



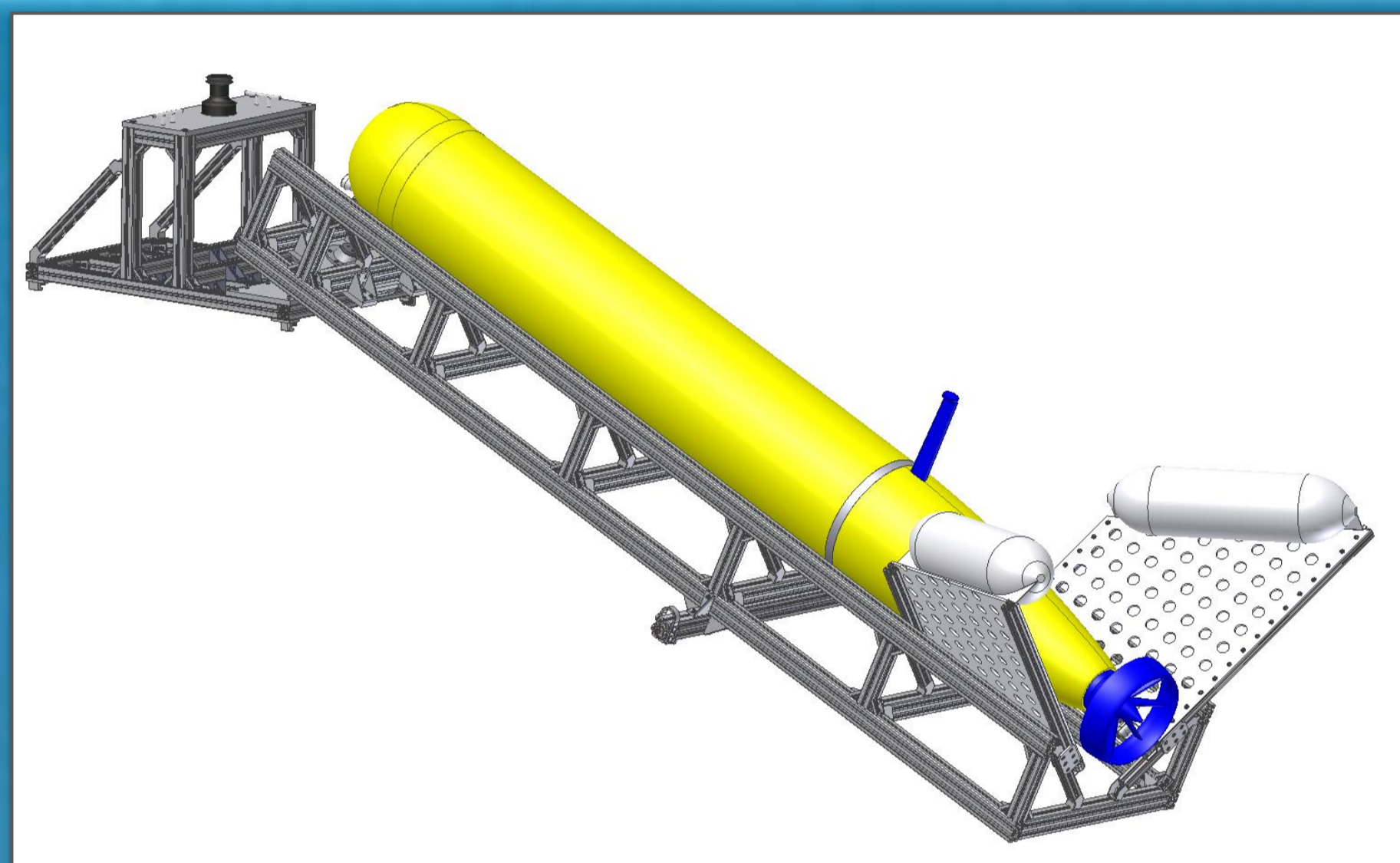
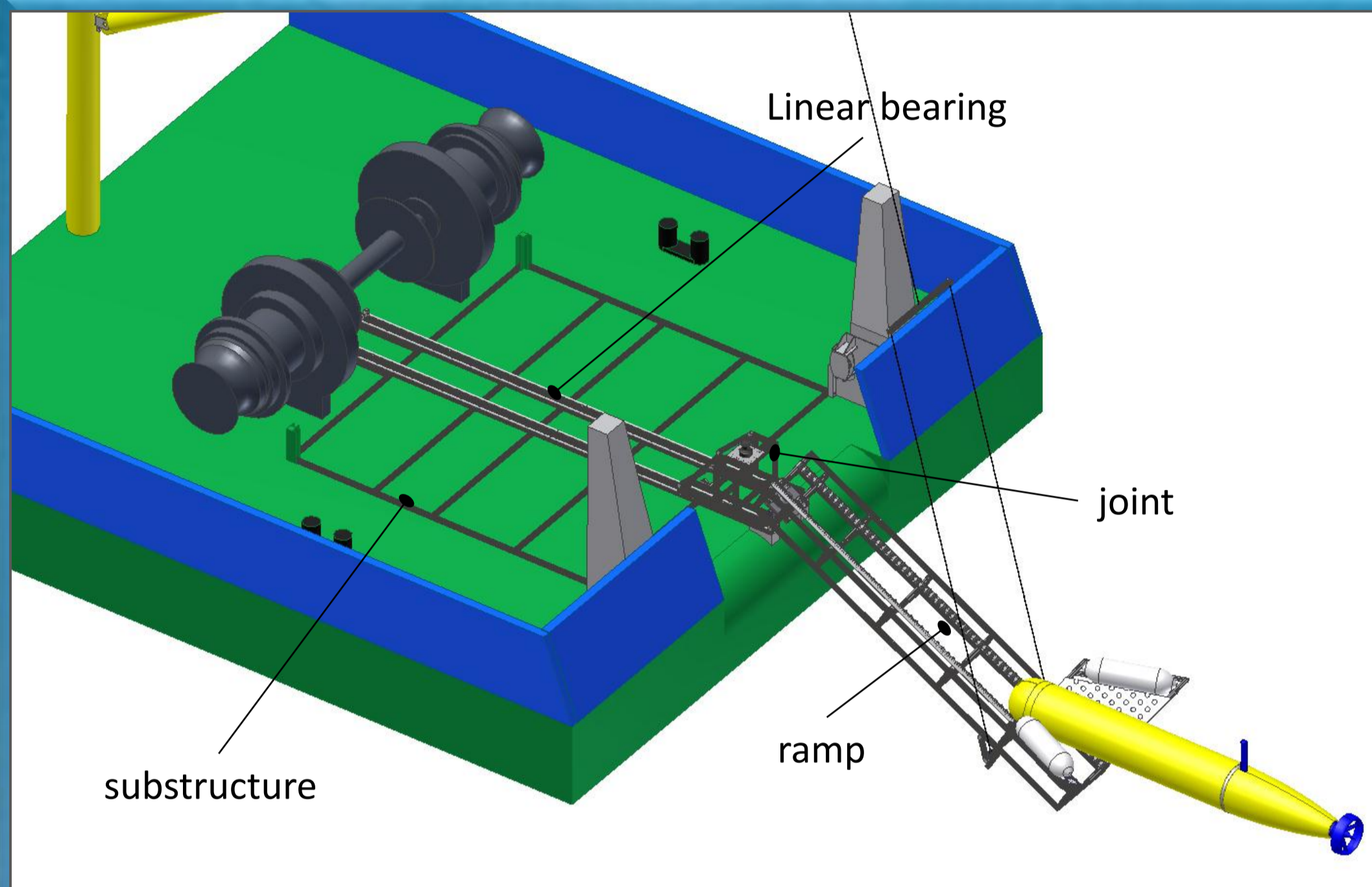
HGF Alliance ROBEX Robotic Exploration of Extreme Environments



