MARINE Safety Forum

Terra Anchor Development

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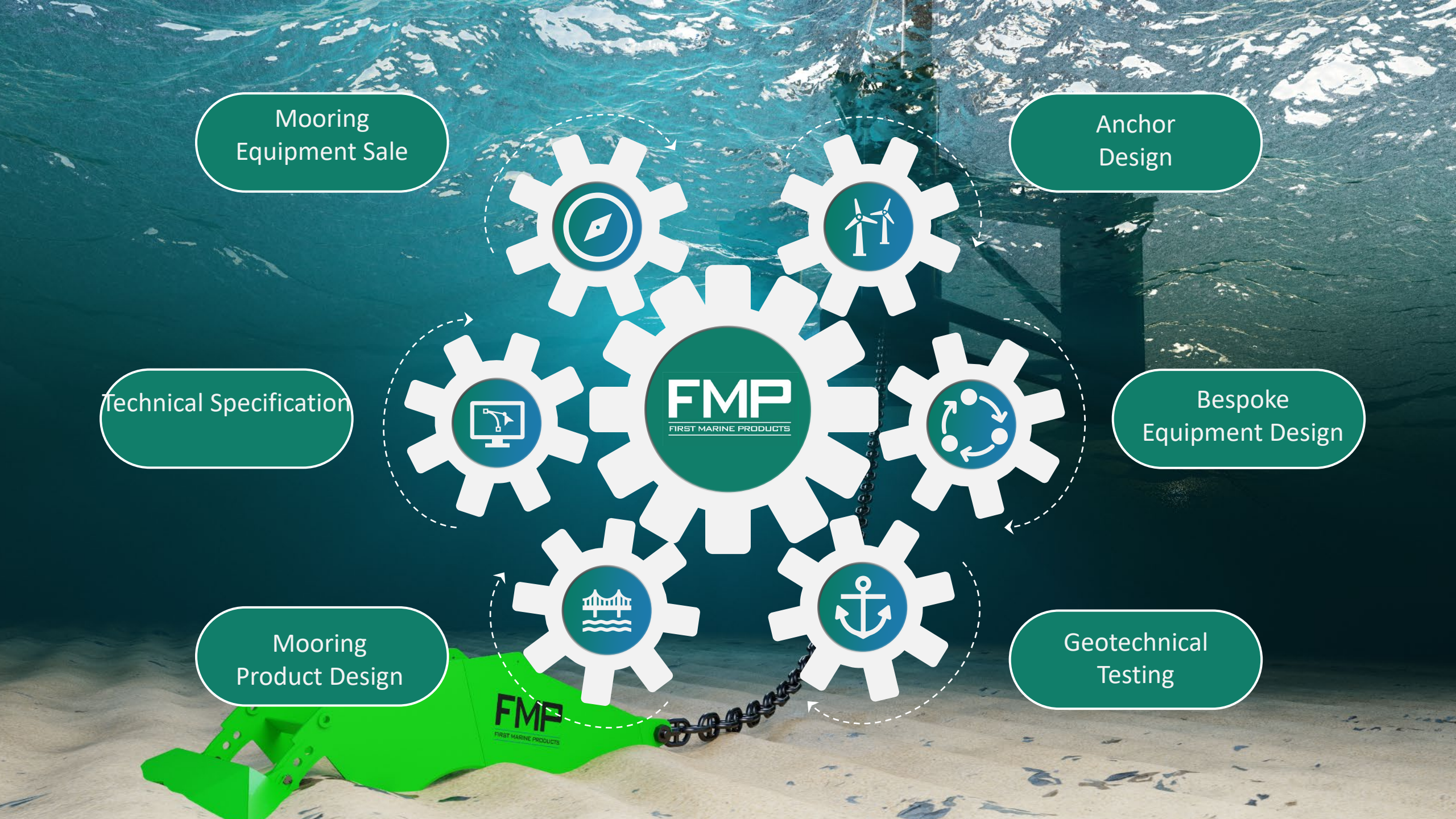
Mooring Equipment Sale
Anchor Design
Technical Specification
Bespoke Equipment Design
Mooring Product Design
Geotechnical Testing
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TERRA

