MHK Technology Update

Ocean Energy USA – OE35 Progress to Deployment

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- Ocean Energy have been developing a floating OWC wave energy technology since 2003
- The development has followed a rigorous regime of testing at sequential TRLs
- The successful progression up the TRLs has helped to de-risk the development and increase confidence in future success
- The progression to market will ultimately result in utility scale deployments
- What is required is short term markets with high cost of electricity

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The Technology

- Simple Design and Ease of Construction
- One moving part in Power conversion – (Turbine Rotor)
- Low mooring forces –vastly improved survivability
- Low Maintenance
- Plug/Unplug away
- Over 3 Years in Open Water Tests
- Patented Technology
- Proven Survivability

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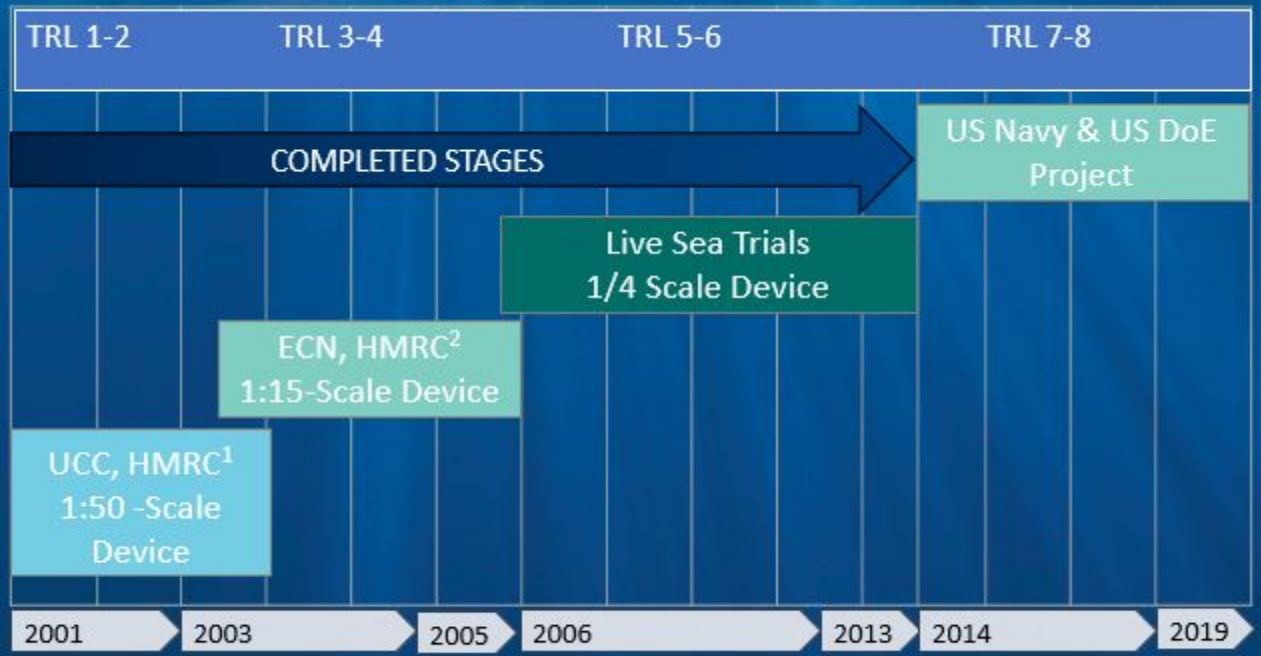
Technology Development Path

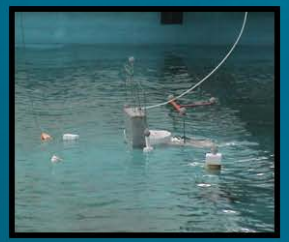


1. University College Cork, Ireland – Hydraulics & Maritime Research Centre
2. École centrale de Nantes, France – Hydraulics & Maritime Research Centre