Design of a Launch and Recovery System for an AUV, developed for the research vessel FK Uthörn

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Launch & Recovery

In order to minimize unpredictable movements, ship will turn bow towards prevailing wave direction and will keep slow forward movement.

Launch

- Extending the ramp and lowering it into the water.
- Smoothly slip the vehicle into the water and release the line.

Recovery

- Catch the nose line and pull the vehicle up the ramp.
- Lifting up the ramp and fix it in transport configuration.

Material

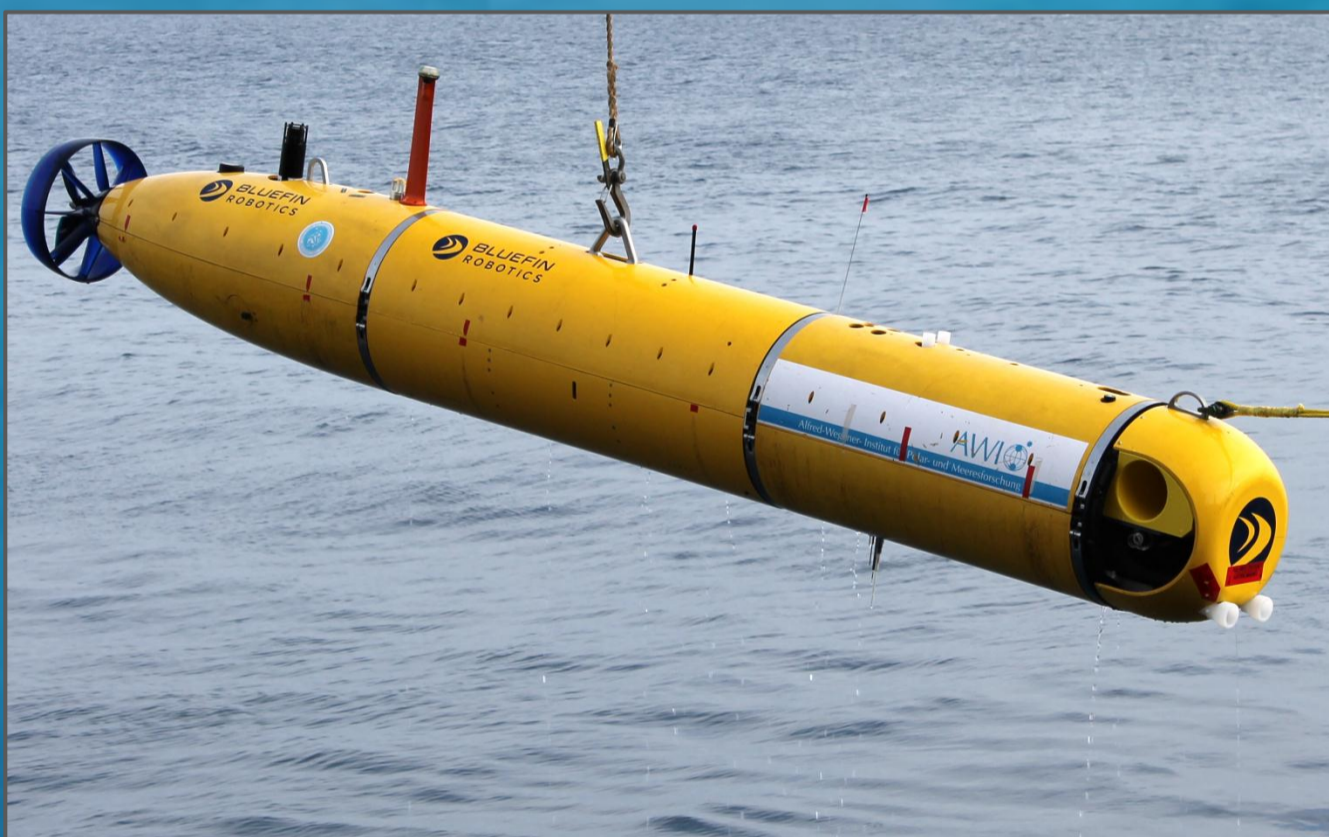
The ABS intended to be a simple, efficient and cost-effective construction, which can be used in the marine environment (risk of corrosion). The main materials used are:

- Bosch Rexroth Aluminum Framing – basic structure
- Igus DryLin@ W – linear bearing
- Stainless steel – joint and high loaded elements

Design

- The Launch and Recovery System (ABS = German: Aussetz- und Bergesystem) is attached to the working deck by a substructure.
- On the substructure the rails of the linear bearing are installed.
- The slide with the joint connects the deck equipment with the ramp.
- The ramp is equipped with wheels to launch and recover the AUV.
- For an easier recovery of the vehicle there is a guiding plates at the end of the ramp. When deployed, the ramp floats on the water and thus performs the same, wave driven motion as the AUV.

