

Specific Targeted R&D projects in shipbuilding: Results and implementation

Vito Radolović



Republic of Croatia
MINISTRY OF THE SEA, TRANSPORT AND INFRASTRUCTURE



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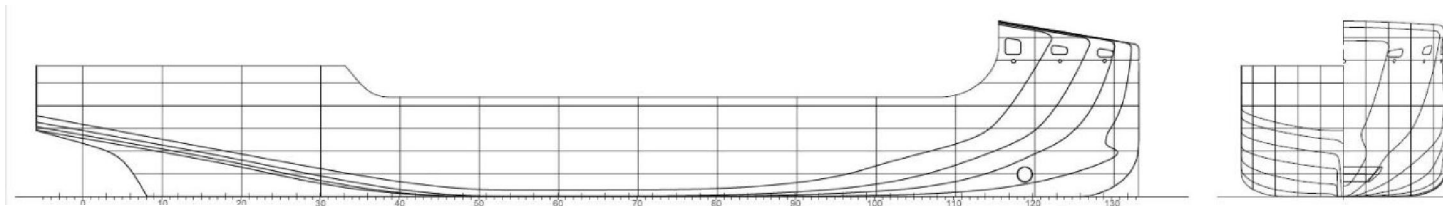


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INTRODUCTION

FLOW SHIP DESIGN IN NUMBERS

- The company: established in 2018 (Pula, Croatia), by four Naval Architects, based on a long experience and competence in the shipyards (10+ years/employee)
- Main activities: R&D, Initial and Basic design, consulting
- R&D experience: 10 EC founded projects since year 2006.
- Design experience: RO-RO, RO-Pax, Car Carriers, medium size cruise vessels, ferries, Dredging vessels, Cable laying, Chemical Tankers, Reefers, Bulk carriers, Fishing vessels, Live stock carriers, etc.



INTRODUCTION

MAIN DRIVERS AND TRENDS

Main Targets: CO2 emissions reduction
Safety

Challenges: Ship performance
Production process
Rules & Regulations

Objective: New design approaches and production processes by
implementing innovative solutions approved by relevant
societies

Solutions: Energy saving devices
Power management: Hybrid, LNG, Batteries, fuel cells, etc.
Innovative materials
...



COLLABORATION



SPECIFIC TARGETED R&D PROJECTS



DELIGHT TRANSPORT (2006 - 2010)

Developing lightweight modules for transport systems featuring efficient production and lifecycle benefits at structural and functional integrity using risk based design. www.delight-trans.net

Budget: Project total 3,7 mEUR



IMPROVE (2006 – 2009)

Design of improved and competitive products using an integrated decision support system for ship production and operation.

Budget: Project total 3,4 mEUR



THROUGHLife (2011 - 2014)

Development and proof of new approaches for through - life asset management based on next generation of materials and production technology. www.throughlife.eu

Budget: Project total 3,6 mEUR



GRIP (2011 - 2015)

The aim of the GRIP project is to reduce fuel consumption in shipping by 5% (with individual ships up to 10%) and thus reduce exhaust gas emissions. <http://www.grip-project.eu>.

Budget: Project total 4,2 mEUR;



SPECIFIC TARGETED R&D PROJECTS



ADAM4EVE (2013-2015)

Adaptive and smart materials and structures for more efficient vessels; <http://www.adam4eve.eu/>
Budget: Project total 4,1 mEUR



SHOPERA (2013-2016)

Energy Efficient Safe SHip OPERAtion; <http://shopera.org/>
Budget: Project total 6,6 mEUR

SMARTYards SMARTYards (2013-2016)

Developing Smart Technologies for Productivity Improvement of European Small and Medium Sized Shipyards www.smartyards-project.eu
Budget: Project total 3,9 mEUR



GREENBLAST (2012-2015)

Using Recycled Glass for Pressure Blasting Steel Surfaces and the Waste Produced in Firing Heavy Clay Constructed Products <http://www.greenblast.eu/>
Budget: Project total 1,2 mEUR





SPECIFIC TARGETED R&D PROJECTS



HOLISHIP (2016 -2020)