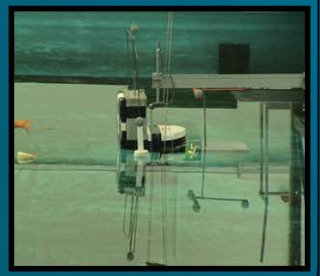
Staged Development

STAGE 1: 1:50

Improvements: B2D2



Improvements: OE Buoy



STAGE 2: 1:15

OE Buoy

OE Buoy Sea Keeping

STAGE 3: 1:4

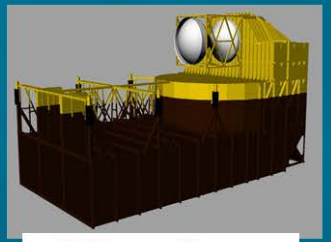
Sim. PTO: Orifice Plate

PTO #1: Well's Air Turbine

PTO #2: Impulse Air Turbine

STAGE 4: 1:1.25

OE Buoy



HydroAir Turbine

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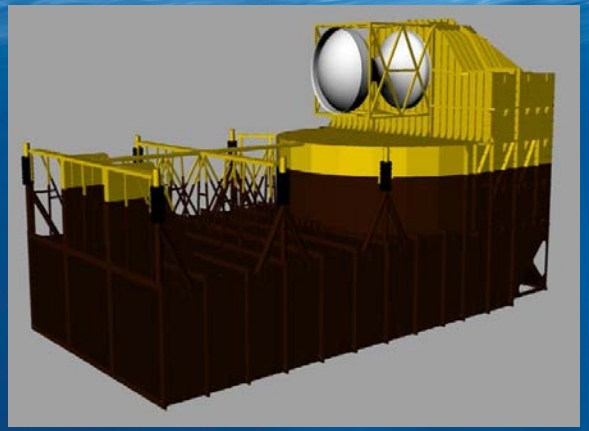
HYDROAIR™ - POWER TAKE OFF SYSTEM



- An innovative power conversion device for use in
- Oscillating Water Column (OWC) technology
- The high efficiency consists of:
  - Advanced air turbine
  - Generator
  - Power electronics

DRESSER-RAND
A Siemens Business

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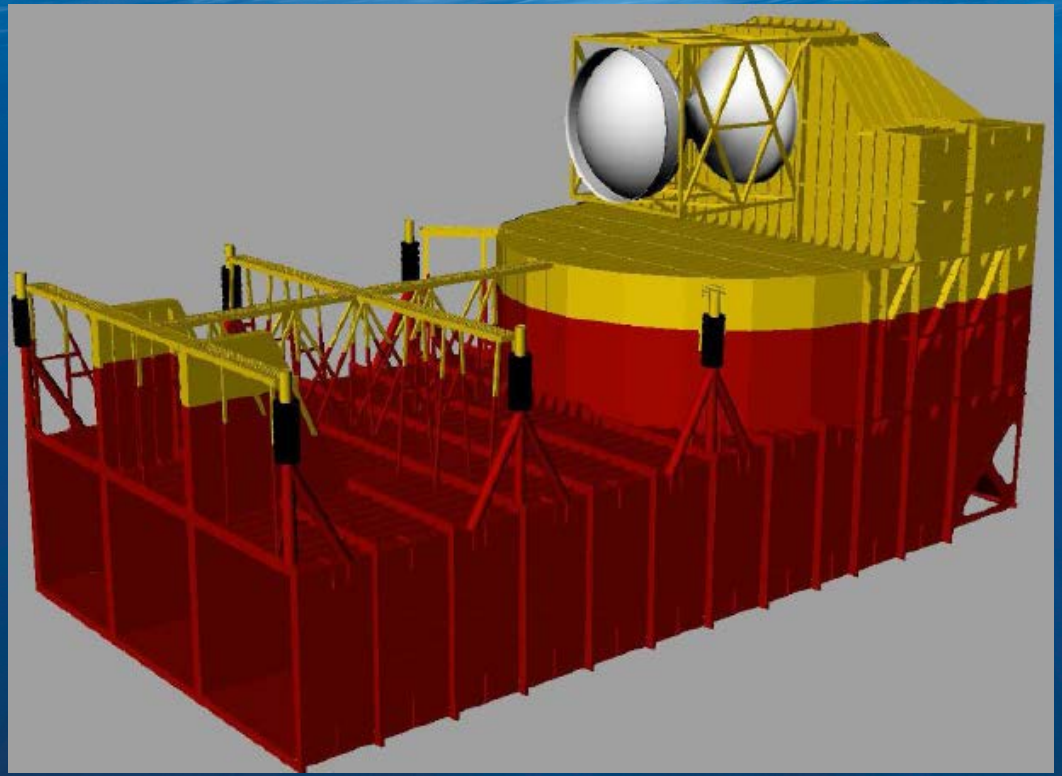

OE35 Device for Demonstration in Hawaii
at US Navy WETS

Lightship weight ~700 tons

LOA 123 ft (37.4m)
Moulded breadth 61ft (18.5m)
Draft 33ft (10m)