Vehicle

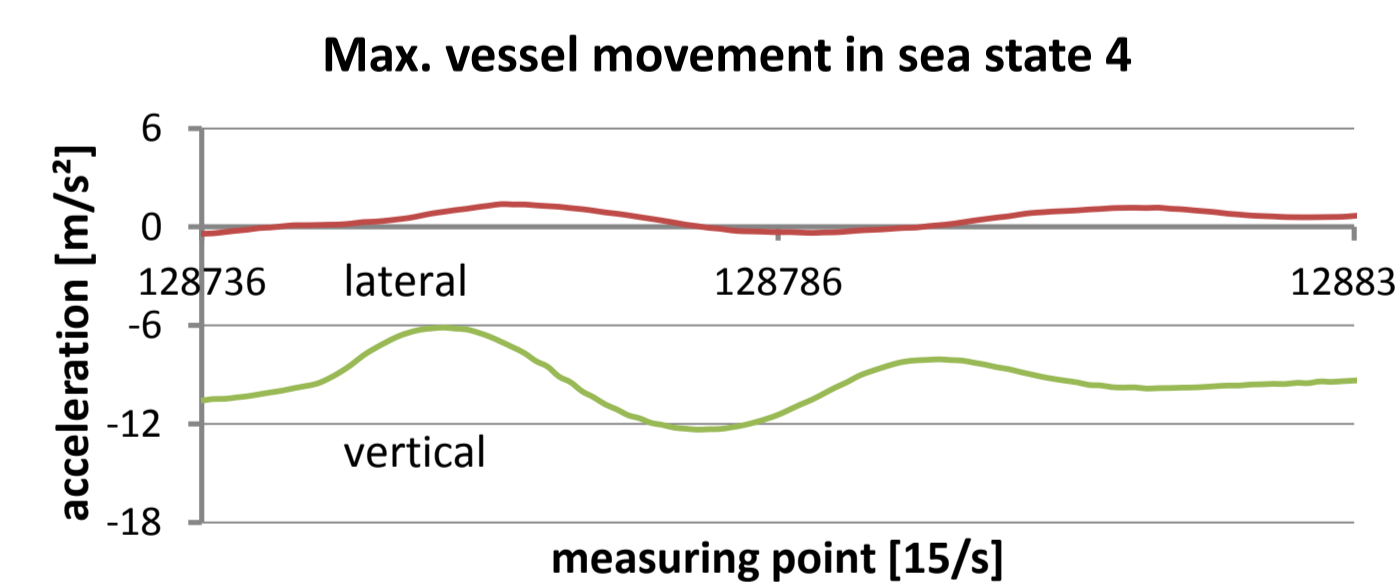


Autonomous Underwater Vehicle (AUV)

