



Smarter Subsea Handling

Pioneers in controllable buoyancy

Marine cleantech controllable and variable buoyancy systems for the underwater and seabed lifting and handling of offshore energies and defence infrastructure

LIFTING AND HANDLING SOLUTIONS FOR PIPELINE BUNDLES AND CABLING

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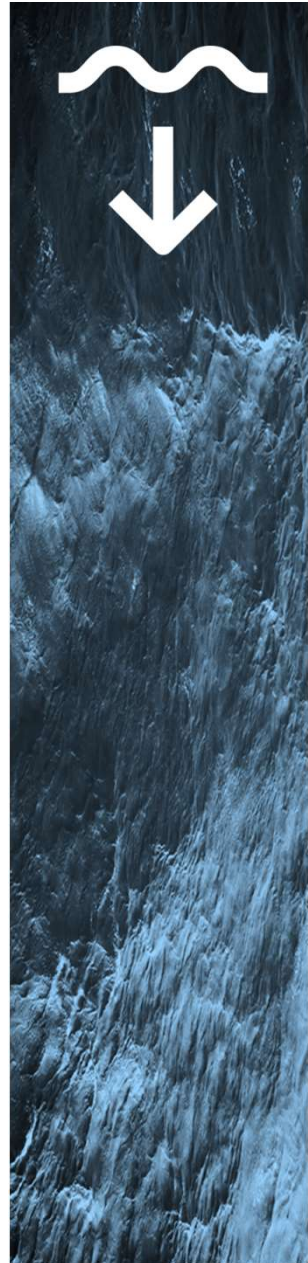
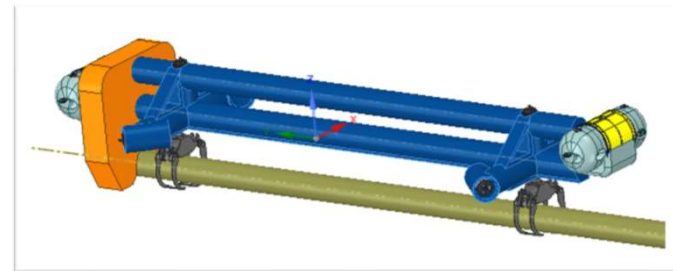
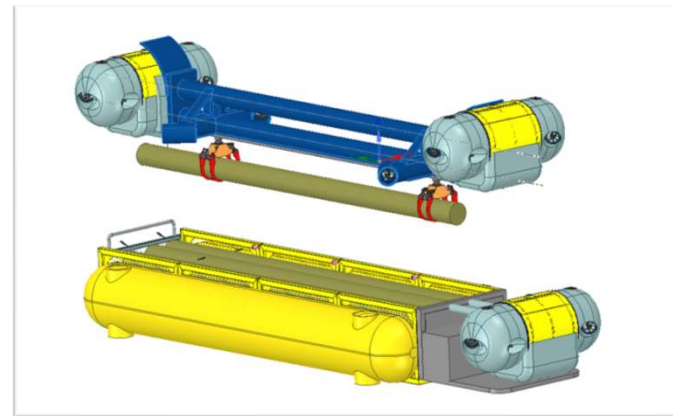


ROVAR Products for pipeline bundles and cabling – Buoyancy Beam (BB)

Smarter Subsea Handling has developed new products in response to market demand using its ROVAR variable and controllable buoyancy system as the kernel of all products.

In the context of specific requirements from the oil gas sector and the industry regulator (OPRED), and also offshore wind project developers, we have developed two specific products to aid with the removal of oil & gas pipeline bundles and the handling of cabling for offshore wind construction and IRM.

- **ROVAR-BB** (Buoyancy Beam) has been designed to handle and spread the load of long structures such as cables, pipeline bundles, umbilicals and tubulars within the subsea operations of all offshore energies sectors.
- **ROVAR-BB** can be deployed independently from a conventional multi-use vessel as part of its backdeck equipment.
- **ROVAR-BB** can be used for the handling of cables, umbilicals and pipelines and for holding 'in-situ'. This facilitates both IRM and repositioning.
- Cabling, umbilicals and pipelines can also be lifted to surface by **ROVAR-BB** for recovery to submersible barge or to vessel back-deck crane.
- **ROVAR-BB** can also recover sections of cabling, pipelines and umbilicals where damaged or needing removal. A cutting tool can be incorporated into ROVAR-BB for cutting pipelines, bundles and other tubular sections.
- In aiding operations, **ROVAR-BB** works in tandem with our buoyant wet basket product, **ROVAR-WB**, in essence operating as a marine "truck and trailer".

