

## Ship service performance analysis

Increasing fuel costs and recent developments in emission regulations inspire ship owners and operators to find ways to reduce fuel consumption. Vessel optimisation, by means of energy saving devices, retrofits in the engine room or improved operational strategies, requires reliable performance indicators. When performance is to be monitored for a long time, e.g. to identify the effect of marine bio-fouling to the hull or propeller, the performance should be filtered for various environmental and operational conditions.

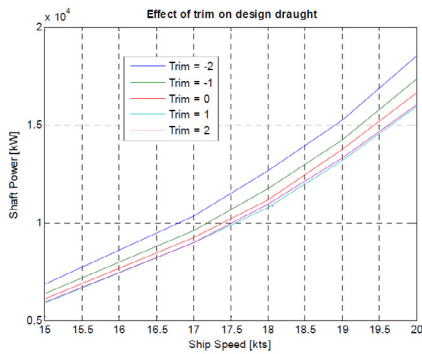


Through both research and commercial projects, MARIN is experienced in improving the performance of existing ships in perspective of fuel consumption. Full-scale performance evaluation is done using tools and experience gained during several multi-year (joint industry) projects on Service Performance Analysis, Speed through water measurement, Energy Saving Devices, Trial Analysis methods, Energy Auditing and Ship Drift in Waves.

Correction methods have been developed to account for environmental conditions and changes in loading conditions so that performance results can be compared. Sensitivity studies are performed to calculate uncertainty levels to better understand performance indicators.

Essential in fuel savings on board is crew awareness. Motivating the crew to act and react to fuel consuming conditions is essential. This can be done by displaying the effect of some operational choices on the ship performance. Navigational conditions in which fuel is wasted are:

- Large speed variations
- Applying full power in shallow or restricted water
- Too sensitive auto pilot setting which initiates frequent rudder Angles
- Suboptimal trims
- fouled propeller



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## Application

Using performance analysis tools already developed, full-scale evaluations of the ship's performance can be conducted over a long period of time. Several data sources can be used; those collected by the ship's own data monitoring system, VDR, or a dedicated data acquisition system can be installed.

Using the same analysis tools, dedicated tests can also be done at full scale in which above mentioned performance influencing parameters are varied. MARIN crew will sail with the vessel on its standard route and experiment with trim, autopilot and power settings in order to learn more about the actual ship performance. These tests will not influence the sailing schedule of the vessel. These dedicated trials result in a custom made solution for the ship owner to reduce the fuel bill. The crew is made aware of the results when the tests are performed. A Fuel Optimisation Booklet is produced in which guidelines are stated for the crew in order to save fuel.

## Expected results

As illustrated by the adjacent figure, fuel consumption reductions of 5% after implementing the custom made results are quite realistic. Key Performance Indicators can be used directly to help decision making in operational strategies or investments. Custom made projects will be dedicated to the client. MARIN will furthermore build on the knowledge gained from these dedicated trials to develop more general calculation and design tools.