Eurofleets+
An alliance of European marine research infrastructure to meet the evolving needs of the research and industrial communities
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement Nº. 824077

INMARTECH 2023. Barcelona 20th-22nd June 2023

Eurofleets + Joint Research Activities: Equipment innovations for deep sea operations from vessels (1)

By Arturo Castellón Masalles[1], Aodhan Fitzgerald[2], Niamh Flavin[2], Erica Koning[6], Lars Jørgensen[3], Elia Rodríguez[4], Francisco J. Ruppen[4], Jarle Sigurd Odegard[5], Jan Kjærstad[5]
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Within the EC **Eurofleets+** project () , Work Package 3 carries out Joint Research Activities and, among them, JRA 3.2 aims to **investigate and develop new equipment for deployment of deep-sea instrumentation and sampling.**

Rigs are fundamental elements for the study of the sea since they are essential to deploy equipment from vessels.

In **smaller** vessels, where space and loads are critical, it is important to achieve interoperability of the rigs to be able to deploy different equipment, and also to have mobile equipment that can be installed on board only when necessary.

Also, **interoperable** and **mobile** equipment could be shared and installed on different ships, offering practical, flexible, and more cost-effective solutions.

Within this JRA, three development projects have been carried out, and furthermore, reports and documents (deliverables) have been produced on some interesting topics to better understand the present and future of this technology, such as the needs for equipment deployment at depth, the use of fiber ropes, new winches, etc.

1. *Gathering information on Deep sea deployments*
2. *Design of new deep sea winch. Fiber ropes. Footprint (20')*
3. *Using on board crane for deployments*
4. *Moon-pool use for deployment and recovery of research tools*

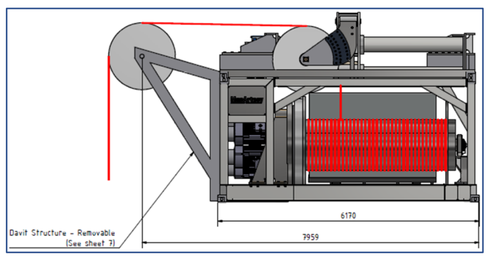
1
Overview of existing European arrays and initiatives
Current and future requirements for deep sea observatories

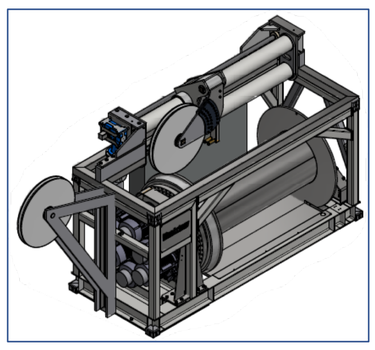
EMSO Observatories

- Technical requirements
- Vessel requirements
- Future requirements

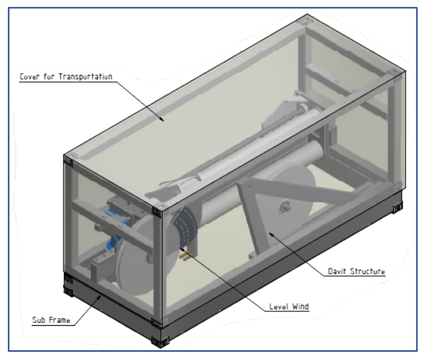
2
New deep sea winch design

This task developed an interoperable and portable deep-sea winch design for deep sea operations, using the latest fiber rope cable technology suitable for use on ocean and regional European Research vessels. (Industrial Task Leader MacArtney Denmark). The winch is based on MacArtney's more than 30 years of experience with whinches and handling equipment

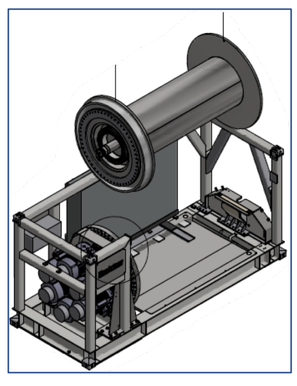




- 20' container footprint
- Welded steel structure -
- Right angle level wind for optimized deck space
- Optional davit, for stand alone applications
- Modular build
- Swappable drum
- Optional Active Heave Compensation
- Optional Constant Tension functions



Swappable drum
- Allowing for shipping in parts (lower weight)
- Allowing for more than one preconfigured drum, with rope or umbilical.
- The drum is prepared for electrical/optical slipring



Preliminary specifications:

Pull force:
- Pull at bottom (1st) Layer: 223kN
- Pull at top layer: 186kN

Speed:
- Speed at bottom (1st) Layer: 0-108m/min
- Speed at top layer: 0-126m/min

(top layer data is depending on rope/cable configuration)

Temperature range:
- Operations: -2° to +30°C
- Storage: -20° to +50°C

Preliminary specifications:

Drum size:
- Core length: 3340mm
- Core diameter: 1700mm
- Flange diameter: 2300mm

Rope/cable capacity:
- 10.500m of Ø22mm in 12 layers
- 7.500m of Ø26mm in 10 layers
- 6.100m of Ø29mm in 8 layers
- 4.150m of Ø33mm in 7 layers

