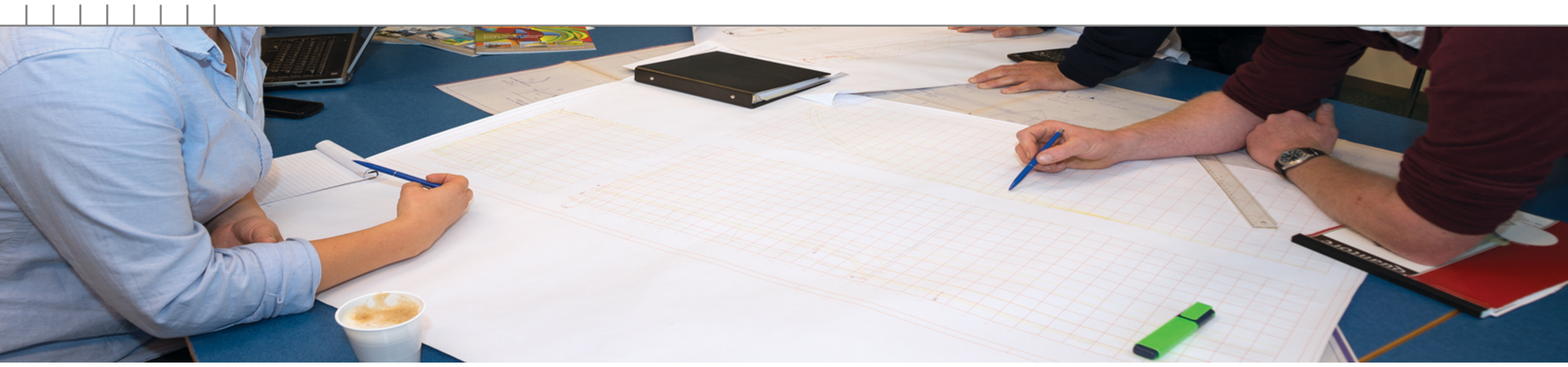
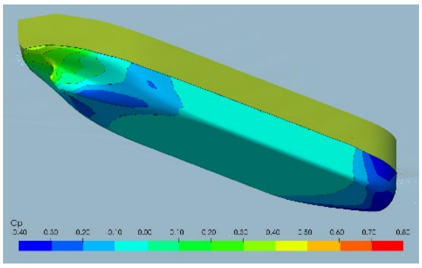


Hull form optimisation

The energy efficiency of a ship can be increased by improving the hull form or the propeller design. MARIN can assist in designing a new ship or optimising an existing lines plan or design. Together we discuss possible improvements and assess their feasibility: do the gains outweigh the costs?

Your input is important too!

To get the best result, the input should be as detailed as the output will be. An inland ship encounters multiple water depths during its lifetime, hence it is valuable to choose the most frequent water depth (or multiple water depths). The same accounts for speed and loading draft. Additionally, a good description of the freedom and fixed points for the hull shape ensures that there is no need to re-adjust the hull form after the optimisation procedure has finished.

