Yacht Design Newsletter

Forthcoming and recent events

Mar. ‘10 - Dubai Boat Show
Feb. ‘10 - Abu Dhabi Boat Show
Nov. ‘09 - Global Superyacht Forum
Oct. ‘09 - Fort Lauderdale IBS
Sept. ‘09 - Monaco Yacht Show

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Welcome

There is nothing like a global financial crisis to focus attention on efficiency - from fundamental design and construction through to operation, the need to maximise efficiency has never been greater.

Going hand in hand with efficiency is the theme of environmental impact; the most exciting yachts being designed today are efficient designs for the environment that embrace innovation and new technology.

All of these themes feature heavily in BMT Nigel Gee’s work load, from our fundamental design and engineering philosophy as featured in our lead article on hull form optimisation, through to development of efficiency focused design concepts such as the Ostria project, our naval architects and engineers continue to challenge technology and push the boundaries.

Being at the leading edge requires investment in research and development, a theme which is at the very foundations of the BMT Group and we have a number of research based projects under development which are reported in this newsletter.

Emerging Young Talent at BMT Nigel Gee

Early in 2009 BMT designers Adrien Jousset and Sylvain Julien were selected as one of five finalists in the World Superyacht Awards - Young Designer of the Year 2009 - with a truly innovative design - Ostria.

“The high standard of entries presented the judges with no easy task in selecting the finalists”, stated Trevor Blakeley, Chief Executive of The Royal Institution of Naval Architects and Chairman of the judging panel. “The judges were impressed by the effort and quality of work presented, reflecting the undoubted talent of today’s young naval architects and marine designers, which surely bodes well for the future of the industry.”

Ostria not only has a radical look but has also been developed to provide an answer to the environmentally conscious owner. Throughout the project the focus has been set on producing a realistic and feasible solution to reduce the environmental impact of a Superyacht whilst creating a truly innovative design.

Although owners are increasingly interested in green designs, they are not usually prepared to compromise on the style, onboard facilities or the sailing experience. Ostria is the result of the convergence of these challenging and often antagonistic aims.

Early in the project it appeared that a carbon free propulsion system was unrealistic. The power production capacity required to propel a 70 metre monohull to any decent speed across an ocean is far too demanding compared to any means of renewable, carbon free, energy production. Even the hotel load requirement could not be answered properly with such solutions unless a significant volume of the yacht was dedicated to this purpose.

The choice of the diesel electric propulsion plant therefore came naturally to provide the necessary flexibility to take advantage of secondary, renewable, carbon free means of energy production (existing or near term technology). Podded propulsors have been selected for their high efficiency but also for the flexibility they provide in the design of the general arrangement.

Ostria has been equipped with 370 m² of solar panels, and a 4 m tall retractable wind turbine designed to become a fully integrated feature of the vessel style.

An in-depth study of the vessel’s main systems was also undertaken to limit the hotel load as far as practically possible. From climate control to rain water collection, a significant number of solutions were studied to assess their feasibility in the marine environment with the aim of reducing the overall energy consumption.

Ostria demonstrates that low carbon emissions and reduced fuel consumption can be achieved through a truly stunning design.

Since completing this design Adrien Jousset has started his own design studio, ASK Yacht Design (http://www.askyachtdesign.com).
Focus on Efficient Design

BMT Nigel Gee is a company founded on the practice of naval architecture. Our experience in this field comes from skills, knowledge and insight acquired by our staff over 23 years in the business, from the highest level of management right through to our most recent graduate employees.

The development and optimisation of hull lines is the state of our art in the practice of naval architecture, and this feature will detail a few of the techniques we use in developing and optimising hullforms to offer unrivalled hydrodynamic performance and efficiency.

Our hull design process begins with two critical parameters: length and speed. These define the Froude number which gives an indication of the basic hull type, where to set our goals and how challenging they will be to achieve. Often the speed is not fixed and there will be a number of speeds to optimise against. This is particularly true in motor yacht design where long range cruise speed and maximum sprint speed are often equally important. A principal design speed is generally selected after careful consideration of the vessel’s operating profile, propulsion system concept and close discussions with the owner’s team.

The next step is to undertake an assessment of the yacht’s overall design concept. Is the vessel a slender, low volume design or a beamy, high displacement motor yacht? These factors have a critical influence on the direction that we follow, as a yacht’s displacement in relation to its length is the most influential parameter on resistance. Additionally there may be special requirements for seakeeping performance which will influence our optimisation process.

At this point we set target values for the optimisation of key form coefficients and parameters including block, prismatic and maximum sectional area coefficients, longitudinal centre of buoyancy and flotation, wetted surface area and immersed transom area. If a bulbous bow is to be used the basic parameters are set down; bulb type, centreline profile shape, sectional area and immersion. Additionally the effects of appendage and propulsion system integration are considered including propeller diameter, tip clearance and rudder configuration amongst others.