HOLIstic optimisation of SHIPdesign and operation for life cycle

www.holiship.eu

Budget: Project total 11,4 mEUR



RAMSSES (2017 -2021)

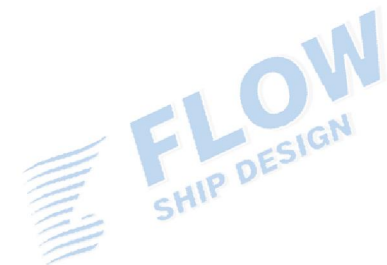
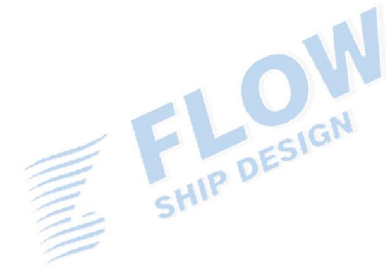
Realization and Demonstration of Advanced Material Solutions for Sustainable and Efficient Ships

Budget: Project total 13,46 mEUR

LASHFIRE (2019 -2023)

Legislative Assessment for Safety Hazards of Fire and Innovations in Ro-ro ship Environment

Budget: Project total 13,57 mEUR



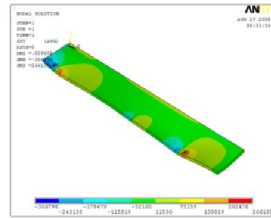
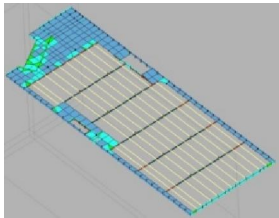
R&D PROJECTS RESULTS IMPLEMENTATION



DELIGHT TRANSPORT – cargo deck of composite materials for RO-RO vessels

DESIGN OPTIMISATION , PROTOTYPE AND TESTING:

- Deck structure weight reduction up to 35%
- Fuel consumption reduction up to 2% → CO2 emission reduction
- Total Lifecycle operation cost savings
- Production process cost reduction
- Satisfactory test results

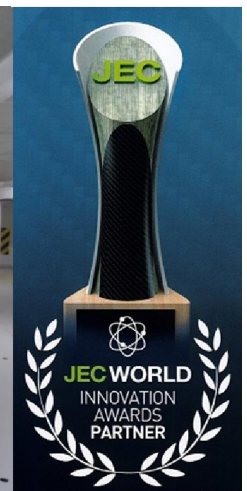


IMPLEMENTATION ON CAR CARRIER / 7000 cars - m/v SIEM CICERO (Delivered July 2017)

- Total area covered by composite structure: 12600 m²
- Deck structure weight reduction of 25%
- Increased cargo intake for 800 t, or fuel consumption reduction of 4.5% (2.1 t/day HFO) for same cargo intake



JEC Innovation Award 2018



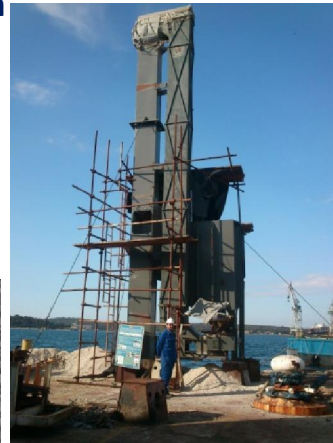
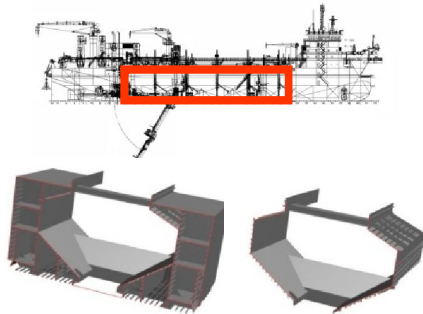
R&D PROJECTS RESULTS IMPLEMENTATION