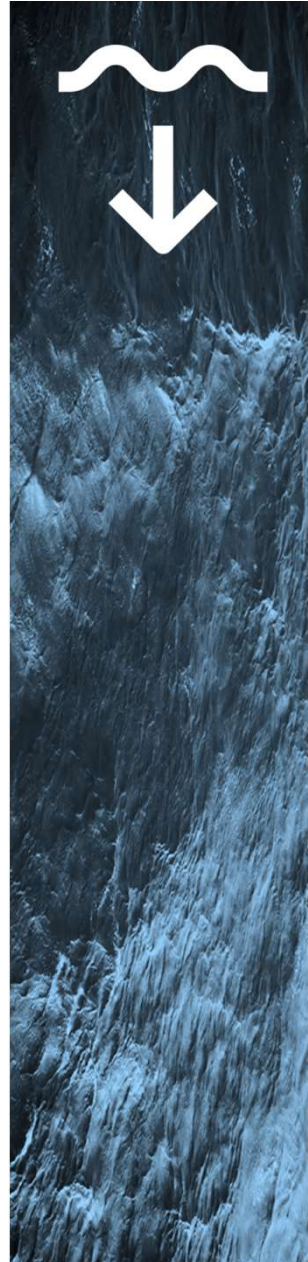
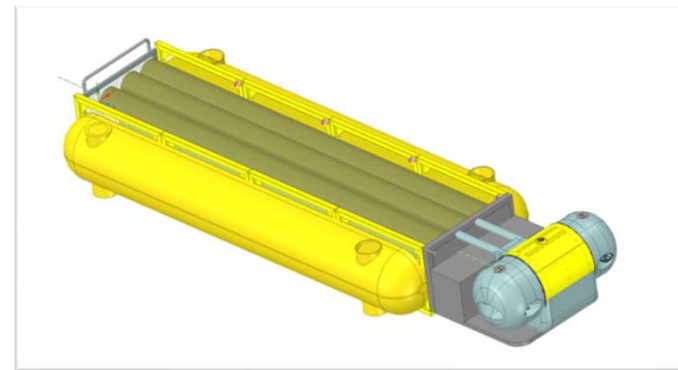
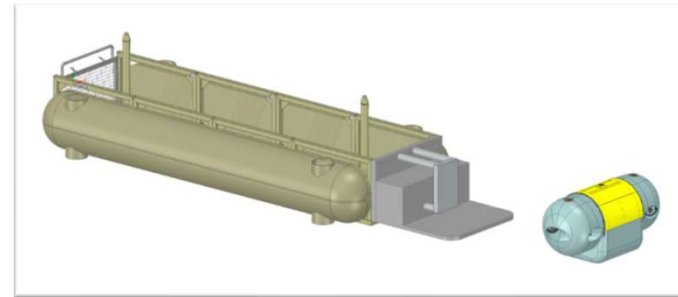


ROVAR Products for pipeline bundles and cabling – Wet Basket (WB)

Smarter Subsea Handling has developed new products in response to market demand using its ROVAR variable and controllable buoyancy system as the kernel of all products.

In the context of specific requirements from the oil gas sector and the industry regulator (OPRED), and also offshore wind project developers, we have developed two specific products to aid with the removal of oil & gas pipeline bundles and the handling of cabling for offshore wind construction and IRM.

