RINA

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International Conference

DESIGN, CONSTRUCTION & OPERATION OF SUPER AND MEGA YACHTS

1 - 2 APRIL 2009

GALATA MUSEO DEL MARE, GENOVA, ITALY

DESIGN, CONSTRUCTION & OPERAT

1 - 2 APRIL 2009, GALATA MUS

This international conference follows a continuing series of successful RINA conferences on the design, construction and operation of sailing and motor yachts. However, this is the first conference to focus on the unique aspects of super and mega yachts.

The growth of demand for luxury motor and sail yachts has increased rapidly in recent years. This has only been matched by the increase in size and complexity of vessels being designed and built. Existing definitions of what constitutes a super yacht seem outdated, with vessels in excess of 150m already built. This growth in size and complexity coupled with the new technologies becoming available bring new challenges requiring innovative solutions.

Today's clients are requiring ever greater levels of comfort and luxury, not only in terms of the vessel fittings and styling but also in the vessels behaviour whilst underway and at anchor. Many vessels are now used for charter and this has implications for the way in which the vessel is designed and classed.

day 1

09.00 - 09.30 **Coffee & Registration**

09.30 - 10.00 **Gigayacht and Passenger Ships**
P Moretti, RINA SpA, ITALY

Large yachts are continuously increasing in size and the 12 passengers upper limit, prescribed by all the major Large Yacht Safety Codes, is now perceived as a very strict limitation. Designing yachts over 3000 Gt and 12 passengers, the so called Giga Yachts, is the new challenge for the yachting industry. MCA-LY2 and passenger ships rules will be compared highlighting the main technical differences in terms of design and operation and providing examples of equivalent technical solutions in order to preserve the distinguishing features of a pleasure vessel.

10.00 - 10.30 **Blending the Disciplines for Success.**
E Fry, Fry Associates, INC. USA

With the drive by designers and builders to meet growing owner demands for improved performance both speed and seakeeping with greater comfort and convenience there is a need for an army of experts to create a reliable work of art that meets all of the owner's expectations. While every project is different the basics of blending the disciplines are the same. For a successful project all the parties need to be concerned about the flow of information, interface of details and coordination of effort all requiring great attention to schedule requirements.

10.30 - 11.15 **Coffee**

11.15 - 11.45 **CFD Modelling for Powering and Propulsion of Motor Yachts - Recent Developments and Applications of the Marine CFD Group, Genoa**
S Brizzolara, S Gaggero, D Grassi & D Villa, University of Genova, ITALY

Paper intends to give a general presentation on the most recent activities of the Marine CFD Group of the University of Genova, part of the Department of Naval Architecture. The group, constituted few years ago inside the department of Naval Architecture of the University of Genoa, was a natural demand of the long time consolidated high technical competence in the hydrodynamic design of advance ships and yachts existing in the area of Genoa.

11.45 - 12.15 **Using Viscous CFD Mega Yacht Design**
R Azcueta, Cape Horn Engineering S.L. SPAIN

This paper will present the application of state-of-the-art viscous CFD simulations to sailing and motor yachts and demonstrate that it is a good alternative to tank testing for the super and mega yacht industry. The simulations are based on the experience gathered over the last few years in the design of high performance racing boats, especially for America's Cup and Volvo Ocean Race campaigns, the Formula One of the seas.

12.15 - 12.45 **CFD for Hydrodynamic Design of Super Yachts**
F Hueber & M Caponnetto, Caponnetto-Hueber Flow Consultancies

In the last decades dimensions and performance of leisure and luxury yachts have grown dramatically, leading to the need of an increasingly more rigorous and sophisticated approach to their design and construction. From the hydrodynamic point of view, conventional experimental tools such as the towing tank have often been used for this purpose, when economically justified by the value of the craft. Besides or in alternative to the experimental tools.

12.45 - 14.15 **Lunch**

14.15 - 14.45 **Setting a Standard for Luxury and Comfort**
K McSweeney & C Baker, American Bureau of Shipping, USA

ABS has recently introduced the new ABS Guide for Owner/Guest Comfort, presenting guidance for measuring the comfort, enjoyment and satisfaction of owners and their guests while occupying cabins, dining spaces, lounges, cocktail bars and other spaces aboard yachts.

14.45 - 15.15 **Achieving a Balanced Acoustic Design: From Concept to Ownership of a Super Yacht or Mega Yacht**
A Payne, Frazer-Nash Consultancy, UK

This paper examines all aspects of the design, build and operation of large luxury yachts, from the perspective of an acoustic engineer responsible for ensuring that the noise and vibration requirements are met, within a balanced and robust design, controlling the risks for the shipyard and enabling a profit to be made. It covers the whole life-cycle from concept design through to operational impacts.

15.15 - 15.45 **A Design Paradigm Shift in the Future of Superyacht Design**
S McCartan, Coventry University, UK

The superyacht design industry has recently seen a dramatic change in aesthetic form development, as a direct influence of an international shift in customer base, and the associated cultural influence, on what is customer focussed bespoke design. The current Russian domination of the market has already caused a significant shift from the conservative designs of the previously American dominated market, with the creative design of Superyacht A, by Philippe Starck. Looking forward 15 years and reflecting upon the socio-economic influences which will shape the future of superyacht design.

