# Deck Machinery for Research Vessels: Lessons Learned


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# RV Tenders

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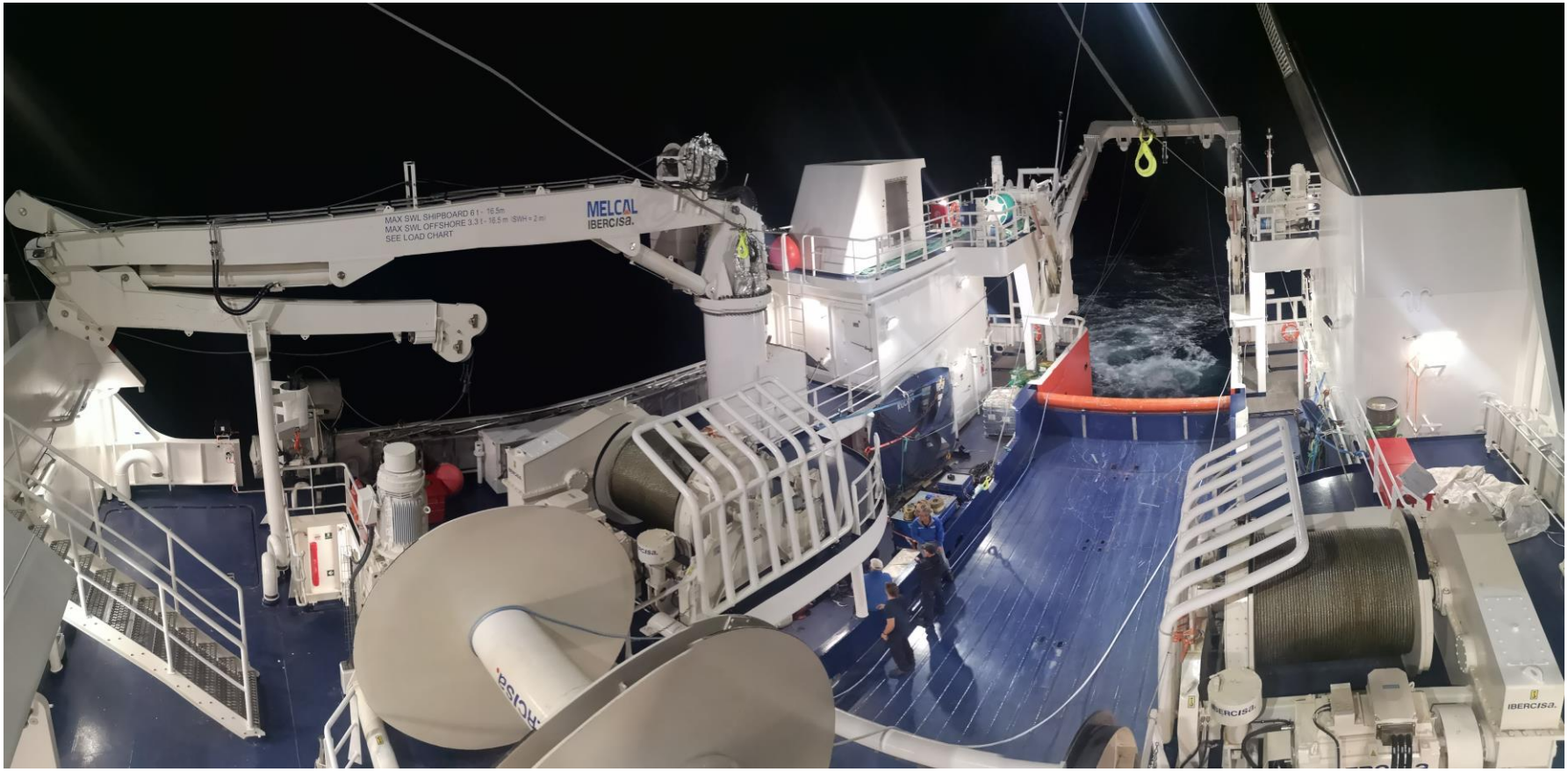
# Fishing winch package



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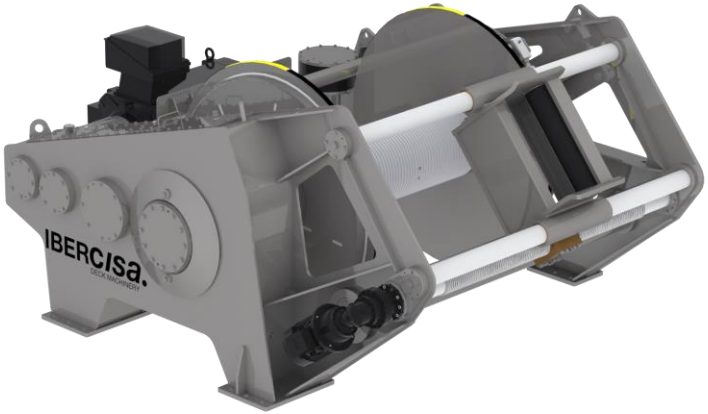
# Fishing winch package

- Trawl Winches
- Net Sounder Winch
- Net Drum
- Sweepline Winches
- Gilson Winches
- Auxiliary Winches
- Cod End Winch

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# Fishing winch package

**Common tender issues**

- General power and speed requirements usually overestimated. Unlike big trawlers, RVs do not need huge catch capacity, so generally the pulls can be kept fairly low.
- RVs multipurpose vessels, incorporating as many technologies and functions as possible, which leads to weight and space limitations.
- Fishing winches designed to be robust and long-lasting, which means bigger and heavier.