- The **ROVAR-WB** or buoyant Wet Basket is an adapted subsea basket with integral buoyancy caissons designed to provide it with the means of independent and controllable lift without the need to use a subsea winch and crane.
- **ROVAR-WB** can be designed to any practical length and weight bearing capacity to suit operational requirements.
- **ROVAR-WB** can be deployed as “seabed trailers” and then moved to the required seabed position by a ROVAR master unit “seabed truck”.
- **ROVAR-WB** is the best solution in multiple scenarios where wet lay-down is needed, or preferred, to both simplify and reduce the costs of subsea operations.
- The seabed “truck and trailer” is ideal for hub and spoke seabed operations where infrastructure needs to be deployed in a “pick and place” mode, or where infrastructure needs to be recovered in a “hunt and gather” approach.
- The ROVAR master unit at either, or both ends, of the seabed “trailer” acts as a “subsea truck” in both shunt or tow modes for **ROVAR-WB**.



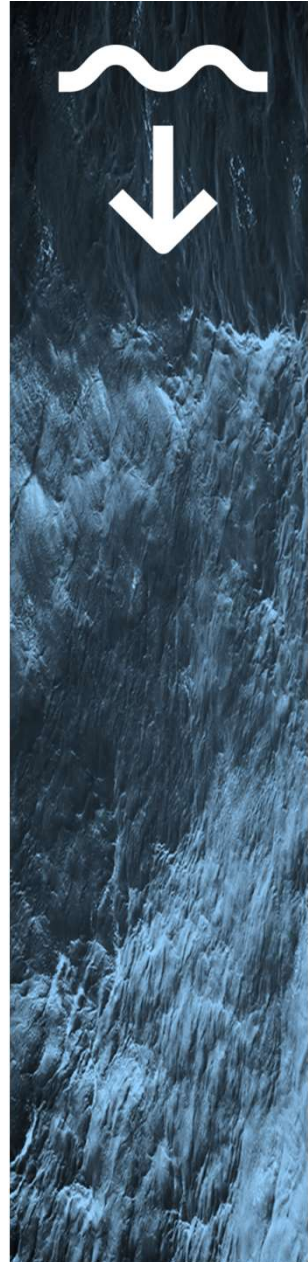
Application for Recovery of Pipeline Bundles

Background and Opportunity

- As of 2022, there are around 87 pipeline bundles, with a total length of 315km in UK waters. The longest bundle is 7.7km in length and the largest bundle is 1.5m diameter, with 80% of bundles less than 1m diameter.
- OPRED (Offshore Petroleum Regulator for Environment and Decommissioning) requires operators to submit decommissioning plans for all pipeline bundles in the UK North Sea.
- OPRED has mandated that the abandonment of seabed surface pipeline bundles “in-situ” shall not be approved, and a “clear-seabed” policy is now required.

Removal Solutions

- Pipeline bundles were manufactured at coastal sites and towed by construction support vessels to their oil & gas destination, thereafter flooded to the seabed.
- The reverse of the install method is not possible as the outer shells of most bundles have integrity issues, and reverse reel on-to pipelay vessels would result in uncontrolled sectioning of the bundles.
- The options available to the industry are to trench, or to cut and recycle to surface.
- Smarter Subsea Handling has developed two solutions for removal. Cutting into c.20m lengths and placing into buoyancy wet baskets for transfer to barge or cutting into lengths of c.100m for chained tug tow to coastal recycle ports.



