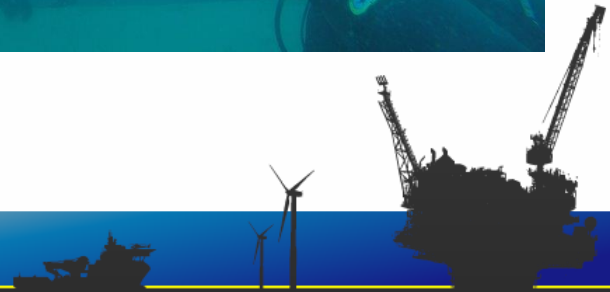
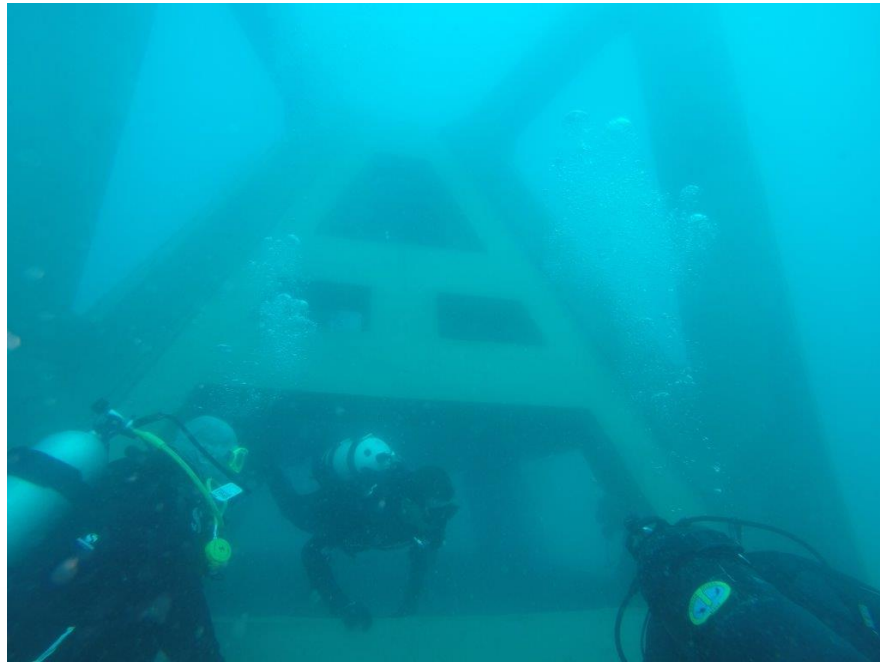