15.45 - 16.30 **Coffee**

16.30 - 17.00 **Design Considerations for the Installation, Integration and Operation of Helidecks in new build Super Yachts**
L Mason, Devenport Royal Dockyard Ltd, UK

For new build super yachts over 3000 GRT, there is ambiguity in the application of the various rules and regulations pertaining to helidecks and hangar facilities. For the ship yard, it should only be a matter of interpreting and applying these rules to achieve a perfect compromise, delivering the maximum, operability, practicality and safety for the ultimate helideck. Unfortunately, a "perfect compromise" is a contradiction in terms, the owners and stylists have a slightly different view of priorities when penning the first GA of the latest 120m super yacht.

17.00 - 17.30 **Assessment of Super Yacht Airwake and its Application to Design**
G Hawkes, E Morrison, R Underhill, R Scott & A Payne, Frazer-Nash Consultancy Ltd, UK

Understanding the aerodynamic environment, or airwake, around a super yacht is a key area of consideration to the naval architect during design. The airwake is characterised by structure-induced flow disturbances and the presence of ventilation and exhaust plumes. These features may significantly influence the safety of helicopter operations, the dispersion of gases away from the yacht, and passenger and crew comfort.

17.30 - 18.00 **The Shadow Yacht - Toy Box of The Sea**
James Roy and Rob Sime - BMT Nigel Gee Ltd

Despite the ever increasing size of large yachts, space is always at a premium. The seemingly endless list of equipment that these vessels are required to carry rapidly turns even the largest vessel into a spatial design challenge. Given that the cost per square metre for this vessel type is at an extreme premium, it is becoming increasingly common for owners to adopt the use of a shadow yacht to carry their 'toys' and free up valuable space on board the mother ship.

18.00 - 18.30 **Drinks Reception**

18.30 - 19.30 **Tour of the Museum**

19.30 - **Dinner**

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TION OF SUPER AND MEGA YACHTS

EO DEL MARE, GENOVA, ITALY

day 2

09.00 - 09.30 **Reception and Coffee**

09.30 - 10.00 **Structural Plan Appraisal of Large Yachts**
W Malinowski & T Blanchard, Lloyd's Register, UK

This paper will discuss selected aspects of good practice structural design and plan appraisal for large motor yachts. Careful consideration of these aspects from the outset can potentially minimise delays in the design and construction of the hull, and lead to a more efficient structure. The application of passenger ship structural design philosophy will also be discussed, since with the advent of large multi-decked motor yachts these vessels share many of the 'small passenger ship' attributes, encouraging a new approach to the design of the large yacht structure and its appraisal against classification requirements.

10.00 - 10.30 **Simulation-Based Design of Super and Mega Yachts**
A Köhlmoos & V Bertram, Germanischer Lloyd, GERMANY

Simulation-based design increasingly replaces traditional experience-based design. This article gives an overview of techniques now used in advanced industry practice, with particular focus on super and mega yacht applications. The article covers the basics of the techniques, illustrating approaches and state of the art with applications taken from the experience of Germanischer Lloyd.

10.30 - 11.15 **Coffee**

11.15 - 11.45 **The Challenges Associated with the Design and Build of Composite High Performance Super Yachts**
M Meunier & R Fogg, SP Ltd, UK

Increasing the size and performance of super yachts has a direct effect on the load structural components must withstand. This in itself leads to fundamental questions; can one easily predict the loads associated with the increase in boat size? What type of laminate and material should one consider when designing various parts of the structure? How can deck structures withstand higher compressive load (from fore & aft bending) and still accommodate cut outs and aesthetic requirements from the architect and interior designers? What are the implications on the manufacturing process? Such examples of subjects will be addressed in this paper.

11.45 - 12.15 **Concurrent Design and Optimisation of FRP Boat Structures**
A Sobey, J Blake & R Shenoi, University of Southampton, UK

Increasingly larger vessels are being designed and manufactured using composite materials as techniques are developed and improved. The ability to change the properties of composite materials combined with low cost and good aesthetics make these materials popular within the leisure boatbuilding community. A positive advantage of composite material usage stems from its diversity in the design and production stages to produce a tailor made product. However, many opportunities for subtle off-design variance can occur in the manufacturing stage leading to a significant change in final composite properties.

12.15 - 12.45 **Assessing Yacht Coatings**
M Kattan, Safinah Ltd, UK

One of the most important elements of a mega-yacht is its visual impact. A large part of this impact is attributable to the final coating and finish of the external hull. For many years the assessment of the hull coating has been based around terms such as "super-yacht standard". This paper sets out to explore what this means and offer suggestions and alternatives as to how the assessment of Yacht finishes could be standardised. The paper will first consider the current approaches adopted and their strengths and weaknesses and then look at the present work of the ISO standards committee and finally suggest some alternatives to these approaches that may have some merit.