Application for Dynamic Handling of Offshore Wind Mooring Lines and Cabling

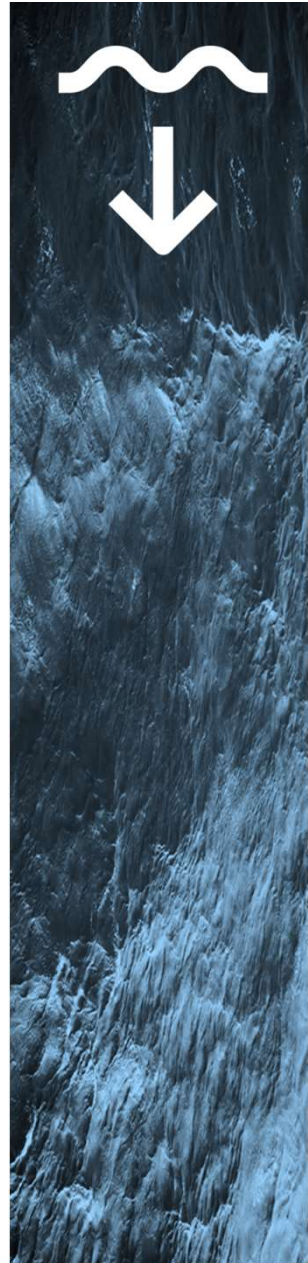
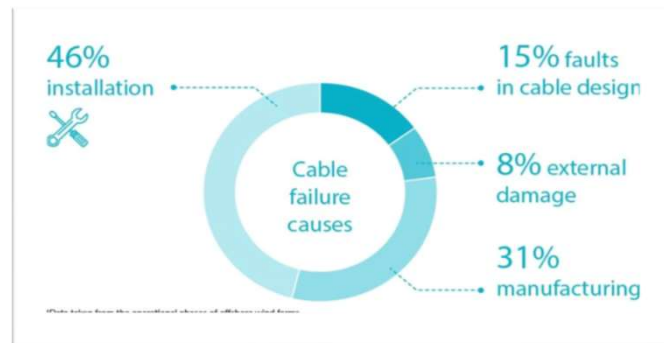
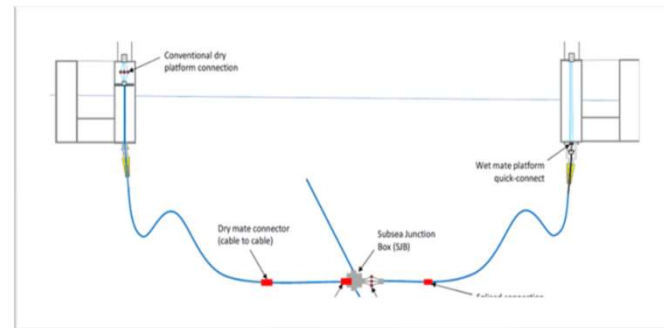
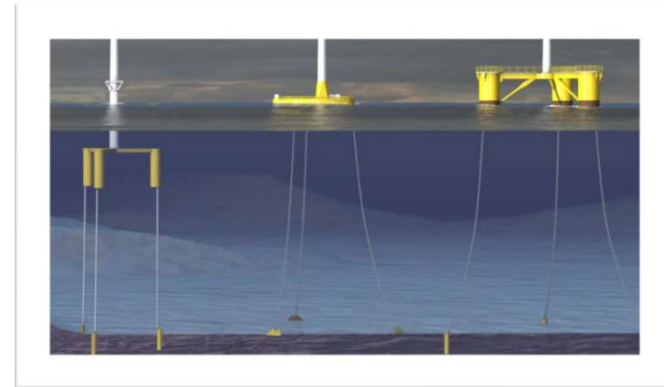
Background and Opportunity

- In 2023, 6000km of cables connect UK offshore wind turbines to the grid and this is growing every year.
- Subsea cables contribute 10% of offshore wind cost but account for 80% of insurance claims by the industry due to offshore logistics and weather.
- Average cost of single cable failure is 12 million GBP, with marine spread time of one month for inter-turbine repair and two months for repair of grid cables.
- Industry needs to reduce the capex and opex of handling, as well as reduce CO2 emissions, reduce marine spread complexity and reduce seabed damage.

Dynamic Handling Solutions

- The ROVAR Buoyancy Beam product expands the lifting and handling capability of smaller and generic vessels, thus facilitating reduced marine costs, simplicity of mobilisation, and continued operation during adverse weather.
- ROVAR enables offshore wind developers to wet laydown mooring lines and cabling in advance of turbine float out, with ROVAR then deployed to dynamically position lines and cabling to final location with a reduced marine spread, reduced complexity, and the ability to operate at several turbines in parallel.
- Major reductions in installation costs are achieved by project developers, as well as faster mobilisations for lines and cabling repairs for the wind operators.