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# Scientific winch package

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# Scientific winch package

- Water sampling winches
- Geological
- Hydrographic
- ROV
- Seismic
- Oceanographic
- Geophysical
- Drop Keel Winches


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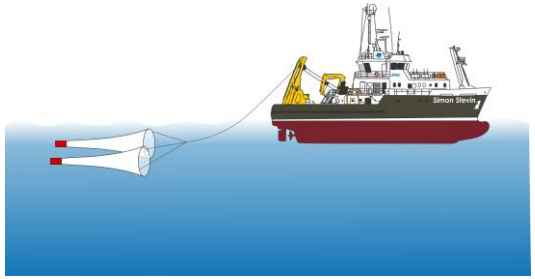
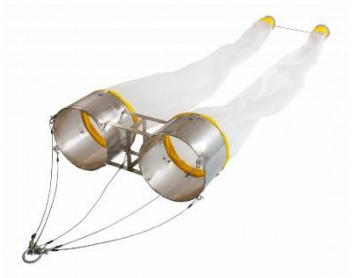
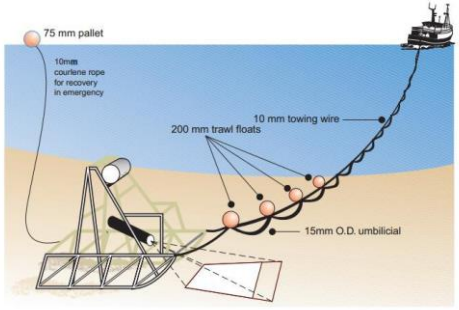
# Scientific winch package

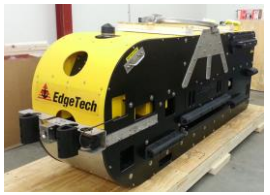
- Three existing types of scientific winches depending on the operation:

1. Towing Winches







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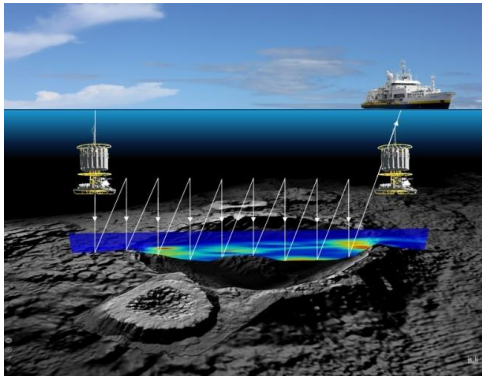
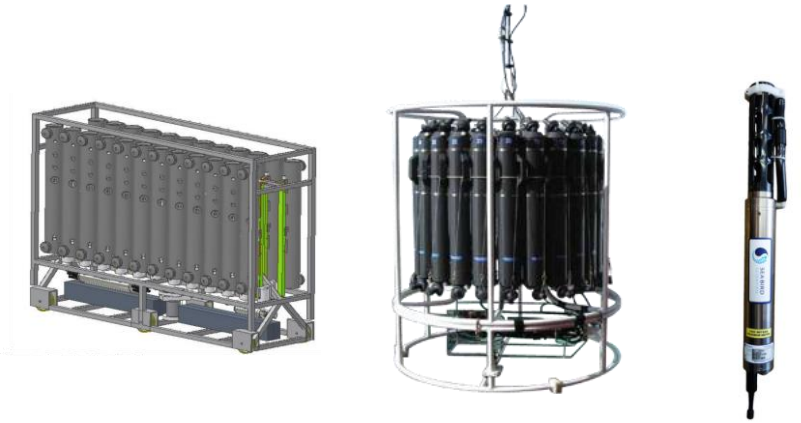
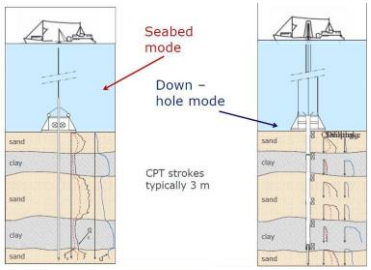
# Scientific winch package