Yellow is above water and
Red is below water

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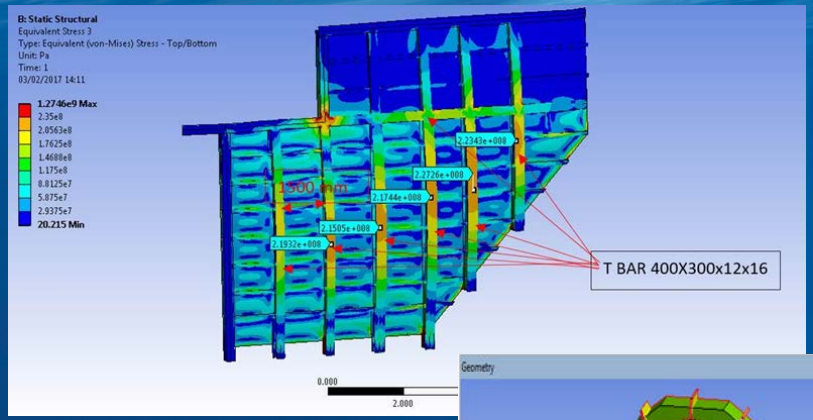

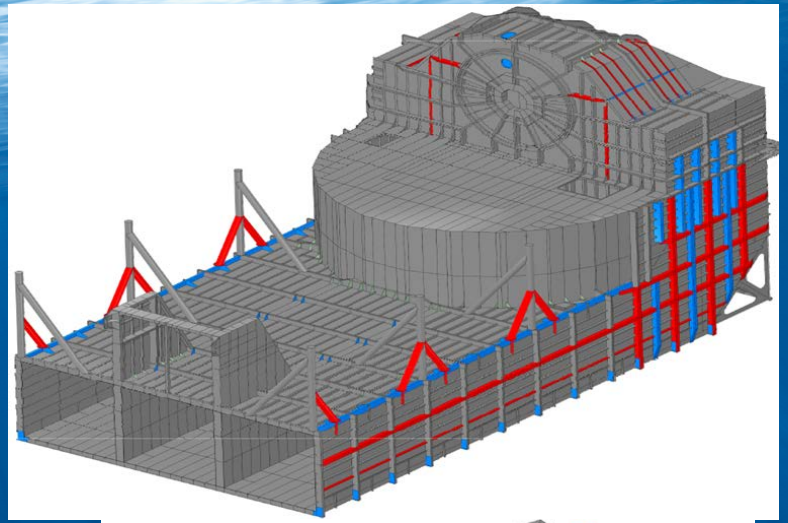

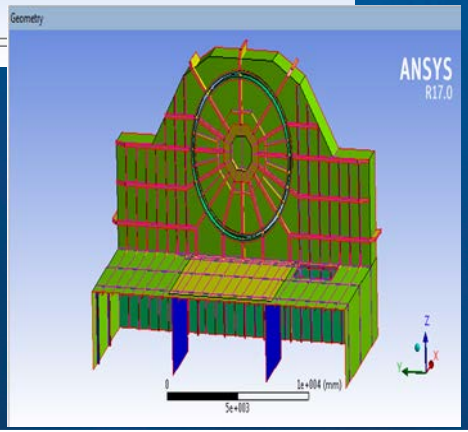

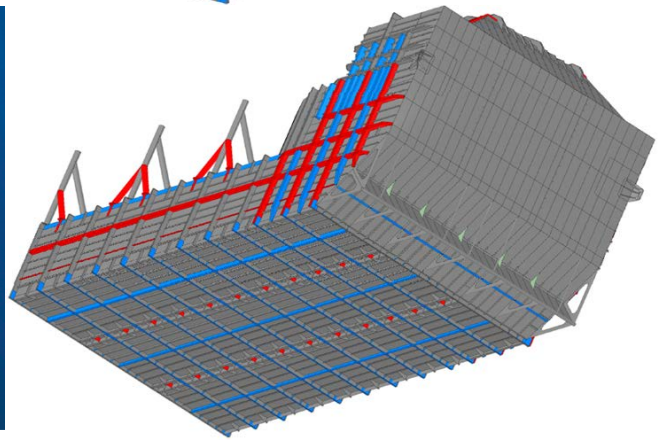

Strengthening for Deployment in 12m. Design Hs