THROUGHLife – protective technology for hopper suction dredgers

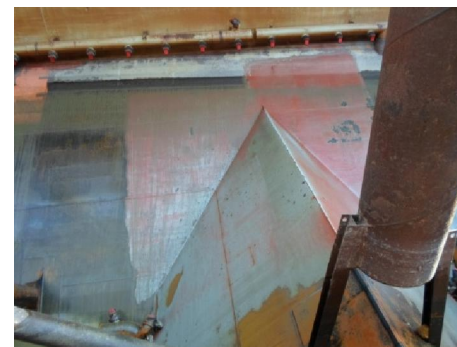
DESIGN, PROTOTYPE AND TESTING

- Improved resistance of plating to abrasion
- Significant reduction of the lifecycle cost
- Reduced lightweight of the ship



IMPLEMENTATION ON TRAILING SUCTION HOPPER DREDGER 14000 m³ (ULAJNIK NEWBUILDINGS 496, 497)

→ testing of the benchmark technology in exploitation by owner



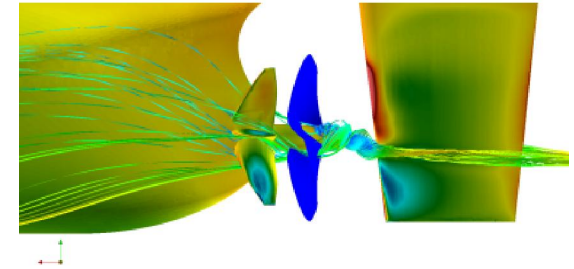
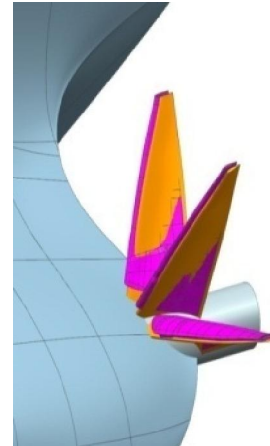
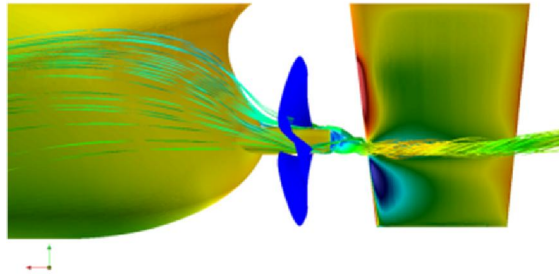
R&D PROJECTS RESULTS IMPLEMENTATION



GRIP – energy saving devices for vessels in exploitation

DESIGN , PROTOTYPE AND SEA TRIALS

- Reduced fuel consumption
- Implementation on ships in exploitation



IMPLEMENTATION ON BULK CARRIER / 52000 DWT (m/v “VALOVINE”) PRE-SWIRL STATOR FINNS (PSS)

- Fuel consumption reduction up to 7% → CO2 emission reduction
- Reduced vibrations → no hub vortex with PSS