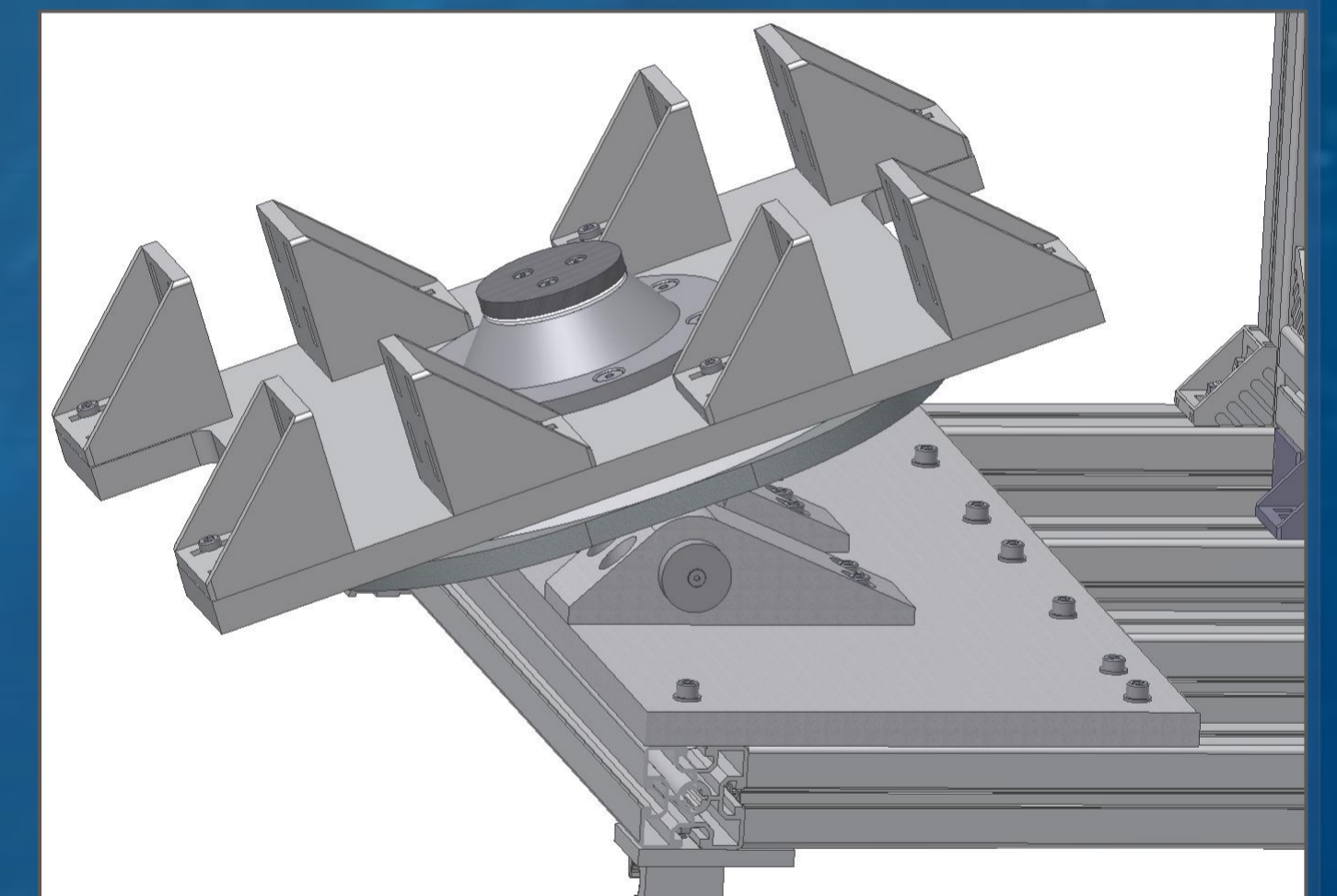
- Bluefin-21 "Paul".
- Vehicle details:
 - Diameter: 53 cm (21")
 - Length: 430 cm
 - Weight(Dry): 450 kg
- Modular structure (4 modules).
- Vehicle's interior is entirely flooded.
- Residual buoyancy is app. 40 N.
- The vehicle can be pulled up on the central Lift-Point (vertical) and on the front Lift-Point (max. 45°).

The Joint

- Connecting joint between slide and ramp has two degrees of freedom (DOF):
 - Hinge joint
 - Pivot joint
- Two DOFs are necessary due to the complex vessel movement.



