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

E-LASS

June 17th, 2021 - Web meeting Building and mounting demonstrators in RAMSSES

(BALance)

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(PodComp) (PodComp) (Coventive / Composites Evolution) (RISE) (Cetena) (Cetena)















"Development of an integrated fire, thermal, acoustic AND lightweight panel system for a competitive price."

Glass prepreg technology → production scale (UK)



Sandwich panel production \rightarrow (SE)













Story line

RAMSSES

- The RAMSSES approach
 - Research on new lightweight products
 - Application of lightweight products in real applications
 - Assessment of solutions
- WPI0 products
 - Fire resistant panels based on renewable materials
 - Panels from organic materials
 - Panels from non organic materials
- Uptake of results inside the project
 - PODCOMP bathroom ceilings
 - FlowShip Cardeck (14)
 - Baltic workboats Sunroof (15)
 - Chantiers de'l Atlantic Cabin floor (18)
 - MW internal "A" wall (13)
- Prospects
 - High volume production







13



Supply WPs

15

Application WPs

18

10

4



Team 10





PODCOMP:WP leader, product design & demo producer, evaluation

RISE SICOMP: pre-trials, material selection and tuning of production process, acoustic design and testing



BALance: concept development, business scenario



Coventive Composites / Composites Evolution: developing and producing PFA prepregs



Composites Evolution



CETENA: acoustic design and testing







Team 10 concepts





POD

Team 10 concepts

The prepreg, glassfibre and PFA resin – the best prepreg we have found in terms of combined sustainability, mechanical and fire-resistance properties and cost

The core – several options depending on application case: All cores are free from petrochemicals

□ Concept 6 with Foamed glass core-latest option

- Incombustible
- Good acoustic properties
- End-of-Life- its sand
- □ Concept 3 with Balsa core
 - renewable core
 - Good fire properties due to charring
 - End-of-Life-it can be composted
- Concept 5 with Silicate core
 - incombustible
 - End-of-Life- its sand
- **D** ...

ientive

omposites

Non-Combustible Lightweight Components





Mechanical

properties



& Markus Lehne, BALance Technology Consulting GmbH Birgitha Nyström, PODCOMP AB

WPI0 results applied



concept 3 Balsa core





Cardeck for FLOW SHIP DESIGN (14)







Chantiers de l'Atlantique (18)



Onshore /On-board demo for Meyer Werft (13)

















Materials used:

Silicate core 10 mm thick sheets glued with water glue to required thickness Density 290 kg/m³ PFA/Glass facing 0.6 mm/layer Weight 1.3 kg/m²

Demonstrators produced:

On-shore - two wall segments 430x2230 On-Board - four wall segments

600x2230

Designed to be easy to mount using aluminum profiles



PFA/Glass laminates glued along short ends



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Onshore / On-board demo for Meyer Werft WP13







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Coventive Composites



- Core sheets are glued to right thickness, cured over night at 80°C & cut to required dimensions
- Panels made three by three with alu-profiles between and along long edges
- Sandwichpanel cured under vacuum at 120°C over night
- Cut in three parts in the centre of alu-profiles after curing



Shipping to Meyer Werft













Onshore demo for Meyer Werft WPI3





One panel is grinded and covered with PVC foil at Meyer Werft













Onshore /On-board demos for Meyer Werft WPI3





Onshore/On-board walls

On-shore - two wall segments 430x2230 On-Board - four wall segments 600x2230 Weight 11kg/m²

- The wall panels mounted Onshore
- Calorific value for the surface layer is 9.52 MJ/kg
- The walls can also be installed onboard
- Planned for one of the future ships after the project ending

& Markus Lehne, BALance Technology Consulting GmbH **Birgitha Nyström, PODCOMP AB**

The walls are installed, one as received and one with PVC-foil, as Meyer Werft On-Shore demonstrator











Sun-Roof Baltic workboats WPI5



Demonstrators produced:

Two panels, each 1660x2500 mm

Materials used:

Silicate core 10 mm thick sheets glued with water glue to required thickness Density 290 kg/m³ PFA/Glass facing 0.6 mm/layer Weight 1.3 kg/m²



4 layers 3 layers









Sun-Roof produced with closed edges

The same production steps as for Onshore/Onboard panels



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Sun-Roof Baltic workboats WPI5





Sunroof panels Two panels each 1660x2500 mm Weight 19.8 kg/m²

- Drill holes for attachment to frame
- Silicone glue and hollow nylon plugs inserted
- Baltic Workboats will present the continuation















GmbH

Full scale fire at test at RISE – specimens and test arrangement

Commercial project -Sandwich panel-





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ventive

Composites



WPI4 specimens (2x)

- Pultruded FRP profile-





WP10 specimen (1x)

-Sandwich \rightarrow RAMSSES laminate+balsa core





Core length 6390 mm Total length 6540 mm

Along circumference, three layers from top and three layers from bottom meet, total 6 layers. Weight of Cardeck 15 kg/m²

38 FRP profiles, length 1.66 m

Non-Combustible Lightweight Components







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Full scale fire at test at RISE – specimens and test arrangement

WPI4 specimens (2x)

- Pultruded FRP profile-



WP10 specimen (1x) -Sandwich \rightarrow RAMSSES laminate+balsa core













Pultruded Polyester with closed edge

VS.

PFA balsa sandwich





06:56 flames coming out through the front end opening, heavy smoke and flames from the top of the panel.

Mean value of the thermocouples mounted on the centre line of the panel.

6:40 a jet flame coming from the panel at the left side above the gas burners.



Full-scale fire test WPI0 concept 3 sandwich panel, designed by Flow-ship

"The FRP profile modules showed a much faster and higher increase of the temperature on the top surface of the tested modules compared to the sandwich panel.

However, firebreak through occurred after almost the same time."



Test setup at RISE Borås



Flame break through at one edge at 6:40



Balsa turned into char



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- Made at Chantiers de l'Atlantique
- The Evopreg PFA/glass balsa sandwich panel for the cabin floor has been redesigned with improved deflection. The weight saving of the panel is very interesting.
- Further calculations will be done according to Bureau Veritas requirements.
- A panel will be made for SOLAS FRD fire test (test to be done at RISE).
- The cabin demonstrator is being constructed (see photo). Because the composite floor panel is not ready yet, a steel floor has been installed temporarily and the composite floor will be retrofitted later.
- Chantiers de l'Atlantique is motivated to continue this development after RAMSSES.















WPI0 results applied



concept 3



















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