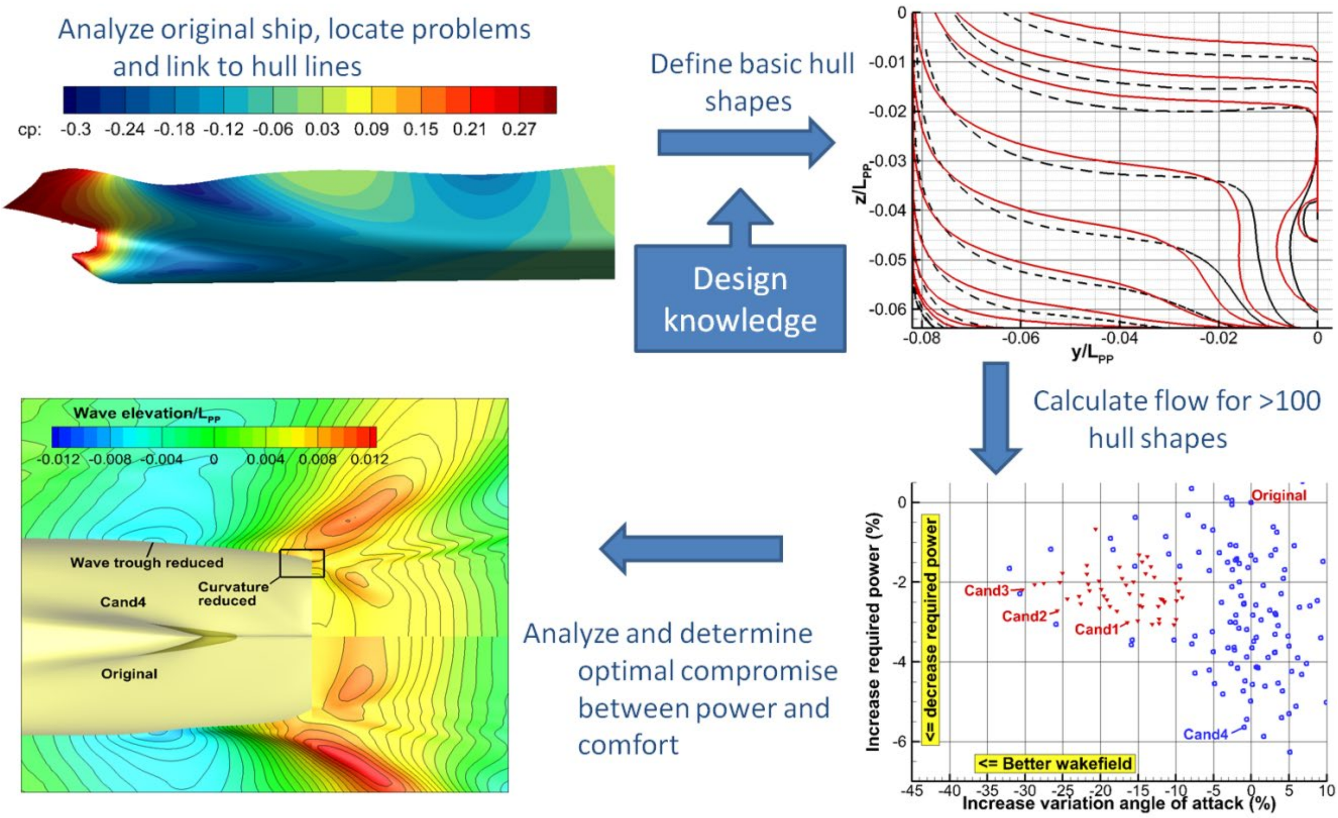


Statistical tools

Most projects start with the application of statistics. For this, we use DESP. DESP estimates the propulsion power of a ship and compares it with similar ships that have been tested or designed at MARIN. DESP can thus be applied to determine the potential of optimisation. Moreover, the power estimate can be used to calculate fuel expenses and its potential reduction, as well as the pay-back time of the optimisation procedure. If the potential gains are promising and the benefits surpass the costs of the study, an optimisation project is a logical next step.

Hull form optimisation

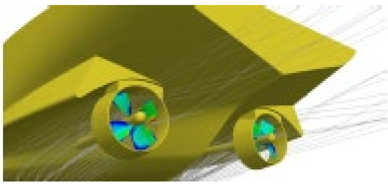
Reducing the resistance of the ship results in a lower power requirement. In addition, the flow into the propeller disc should be optimised to reduce potential vibration problems or propeller efficiency reduction. Typically the hull form will be optimised using a combination of potential flow and RANS codes, within the design constraints that will be delivered by the client. The calculations can be done for a number of speed draught combinations representing the operational profile of the vessel. In this hull optimisation process, particular attention will be paid to the reduction of the waves and optimisation of the pressure distribution over the hull as well as the propulsive efficiency by analysing the nominal wake field and by taking into account an operating propeller during the hull optimisation. Use will be made of our Explorer package for systematic hull form variations in combination with optimisers to balance the design for the operational profile, as illustrated.

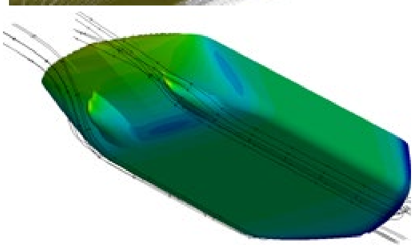


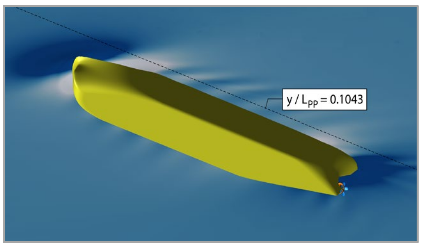
Feel free to contact us!

MARIN offers a wide range of tools to improve your ship's fuel efficiency. Which tools we use depends on what you need and what you expect. Interested? Contact us to discuss, free of charge, all options to increase the energy efficiency of your ship.

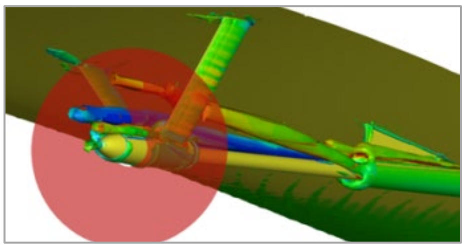
From the hull form optimisation, a final hull form is derived and besides the calculated full scale resistance also the nominal wake field can be derived to support the propeller design and local flow lines can be obtained to align appendages for minimum drag. While CFD tools give very detailed information on the flow and show possibilities for improvements, we use model testing for the most accurate estimate of the achievable speed (or the required propulsion power). By scaling model test results to full-scale operational data, an accurate estimate can be made.







Propulsion



Fully-appended ships

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