## 2.1 Vertical profiling winches: water sampler





## 2.2 Vertical profiling winches: seabed

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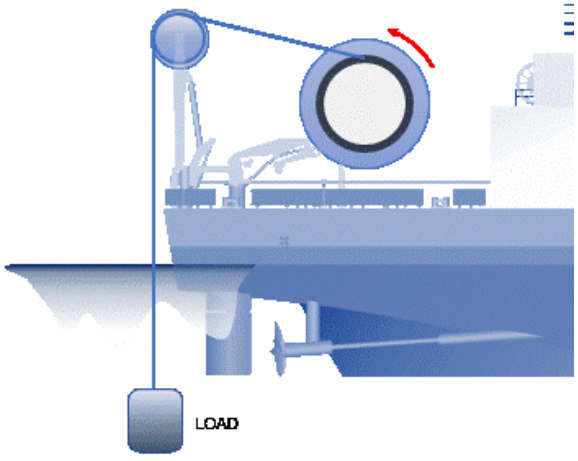
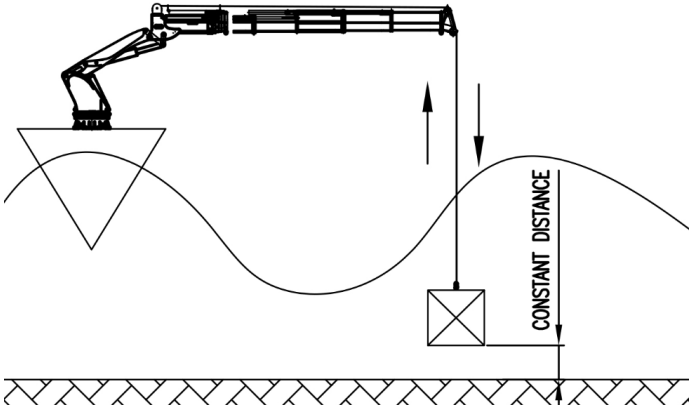
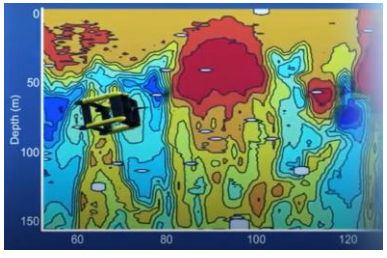
# Scientific winch package

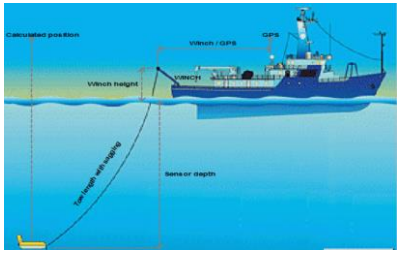
## 3.1 AHC Vertical profiling



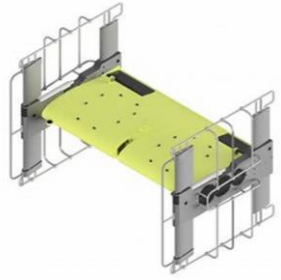




## 3.2 AHC Towing







# Scientific winch package

**Common tender issues**

- General pull requirements often incorrectly estimated, whilst speed requirements usually overestimated.
- Sliprings: number of conducts and fiber optics are often overestimated. Define if fiber optic is multimode or monomode.
- Cable requirement information vital to dimension winch and motors.
- Scientific instrument information is other main priority for supplier to dimension winch.
- Correctly dimensioned performance requirements can reduce size and weight. Reduced motor sizes assist this, as well as potential price reduction.

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# Technical requirements

# Scientific winch package

## Scientific winches: Deep sea analysis

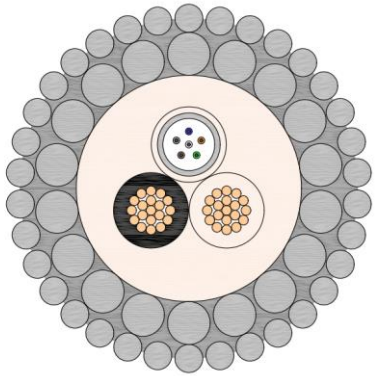
Winch manufacturer requirements:

- Wire length

**Wire (Not included)** Steel Wire Rotation Resistant 35WxK7 1960 N/mm² .

| | | | |
|---|---|---|---|
| Steel Wire diameter | 10 mm | Steel Wire length | 6.000 m |
| Steel Wire breaking load | 88,3 kN | Steel Wire weight unit | 50,4 kg/100m |
| Steel Wire weight | 3.024 kg | Steel Wire weight in seawater | 2.639 kg |

- Wire datasheet



| Description | Controlled Customer Copy | Part No. | Revision | Issue |
|---|---|---|---|---|
| Inspection Cable | Rochester Cable | A309113 | C | 1 |

| CABLE CHARACTERISTICS<br>NOMINAL VALUES @ 20°C | Imperial/US | SI |
|---|---|---|
| **PHYSICAL** | | |
| Weight in Air | 444 lb/kft | 661 kg/km |
| Weight in Seawater | 358 lb/kft | 533 kg/km |
| Specific Gravity | 5.1 | 5.1 |
| **MECHANICAL** | | |
| Breaking Strength | 23,500 lbf | 104 kN |
| Working Load | 5,800 lbf | 26 kN |
| Recommended Bend Radius[1] | 11 in | 27 cm |
| **ELECTRICAL** | | |
| Voltage Rating | | |
| Element A | 1,200 V | 1,200 V |
| dc Resistance | | |
| Element A | 3.0 Ω/kft | 9.9 Ω/km |
| Insulation Resistance | | |
| Element A | 20,000 MΩ•kft | 6,000 MΩ•km |