Cranked or Elbowed shank for improved penetration

Shank design optimised for operational handling

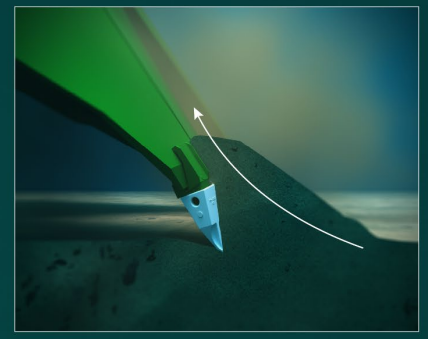
Conical fluke shape for stability

3 x 'pick points' per fluke side for hard seabed fracturing

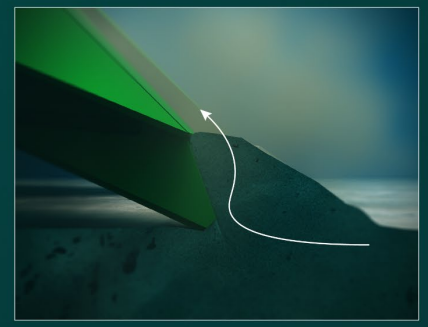
Large fluke area for high holding capacity. Optional ballasted fluke for improved hard soil performance

Dedicated lift points on underside of fluke for enhanced offshore handling and certified lifting operations

Pick Points push soil onto fluke top plate with no resistance from structure



Resistance from top plate in Titan and other anchor designs



Design based on mining theory, where in hard soils/rock, fracturing of soil works in tandem to improve penetration

Multiple Pick Points result in a 'trench' being made, increase in % fluke that is buried.

Offshore Test

15t Terra anchor was installed in a location in the North Sea known for its challenging seabed conditions.

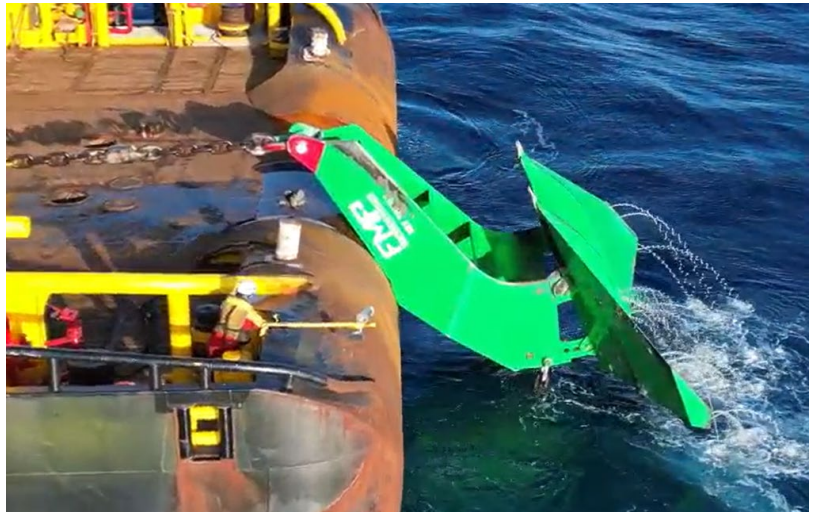
Soil profile at location consists of:

- **Top 0.3m to 0.5m dense Gravelly SAND**
- **Very stiff to very high strength CLAY**

Sandy and gravel content is noted within the layers, which is unfavorable for DEA use.

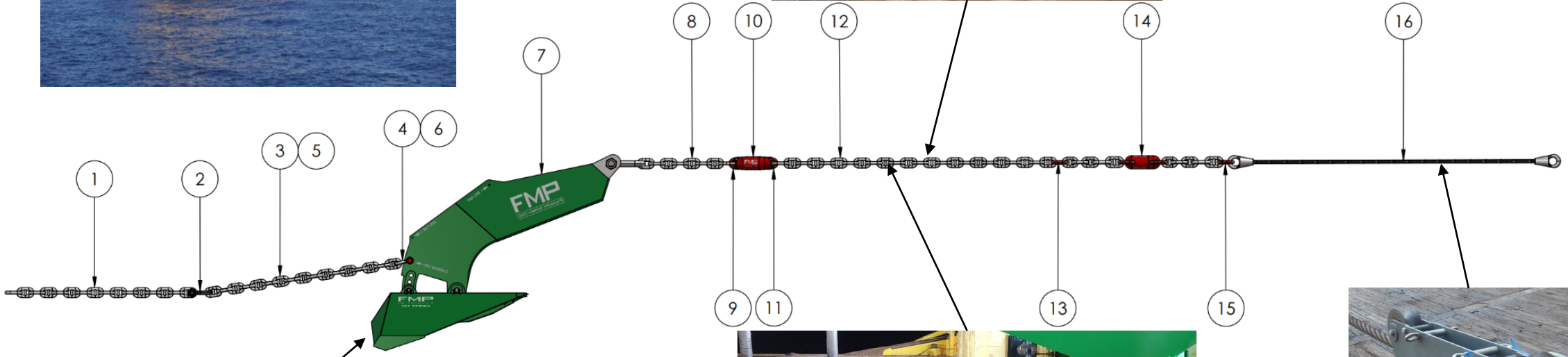
DEA would have to penetrate clay with a shear strength of 250kPa to achieve holding capacity.