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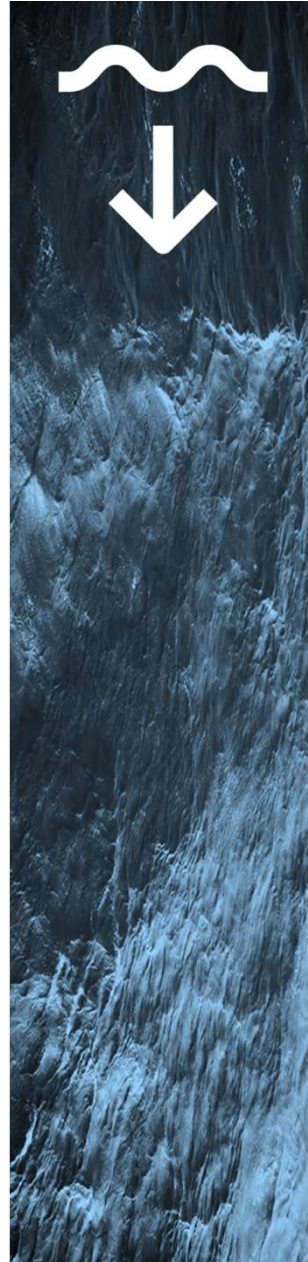
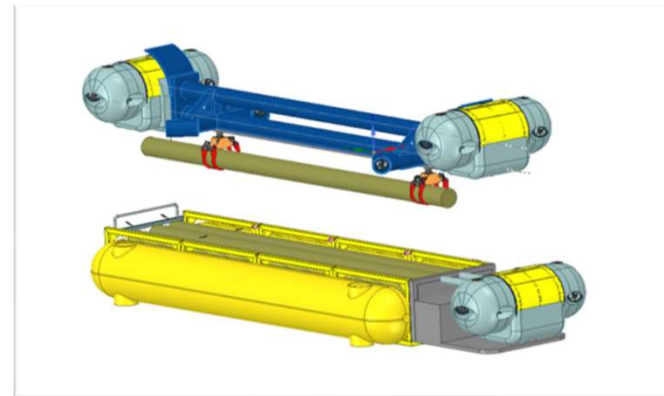
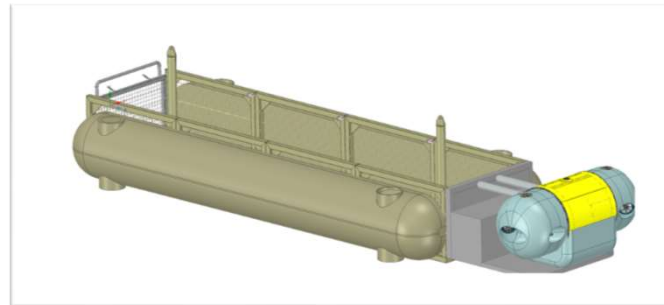
Use Example 1/2: ROVAR Recovery of Pipeline Bundles to Barge and to Land

Wet Basket and Cutting Solution

- The Wet Basket and Cutting Solution has ROVAR in two complementary configurations, with one **ROVAR-BB** unit operating as a cutting and handling beam for c.20m pipeline sections, and a **ROVAR-WB** unit operating as a controllable buoyancy wet basket.
- The operating sequence would be for **ROVAR-BB** to segment c.20m sections and handle them into the **ROVAR-WB** baskets, which would then be floated to the surface for transfer to a submersible barge and subsequent tug tow to land.

Chained Tow and Cutting Solution

- The Chained Tow solution sections longer bundle lengths for tug tow to the coastal recycle yards and, therefore, would not use **ROVAR-WBs** or submersible barges.
- This solution uses a **ROVAR-BB** cutting unit and several **ROVAR-BB** lifting units to section a c.100m length of pipeline bundle, stop or crimp the ends of the pipeline sections and then lift to the splashzone. A **ROVAR-BB** cutting unit remains onsite to continue sectioning whilst **ROVAR-BB** lifting units recover sections to surface.
- Once at the splashzone, conventional modular fixed buoyancy units would be fitted to each section which would then be chain-linked as multiple sections for tug tow to coastal recycle yards.
- On arrival at the yards, the chained sections would be lifted by quayside crane for processing and recycling.