# Scientific winch package

**Scientific winches: Deep sea analysis**

- Speed at first layer or full wire deployment time

SPEED → DEPLOYMENT TIME

- Payload

**Note: The Payload is the maximum lifting mass that the winch is able to lift in nominal conditions excluding wire weight (in water). The scientific element should not exceed this value:*

| | |
|---|---|
| Payload | 680 kg |
| Multi Corer OSIL MIDI | |

| | |
|---|---|
| **Safety Factor (Last layer)** | **3,9** |
| **Safety Factor (1st layer)** | **2,2** |

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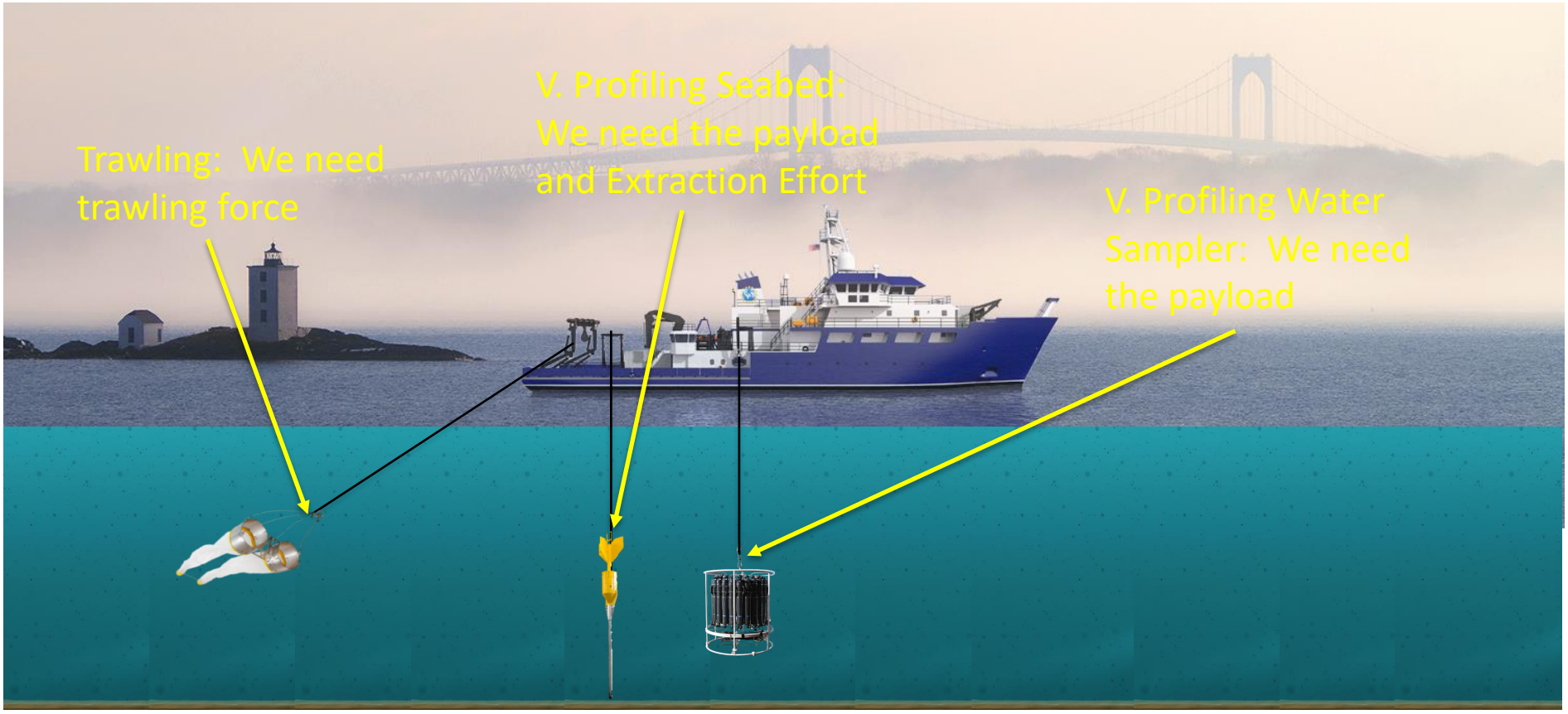
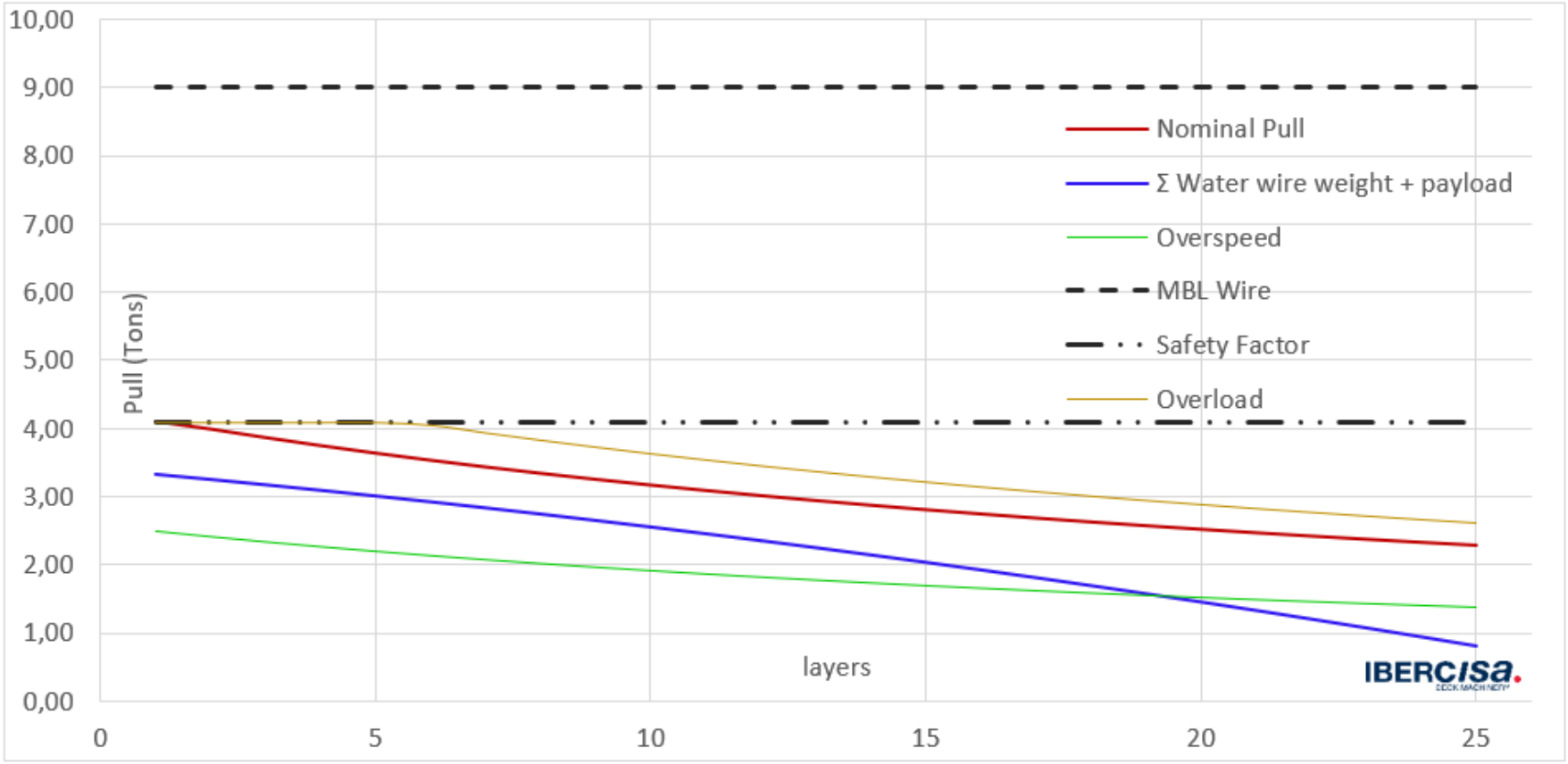
# Scientific winch package