12.45 - 14.15 **Lunch**

14.15 - 14.45 **Resistance Characteristics of Semi-Displacement Mega Yacht Hull Forms**
D Blount, Donald L. Blount and Associates, Inc. USA

Mega yachts are becoming much longer. The combination of cruise and maximum speeds along with increase in lengths result in operational Froude numbers, FL, between 0.3 and 1.0. The concentration of current mega yacht projects have FL between 0.3 and 0.6 with few approaching FL = 1.0. Hull forms with different transverse sections show a variation in resistance characteristics for similar slenderness ratios in this range of Froude numbers. On occasion, LCG shifts and stern wedges are techniques being employed to achieve minimum resistance. However, these approaches need to be approached with caution as transverse instabilities can result at speeds greater than 22 to 25 knots.

14.45 - 15.15 **Propeller Design Process for a Mega Yacht**
P Aren, Rolls Royce AB, SWEDEN

The paper describes the propeller design process. A feasibility study including a cavitation test with a stock propeller was made before the order for the propellers was accepted by Rolls-Royce. Results from theoretical analysis of the propeller cavitation behavior as well as from a cavitation test of the final propeller design are given. The results are presented from a vibration measurement conducted in full scale where a propeller shaft synchronization system was investigated. The system controls the phase angle between the two propeller shafts. The system can be used to control the vibration level in the hull structure in vertical and horizontal direction.

15.15 - 15.45 **Modern Folding Propellers for Large Sailing Yachts - A Design Guide for Naval Architects, Designers & Builders**
T Ramsay, A Miles, Bruntons Propellers Ltd. UK

In the large motor yacht industry, low noise and vibration is one of the major requirements for propeller design, and is now becoming increasingly important in large sailing yachts. At the same time the trend for larger boats and larger installed powers will continue. Modern folding propellers are an excellent solution, but they are not as flexible in terms of available pitch/diameter ratio or blade area ratio as a custom designed fixed propeller. This makes it even more important that the Propeller Designer gets involved early in the development of a project, working with the Designer to optimise the conflicting requirements of performance under power, low noise, and drag under sail.

15.45 - 16.30 **Coffee**

16.30 - 17.00 **Electric Propulsion for Super and Mega Yachts - A viable option?**
P Norton, Converteam Ltd. UK

This paper examines the latest technology electric power supply and propulsion systems that could be used in Super and Mega yachts and explores the opportunities this may enable for ship designs and operation. There are a range of electric power & propulsion solutions for a wide number of vessels from small research vessels to cruise ships. New technologies such as compact induction and High Temperature Super-conducting (HTS) machines developed for naval and other specialist vessels offer high power density and low noise & vibration advantages with the potential for a reduced number of prime movers, which may make them suitable for the next generation of yachts.

17.00 - 17.30 **Super and Mega Yachts - Regulatory Requirements**
J Strachan, Burness Corlett - Three Quays, UK
M Lagoumidou, Lloyds Register of Shipping, UK

There are various sets of regulatory requirements that can be applied to Super and Mega Yachts. LY2, SOLAS for Passenger Ship or Cargo Ship. Additionally there are Classification requirements that must be compiled with. Recent regulatory changes have been made to location of FO tanks, and damage stability for passenger ships. Although Yachts may be exempted from complying with future regulations regarding Safe return to Port, USCG & USPH Regulations may be considered when a vessel operates in US.LR's SSC rules have recently been modified to delete Yacht P notation. The paper sets out to explain the various options for commercial yachts that are over and under 3000GRT. Additionally the paper sets out to explains how the new regulations effect yacht design.

17.30 - 18.00 **New Class Approach for Fast Yacht Designs**
M Pachot - Bureau Veritas, ITALY

For the last few years the large Yacht industry has been one of the fastest growing marine industries. It has lead to and still does lead to new innovative design solutions, pushing technological limits non-stop, in terms of speed, comfort onboard, power control, manoeuvrability, … In some cases, it has highlighted the limit of the Rules (International, Class, Flags, etc.). As a Class Society, Bureau Veritas (BV) has followed this state-of-the-art technical wave and has set down these developments into new Rules. The philosophy of these Rules is to be the most self-explanatory, to offer designers, builders, yacht owners and Flag Administrations a comprehensive set of dedicated safety standards for modern fast Yachts and Mega Yachts. This paper presents the different key criteria considered for new Class requirements by going through all Class aspects (structural strength, propulsion and piping, electrical and automation systems, fire safety) with a particular eye on specific items due to high speed.

18.00 - **General Discussion**

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VENUE
The Venue for the conference is Galata Museo del Mare, Calata De Mari, 16126 Genova, Italy

EVENING DRINKS RECEPTION, MUSEUM TOUR & DINNER
Following the end of day one (1 April), delegates are invited to attend an evening drinks reception at the conference venue, followed by a tour of the museum and a dinner.

ACCOMMODATION
Upon registration you will be provided with details of local hotels.

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