Stabilising Marine Assets since 2011

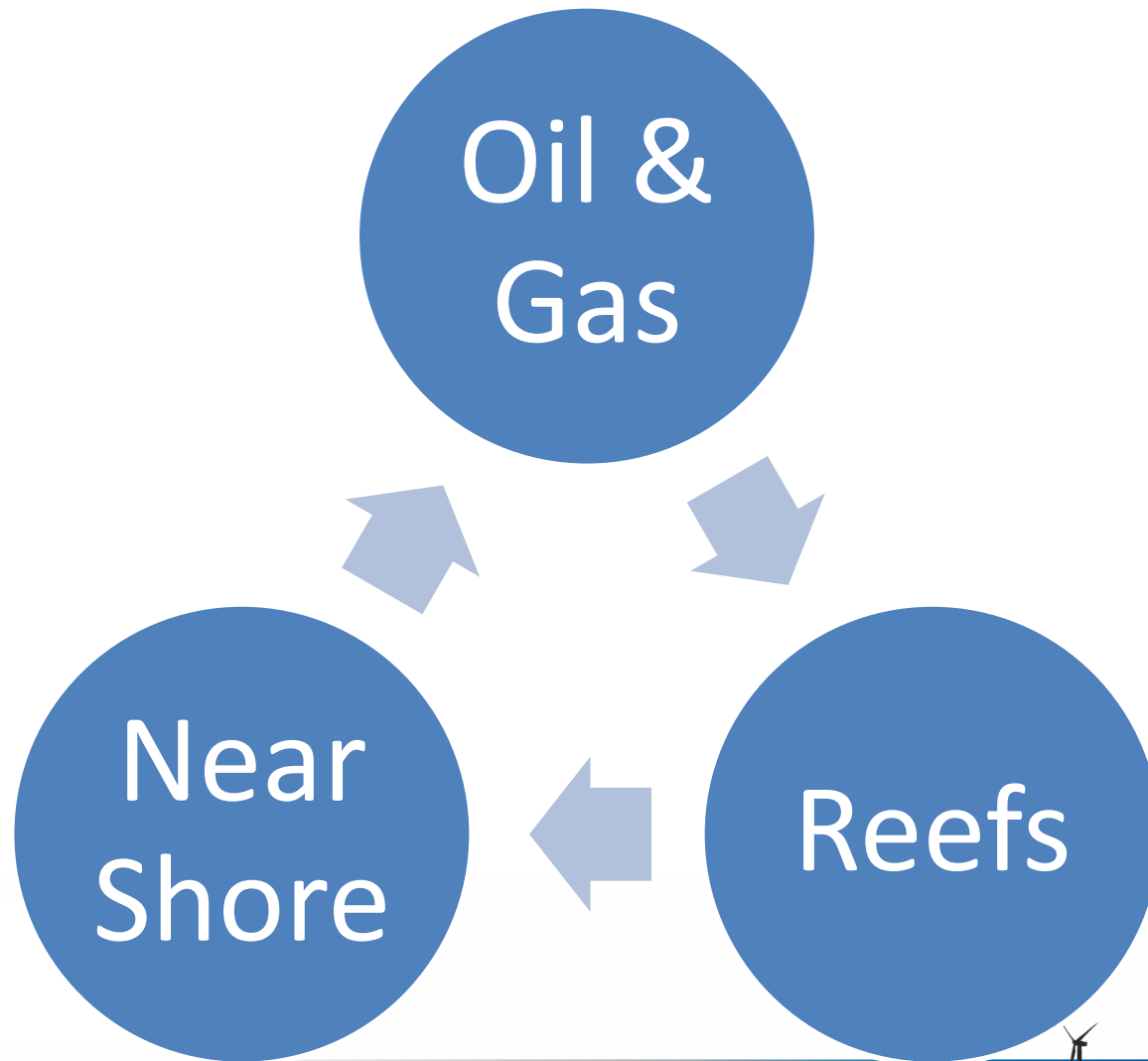


Hooked on Reefs

Toby Roe

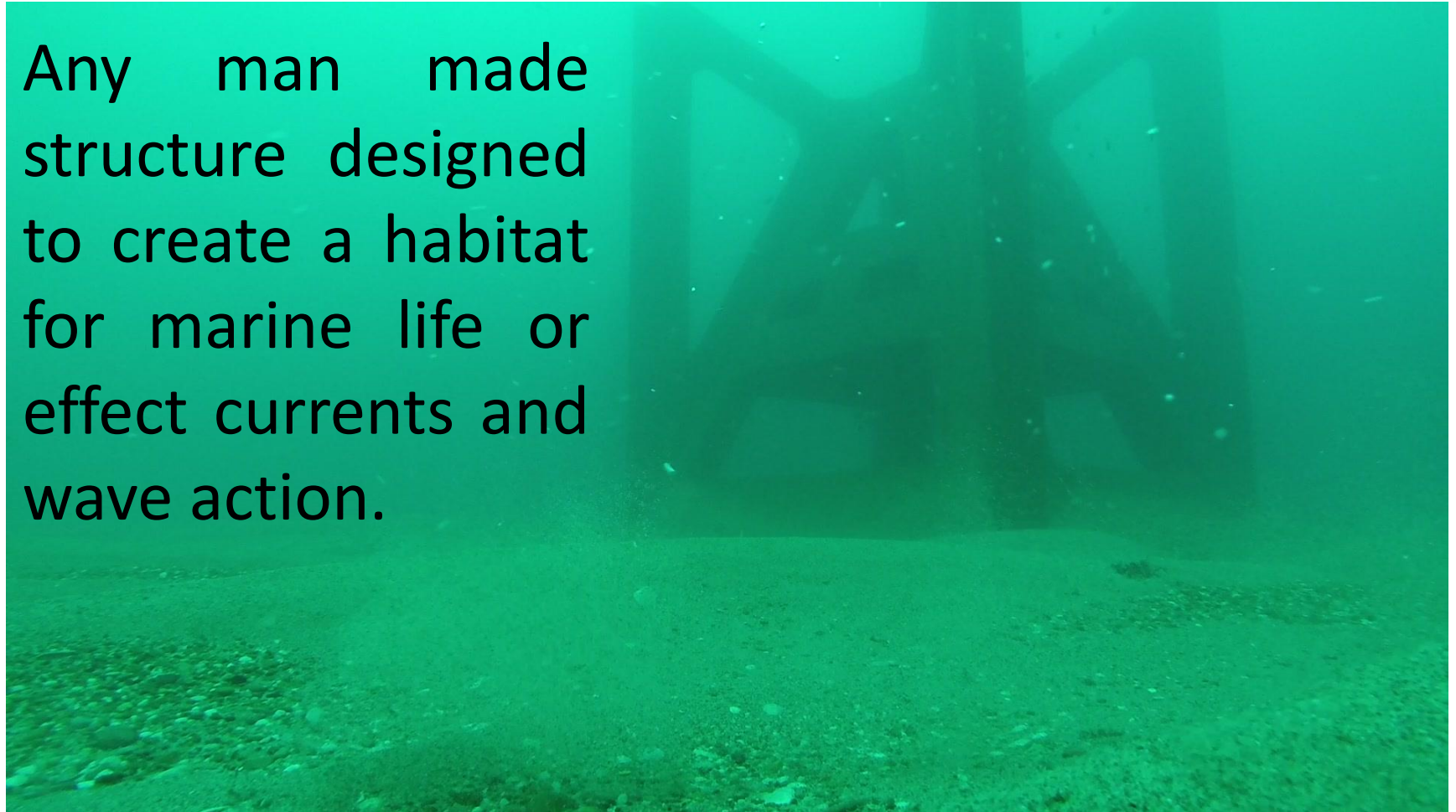
Engineering and Operations Manager

Agenda: Cross-Industry Innovation



What is an Offshore Artificial Reef?

Any man made structure designed to create a habitat for marine life or effect currents and wave action.



