

RV Belgica refit & replacement: the final step!



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RV Belgica: 2 years of problems



Flooding & damages

2015

- 19th of July: Flooding of engine room (0.8-1.2 m): affecting main engine, generators, pumps, electrical cabling, etc.
- Analyses showed that the hole was the result of biological corrosion mediated by sulfur-reducing bacteria
- **Final cost was 1.5 M€ incl. VAT**, of which 100 K€ was refused by the expert (cfr. regular maintenance costs)
 - CASCO insurers paid an advance of 900 k€
 - CASCO insurers refuse to pay the 250 k€ VAT (cfr. enrichment of the Federal State)
- Renewal CASCO insurance 2016 was obtained after an increase of the fee by 32%
- **63 planned scientific days lost; 17 programs affected** (mainly seasonal monitoring – no recuperation)
 - Makeshift solutions using other vessels were problematic (cfr. cost, availability, capabilities, berths, etc.)
 - Campaigns were restarted from the 7th of Dec





Obsolescence maintenance

2016

- Obsolescence maintenance
 - Planned from 28th of March to 24th of August 2016
 - 1.019 M€ extra budget foreseen

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
January	Vacation	Zeebrugge	MT			ADE		Zeebrugge		ILVO		Zeebrugge		OD Nature	INBO		Zeebrugge		ILVO		Zeebrugge		ILVO		Zeebrugge		ILVO		Zeebrugge		Zeebrugge	
February						1 MP					2 EV							3 KP ¹ MF JH KPn ES							4 EV							
March																																
April	OBSOLESCENCE MAINTENANCE																															
May	OBSOLESCENCE MAINTENANCE																															
June	OBSOLESCENCE MAINTENANCE																															
July	OBSOLESCENCE MAINTENANCE																															
August	OBSOLESCENCE MAINTENANCE																															
September																																
October																																
November																																
December																																

Obsolescence maintenance

2016

- Obsolescence maintenance
 - Replacement/automation of alarm & control systems engine room / main engine / propeller
Incl. bridge controls on portside
 - Replacement control systems hydraulic system
Incl. fishery corner on the bridge
Incl. bridge wing controls
 - Extension of fire and bilge alarm systems
 - Replacement of CCTV system
 - Replacement of telephone system
 - Replacement of navigation lights (LED)
 - Replacement flood lights (LED)
 - Replacement of kitchen (cfr. HACCP)
 - Replacement of living container





Regular maintenance

2016

- Regular maintenance
 - Planned from 28th of March to 24th of August 2016 (cfr. obsolescence maintenance period)
 - 1.028 M€ budget foreseen
 - Standard dry dock foreseen cfr. Class (DNV-GL)
- Propeller shaft needed to be removed and checked

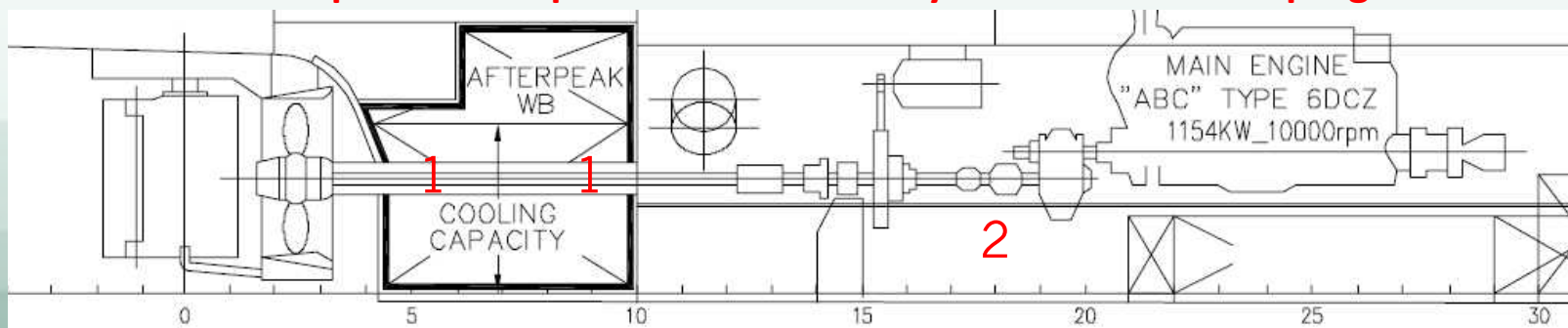
...nothing special!?