R&D PROJECTS RESULTS IMPLEMENTATION

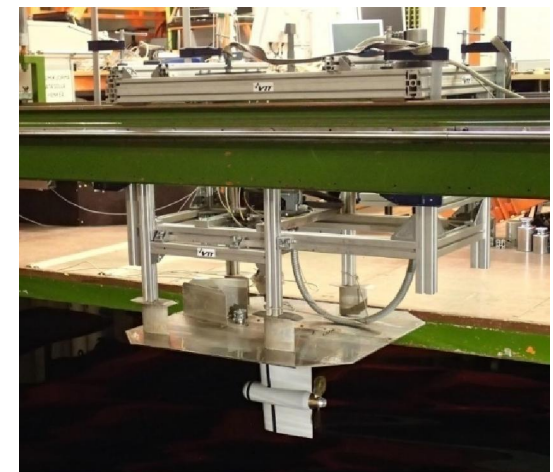
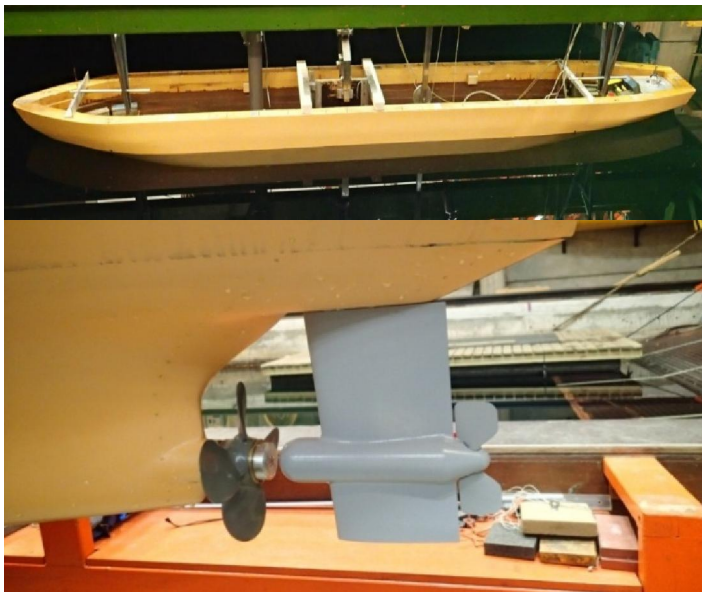
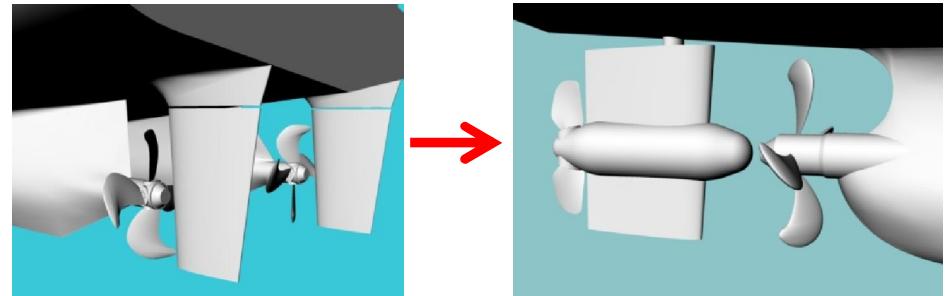


ADAM4EVE– Adaptive and smart materials and structures for more efficient vessels

DESIGN OPTIMISATION , PROTOTYPE AND TESTING

Development and application of adaptive rudder propeller used in yachts and ferry vessels, where manoeuvring criteria are based on the requirements for the frequent berthing at the terminals:

- fuel consumption reduction of about 21 %
- increased manoeuvring capability
- SRTP functionality
- lightweight reduction by 2-5 %, and
- increased cargo capacity by 4 %.



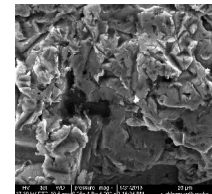
R&D PROJECTS RESULTS IMPLEMENTATION



GREENBLAST – Using Recycled Glass for Pressure Blasting Steel Surfaces and the Waste Produced in Firing Heavy Clay Constructed Products

SMAL AND LARGE SCALE TESTING, ANALISYS OF BLASTED SURFACE AND BLASTING MEDIA

- Satisfactory analysis results
- Environment friendly
- Recyclable blasting waist



WORKSHOP TRIALS AT ULJANIK SHIPYARD

→ Satisfactory blasting results (roughness, cleanness, etc)

- 507 – MULTI PURPOSE OFSHORE CONSTRUCTION VESSEL,
- 502 – RO-PAX FOR CASPIAN SEA
- OFSHORE PLATFORM LABIN



Collaboration with Lade AS on the Vindskip® project:

- Design development
- Structural design including implementation of innovative materials



Vindskip® is a hybrid merchant vessel for sustainable sea transport, driven by the wind and LNG. A state of the art design as per 2012 is holding a Norwegian Patent and a WIPO PCT International Patent on the concept.



BUSINESS MODEL FLOW ship design



Comprehensive design and first hand production experience and background in built and delivered vessels as well as R&D projects

→ optimal design solutions in the best shipbuilding practice



FUTURE STEPS FLOW ship design

Research and development are central to the business strategy program:

- Apply for funds in R&D
- Collaboration with partners from shipbuilding and other industries



THANK YOU!

CONTACTS:

vito.radolovic@flowship.eu

josip.andrusic@flowship.eu

flowship.eu



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