Why Build an OAR?

- Fish habitat
- High quality fishing
- Positive infrastructure
- Replenishment
- Compensation



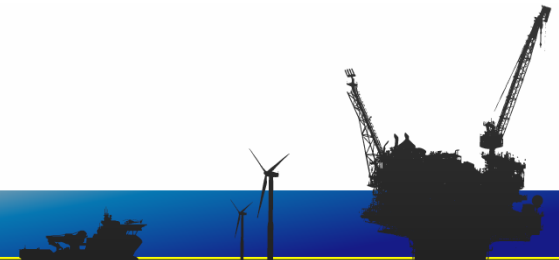
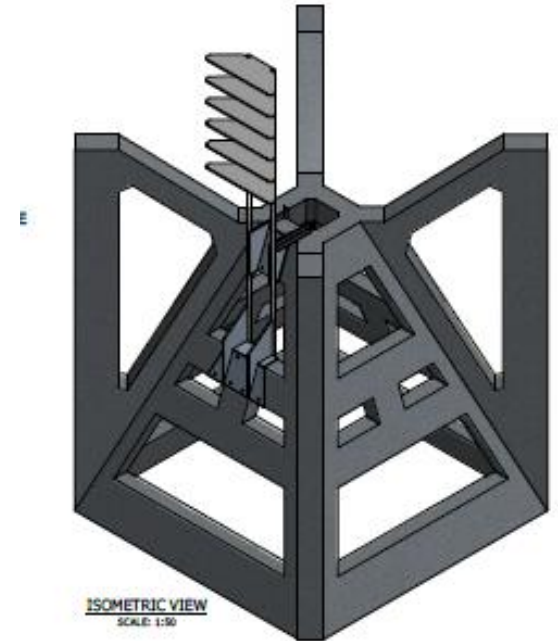
Engineering Connections – “Reef Style”

What have the wing tip of a Boeing 737, the Pyramids of Giza, UWA and horse hair plaster got to do with artificial reef design?