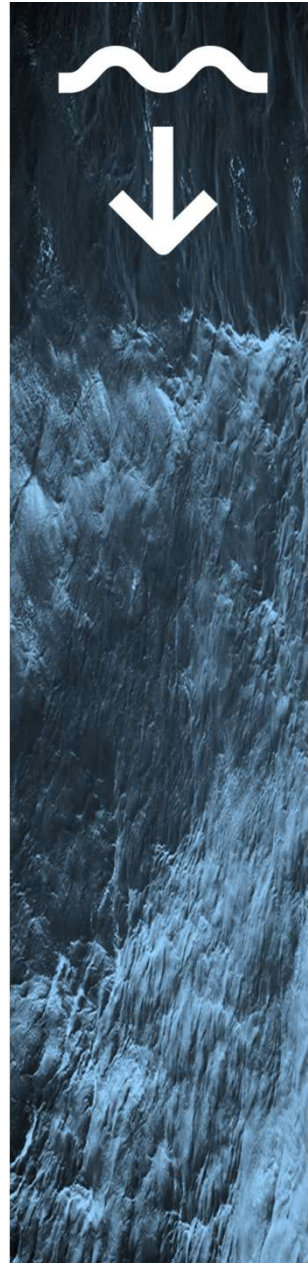
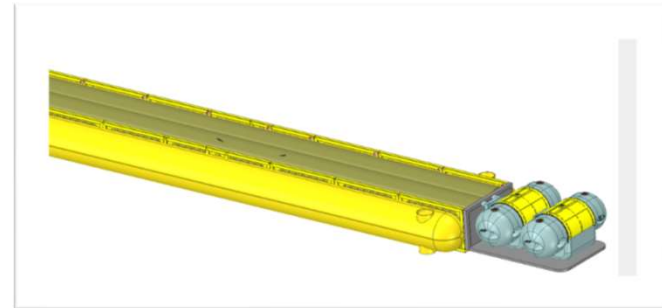
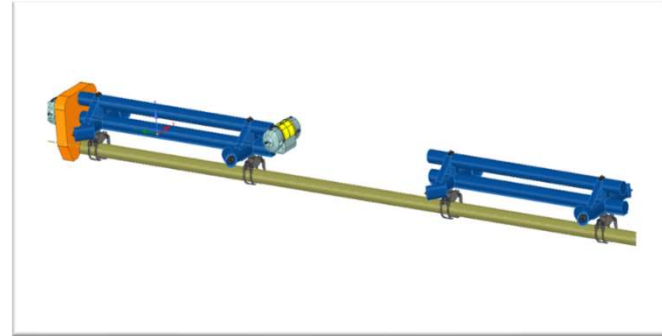


Use Example 2/2: Pipeline Bundles Recovery, Single and Multiple Bundles

Opportunity Value

- **Feasibility:** ROVAR solutions deliver a “clear-seabed” option for pipeline bundles.
- **Flexibility:** ROVAR operates in multiple modes as underwater crane, seabed forklift, subsea “truck and trailer”, and sub-splashzone towing.
- **Cost Effective:** ROVAR recovery solutions for bundles are designed as systems to be deployed across multiple bundle projects reducing cost per use.
- **Reduced Emissions:** No large crane capacity is required meaning smaller vessels deployed, reduced marine costs, reduced lifting risks and lower carbon emissions.
- **Repeatability:** The Wet Basket mode enables cutting to be repetitively performed onsite without large vessel spreads, for eventual single-lift by a dedicated barge.
- **Direct Tow Option:** The Chained Tow solution enables longer sections of bundle to be tug-towed direct to coastal yards for recycle.
- **UK Supply Chain:** Ability to carry out cleaning and recycling at UK ports and harbours using smaller, fit-for-purpose, lower-cost vessels.
- **Standardised:** Integrates industry standard subsea lift and cut tooling including diamond wire saw, abrasive water-jet cutting, shear cutter and gated shear cutter.
- **Amortised Costs:** Assuming a single bundle of 6km, the c.20m Wet Basket option requires 300 sections, and the 100m Tow Option requires 60. The cost for the Wet Basket option is c.GBP2300 per metre, and for the Tow option is c.GBP2000 per metre. Multiple bundles would reduce these costs to c.GBP1000 per metre and c.GBP800 per metre respectively for a 20km removal programme, for instance.

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