Regular maintenance

2016

- Regular maintenance
 - Propeller shaft needed to be removed and checked
 1. Stern tube bearings were run in **(1) (April 2016)**
 2. Stern tube incl. bearings /propeller shaft were misaligned
 3. Realignment of stern tube incl. bearings /propeller shaft resulted in misalignment of propulsion line
 4. Propulsion line (incl. main engine) was moved to achieve alignment (ca. 7 mm)
 5. During SAT the intermediate bearing overheated **(2) (> 90 ° C; cfr. 55 ° C) (July 2016)**
 6. After several adjustments incl. oil change bearing and tooth gear coupling still overheats
 7. New measurement indicated again misalignment of propulsion line (ca. 1 mm); propulsion line moved
 8. After several adjustments & tests intermediate bearing still overheats **(October 2016)**
 9. Bearing and intermediate shaft have been removed and have been renewed/maintained, but bearing still overheats **(Nov-Dec 2016)**

Due to this problem 71 planned scientific days were lost and 21 programs affected in 2016





Regular maintenance

- 2017**
- Regular maintenance
 - Overheating of intermediate bearing
 - 10. Extensive vibration and ODS measurements (**January 2017**)
 - indication of vertical movement; yard says: due to a structural fault in the ship (stiffness?)
 - 11. During several sea trials the problem remains with temperatures above 100° C, even after changing to oil with a higher viscosity (**January 2017**)
 - 12. RBINS-OD Nature own investigations shows that there still is a misaligned of the propulsion line; not horizontally but vertically. An independent company was hired to again measure the alignment of the propulsion line. (**March 2017**)
 - Alignment couldn't be controlled since taking apart the intermediate and propeller shaft is only possible in dry dock.
 - Ship yard refuses to take the ship into dry dock
 - 13. RBINS-OD Nature gets in contact with DAMEN NewBuild
 - 14. The ship yard appoints a new subcontractor to do a full analyses of the propulsion line (temperatures, displacement, vibration, bending stress, etc.) (**March-April 2017**)
 - The propulsion line seems to be ok, no major abnormalities (incl. vibrations and displacements)
 - The oil was changed to a lower viscosity oil identical to the oil used in the past. Bearing temperature significantly reduced cfr. lower shear friction and possible effects of slipping (ca. 20° C)
 - The design of the bearing and too low load are indicated as main cause of the problem



Regular maintenance

2017

- Regular maintenance
 - Overheating of intermediate bearing
- 15. DNV-GL allows to resume full operation (**April 2017**) based on:
 - Strongly reduced bearing temperature
 - Continuously monitored bearing temperatures
 - Addition of a cooling system
 - Indication that there is no structural problem with the propulsion line
- 16. Discussion with the ship yard on who is responsible for the costs (refit costs after SAT, chartering of vessels, loss of income) since July 2016 is unresolved
- 17. It was only in March 2017 that scientist got the media involved which led to inquiries on minister level

Due to this problem 88 planned scientific days were lost and 25 programs affected in 2017

- The last 2 years, the ship was at quay side for 19 months and this resulted in many frustrations (scientists, crew, all parties involved in the maintenance, etc.)
- Since April 2017, start of new maintenance contract with new ship yard until end life (2020)

RV Belgica will resume her original 2017 program from this week onward



NewRV

A new multidisciplinary research vessel to replace RV Belgica





Replacement Process

2005-2017

- 2005 Council of Ministers agrees with the start of the feasibility study on the replacement or modernization of the RV Belgica
- 2013 Council of Ministers agrees with the feasibility study and with the start of the finance study on the replacement or the modernization of the RV Belgica
- 2014 Council of Ministers agrees with the finance study: the build of a new research vessel is the best solution
- 2016 Council of Ministers principally agrees with the replacement of the RV Belgica and with the preparation of the public tender and the development of the further collaboration between Federal Sciences Policy and Defence for the exploitation of the new research vessel
- 2017 Council of Ministers agrees with the launch of the public tender and the replacement of the RV Belgica by providing the necessary budget (54.45 M€ incl. VAT)