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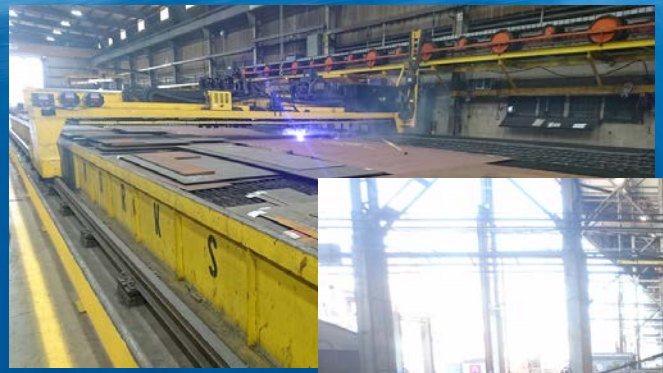
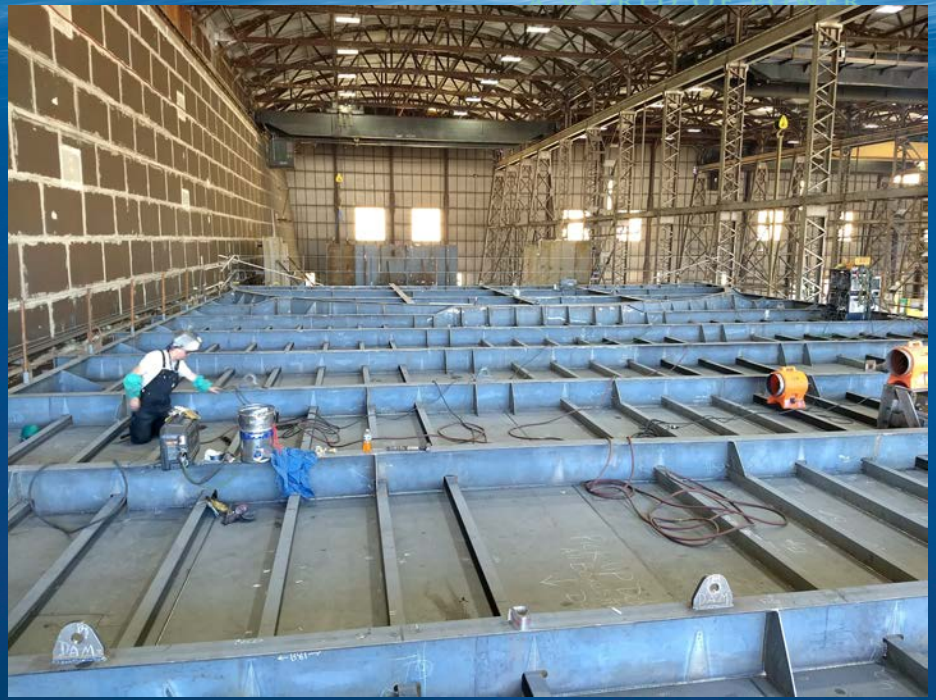
Steel sections and plate arrive at the VIGOR Yard, Portland



Shipyard Fabrication Bays
Vigor Engineers and OE site team



Fabrication Bay 6 with panel fabrication ongoing

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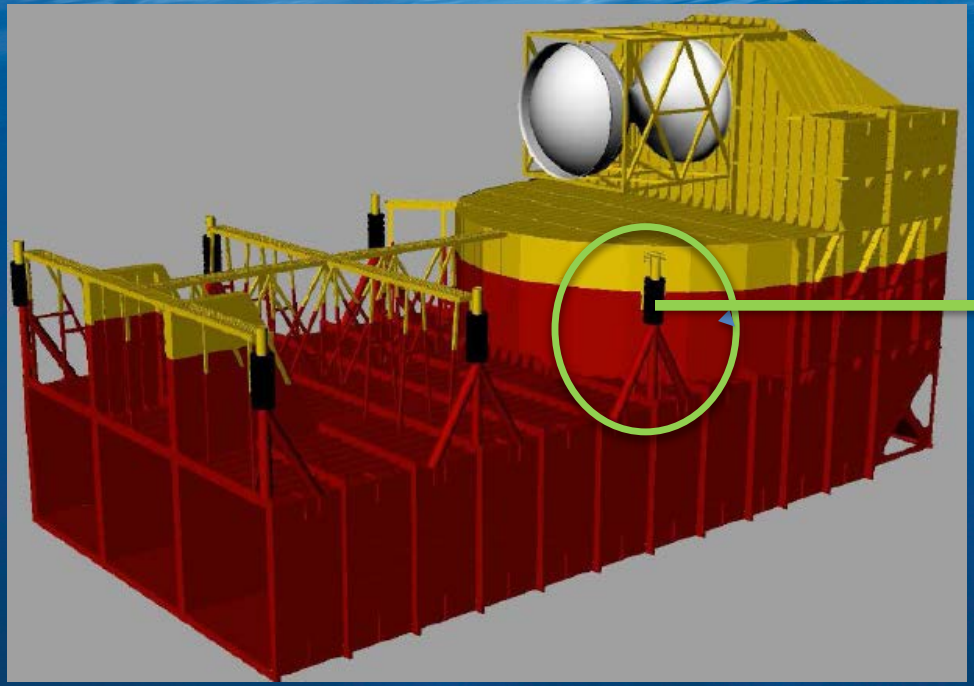