Key Features of a great reef

- Recruitment vs production
- Crypted spaces to accommodate smaller species
- Tall vertical relief to attract pelagic fish
- Flow modification
- Field layout for Halo effect



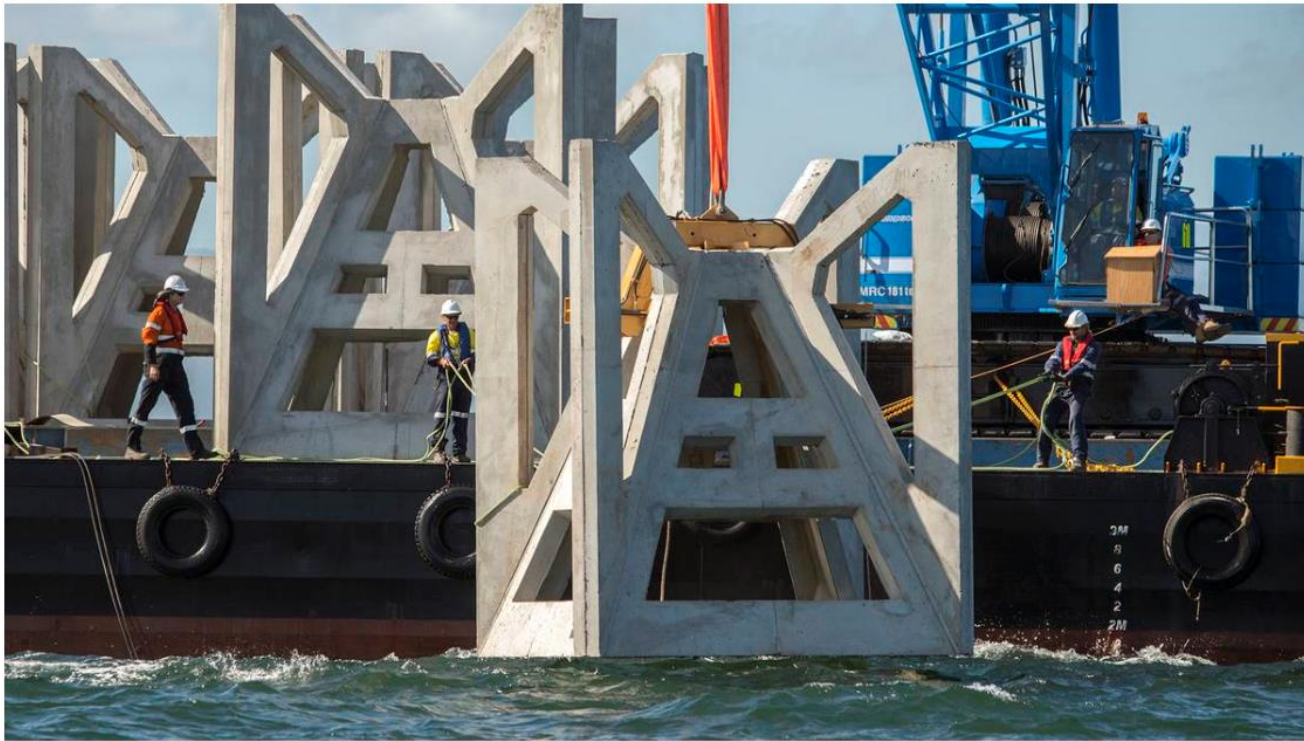
The Crypt

We started with a pyramid:

- It was the perfect cave
- Light and shade promotes marine fauna
- Openings sized for bait fish, demersals, divers and pelagic species

