- **Power output:** Allows increase in size and therefore power output of offshore wind turbines
- **Location:** Allows wind turbines to be located further offshore
- **Deployment:** installed using existing suction caisson installation techniques.
- **Fabrication:** Relatively simple to fabricate.
- **Reduced cost:** compared with widely used monopole foundations
- **Design:** can be easily customised for an application

# Applications

- Foundations for offshore structures
- Wind turbines

# Opportunity

Licensing or collaborative development program.

# Patents

- Provisional application reference GB1819844.0 filed 5th December 2018