Replacement Process

2015-2016

- Working group with Cabinet Science policy
- Cooperation agreement Belgian Defence – Belspo – RBINS-OD Nature
 - Steering committee
 - Project team technical and scientific specifications (NewRV@belspo.be)
 - Working group operational aspects – convention
- Final input by scientists cfr. scientific needs
- New support letters rectors/directors of universities, institutes & private companies
- Contacts were made with neighboring countries for cooperation (FR, UK, NL, DK, LUX, etc.)
 - Only with FR (IFREMER) cooperation seems feasible cfr. ship time & infrastructure exchange



Replacement Process

2016-2020

- 2016: specifications NewRV discussed with 10 ship yards (ESP, FR, NED, UK)
- March 2017: final agreement on replacement including budget (Council of Ministers)
- June 2017: launch of tender
- End 2017: agreement on selection of ship yard (Council of Ministers) & signed contract
- 2018-2020: Design & build NewRV
- 2018-2019: New convention and business plan (Council of Ministers)
- Mid 2020: Delivery NewRV

Replacement

Built:	2018 - 2020
Prize:	54,4 M€ incl. 21% VAT
Length:	> 65 m
Beam:	> 15 m
Draft:	Max. 4.8 m
Berths Crew + Scientists:	12 + 28 (4 single - 18 double)
Days (24h) at sea:	300/y
Operating cost:	4,3 M€/y incl. VAT





Replacement

Specifications

- Diesel-Electric propulsion (AC), waste-heat recovery, MARPOL TIER III
- DNV-GL Silent-R or equivalent
- 11 kn operational speed (max. 13 kn)
- North Sea, Atlantic Ocean, Mediterranean Sea
- Instrumentation adapted to water depths of 5000 m
- Minimum Ice Class (DNV-GL ICE-1C or equivalent) for summer operations in Arctic areas
- Dynamic Positioning Class 2 (DP-2)
- Active stabilization System
- 30 day autonomy

Replacement

Specifications

- 3 Cranes (fwd, mid, aft) – 1.5t, 4t, 8t
- 2 CTD Winches (stbd) – AHC – 5500 m
- Multifunctional Winch (stbd) – 5500 m
- Hydrographic Winch (aft/stbd) – 5500 m
- 2 Trawl Winches – 40t – 5500 m
- Net Drum Winch – 30t – 10 m²
- Split Net Drum Winch – 30t – 8 m² each
- Net Sonde Winch – 6t – 5500 m
- 2 Gilson Winches – 40t – 5500 m
- CTD Gantry & LARS (stbd)
- 2 stbd Gantries – 10t
- Aft A-Frame – 30t
- Gilson Gantry
- Work Boat – 6 m
- Wet Lab
- 3 Dry Labs
- Wet and Dry Fish Lab
- AUMS Lab
- Aerosol Lab
- Diver Store
- Seismic Room
- Scientific Lab
- Operational Center
- CTD hangar
- Hangar
- Crow's Nest
- Cold & Freeze Rooms
- Large aft & stbd decks



Replacement

Specifications

Full Acoustic Underwater Instrumentation suite

- Shallow and deep-water bathymetric multibeam echosounders (>300 m & >5000 m)
- Parametric subbottom profiler (>5000 m)
- Scientific multibeam & split-beam wideband echosounder (>5000 m)
- Omnidirectional fish sonar (>4000 m)
- net- and catch monitoring system
- Underwater position-reference system (USBL) (<5000 m)
- Acoustic Doppler Current Profilers (>700 m & <50 m)

Mapping and analyses of full water column (incl. fauna) , sea floor and subsurface

Replacement

New potential and new end users

- Complete support of Belgian Marine Science community (incl. blue ocean research)
- Ship time exchange with European Research institutes to: Enhance research capacity and study areas based on shared cost
- Strengthening the Belgian role in the Blue economy via its researchers, training centers & maritime industry
- Financial return by deploying NewRV as an exploration- & test platform, research- & monitoring ship, education- & training platform



Thank you!



Please visit: odnature.naturalsciences.be/belgica (website, Facebook, Twitter, etc.)