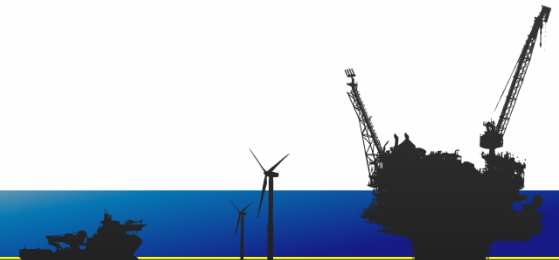


Vertical Relief



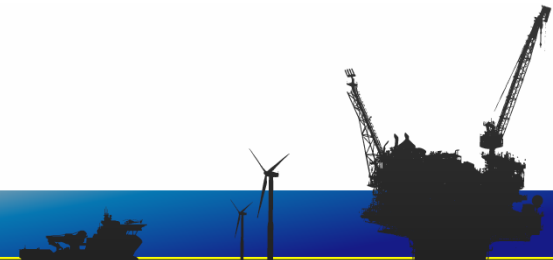
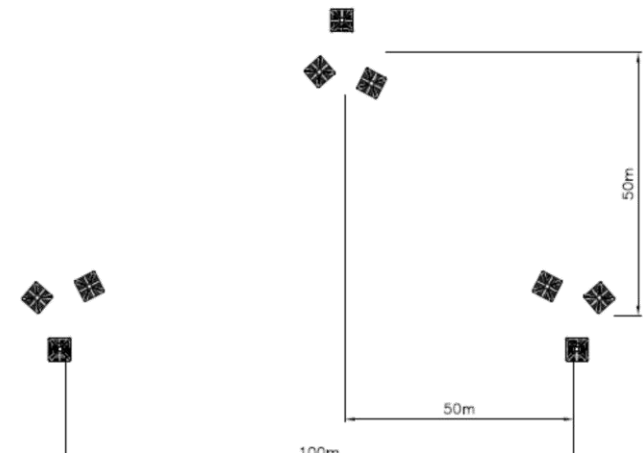
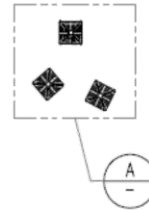
- Attracts pelagic species
- Reef for any environment

Flow Modification

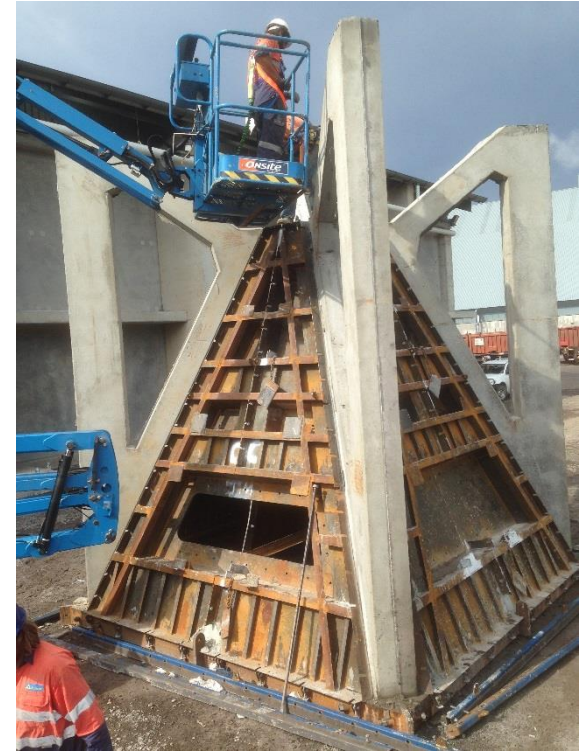


Field Layout

- Halo effects – circa 50m
- Fishability
- Overall volume = productivity = 800m³
 - We've been able to double the volume to 1600m³



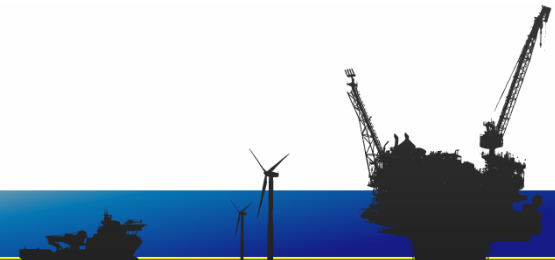
Then we had to fab our crazy shape!



Turns out building these from steel reinforced concrete is really hard!

Then we had to fab our crazy shape!

- So we redesigned the reef using fibre reinforcing and reduced the cost of fabrication.