# Scientific winch package

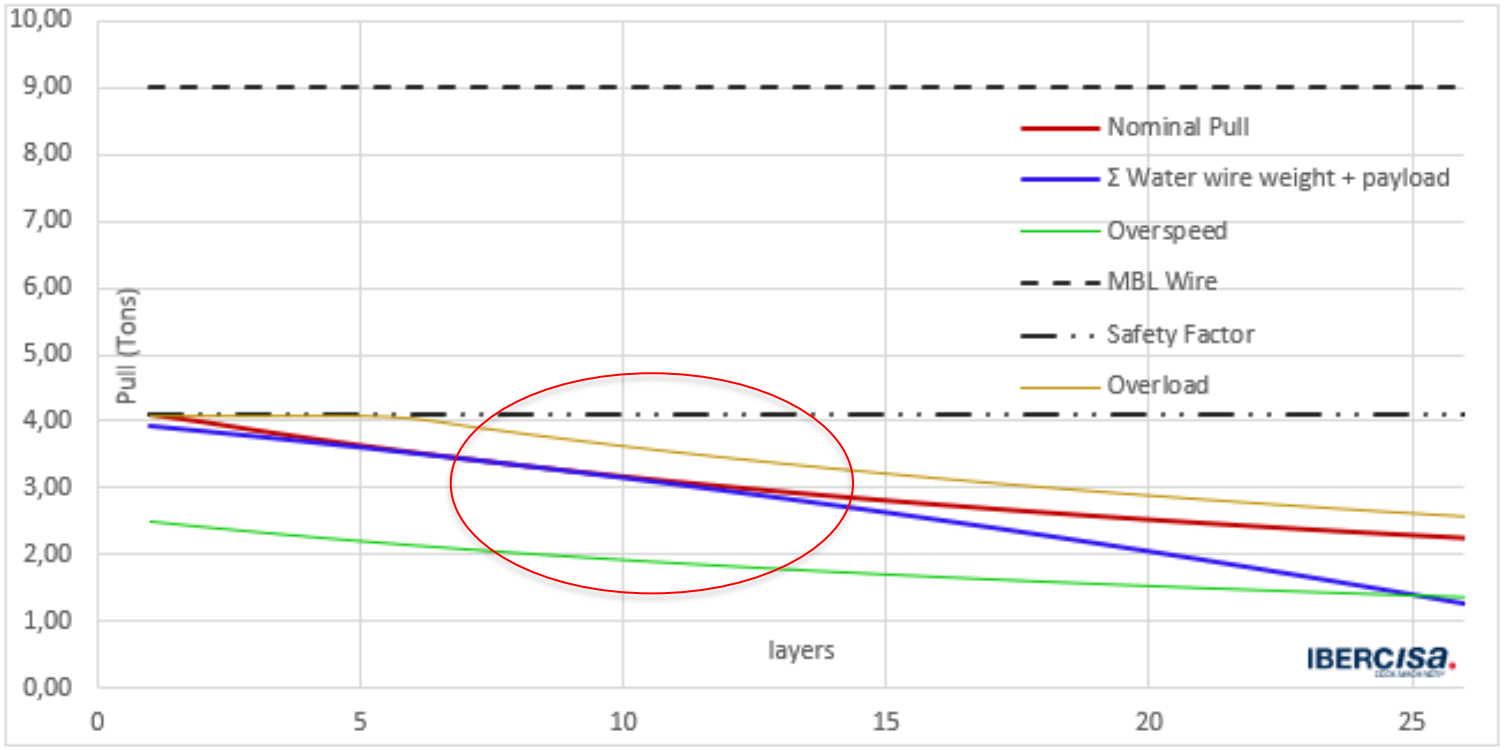
## Scientific winches: Deep sea analysis



# Scientific winch package

## Scientific winches: Deep sea analysis

Example of a typical problem in deep sea analysis with incorrect dimensioning.



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# Scientific winch package

**Scientific winches: Deep sea analysis**

Supplier's responsibility to define the necessary

- Pull at all layers
- Drum dimensions

# Scientific winch package

**Scientific winches: Deep Sea AHC Winches**

Winch manufacturer requirements:

- Wire length
- Wire datasheet
- Payload

For AHC operations, it is highly recommended that the SUPPLIER defines the speed according to AHC requirements

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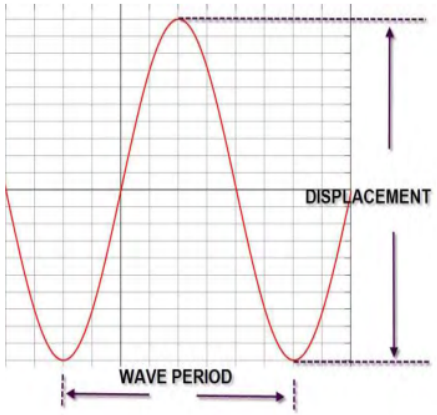
# Scientific winch package

**Scientific winches: Deep Sea AHC Winches**

- Wave Period m/s² on the block sheave.
- Wave Amplitude m/s on the block sheave.

AHC Analyzer results

| | | | |
|---|---|---|---|
| 1 Stage | Length (paid out) | 500 m | 100% |
| | Displacement | 8,0 m - 2,51 m/s | |
| | Period | 10,0 s - 1,58 m/s² | |
| | Payload | 700 kg | |
| 2 Stage | Length (paid out) | 1.000 m | 100% |
| | Displacement | 8,0 m - 2,51 m/s | |
| | Period | 10,0 s - 1,58 m/s² | |
| | Payload | 700 kg | |
| 3 Stage | Length (paid out) | 2.000 m | 100% |
| | Displacement | 8,0 m - 2,51 m/s | |
| | Period | 10,0 s - 1,58 m/s² | |
| | Payload | 700 kg | |




*Important note: Payload and vessel movement must be calculated by ship designer to verify that the acceleration and speed at the working position sheave does not exceed these values. If this is the case, the power requirement of the winch would have to be recalculated and corrected.*

IMPORTANT Eurofleets to define standardised wave amplitude/period values.