Anchor test, with sensors located on the anchor, was undertaken.



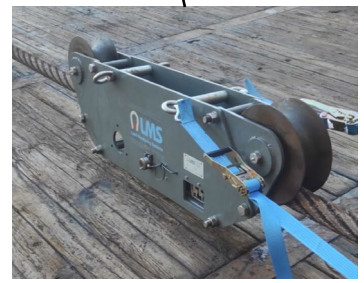
Anchor Test Setup

3 Trimson buoy connected
at 50m & 100m



IMU Fitted inside fluke of anchor.

Colour coding of chain links to enable measurement distance, and if required, depth of anchor chain.



Calibrated line running tensioner used on vessel wire.

Seabed Footage

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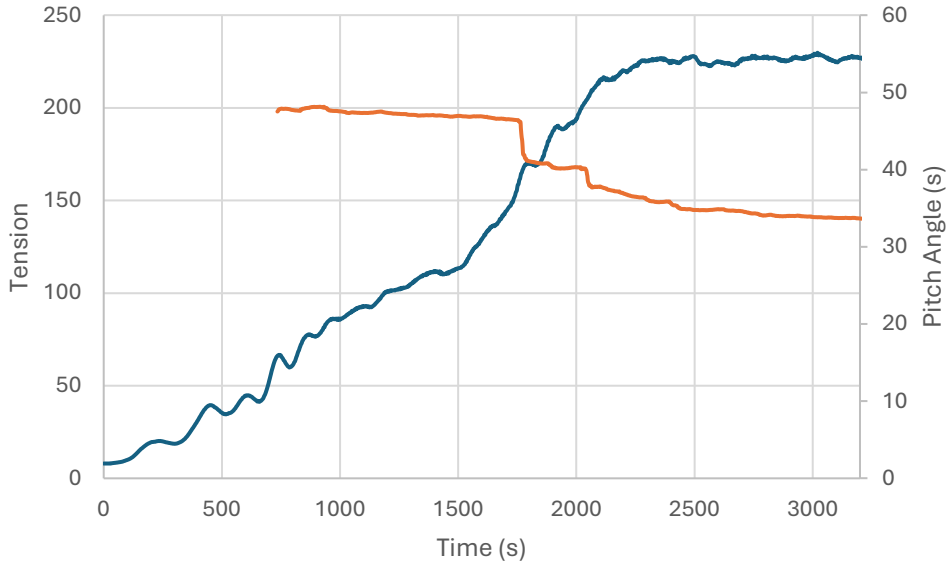
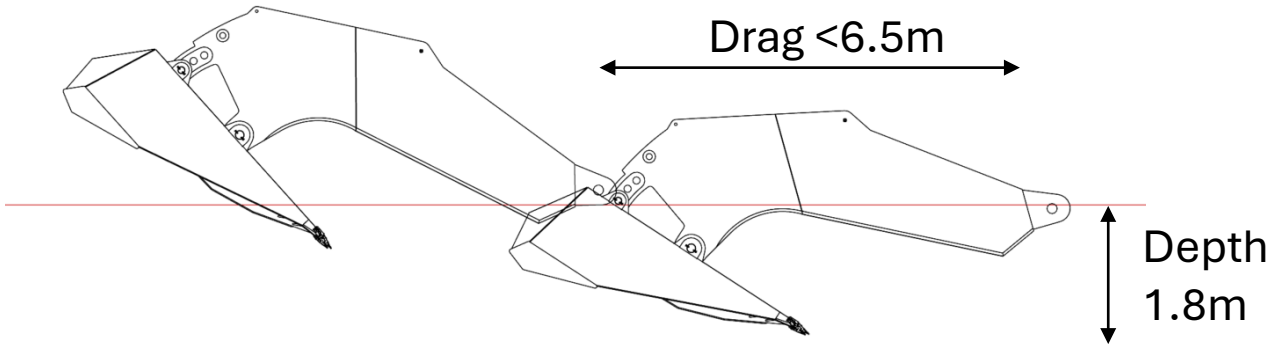
Anchor Initiated