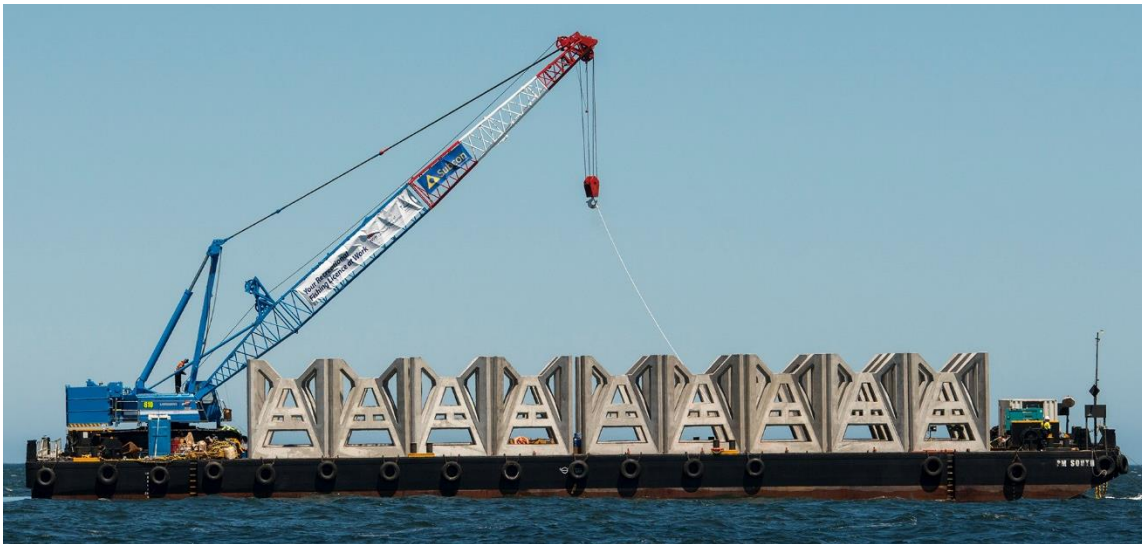


Fabrication - Video

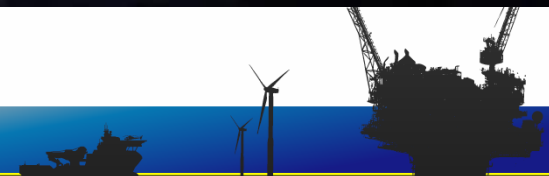


Installation

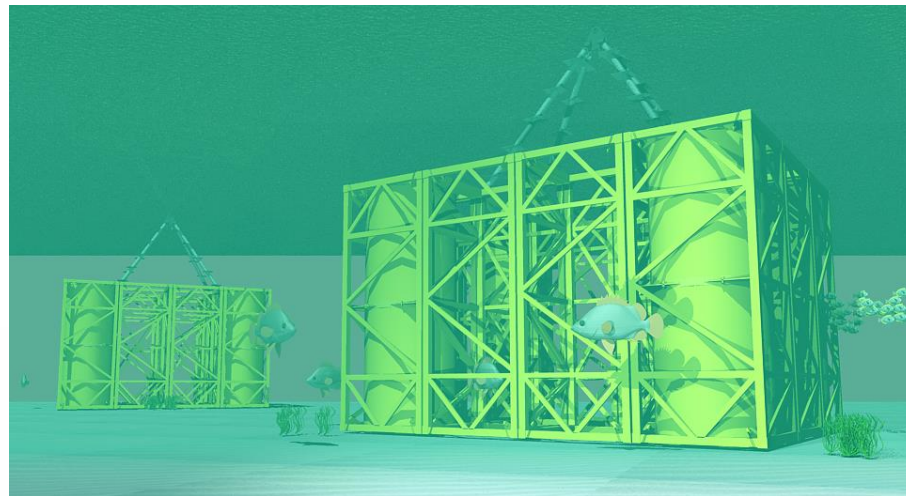
