

Pressure-Tolerant Test Vessel for 6 000 m Deep-Sea Applications

Project Goal

Development of concepts for pressure-tolerant electronic and mechatronic systems in deep-sea environments

Project duration: July 2006 - December 2009

Approach

- Novel design approach of a pressure-tolerant autonomous unmanned under-water vehicle (UUV)
- Evaluation of pressure-tolerant electronic and mechatronic components
- Evaluation of castings for electronic components
- Design, pressure tests and long-term sea water tests of pressure-tolerant assemblies

Conclusion

- Pressure-tolerant assemblies can go down to almost any diving depth
- Pressure-tolerant UUV's exhibit significant advantages like lightweight design and immensely reduced costs
- Flexible overall vehicle design with adaptable payload section serves for different tasks

Technical Data

- Diameter 55 cm
- Length 3.1 m
- Depth rating 6 000 m
- Survey Speed 4 kn
- Maximum Speed 8 kn
- Dry Weight 300 kg
- Power Supply 5.2 kWh Li-Po-Battery
- Payload 600 cm (variable length)

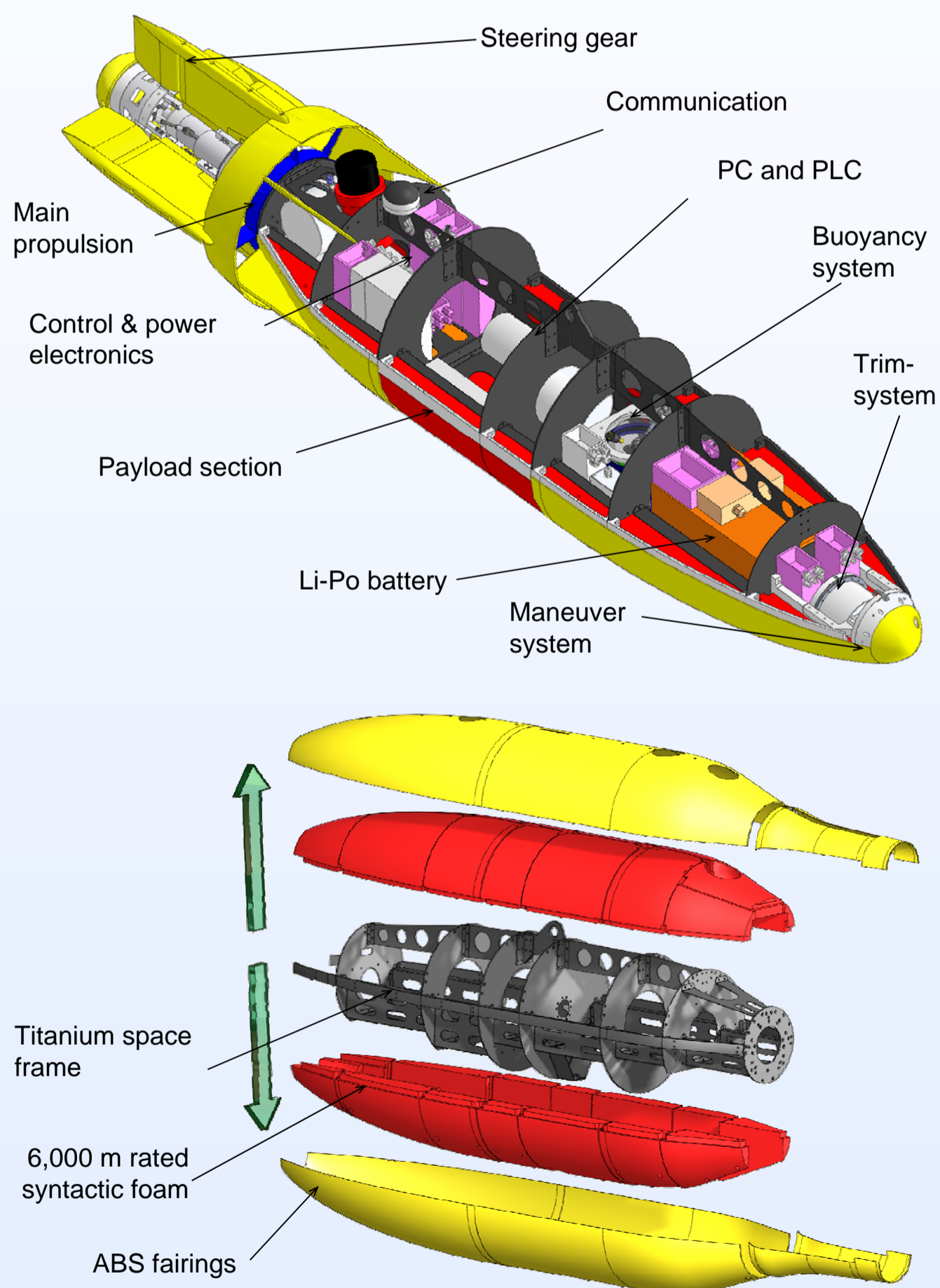


Applications

- Ocean exploration and surveying
- Sea floor mapping
- Inspection of pipeline and cable routes
- Explorations for oil and gas industry
- Data collection as profiler