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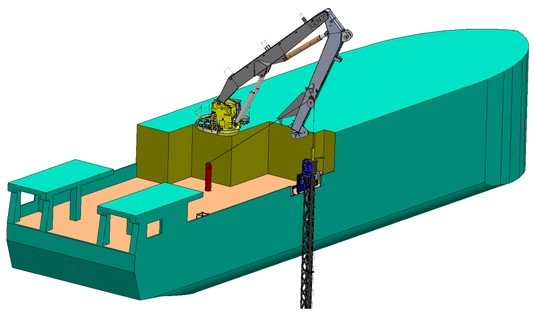
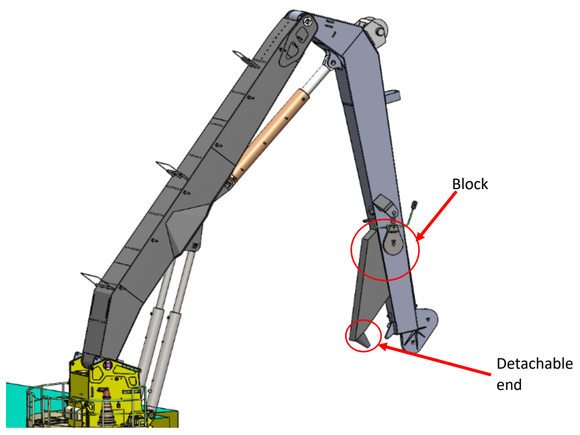
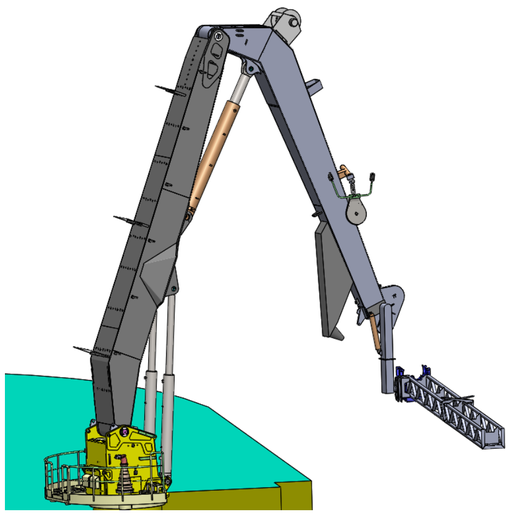
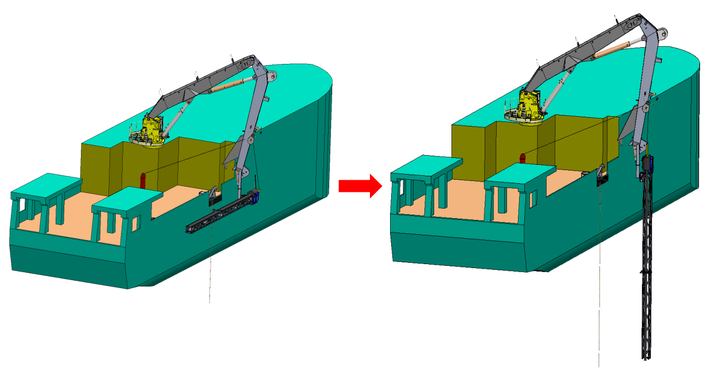
3
Multipurpose crane/handling system for deep sea operations. (CSIC, with design engineering work *Industrias Ferri SA*)

Explore the development of a multifunction knuckle-jib crane normally used for loading equipment on board to double as a system for deployment of grabs and corer. Fiber ropes.









-Crane located on the ship's centerline, with an outreach of 16m and a working load of 5T for SS4

-Turning system with a support point and a lattice

-Winch for 8000 m long fibre rope, located below deck

-Fairlead to guide the fibre rope from the winch located below deck

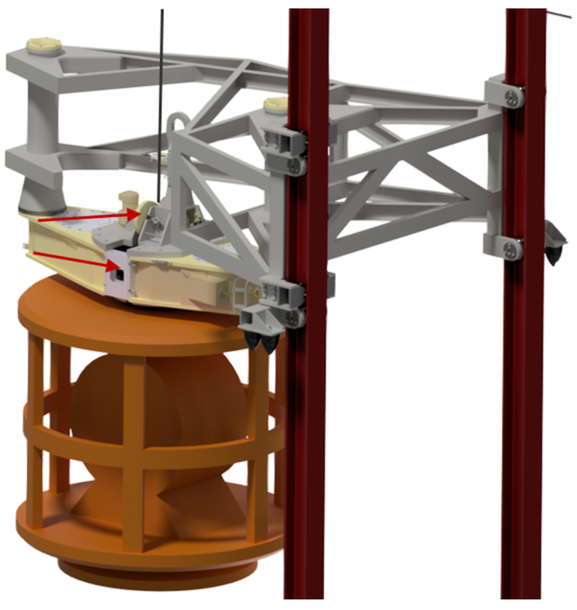
-Piston corer of 1.500 kg with core barrel sup to 15 m long

-Pull force required to remove the piston corer from the sea bottom: 4.000 kg

-Pilot weight and trigger arm

4
Moon-pool use for deployment and recovery of research tools. (Task Leader: SEAONICS).

The Dual Mode Handling System (DMHS) has been designed as a multipurpose launch and recovery system for oceanographic research tools and equipment such as (but not limited to) ROV, AUV, grabs, drop cameras and observatory components to seabed through moonpool and/or over the side.



Hangar layout

- Deck skidding system for moving the equipment from storage place to moonpool or over the side via the moonpool hatch
- Multiple pivoting sheaves to route rope and umbilical either into moonpool or over the side
- The two pictures present a typical hangar layout for a research vessel. This will be made according to the end user needs and type of equipment to be located in the hangar.

Moonpool layout

- The design of the moonpool is very important and crucial for the safety of the deployed equipment.
- A moonpool that is correctly dimensioned will have very little drag forces and swell inside, which will make the operations easier and smoother with less risk for the equipment.

- Special attention has been given to allow for launch and recovery for a wide variety of equipment while keeping setup/rigging time to a minimum. Scientific docking head on a-frame and moonpool cursors has been designed for moving equipment between A-frame and moonpool without requiring re-termination of umbilical.