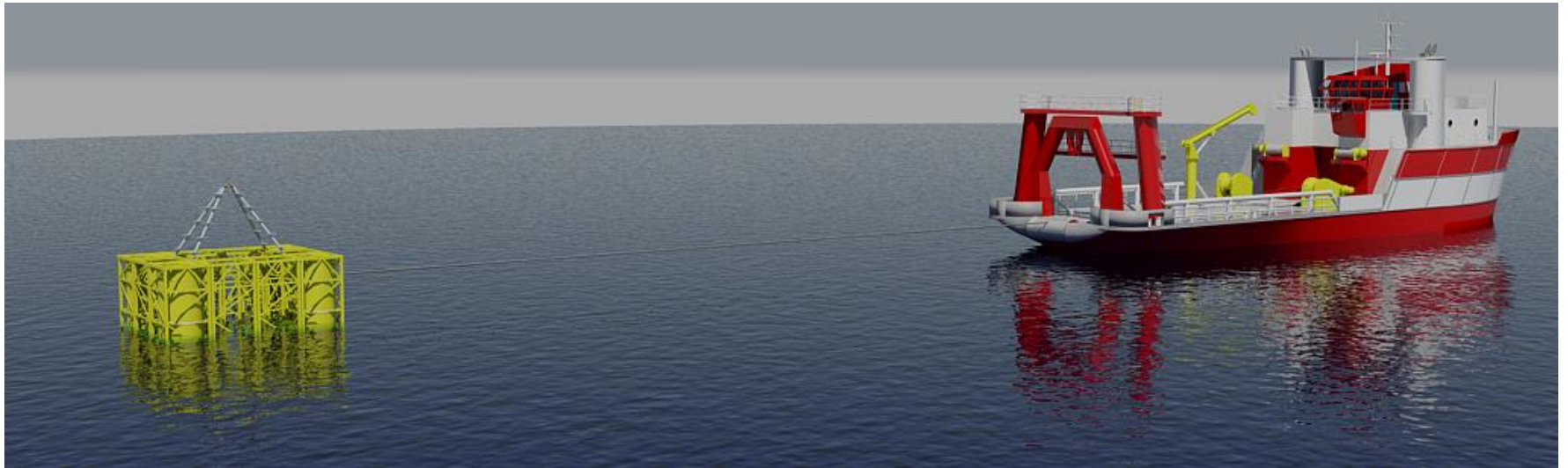
- Weather sensitive
- Hydraulic tools – faster operations and hands free lifting
- dGPS positioning



Installation - Video



What's Next...

