

THE Motorship

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Insight for marine technology professionals

Gas giants:

CMA CGM's ground-breaking order

Better than real:

Augmented assistance emerges

Keeping it light:

Composites gain ground

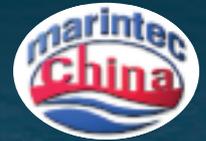
Selling slow steaming:

Flemming Bo Larssen

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LOG-ON



Gavin Lipsith | Editor

Fuels of the future

AS THE FINAL issue of the year comes to a close, two major stories highlight the increasingly important trend of future fuels.

First is CMA CGM's decision to fuel its nine 22,000 teu newbuild containerships, due for delivery in 2020, with LNG (powered by low pressure, dual-fuel WinGD 12X92DF engines). With GTT set to build 18,600m³ gas fuel tanks – by far the biggest LNG fuel tanks ever built – the vessels will be able to sail from Europe to Asia and back without refuelling. That, along with LNG-fuelled Aframax tanker orders earlier this year from Sovcomflot and AET, contributes greatly to the viability of LNG as fuel beyond coastal, short sea, fixed schedule and point-to-point operations.

The fact that just one bunkering is needed per round trip sets up an interesting competition between Asian and European bunker suppliers to provide LNG to the massive containerships. Hopefully it will stimulate the introduction of LNG bunkering in other ports rather than constrain the development of infrastructure to one continent or the other.

LNG is a fossil fuel, albeit one that offers significant emissions reductions, and the long-term future of many ships will most likely be linked with other, non-carbon energy sources. Indeed, many observers believe the industry must adopt renewable resources if it is to achieve its 'fair share' of decarbonisation. The Royal Caribbean Cruise Line is progressing in this direction with the start of its trial with fuel cells, ahead of a planned roll-out for the technology onboard its forthcoming Icon-class ships.

These developments are timely, coming both as the United Nations Framework Convention on Climate Change's twenty-third Conference of Parties (COP) takes place in Bonn, and as delegates gather in Helsinki for the eighth Gas Fuelled Ships conference in association with *The Motorship*. While the former may provide more clarity on the political path shipping must tread towards decarbonisation, we hope that Gas Fuelled Ships – with its emphasis not only on LNG but also on other low-flashpoint fuels (including hydrogen-driven fuel cells) – will continue to illuminate technical aspects of the road ahead.

The fuelling of global merchant shipping has been at the core of *The Motorship* since it was founded in April 1920, with an eye on encouraging uptake of diesel power in shipping. The title reaches its centenary in 2020 and it seems fitting that new regulations are now encouraging owners to examine alternative sources of propulsion power. As we head towards our second century, an exciting new era of ship propulsion beckons.

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ON OCTOBER 10 and 11 the consortium behind the new European innovation project Realisation and Demonstration of Advanced Material Solutions for Sustainable and Efficient Ships (RAMSSES) and the European network for lightweight applications at sea (E-LASS) met in Croatia for the first in a series of joint public conferences. The event provided a unique opportunity to bring together stakeholders and to discuss the latest successes from research and innovation on novel materials in maritime applications, as well as to develop ideas on how to meet existing challenges.

Based on impressions from the conference, this article gives insight on these stories and challenges. It also aims to inform the wider shipping audience about the work of E-LASS and RAMSSES in general, and identifies areas for potential cooperation.

SUCCESS STORIES

The workshop started with technical visits to two shipyards belonging to the Uljanik Group: the Uljanik shipyard in Pula and 3 Maj in Rijeka. It was soon obvious why these venues had been selected. Uljanik is a renowned producer of ro-ro vessels and car carriers, being involved in joint re-research and innovation projects for many years, with a focus on lightweight structures.

As an example, standardised composite panels for car carriers were developed in the joint research project DE-LIGHT Transport (part of the EU's seventh framework programme). By replacing conventional steel decks with the novel solution, Uljanik yielded considerable weight savings for their products. Even more important, thanks to a well-thought assembly concept, an enormous reduction of slipway lead time was achieved. This concept is now widely applied on Uljanik-built ships.

