

Meyer Werft and MARIN:

# a 30-year research partnership and still counting

Many of the world's iconic cruise vessels have been under test at MARIN over the decades following the long-term cooperation with leading shipbuilder, Meyer Werft. Report highlights this very special relationship.



ECLIPSE making the journey from the yard to open sea. Courtesy Meyer Werft GmbH

**E**stablished in 1795, German shipyard Meyer Werft is still family owned and currently operated by the sixth generation of the Meyer family. And although MARIN's relationship doesn't date back quite that far, the two have worked closely together since the early eighties. Many model tests and simulations have been carried out on behalf of Meyer Werft and this has included tests on some of the most well-known cruise vessels.

As well as its long history, perhaps one of the most famous things about Meyer Werft is its location in Papenburg, along the River Ems. The extremely long 10-hour voyage from the yard to open sea has been the focus of MARIN over the years, with many model tests looking into the optimisation of this notorious river passage.

Henning Luhmann, Meyer Werft Head of Department Naval Architecture and a frequent visitor to MARIN, talks about the shipyard and MARIN's relationship and explains what makes the journey down the River Ems so special. Henning has been with the yard since 1986 and now heads up a 15-strong naval architecture department.

**Notorious river passage** He tells Report: "There is no second chance on the River Ems, no clearance in any direction - length, beam, draught and height - as well as considerable wind limitations. Therefore it is vital we work with a test centre with vast experience, we must have 100% confidence." Pretty much each ship's passage has been simulated at MARIN and this has included intensive pilot training.

In the early nineties the partners' relationship intensified when the first simulation tests on the full bridge simulator of MARIN took place when the passage along the river was modelled for the legendary Oriana.

As the partnership evolved, work moved on to full-scale tests as well. The River Ems pilots working for Meyer Werft train at MARIN and then they are on board the ships when the full-scale river passage is carried out, together with MARIN experts. This full-scale experience can be used to improve the accuracy of simulation software and to extend the boundaries of models, adds Mr Luhmann.



Training pilots, crew and captains is another important part of the work done at MARIN. "It is vital they understand the impact of wind speeds and weather conditions and how to manoeuvre the ship during the passage," he stresses.

The measures that have to be taken to ensure a smooth passage are already quite extraordinary, with the shipyard having to close the Ems barrier so there is no current

when vessels leave the yard, a railway bridge has to be dismantled and high voltage cables that go across the river have to be switched off. This shows the importance of getting the voyage planned and scheduled well in advance by investigating different scenarios at MARIN, he says.

**Challenging flow behaviour** For a long time, he admits, the yard and MARIN had focused on the bends of the river

and the passage of the bridges and yet one of the most challenging parts of the whole voyage is actually leaving the yard. "The river is very wide but at the same time the size of the lock is very limited so when the ship leaves the basin it effectively blocks the opening. And the flow of water passing through from the river creates very strange flow behaviour. We had to simulate this more thoroughly and it led to changes in the data model we used."

**Customer confidence** Modelling the passage of larger ships is a matter of course prior to the yard being awarded the contract. "Often this process proves crucial in convincing new clients, they want to see

tests for seakeeping and manoeuvring tests in waves to optimise the vessel against possible speed loss in waves. Special tests for lifeboats have also been conducted and cavitation tests to optimise comfort on board.

**Flooding and energy efficiency tests** There are also several areas where Meyer Werft expects to see further development for the future of the industry including anything related to flooding. Here MARIN is playing an important role in the development of software to simulate the flooding process in waves, he says.

Another vital area is energy efficiency and here again Mr Luhmann would like to see

And although Meyer Werft has used MARIN's basins for many years to test noise and vibration levels, "requirements are getting tougher and expectations getting higher". The DWB is a big step in being able to achieve quieter ships, he says, but this is an area the industry needs to improve, he emphasises. "Cooperation is needed, we shouldn't just focus on the hydrodynamics of the propeller if vibrations are unacceptable overall. We need a link between all of the different disciplines to improve safety efficiency and comfort."

**New challenges** Manoeuvring continues to be an area of focus, particularly as the cruise industry expands its reach into smaller ports and more inaccessible areas.



Pilot training on the full-mission bridge simulator: Disney Fantasy passing the Ems railway bridge

the proof for themselves and we can provide this because of the good cooperation we have with MARIN."

And certainly the input from the tests provides vital input. Recent simulations showed that the yard's conventional method to fix tugs to the ship is not always sufficient so special systems are being developed. "This was a direct result of MARIN tests when our pilots found that if there is a blackout for instance, tugs need to be fixed in a different way."

This continuous process of development and optimisation continues, particularly as vessels get more complex. Extensive tests and simulations are being carried out for cruise ship projects such as simulations to check the feasibility of the ship itself, full CFD calculations, model tests in calm water,

MARIN continuing its research. "There needs to be more research in optimising ships and hull forms for their entire lifetime, including their operating profiles in current, wind and waves. We have optimised hull forms for calm water conditions under laboratory conditions but as we know this is not what happens in real life."

**Beyond calm water tests** This needs to be addressed to ensure the ship design is fit for purpose outside model test conditions, he stresses. "MARIN's new Depressurised Wave Basin (DWB) is ideal for helping to predict a vessel's performance in waves and to examine how even small modifications to the hull form can have quite an impact." For instance, it is not just the form of the bulbous bow, everything has to be fine tuned to improve energy consumption, he stresses.

And as cruises are now year-round and in regions such as the Baltic in non-Mediterranean weather conditions, it could be that tailor-made vessels are built for specific markets. It is helpful to have studies to address the vessel's performance in these areas, he stresses.

The crabbing performance of a vessel is another challenge the industry has to tackle. Many still underestimate the effect of wind on cruise liners entering ports, says Mr Luhmann. This is a safety and a business issue for cruise operators, he says. "Again, MARIN can help here!"

Undoubtedly, MARIN and Meyer Werft will continue their fruitful relationship because as Mr Luhmann says: "There will always be new challenges at the front door!" ▢