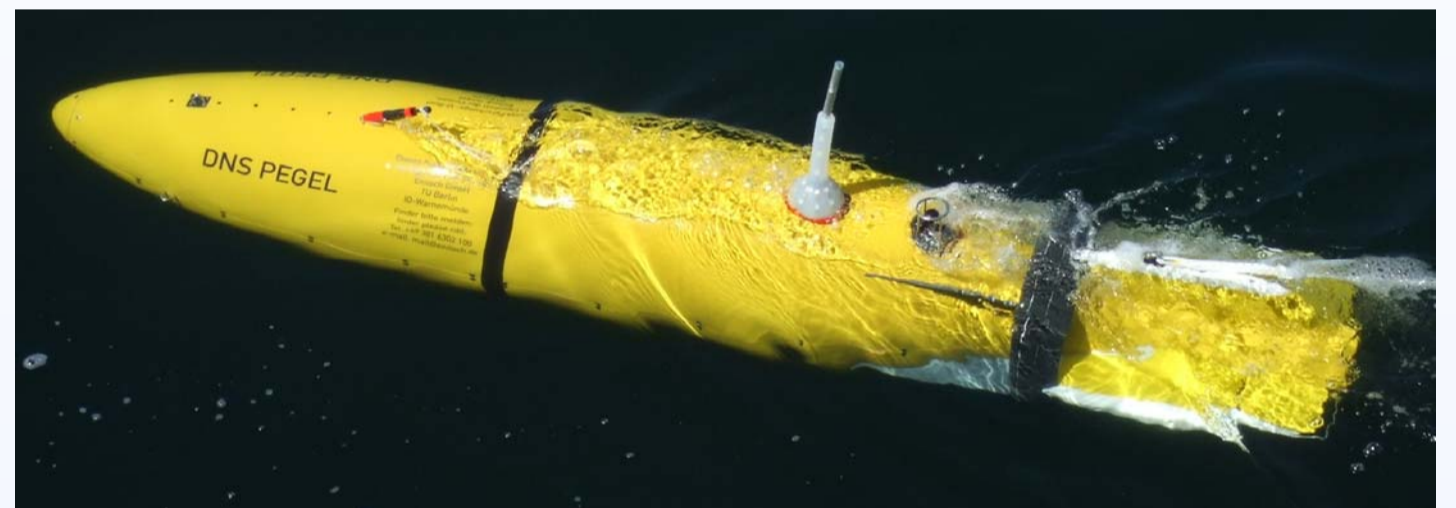


Design Configuration: DNS Pegel



Sea Trials

The UUV was tested in various areas and depths of the Baltic Sea



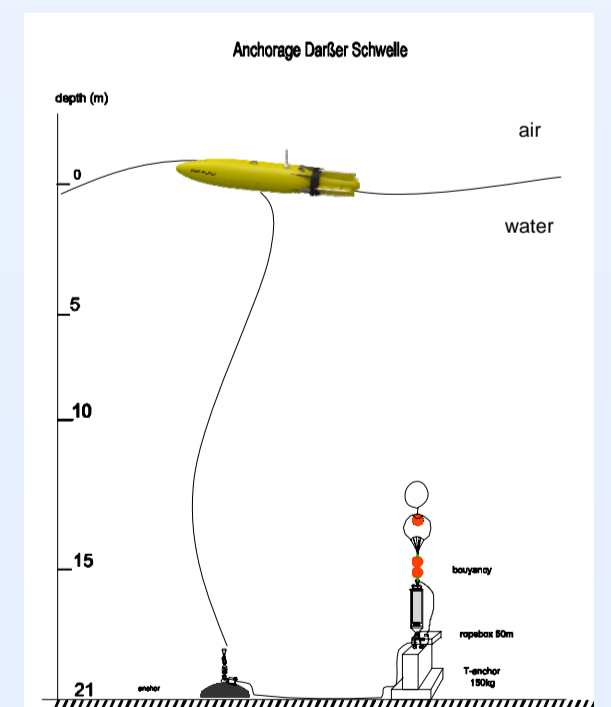
Long Term Tests

- Anchored at Darßer Schwellen for 2 months
- Profiler configuration
- Pressure tolerant winch integrated
- No degradation of castings
- Battery intact
- Slight indication of crevice corrosion



Open Water Dive Tests

- Controller regulated depth and course trips
- PLC preprogrammed dive cruises
- The vehicle position was tracked by a USBL system
- Communication via acoustic modem



Examples of Pressure-Tolerant Components - all subsystems are successfully tested at a pressure of 600 bar

Pressure tolerant Li-polymer battery

Battery management system, casted electronic circuit boards



encapsulated pressure-tolerant rudder positioning sensor (magneto resistant angle sensor)



Brushless DC pressure-tolerant motor integrated in transmission for rudder system



Pressure tolerant casted antenna rod, the base is used as ODAS-identifier-flash-light made of yellow high power LEDs

