RAMSSES - Realisation and Demonstration of Advanced Material Solutions for Sustainable and Efficient Ships

- Conclusions and plans for an IMO SDC9 submission September 13th, 2022
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- Center of Maritime Technologies gGmbH





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i. Objectives of the project and consortium overview

ii. Main challenges addressed

INTRODUCTION





- Lightweight Materials ... (IA)
- **Coordinator: CETENA (Italy) – Financial and Administrative** CMT (Germany) – Technical and Dissemination



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- 9 very well received events
 - Jointly organized by RAMSSES and E-LASS
 - Enhancing information exchange and networking
 - Open to the entire European maritime/lightweight industry
- Strengthening the sustainable network
 - Initiatives to enhance matchmaking between stakeholders, project dissemination, attractiveness of E-LASS events, connections to national networks, project exploitation, sharing of research data
 - E-LASS is the place to be for international information exchange on maritime lightweight in Europe
 - 2017 Pula: Technical visit: Uljanik shipyard
 - 2018 Borås: T.T.-Workshop: FRP use in other industries
 - 2018 Pornichet: MAG: E-FERRY Project experience
 - 2019 Piteå: Technical visit: Composite village 'Öjebyn' TT Workshop: rules and regulations
 - 2019Vigo: RAMSSES results: composite rudder flap
 - 2020 Bremen: IMO lunch presentation: STtA Workshop: Structural health monitoring
 - 2020 digital: RAMSSES results: non-combustible components
 - 2021 Nantes: RAMSSES final conference







iii. Main achievements

OUTCOMES

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... resulted in 13 demonstrators close to commercial application



Ocomposite Structures

Integration of systems for internal walls and superstructure of cruise ships into shipyard processes





LIFE CYCLE PERFORMANCE ASSESSMENT

% DIFFERENCE TO REFERENCE SHIP

-0.2

Global Warming

Potential

- shipyard-ready developments:
 - Modular lightweight panel
 - 86 fire tests in total
 - Fire resistance requirements FTP code part 5 & 3 passed
 - General design
 - mechanical, noise & vibration and processes
 - Efficient installation process
 - bonding techniques of composite and steel materials
 - Demonstration of a globally non-load bearing internal bulkhead
- Product innovation for weight reduction (up to 30%):
 - Ready to introduce (FRP) into the yard production process
 - cruise ships, passenger ferries and gas carriers

Perspective:

IntraCore company

- Further material development iteration & fire tests
 - until all criteria are compliant to SOLAS requirements
- Review of the IMO FTP Code tests and test institutes' practice
 - the applicability to deliver viable test results with thick FRP sandwich instead of "thin" standard metal specimens

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-0.07

Demand

Cumulative Energy Aerosol Formation

-0.06

TECHNOLOGY HIGHLIGHTS

- Lightweight panel reduced fuel consumption, emission, less draught, better stability and adde more payload
- Standardized & easily to be modified modular panel to react on the late stage change process to customer wishes

MEYER WERF

9



- Development of pultruded FRP profiles usecase:
 - internal decks
 - Design concept is applicable for
 - production
 - assembly procedures
 - Integration of outfitting
 - lashing openings
 - Tests
 - Laboratory tests results (mechanical tests, fire tests)
 - site tests on the full scale demonstrator
 - demonstrator production process and assembly
- Product innovation and savings:
 - Weight reduction of 14 %
 - Reduced fuel consumption up to 2 % (1 t/day) or increased payload for 400 t compared to design with conventional steel decks
 - Production lead time reduced by >10 %
 - production costs <20 %
 - Reduced emissions
 - during production and operation up to 0,9%

Perspective:

- Flexibility in
 - Design
 - production
 - costs \rightarrow opportunity to introduce the technology to shipyards and shipowners
- Further extend the range of applications to structural and outfitting applications on various types of vessels





LIFE CYCLE PERFORMANCE ASSESSMENT



TECHNOLOGY HIGHLIGHTS

- Reduced the weight and fuel consumption
- Modular lightweight panel design can reduce the assembly time in the shipyard
- Reduce the emission and increase the net present value up to 1%

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O.C.S.

Main achievements II – Enhance the maritime industry's innovation capability



- Smart Track to Approval (STtA)
 - Set of measures to make the approval process under the existing regulatory framework more efficient





iv. Lessons learnt and Policy recommendations for further researchv. Exploitation potential and challenges for market take-upvi. Further information and contacts

OUTLOOK

R&D and rule making process - must be continuous and must go hand in hand!





Successful dialogue

To be continued (?)

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I. Technical development: achievable solutions for various applications could be found, but

- I. Fire properties are still a challenge
- 2. Acoustic and thermal insulation may require additional materials which causes additional weight
- 3. Solutions which started on a lower TRL still offer various perspectives for development
- 2. Uptake of results: Required processes are in place, however
 - I. Further development for automated production or
 - 2. Large scale industrialisation needs to be done
- 3. Approval process, rules & regulations: Many RAMSSES solutions were successfully qualified, whereas
 - I. the proposed STtA concept can speed up development processes
 - 2. The approval of novel solutions depends on whether or not the suitability of existing test codes and routines is questioned

Recommendations



I. Upscaling

- Projects to demonstrate in full scale
 - Production process in large scale/quantities
 - Large lightweight products
- Suitable funding schemes:
 - Innovation Fund applicable if lightweight structures are one enabling technology among others for carbon reduction
 - Other funding schemes which allow focusing on full scale demonstration of lightweight technologies are being sought

2. Continue the ongoing dialogue with IMO

- IMO invited to give feedback on the INTERIM GUIDELINES FOR USE OF FIBRE REINFORCED PLASTIC... (MSC.1/Circ.1574)
- RAMSSES partners intend to prepare a submission to IMO SDC9 (Jan 2023), with the suggestions to **both**
 - Review the regulation and consider specific modifications (see below), and
 - Accept the STtA as a concept that can help making the approval process smoother
- E-LASS and national fellow networks will be involved in the specification process of the submission
- Discuss initiatives with representatives from the Commission and CINEA

3. R&D and accompanying rules development

- Funded RIA with the goal to
 - Systematically review the existing regulation, particularly fire tests codes
 - Develop and apply alternative test procedures which are applicable to new materials' and structures' specific properties

Thank you! Further information and contacts





RAMSSES project website:

- Downloads:
 - **Publications**
 - All Public Deliverables
 - Presentations of the public **Final** Conference
 - Project **brochure**
 - Nine **RAMSSES videos**



LinkedIn: News and posts





E-LASS

Website of the E-LASS network:

https://e-lass.eu/archive/seminars/

RAMSSES related presentations from various E-LASS seminars 2017...2021

Coordinators: Technical



CETENA

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