

RV Aranda – New technologies on 30 years young vessel

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Aranda – Ocean Class Research Vessel

Class Notation (DNV): 1A, Battery(Power), E0, Ice(1A), Research Ship

- NB Year 1989
- Modernization 2017-2018
- Length 66,3m
- Beam 13,8m
- Draft 5,0m
- Cruising speed 10-12kn
- Crew 5-13
- Scientists 27



RV Aranda – Background and History

**In Arctic 1989, 1990,
1991, 1993, 1995, 2003**



Antarctic 1989-90, 1995/96



Modernization / Refurbishment 2017-2018



Modernization focus on:

- Extend the lifetime of the vessel to 2030's
- Reduction of UW noise through more silent propeller blades and new bow thruster.
- Decreasing emissions through reshaped (aft) hull and diesel-electric machinery.
- Increasing laboratory space by lengthening the vessel.

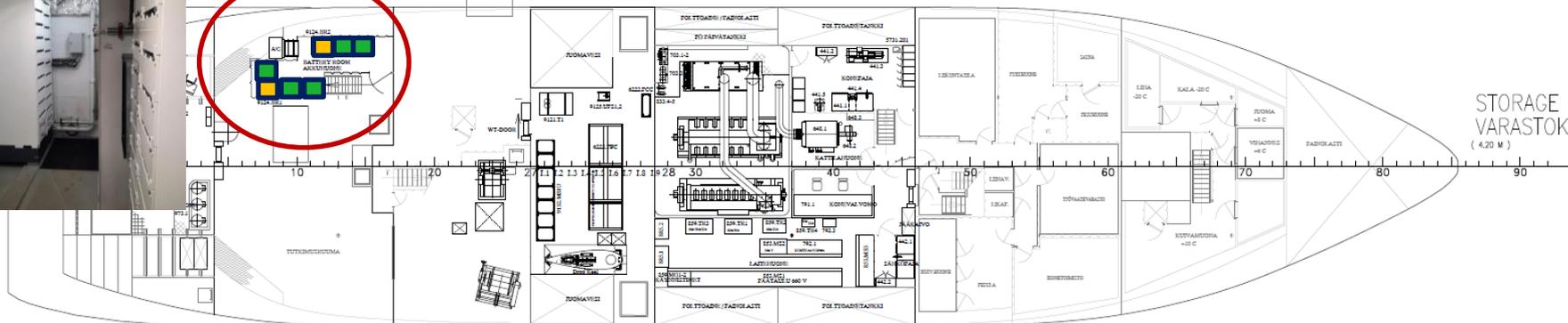
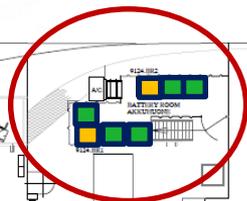
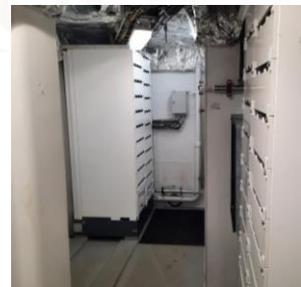
RV Aranda's Hybrid System

- Part of the modernization project was to install hybrid system to enable periods of "zero emission, silent sailing".
- The hybrid system is installed in two steps;
 - Step 1; 2x 100kWh Li-Ion batteries for testing and evaluation purposes. Operational time on batteries 20-30min *
 - Step 2; expand to 7x 100kWh batteries to increase operational time on batteries up to 2h *

* Depending on speed and ambient conditions.



"1 battery rack =
100kWh = 1 Tesla S"



STORAGE DECK
VARASTOKANSI
(4,20 M)

Hydrogen Fuel Cell Research Project "MARANDA"

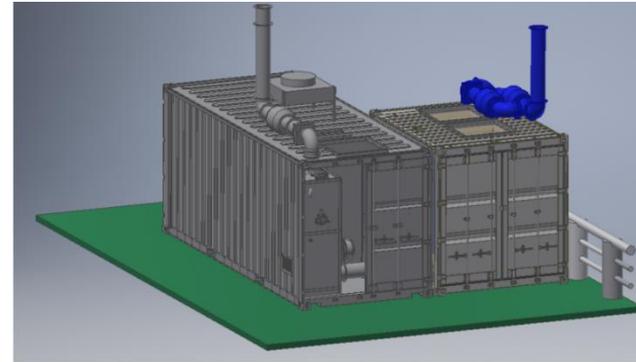
MARANDA

MARANDA - Marine application of a new fuel cell powertrain validated in demanding arctic conditions

- FCH JU project: 01/03/2017-28/02/2024 30/11/2021
- 7 European partners.
- Project main objective:
 - Develop an emission-free hydrogen fuelled PEMFC based hybrid powertrain system for marine applications.
 - Install the 165 kW system on-board Aranda research vessel.
 - Validate system and H2 storage in test benches (1x 82,5 kW system) and on board the research vessel Aranda