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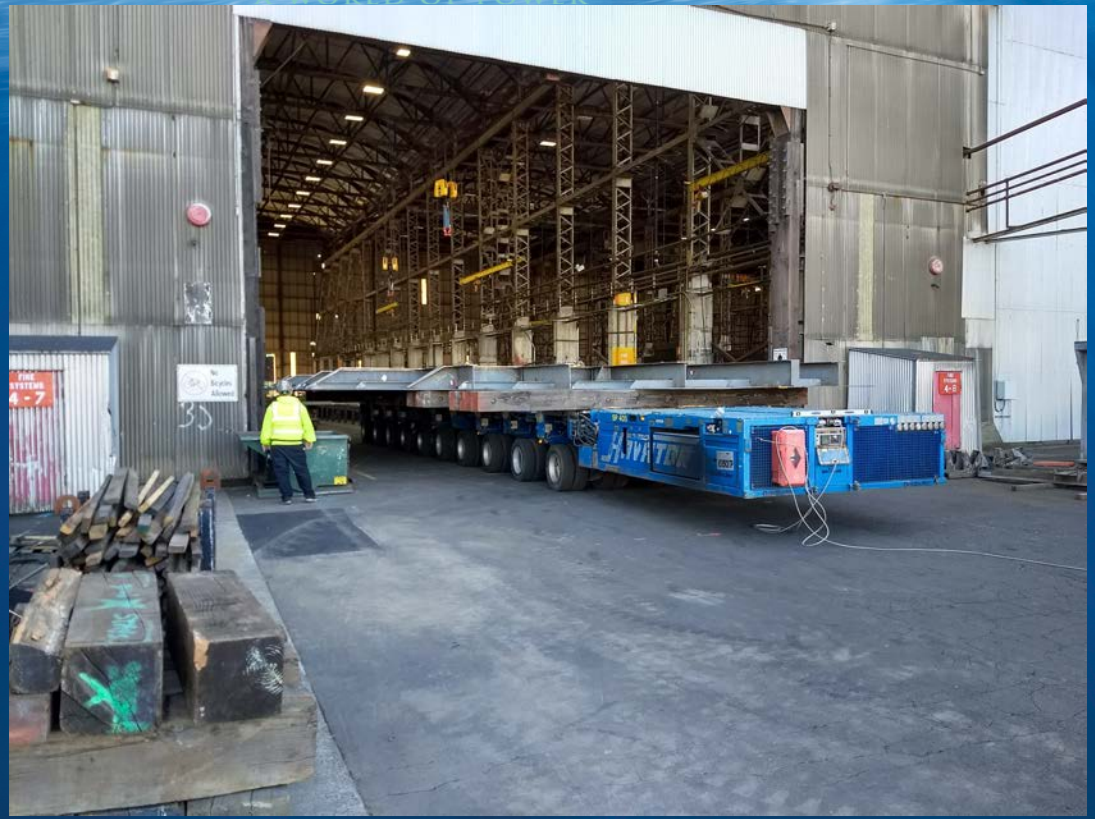

