

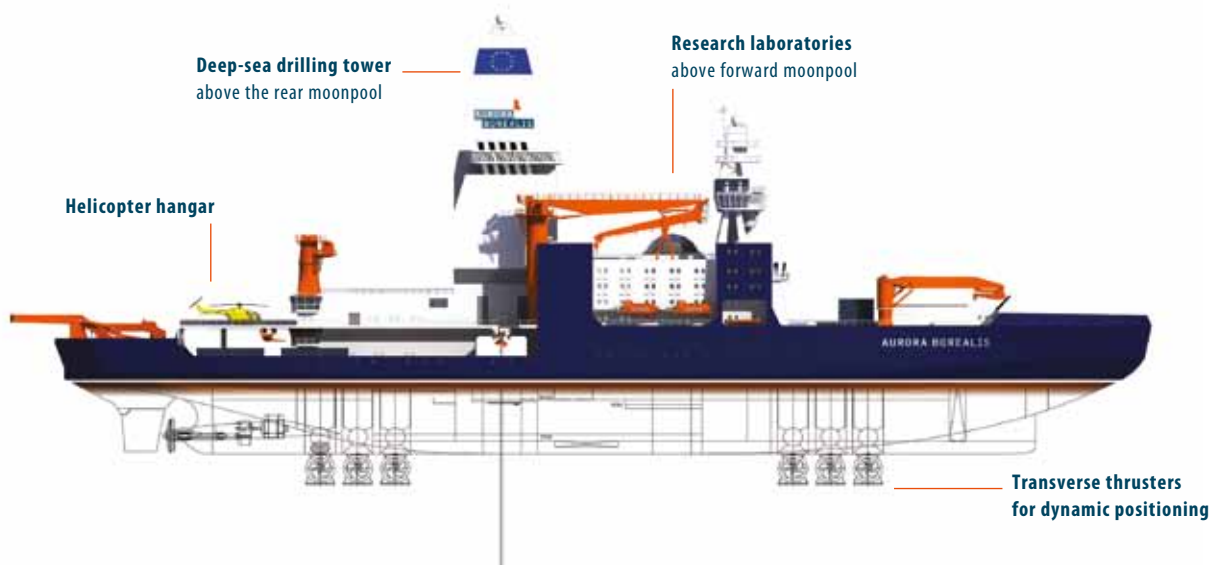
# TECHNOLOGY AND INNOVATIONS



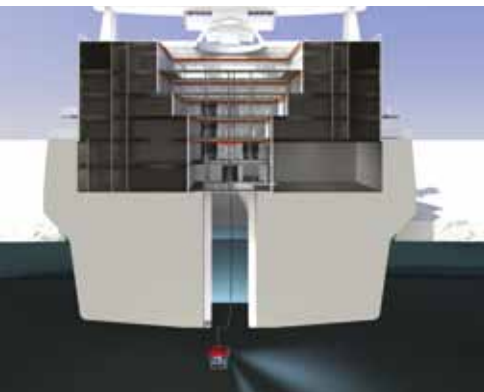
## FUTURE POLAR RESEARCH

Based on well-established preceding ships, the research icebreaker AURORA BOREALIS will be the most advanced Polar and marine research vessel worldwide. For example, the ship will include transverse thrusters for dynamic positioning in closed sea-ice cover. This secures successful operation during all seasons of the polar year and summer deep-sea

drilling. Also, marine researchers can deploy remotely operated vehicles (ROV) and autonomous underwater vehicles (AUV) from the one of the two moonpools. Why all these efforts? Extensive, thorough polar research aims to provide sound data for societal decision processes in stakeholder countries.



View of the AURORA BOREALIS model



Marine researchers would flexibly equip the ship with lab and supply containers, can rely on support of multiple helicopters, advanced ice-forecasting, free deck space, separate weather-sheltered deck areas, winches, cranes, etc. Above: cross section shows moonpool with deployed underwater vehicle. Below: inside of drilling tower.

## FOR EXAMPLE, SINGLE-SHIP RESEARCH EXPEDITIONS TO THE CENTRAL ARCTIC OCEAN

As the projected research vessel is designed for polar all-year single-ship operations, it will meet the specifications of the highest ice-class for polar icebreakers (turn page for technical details). Thus, during all seasons of the year, it will go autonomously even into the central Arctic Ocean covered with 2.5 meters of ice.

The literally outstanding feature of the vessel is the deep-sea drilling rig that enables sampling of the ocean floor: in more than 5000 m water depth and 1000 m penetration at the most inhospitable places on Earth. In the long run, AURORA BOREALIS could be used for sampling in both Arctic and Antarctic regions, being the only vessel worldwide that could undertake this type of scientific investigation.

Several innovative technical solutions were developed during the design engineering of the research icebreaker AURORA BOREALIS. This research icebreaker project therefore points to extended technical potentials and innovations for marine engineering and the ship-building industry.

# TECHNICAL DETAILS

## 3 IN 1 – MULTI-DISCIPLINARY RESEARCH VESSEL, DEEP-SEA DRILLING SHIP, HEAVY ICEBREAKER

Ice test run of model ship to verify maneuvering in thick ice layers.  
(Copyright Jan Meyer, AWI)



### Scientific disciplines:

Geology, Geophysics, Biology, Physical and Chemical Oceanography, Glaciology, Meteorology, Atmospheric Physics and Chemistry, Bathymetry

- **Icebreaking capacity:** highest IACS Ice Class (Polar Class 1), more than 2.5 m of multi-year ice at 2–3 kn
- **Dynamic positioning:** drifting ice up to 2.5 m thickness or open water
- **Drilling rig:** riserless drilling  
Max. drilling depth: 5000 m water depth, >1000 m below mudline
- **Two moon pools, 7 x 7 m size each:** one for scientific drilling, one for deploying scientific equipment
- Operational temperature: fully functional down to –50°C, working capacity +45°C to –30°C
- Max. operational endurance: 90 days
- Berthing capacity: 120 (scientists and crew)
- Accommodation: 80 single and 20 double cabins
- Scientific echosounders: multibeam with 1°x1° resolution and sediment echosounder, additional echosounding systems depending on configuration
- Hangar and landing deck capacity for three helicopters
- Length overall: 199.85 m | Length between perpendiculars: 174.27 m
- Moulded breadth: 49.00 m | Breadth at 13 m draught: 45.00 m
- Maximum draught: 13 m | Displacement: approx. 65,000 tons
- In open water: max. cruise speed 15.5 kn, cruising speed 12 kn
- Propulsion: diesel-electric | Main propulsion: 81 MW (3 x 27 MW)
- Main propeller: 3 x 6.5 m diameter, fixed pitch, ice strengthened
- Maximum generator output: ca. 94 MW (electric)
- Number of generator units: eight plus onshore and emergency generators, waste heat recovery and exhaust gas cleaning systems
- Transverse thrusters: 2 x 3 units, fixed, fully retractable, one unit forward and aft also usable in retracted position for manoeuvring

The AURORA BOREALIS European Research Icebreaker Consortium is an EU-funded project to set up scientific, financial and organisational frames for a new ship: a multi-disciplinary research icebreaker with a drilling tower. This unique research icebreaker is designed to gain sound climate-relevant data to support societal decision processes. Release of funds pending til Feb 2012.

The ERICON project is supported by European Commission under FP7 (grant agreement 211796). The design study was supported by German Ministry for Education and Research (BMBF grant 03F0464).

### Timelines

Start of construction: 2014 (planned)

Commissioning: 2016

Operational lifetime: 35 – 40 years

Estimated costs:

Construction: 790 mio. €

Operation: 39 mio. € p.a.

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