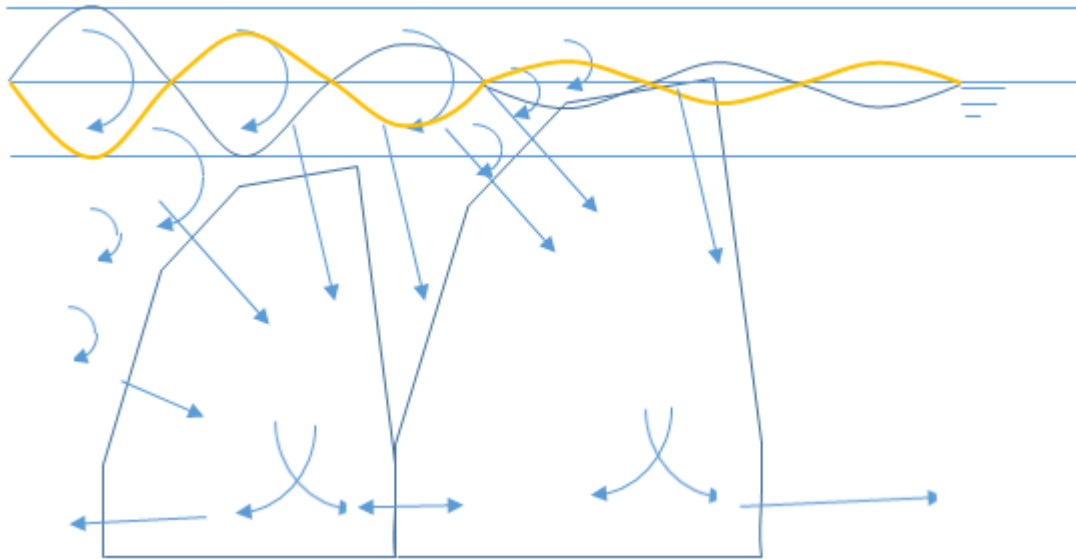


Application to Coastal



Application to Coastal

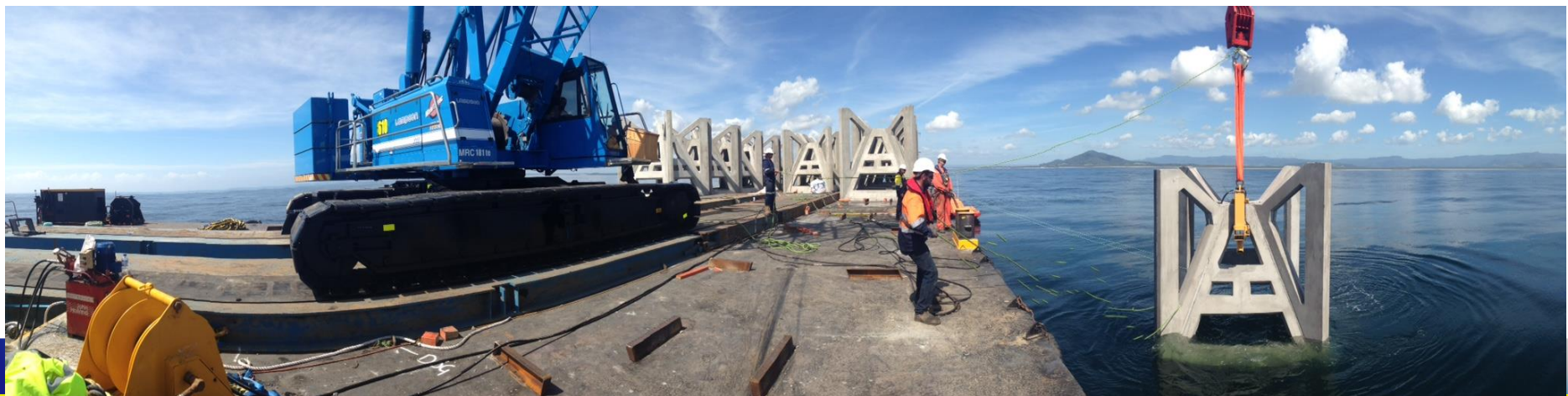
Wave attenuation



Application to Oil and Gas

Fibre reinforced concrete

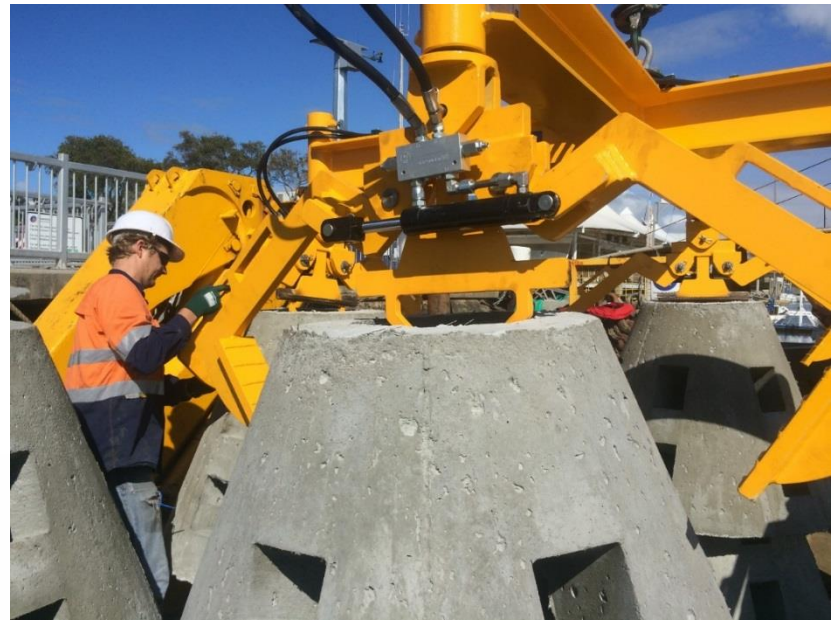
- cheaper fabrication
- design and construction of extremely complex concrete structures previously not possible
- Lifting without steel
- greatly extended design lives (100 years +)



Application to Oil and Gas

Lifting Tools

- used in New Caledonia
- potential for use on recovery of questionable structures



Questions?