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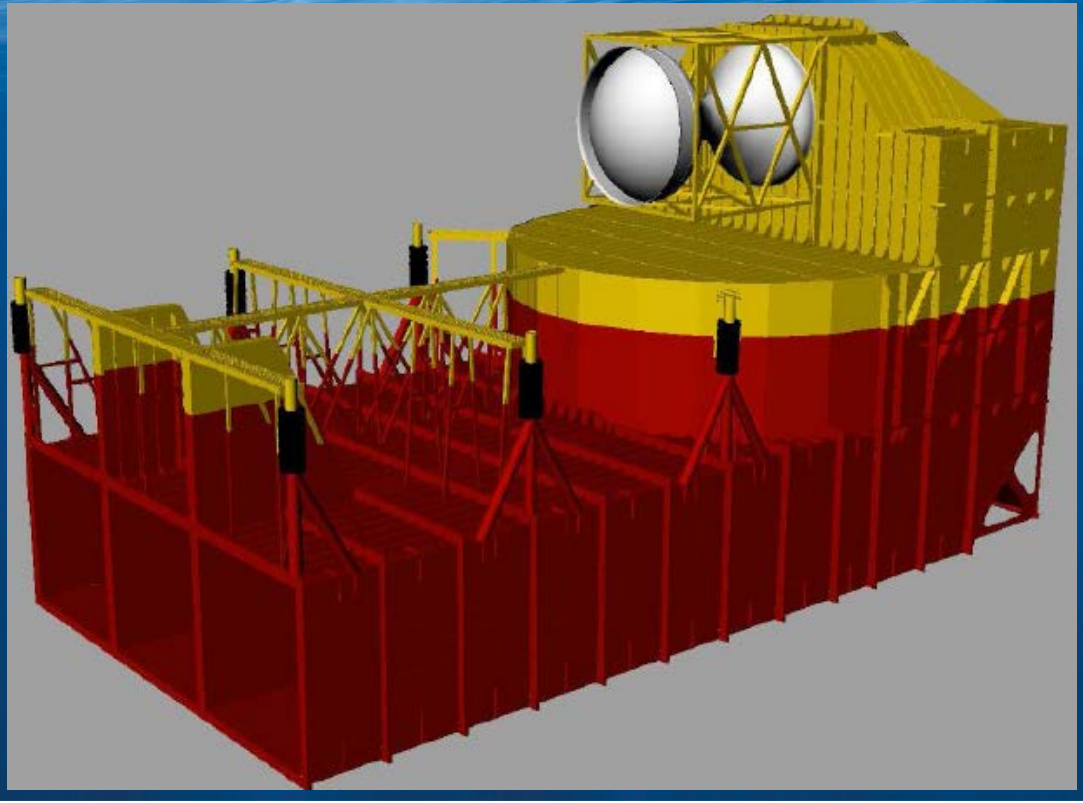

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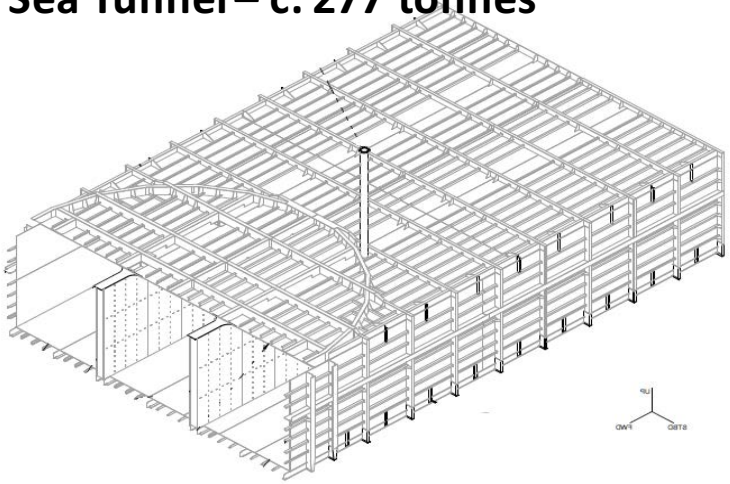
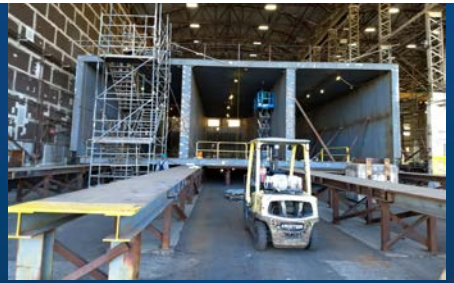
Sea Tunnel – c. 277 tonnes