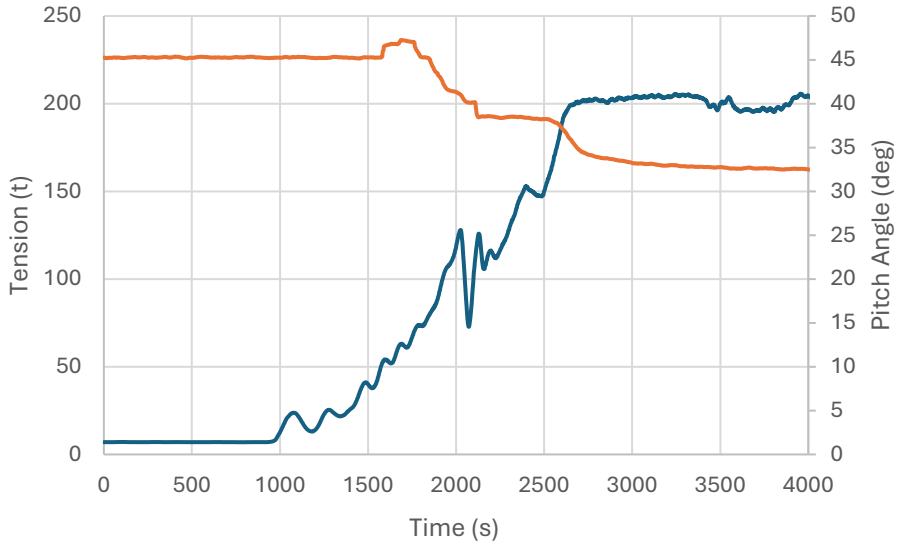
Anchor Post Tensioning

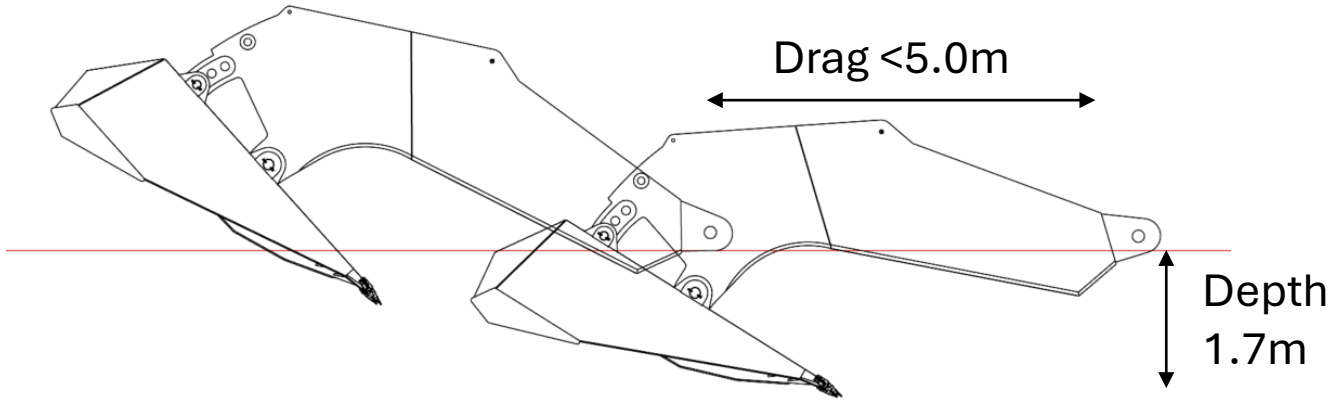
Anchor Test 1 Results





Anchor Test 2 Results





1st Terra Project

Following the offshore test, an order was placed for 8 of 15t Terra Anchor.

7 of anchors to be built within 7 weeks, during Christmas break.

