



Hightech Afloat | Efficiency in Ship Design

Gijs Streppel MSc.

Meyer Werft GmbH, Germany

MEYER WERFT is a company with tradition, which started operations in Papenburg on the Ems in 1795. For more than 200 years ships of most different types have been built by the experts working for this family-owned company. To be able to compete with other shipyards on an international scale, production engineering has been permanently improved. Nowadays MEYER WERFT's production premises count among the most modern ones in the shipbuilding industry.

The two covered docks, of which one is the biggest covered shipbuilding dock in the world, as well as the modern manufacturing plants and the concept of short distances ensure the shipyard's success. MEYER WERFT is equipped with the biggest laser center in Europe with six large laser facilities for which a special process, the so-called "laser-hybrid" welding is developed. Innovations and the newest technologies characterize the shipyard's daily routine.

Products of MEYER WERFT are standing out in innovation, which is the key to success both for MEYER WERFT and its customers. The order book is filled with work for as long as 2017, which makes MEYER WERFT world leader in cruise ship building.

Several drivers for innovation are available:

- Product and technology innovation by the yard
- Product and technology innovation by the customer
- Product and technology innovation by suppliers
- Changes in rules and regulations

Very often the newest ideas are development by combinations of drivers as listed above. Energy efficiency for example is a steady development in all thinkable areas. Rules and regulations prescribe significant reductions in sulphur through the coming years and discussions to increase the amount of emission controlled areas are going on. The latest technical development for the reduction of sulphur is the so called scrubber. Up to 97% of sulphur can be washed out of exhaust gasses.

However, cleaning exhaust gasses will not make fossil fuels limitless. Better fuel efficiency is as important as cleaner fuels. What you do not need, you will not pay for. On an average cruise some one third of the power demand is needed for propulsion purposes only. Careful planning of an itinerary can reduce fuel consumption already significantly.

Hydrodynamical development also increased the efficiency of a vessel significantly. Starting with some easy potential flow CFD calculations, through parametrical models up to RANSE CFD calculations, they all influenced hull form development in a positive way. With the RANSE tools available today, also the optimization of appendages like stabilizers, rudders and pods is moving fast forward.

If propulsion power is taken out of the electrical power demand of a cruise vessel, HVAC is by far the biggest energy consumer. Energy consumption is thus very important for reducing hotel load, but reducing consumption cannot compromise passenger and crew comfort. Increasing passenger and crew comfort in the past went hand in hand with an increase of energy consumption in case of developments in the HVAC system. With the introduction of fan coil units, it is possible to reduce energy consumption and increase passenger and crew comfort at the same time. On a smaller scale MEYER WERFT is now testing so called absorption chillers in practice. With this system it is possible to make cold out of heat and thus lower energy consumption further.

The next biggest energy consumer on a cruise vessel is lighting. Lighting has a direct influence on passenger and crew comfort as well. Without any technical solutions savings are already achievable. Dimming the light to 80% is not visible to the human eye and does not drive investment costs sky high. Other technical developments are

of course the use of LEDs, motion sensors or programming the light intensity. Within the development of two prototypes in seven years for one ship owner it has been possible to reduce the power consumption of a passenger cabin by over 25%, although the amount of lights has been increased.

Along with other savings like e.g. direct fuel consumption of the main engines it has been possible to lower the power per lower berth by over 45% from a prototype delivered in 2001 to a prototype that will be delivered in 2014.

And development is still ongoing. In the process of moving to environmentally clean fuels, more than 80% of the order book of MEYER WERFT as available today will be equipped with an exhaust cleaning system. The first LNG fuelled vessel has been delivered by MEYER WERFT in 2012 and designs for LNG fuelled cruise vessels are ready to be build. Approvals in principle by the usual class societies for cruise vessels are available.

However, also LNG as well as exhaust cleaning will not be the final solution for more environmentally friendly ships. MEYER WERFT is doing research in lowering the fuel consumption by developing new system solutions, but also by doing research in alternative power generation like solar panels or fuel cells. Such solutions are not yet compact enough for wide maritime use, but those solutions do have potential for the (near) future. At the same time, several different kinds of materials are investigated to lower the ships weight and thus lower resistance and decrease propulsion power. Lowering the weight of a sink in a cabins wet cell saves already more than two tons of weight in a large passenger vessel!

Technical solutions like exhaust gas cleaning or changing HFO into cleaner, but still fossil fuels are steps in the right direction. But those solutions are only part of the whole development process to even more environmentally friendly vessels. MEYER WERFT is doing research and development at the forefront of technical possibilities and beyond to provide its customers the most efficient products both for the environment as well as for the customers business.

Gijs Streppel started his career at MEYER WERFT in 2004. Since then, he has worked as a naval architect in the Sales and Design Department. As a project engineer he has played an active role in the development of, for example, the Disney Dream and the latest project for RCL, Quantum of the Seas. Since 2012, he has been a member of the German delegation at IMO responsible for the development of the new generation of intact stability criteria. Gijs Streppel (32) grew up in the Netherlands and studied naval architecture at the Technical University of Delft. After finishing his master's thesis at the Royal Dutch Navy in 2004, he moved to Germany and started working for MEYER WERFT. Gijs Streppel is married and has one child.