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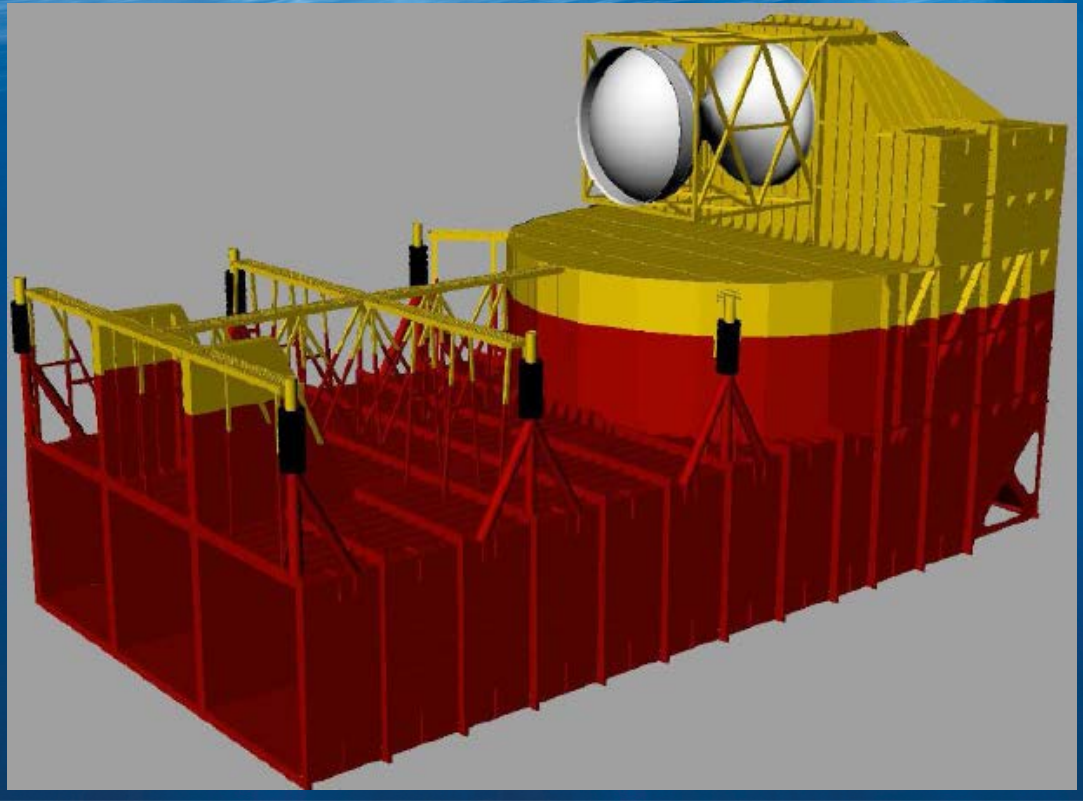

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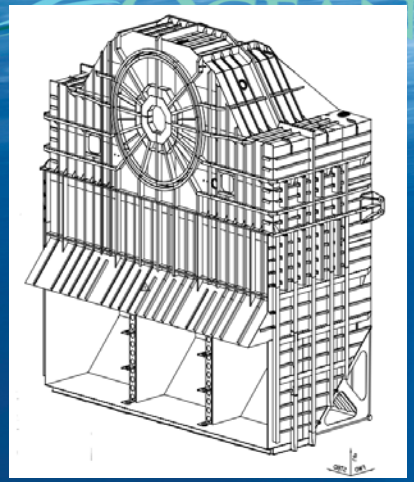
FWD Module – c. 308 tonnes



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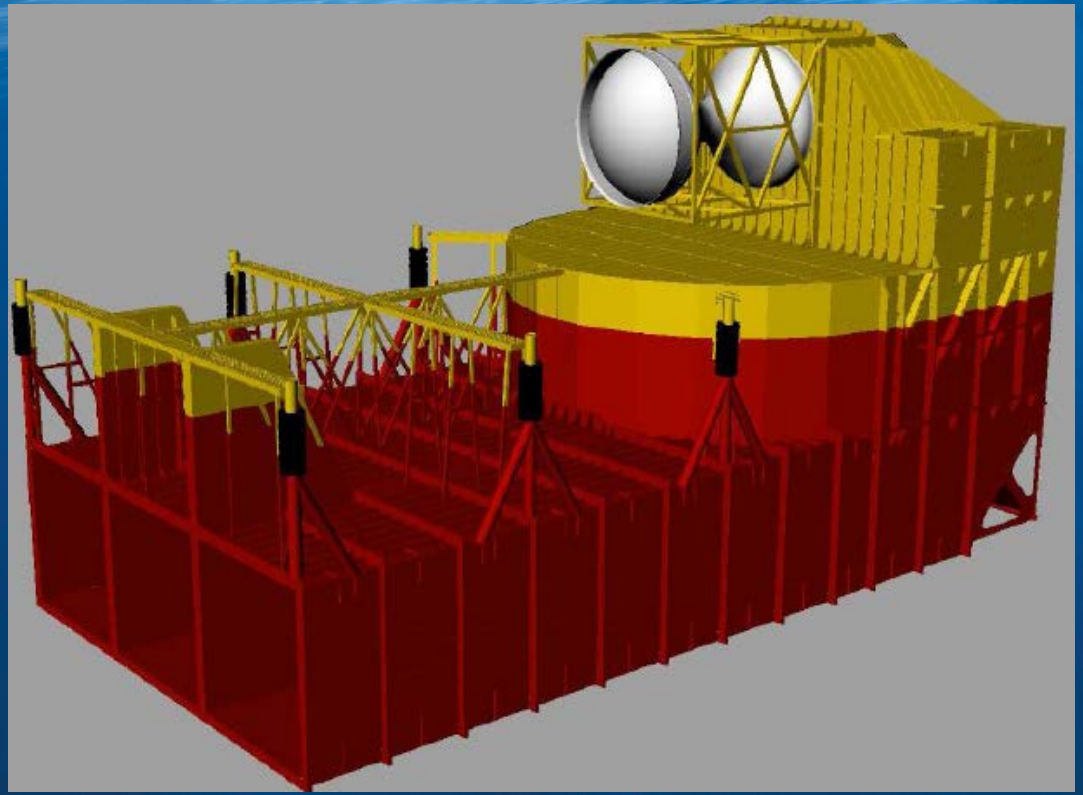