Uljanik can serve as a prime example of how highly innovative shipbuilders with a very hands-on approach can quickly and successfully turn research results into commercial products. The shipyard has recently delivered the first car carrier in the world using a composite structure for its cargo decks - Siem Car Carriers' Siem Cicero.

The achievements of the Croatian shipbuilders did not come from nowhere, and they were not working

How to be light

The EU-funded project RAMSSES is aiming to accelerate the adoption of lightweight composite materials in shipbuilding. **Matthias Krause** and **Dr Frank Roland** from the Center of Maritime Technologies review progress and next steps.



'Siem Cicero', the first car carrier to use composite materials in its cargo deck structure, being built at 3 Maj

on their own. Teaming up with universities, material and technology providers, classification societies and research organisations with broad networks to connect major stakeholders was the key to success. A group of actors, organised in a joint Swedish national research project, felt the need to establish a standing network for exchange of information and initiation of collaboration, and founded E-LASS. The idea has grown into an impressive forum with some 240 members, including all kinds of groups with an interest in lightweight innovation in the maritime industry.

Coordinated by the Research Institute of Sweden (RISE) in Borås, E-LASS organises workshops with

technical visits, presentations on latest developments and lively discussions. Among others, the latest workshop in Pula included presentations on the application of composite structures in 'tween decks of bulk carriers and on inland waterway passenger ships, as well as opportunities for new materials like basalt fibres. The presentations can be downloaded from the E-LASS website (<http://e-lass.eu/>).

FACING THE CHALLENGES

Besides telling each other what has been achieved with lightweight structures, it is at least as important to exchange ideas on how to improve further. One big topic in E-LASS is the current approval process of novel structures. Due to the lack of prescriptive rules, a lengthy risk-based design approach usually has to be undergone, involving lots of reviews and tests with the aim of proving that a safety level equivalent to conventional structures is ensured. Most often, approval for using a novel technology is given for a single application or a limited range only. These conditions have often acted as a barrier towards lightweight innovation in commercial shipbuilding.

In order to overcome those obstacles, more than 30 E-LASS members have joined the new EU project RAMSSES which is coordinated by Italian naval research and consultancy agency CETENA. The objectives pursued are both practical and strategic. On the practical side, 13 shipyards and suppliers are developing and building demonstrators that show the versatility of lightweight technology, both in terms of material types and application areas.



E-LASS members inspecting composite panels at Uljanik shipyard

The demonstrator cases are:

- Panel system (truss structure): lightweight fire-resistant and bio-composite panels. (Project leader: Baltico, Germany)
- Panel system (bio-based and other): lightweight components for high loads and fire class. (Podcomp, Sweden)
- Additive manufacturing: 3D-printed propeller blade. (Naval Group, France)
- Composite rudder flap. (Becker Marine Systems, Germany)
- Versatile walls: Integration of system for internal walls and superstructure of cruise ships in- to shipyard processes. (Meyer Werft, Germany)
- Non-metallic modular decks for ro-ro vessels. (Uljanik Shipyard, Croatia)
- Lightweight aluminium and composite panels for workboats. (MEC, Estonia)
- Superstructure module on a steel deck of multi-purpose vessels (multi-material - compo-site/steel). (Naval Group, France)
- Non-metallic custom-made hull of an offshore vessel. (Damen Schelde Naval, The Netherlands)
- Cabin system: fully outfitted and modularised lightweight cabin area for passenger ships. (STX, France)
- Steel design - highly loaded structural details from high-tensile low-alloy steels for cruise and research vessels. (Fincantieri, Italy)
- Lightweight decks of high tensile steel in cruise ships. (Meyer Turku, Finland)
- Patch repair: composite overlay to repair and improve metallic and non-metallic structures. (Cardama, Spain).