Interface



Platform



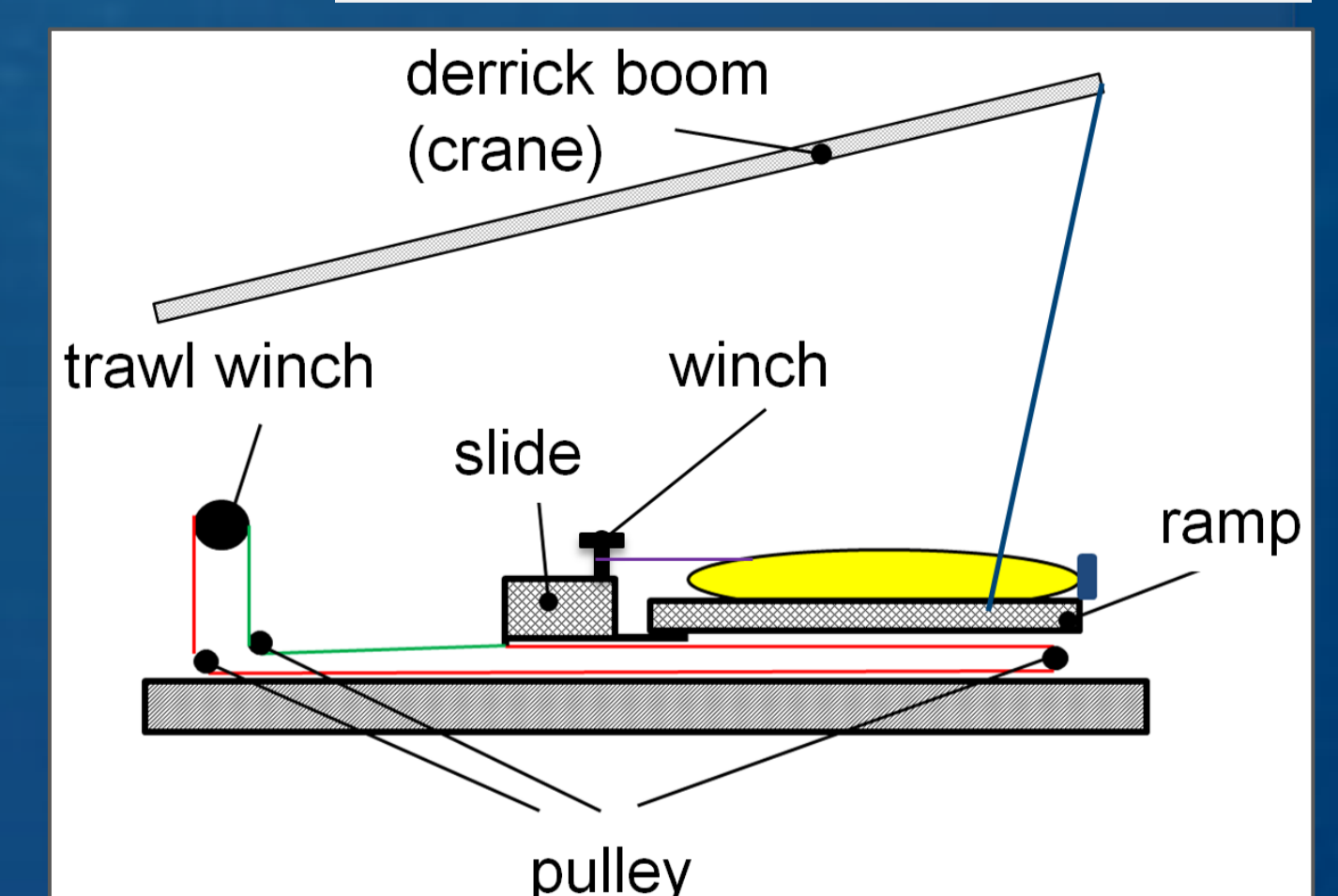
FK Uthörn

- Small research vessel Uthörn, built in 1982
- The area of operations is the German Bight.
- Vessel details:
 - Length: 30 m
 - Beam: 8,3 m
 - Draught: 2,5 m
 - Speed: 10 kn
- The vessel is equipped with a derrick boom and a trawl winch.
- Safe work on deck up to sea state 4.

Mechanical Motion

- Ship equipment such as derrick boom and trawl winch are sufficient to enable ABS operations.
- The movement of the slide is controlled by the trawl winch, which is connected with the slide by ropes.
- The ramp can be moved up and down by the derrick.
- For launch and recovery operations, trawl winch and derrick have to work simultaneously.
- To pull the AUV out of the water, a winch mounted on the slide is used.

Operating Mode



For further information please visit our Web-Site: <http://www.awi-bremerhaven.de/Research/ProjectGroups/DeepSea/index.html> or contact: Jonas.Hagemann@awi.de, Phone: +49 471 4831-2045