Anchors were successfully delivered on time for the mobilization.

Being February, there was narrow weather windows during installation.

With the Terra anchor reaching the target tension on the first deployment for all 8 locations.

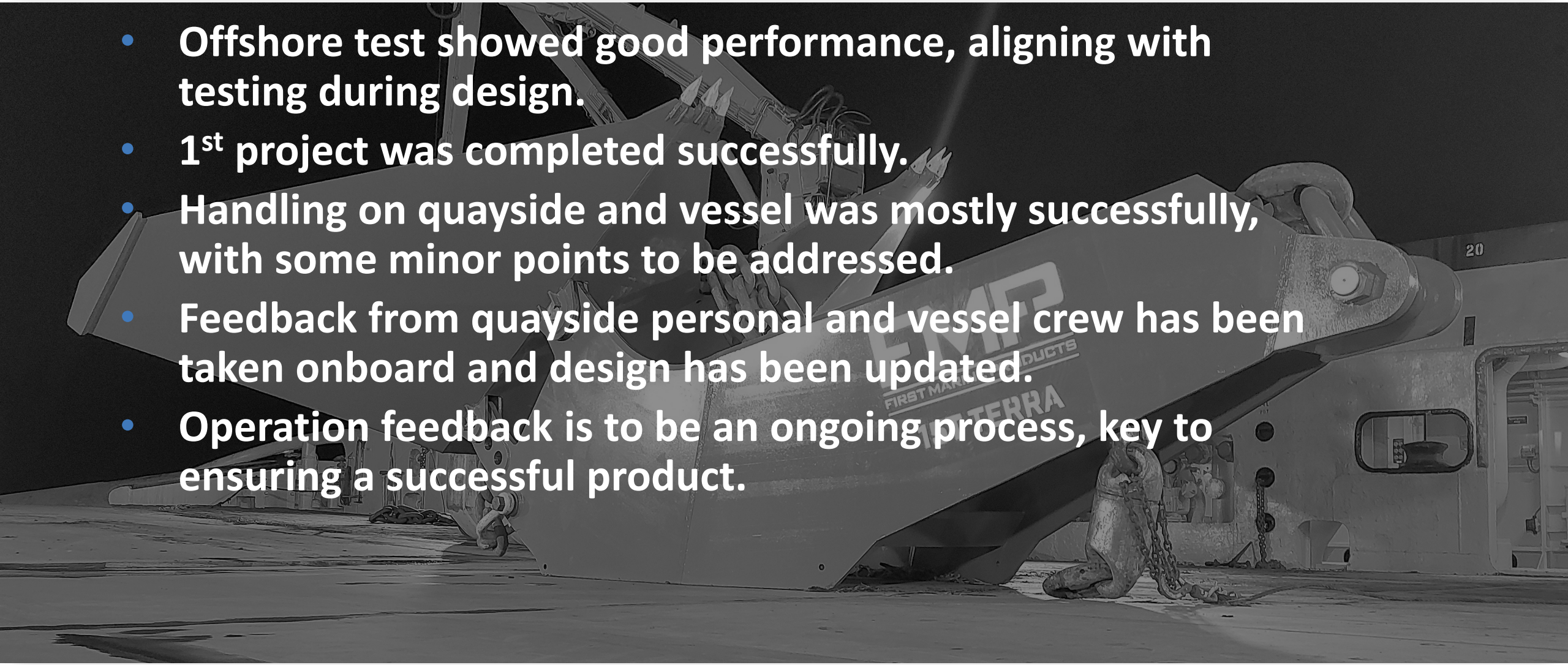
Terra Handling

Terra & Titan have been designed to ensure they are easily to setup and handle.

Design features that aid handling include:

- **Dedicated 3-point lift points, with easy access at rear of fluke.**
- **Rear lift points offer safe restraint point for changing fluke angles offshore.**
- **Stable on deck, enabling safe deck operations.**
- **Efficient pin size and clearance for ease of setup and angle change setting.**
- **Height of rear pin at good level of safe & efficient operation.**

Conclusion



- Offshore test showed good performance, aligning with testing during design.
- 1st project was completed successfully.
- Handling on quayside and vessel was mostly successfully, with some minor points to be addressed.
- Feedback from quayside personal and vessel crew has been taken onboard and design has been updated.
- Operation feedback is to be an ongoing process, key to ensuring a successful product.