All demonstration cases will be thoroughly assessed, ensuring future acceptance by classification societies and customers. To fulfil an indispensable prerequisite for economic success, RAMSSES Life Cycle Performance assessment studies for all cases will also discuss strategies for smooth integration with shipyard processes and proper connection of novel structures with conventional ones.



A composite deck built at Uljanik shipyard

The strategic aspect of RAMSSES is targeting at a 'fast track to approval' for the future - an ambitious goal which requires a wide range of sound measures. RAMSSES will develop a common knowledge base: results of technical tests, for instance in the form of statistical process models, will serve as reference points for future development of new solutions. Standardised risk scenarios will help to make the design review easier and faster.

NEXT STEPS

RAMSSES and E-LASS will further intensify their collaboration: Two public events per year are on the agenda, among others including updates on the progress of RAMSSES demo cases, and workshops on technology transfer from sectors other than maritime. Furthermore, a maritime advisory group for ship owners will be established, enhancing the exchange of ideas with technology end users.

Matthias Krause, technical manager of the RAMSSES project from Center of Maritime Technologies, summarises: "Recently the International Maritime Organisation (IMO) has issued interim guidelines for use of fibre-reinforced polymer (FRP) elements, which will be reviewed within four years after approval, based on

experience gained in their use. This is a great chance which must not be missed. Now the maritime industry must come with a concerted initiative towards acknowledged flexible rules for innovative materials. The timing of RAMSSES could not be better. This, along with the strong partnership with the E-LASS network and the successful workshop in Pula, is encouraging news."

The RAMSSES project has received funding under the European Union's Horizon 2020 research and innovation programme under a grant agreement (No 723246). Partners in the project are: Cetena, the Center of Maritime Technologies, Balance, Naval Group, Bureau Veritas, Damen Schelde, Meyer Werft, Meyer Turku, Baltico, Podcomp, Uljanik, MEC, STX France, Baltic Workboats, Airborne, Netcomposites, Swerea Sicomp, Rise, Fraunhofer IFAM, L'Institut de Recherche Technologique Jules Verne, TNO, ENSTA, ECN, Aal-to, NTUA, Fincantieri, Infracore, Galventus, Cardama, the Netherlands Maritime Technology Foundation, Evonik, Becker Marine Systems, Damen Gorinchem, OCS, Hutchinson and AIMEN.

Organisations interested in further contacts and information, membership in E-LASS or the RAMSSES Maritime Advisory Group are invited to visit the RAMSSES website (www.RAMSSES-project.eu) or to join the project on LinkedIn. 

SCHULTE MARINE CONCEPT (SMC) will provide technical consultancy and newbuild supervision services in its first cruise ship contract.

Working with Bernhard Schulte Cruise Services (BS Cruise), SMC, the project management arm of Bernhard Schulte Shipmanagement (BSM), will support construction of Mystic Cruises expedition vessel *MS World Explorer*.

Krzysztof Kozdron, managing director of SMC, said: "Schulte Marine Concept is pleased to enter the expedition cruise newbuilding segment with an innovative vessel such as the *World Explorer*, which will be the ultimate benchmark for environmental sustainability and luxury cruising in remote areas."

Construction of the 126m long *MS World Explorer* has commenced at the West Sea shipyard in Viana do Castelo, Portugal.

SMC wins first cruise ship contract



The 126m long 'MS World Explorer' will be equipped with hybrid power and propulsion technology

The vessel will meet the latest Polar Code operating requirements and will be equipped with hybrid power and propulsion technology, which will enable the ship to cruise in environmentally-sensitive areas.

Its first cruise is anticipated to be during winter

2018. The Mario Ferreira-led Mystic Group owns DouroAzul and Nicko Cruises, both of which will be expanding with new ships in 2018.

Mr Ferreira expects at least another three cruise vessels besides *World Explorer* to be delivered over the next four years, said BSM.