

Novel Offshore Fish Pen Design: Phase 2

(Model Tests, Concept Qualification and Design Optimization)

Summary

In Phase 1 of the Novel Offshore Fish Pen Design, the multidisciplinary project team comprising architects, structural engineers, geotechnical engineers, offshore engineers and researchers, and fish farm operators developed a conceptual design of SeaFisher (see Figure 1).

The engineering design details and hydroelastic analysis of the SeaFisher under wave and current actions were reported in a journal paper published in the Journal of Marine Science and Engineering, Vol. 11, Article No. 1795, 2023.

The SeaFisher comprises modular cubic pens that are assembled to form a 2 x n array offshore fish pen. Its frame structure is made from bundling high density polyethylene (HDPE) pipes and held together by specially tailored pipe bundling brackets and connector pods.

To withstand the harsh sea environment, glass fibre reinforced polymer (GFRP) diagrid rods are used to stiffen the frame structure. It is moored by a single point mooring system to minimize environmental loads on the structure and to improve waste dispersal. More importantly, the SeaFisher is equipped with ballasting tube system to allow it to submerge to an appropriate depth to avoid strong surface waves during a severe storm.

Continuing in the development of SeaFisher, this Phase 2 project aims to bring the SeaFisher to a concept qualification and design optimisation stage through physical model testings carried out concurrently with digital model simulations as well as physical testing of construction details like the novel pipe bundling brackets and connector pods. The successful conclusion of this Phase 2 will raise the SeaFisher concept from a technology readiness level 3 up to levels 4 and 5 towards the ultimate goal of creating a safer, more efficient and affordable offshore fish pen structures.

The eight partners for this Phase 2 project are Huon Aquaculture and Tassal Group with broad fish farming operational expertise, Maccaferri - the manufacturer of Kikkonet that has been adopted in offshore fish pens for its durability and excellent anti-biofouling characteristics, TCOMS that has the state-of-the-art ocean basin and 4 universities (University of Queensland, Griffith University, University of Tasmania and the National University of Singapore) with structural, materials, offshore and marine engineering expertise.

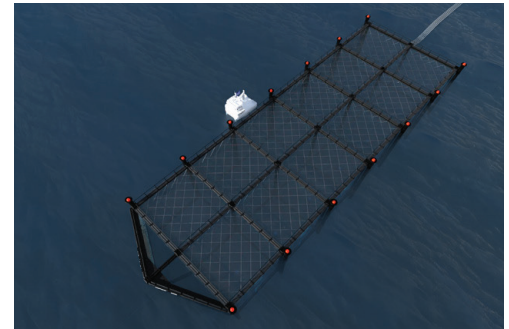


Figure 1

Project ID

1.23.006

Research Program

RP1 Offshore Engineering and Technology (OET) Program

Project Leader

Chien Ming Wang

Duration

24 months

Partners

- » BMT
- » The University of Queensland
- » Griffith University
- » Huon Aquaculture
- » National University of Singapore
- » Tassal Group
- » Technology Centre for Offshore and Marine
- » University of Tasmania

Third Party Participants

- » Maccaferri (Malaysia)