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

Project Goal

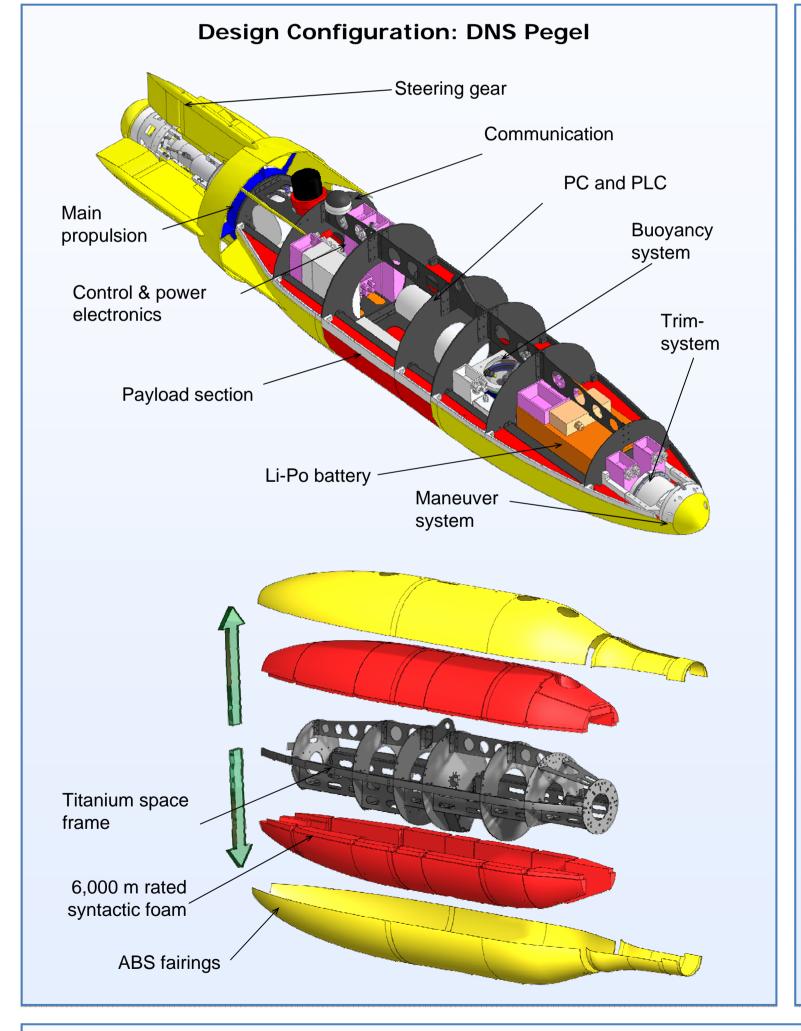
Development of concepts for pressure-tolerant electronic and mechatronic systems in deep-sea environments Project duration: July 2006 - December 2009

Approach

- Novel design approach of a pressure-tolerant autonomous unmanned underwater 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
- Depth rating 6 000 m
- Survey Speed
- Maximum Speed 8 kn
- Dry Weight
- Power Supply 5.2 kWh Li-Po-Battery

300 kg

3.1 m

4 kn

600 cm (variable length)

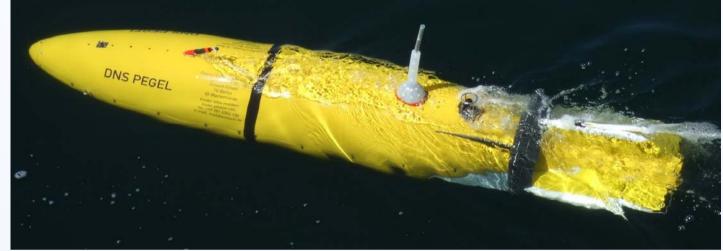
Applications

Payload

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

Sea Trials

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





Long Term Tests

- Anchored at Darßer Schwelle for 2 months
- Profiler configuration
- Pressure tolerant winch integrated
- No degradation of castings

Open Water Dive Tests

• PLC preprogrammed dive cruises

The vehicle position was tracked

Communication via acoustic

by a USBL system

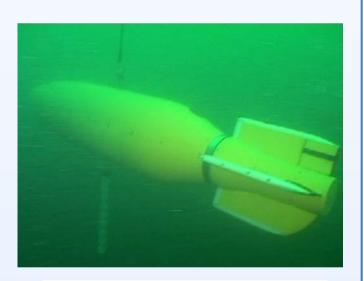
Battery intact

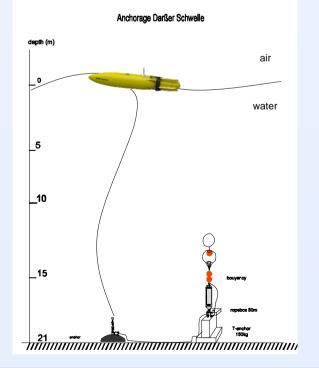
trips

modem

Slight indication of crevice corrosion

• Controller regulated depth and course





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

Pressure tolerant Lipolymer 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-identifierflash-light made of yellow high power LEDs



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