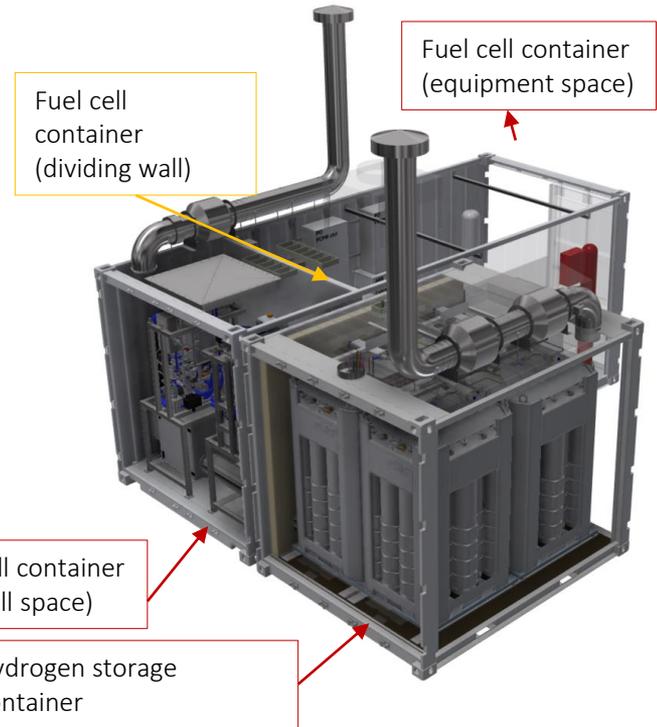


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Hydrogen Fuel Cell Research Project "MARANDA"

- Two Fuel Cell Modules, each delivering 85kW
- H2 capacity ~60kg (compressed gas)
- For reference; Daimler Citaro FuelCELL bus carries 35kg of compressed hydrogen and has FC power of 120kW *



Acknowledgements

- This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking under grant agreement No 735717. This Joint Undertaking receives support from the European Union's Horizon 2020 research and innovation programme and Hydrogen Europe and N.ERGHY

Thank you!

Questions?



R/V ARANDA



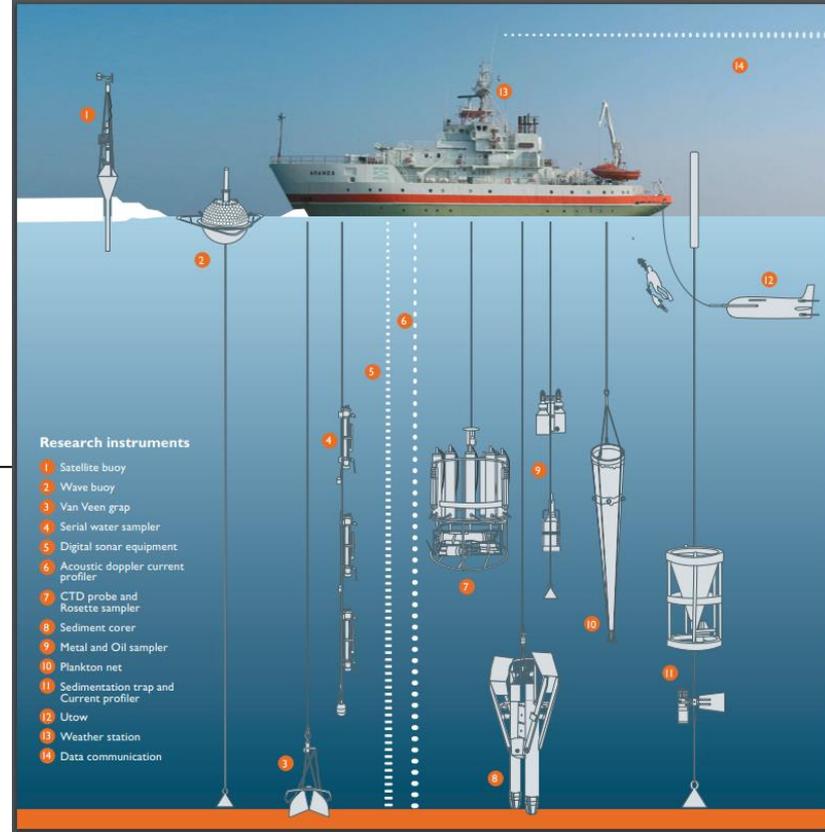
Photo: Pami Hänninen

OWNER
COMMISSIONED
MAJOR REFIT
HOME PORT
LENGTH (LOA)
BEAM
DRAFT
GROSS TONNAGE
POWER
CRUISING SPEED
MAXIMUM ENDURANCE
SCIENTISTS
CREW

FINNISH ENVIRONMENT INSTITUTE
1989, HELSINKI, FINLAND
2018, RAUMA, FINLAND
HELSINKI, FINLAND
66.30 m
13.80 m
5.00 m
1969 GT
3215 kW
10 - 12 KNOTS
60 DAYS
27 PERSONS
5- 13 PERSONS

LABORATORIES AND SCIENTIFIC AUXILIARY SPACES

CTD room	16 m ²
Chemical laboratory (2)	25 m ² and 20 m ²
Nutrient laboratory	19 m ²
Salinity laboratory	6 m ²
Biological laboratory	30 m ²
Isotope laboratory	8 m ²
Wet (incl. benthos sieving)	9 m ²
Sample handling room	18 m ²
Server room	5 m ²
Sounding laboratory	7 m ²
Acoustics laboratory	5 m ²
Library	4 m ²
Instrument workshop	2 m ²
Mechanical workshop	5 m ²
Scientific hold	68 m ²
Refrigerated sample store	2x2,5 m ² and 1x5,3m ² (+4 C - -8 C)
CTD Hangar (inside)	30 m ²
Aft deck	110 m ² , the hatch on the aft deck 1,55m x 2,3m and the lift 1,5m x 2,0m Side scan sonar operation shaft/space
Container spaces	2 x 20 ft and 2 x 10 ft on the boat deck 2 x 10 ft container and 1 x storage container (on board) on the research (aft) deck. Storage container can be replaced with a 20 ft container.
Available containers	General lab container and sampling container



SYKE