Most commonly used values: 4m (1.57 m/min) displacement @ 8 seconds (1.23 m/s²)

# Scientific winch package

**Scientific winches: Deep Sea AHC Winches**

Supplier's responsibility to define the necessary

- Pull at all layers
- Speed at all layers
- Drum dimensions

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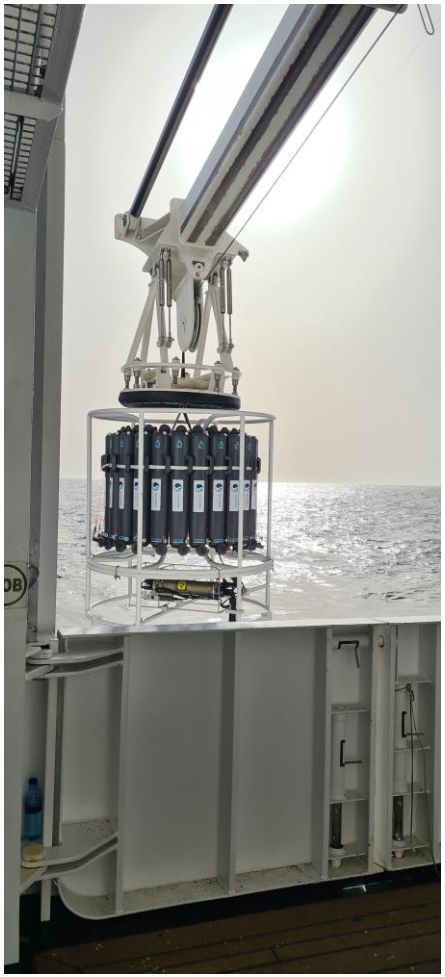
# Launch And Recovery System

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# Launch And Recovery System

- Frames (A, J, T, L)
- Telescopic Booms
- Piston Corer Deployment
- ROV LARS



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# Launch And Recovery System

**Common tender issues**

- SWL and deployment time requirements usually overestimated
- Electro-hydraulic power unit specifications usually overestimated due to unecessary simultaneity requirements
- Information on various scientific instrument is other main priority for supplier to dimension the frames
- Which winch works with each frame is often unclear

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# LARS Technical requirements

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# Launch And Recovery System

**Frame definition**

- Type of frame
- Define Classification Society

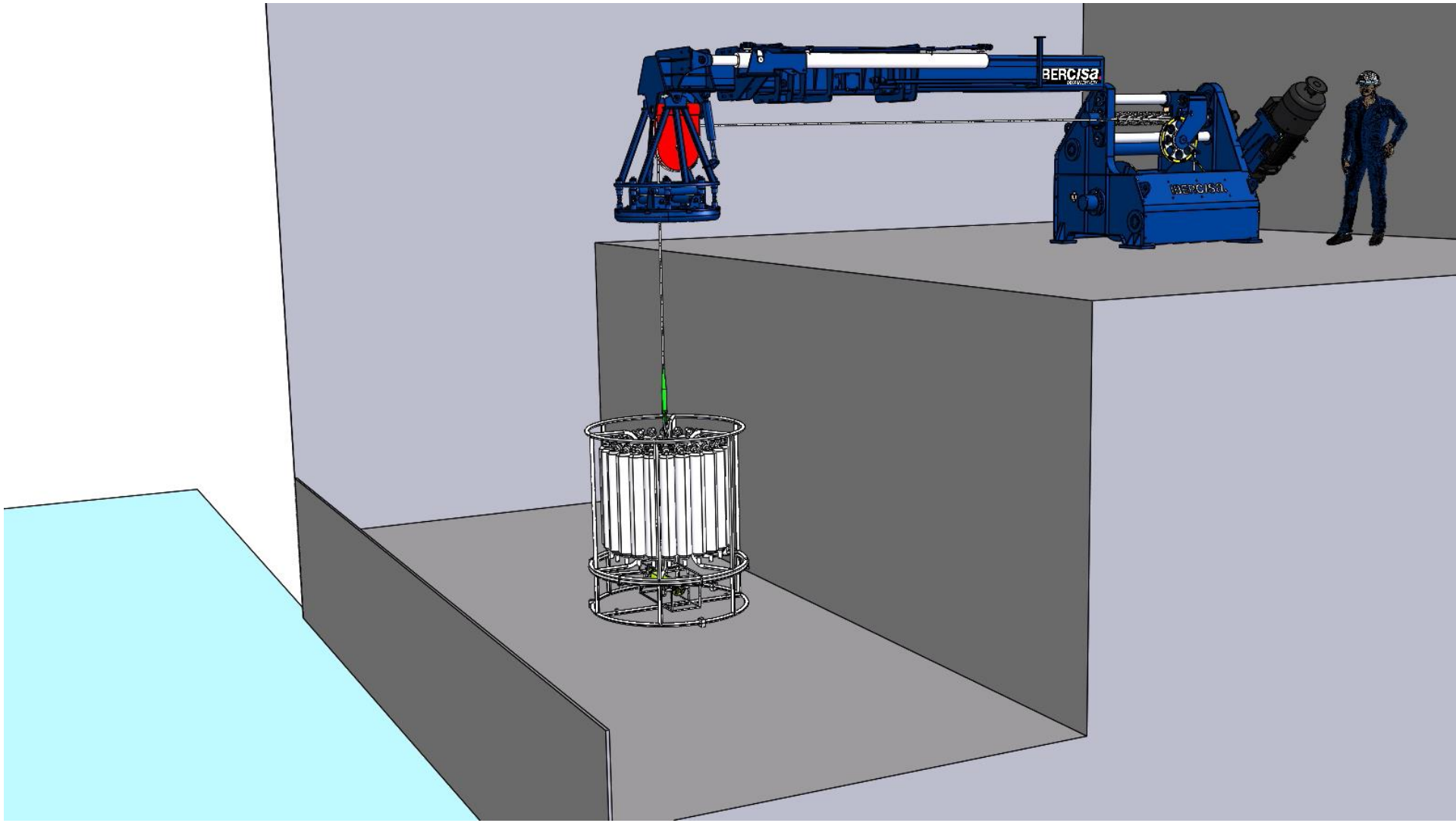
If DNVGL-ST-377 is the case:

1. Select wire. With this wire, the frame must be designed for wire MBL at top-out position. Wire will break before frame
2. Define the Dynamic SWL with payload @ sea state

If not DNVGL, follow SWL:

1. Define the Static SWL @ sea state
2. Define the Dynamic SWL with payload @ sea state

| Douglas Scale | |
|---|---|
| **Sea State** | Hsig (m) |
| **SS1low** | 0 |
| **SS1high** | 0,1 |
| **SS2low** | 0,1 |
| **SS2high** | 0,5 |
| **SS3low** | 0,5 |
| **SS3high** | 1,25 |
| **SS4low** | 1,25 |
| **SS4high** | 2,5 |
| **SS5low** | 2,5 |
| **SS5high** | 4 |
| **SS6low** | 4 |
| **SS6high** | 6 |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# Control and automation

- AHC
- Autotrawl
- Hangar mode
- Local & remote control
- Data logging and cloud transfer
- Energy regeneration & treatment
- Remote connectivity and support


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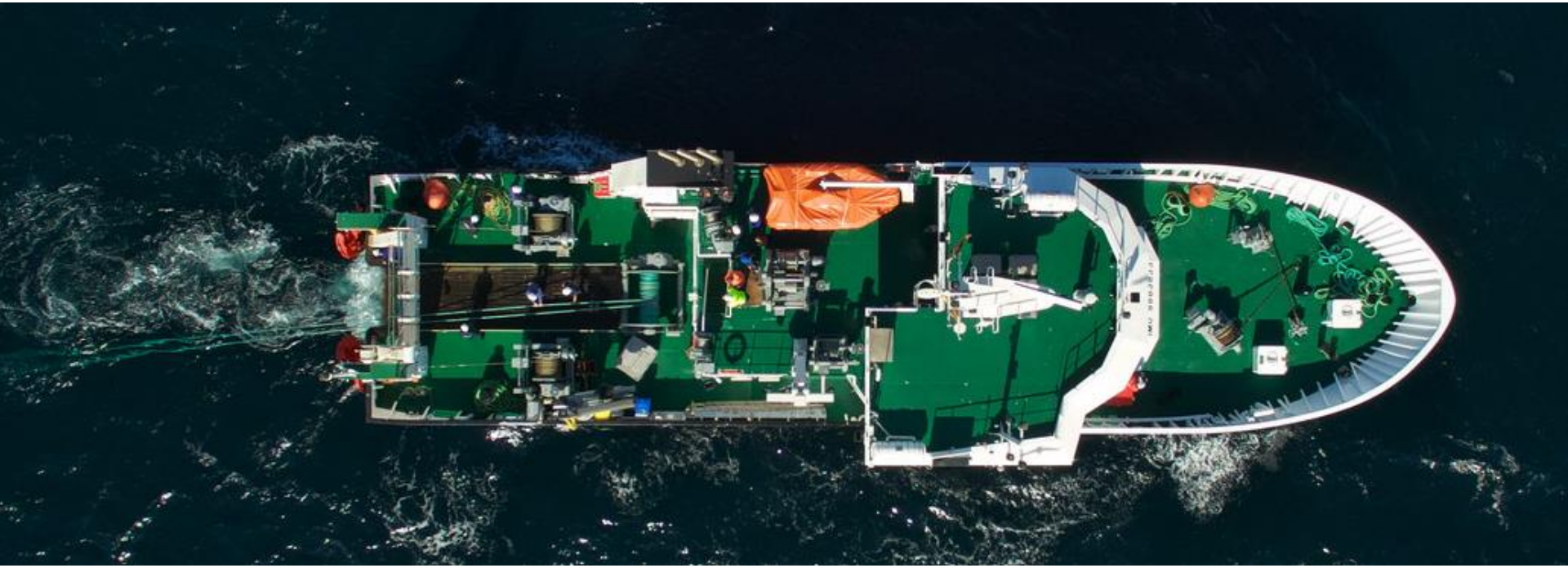
# Project realisation



# Project realisation

**Future project**

- Collaboration is key
- The winch package cannot be ‘off-the-shelf’
- Owner / operators must share all information on instruments, cables, and manner of operation as early as possible

# Project realisation

## Proposal for future projects

- Eurofleets to create library of scientific instruments

- Eurofleets to define standardised wave amplitude/period values

- Owner / operator new ideas to be shared on platform on Eurofleets

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# After sale and through-life-care

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# After sale and through-life-care

- Process doesn’t end at sale
- Owner/operator and supplier must maintain contact
- Sea trials to include specific oceanographic trials and training (5 days)
- After sale service and maintenance