Following these main decisions, a candidate parent hullform is identified; starting from a known and quantified baseline is considered a critical step. With its origins in the National Physics Laboratory (NPL) and the British Ship Research Association (BSRA) BMT’s in-house archive of model test data is extensive and spans 50 years of work.

For hullforms requiring more novel solutions we may start from a completely blank sheet of paper, perhaps firstly undertaking a parametric study to investigate optimum dimensions and hull type.

As naval architects we are faced with the challenge of producing hydrodynamically efficient hullforms offering sufficient displacement within the given dimensional constraints, whilst maintaining favourable shape coefficients and fair hull lines, that must also achieve the required speed, stability and seakeeping characteristics. To achieve these goals the naval architects at BMT Nigel Gee choose to adopt a methodical approach in developing a hullform, and use optimisation techniques predominantly based on experience, married with an appropriate level of computational analysis. With modern computer techniques it is very easy to launch forward waterline curvature are all parameters which we optimise at this time. The use of Computational Fluid Dynamics might be used at this stage to make subtle refinements and position appendages such as bilge keels or study theoretical flow patterns in areas of special consideration.

Use of CFD techniques across a wider spectrum of the optimisation process has been employed by BMT in the past with multi variable optimisation routines used in conjunction with CFD codes to study theoretical minimum resistance shapes. Such techniques must, in our experience, be tempered with optimisation variable limitations from practical experience, and taking such an approach in conjunction with verification by physical model testing, has produced good results.

The final stage in the optimisation process is to ensure we have a fair set of hull lines. Whilst lines can be checked for fairness on-screen using curve fairness tools there is no substitute for the more traditional approach of assessing small scale, large paper plots for fairness by eye.

As a company BMT Nigel Gee has a reputation for the development not just of conventional yachts but also those with more novel and specialised hull forms. With experience of SWATHs, catamarans, trimarans, high speed and ultra light weight yachts we have design experience developed specifically to meet a wide range of demanding operating requirements.

Regardless of set of requirements we are optimising for BMT Nigel Gee strongly believe that the emphasis of efficient hullform development and optimisation be focused on the fundamental aspects - get these right and the gains in efficiency can be significant.
Research and Development Activities

During 2008 / 2009 BMT Nigel Gee has been busy on a number of research and development activities.

In November 2008 we completed a joint project with Devonport Yachts looking in detail at framing systems for large yacht structures.

The selection of a structural framing system in any vessel must be made from a consideration of weight, production matters, suitability to resist global loads and vibration. Yacht’s can principally be either transversely or longitudinally framed although hybrid systems are also in use. However the choice of which framing system is best can be the cause of considerable debate between designers and builders with the advantages and disadvantages of each system often being debated but rarely quantified.

Our research explored the structural design of an 80m displacement motor yacht utilising both transversely and longitudinally framed systems, with the aim of quantifying the weight, structural benefits, and production differences between the two and, following analysis of the results, assessing a hybrid framing system which is considered to combine most of the advantages of other systems.

The results of this research were presented in a technical paper present at the 20th HISWA Symposium on Yacht Design and Construction in Amsterdam.

In the spring we headed to Genoa in Italy to present the results of our research into Shadow Yachts at the RINA Design, Operation and Maintenance of Superyachts conference. Having been involved in a number of shadow yacht projects BMT Nigel Gee presented a series of studies to illustrate quantitatively a range of benefits offered by shadow yachts.

Finally during April this year we announced a research project into the impact of future regulations on the design of large SOLAS certified yachts.

In recent years the number of yachts in the upper segment of the industry that are outside of the LY2 regulatory framework has increased. The application of SOLAS passenger ship regulations to these yachts is now increasingly common.

The SOLAS based regulatory framework is undergoing a period of significant change with the recent ratification of a number of new regulations. Together with near term future regulations, these will have a significant impact on the layout of SOLAS certified passenger ships and therefore yachts above 12 passengers and 3000 GRT. Our research will focus on quantifying the implications of these future regulations on the layout of large yachts and how current design practices will need to change.

Parent company BMT Group has strong foundations in research based activities and the group invests in a number of research programmes each year allowing us to stay at the forefront of the industry. Technical papers can be downloaded at our website www.bmtyachts.com.

Summer Regattas

Following the success of last year’s BMT Mainsail Regatta the event was re-run in June. The Island Sailing Club in Cowes organised a good set of races in ideal conditions, giving some very close racing.

This year’s event attracted a total of 8 boats from 5 companies with BMT Nigel Gee showing they are a force to be reckoned with for a second year running. Boat A skippered by BMT Nigel Gee project manager Steve Lee dominated the race with an outstanding set of 6 bullets.

This year we also participated in the Yacht Brokers Regatta for the first time. Based from Cowes on the Isle of Wight the event featured fourteen teams from the industry racing Jeanneau Sunfast 37’s over a five race series.

Three yachts dominated the results of this event of which BMT Nigel Gee was one. The racing at the front was so close that the overall event result came down to the final race with BMT Nigel Gee finishing third overall with a 3-1-3-2-3 score sheet.

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