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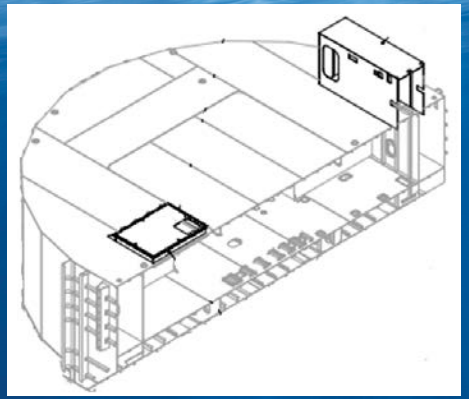
Machine House – c. 154 tonnes



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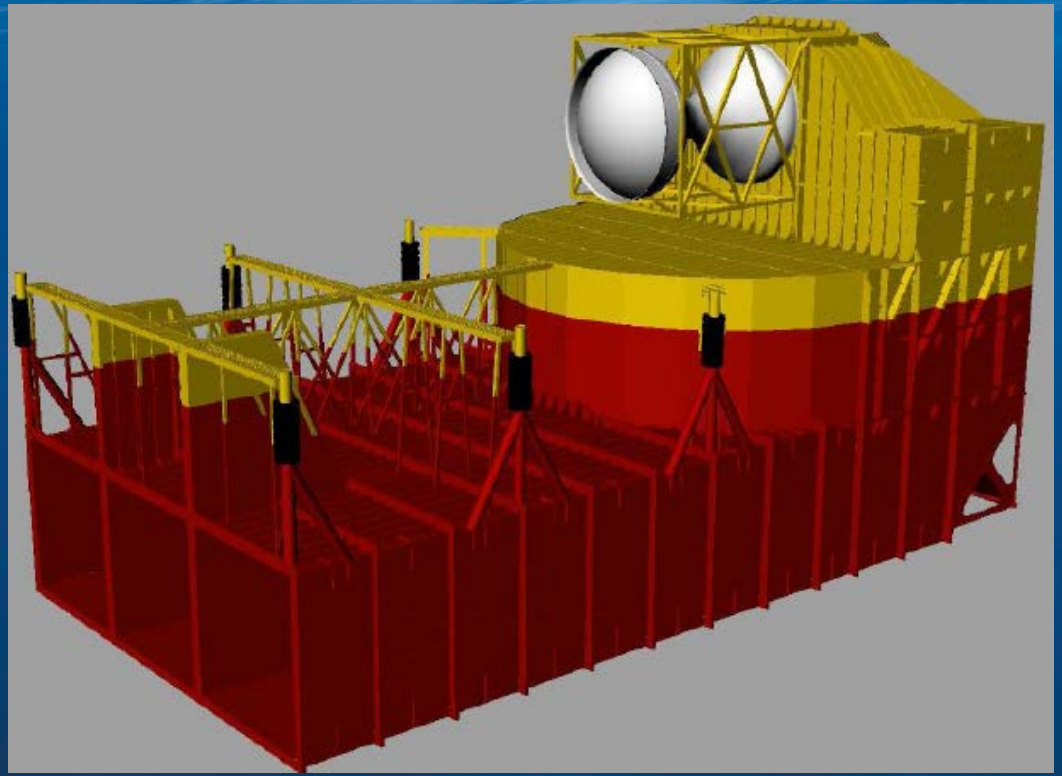

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THANK YOU
(Aloha)

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