

FUELSAVER...

... combines the knowledge about the optimum trim with the ability to achieve it



FORCE TECHNOLOGY

CFD & Model tests

Christian Schack: "At FORCE Technology, we have performed trim model test on numerous vessels, among others tankers, container vessels, LNG carriers and ro-ro vessels. Our testing shows possible fuel savings of 3-15% at specific conditions. In overall fleet operations, typical savings can be as high as 3-4%. Further, we are one of the market leaders within CFD with many years of experience and specialists designated to developing the precision and usability of CFD calculations."

www.forceshipmodeltesting.dk



OSK-SHIPTECH

CFD

Anders Ørgård Hansen: "OSK-ShipTech A/S uses the state of the art computational fluid dynamic software STAR-CCM+ from CD-Adapco for hull form optimisation and motion studies. The resistance can be calculated with a precision of more than 95%. The optimum trim can be investigated by calculating the resistance for a range of trims over a range of draughts to find the optimum trim."

www.OSK-ShipTech.com



MARIN

CFD & Model tests

Patrick Hooijmans: "Probably the easiest way to save fuel during transit is to trim a vessel to its optimum draught and trim. From either model tests or CFD calculations, fuel reductions ranging from 2 - 7% have been found, depending on ship type and speed. However, for every type of vessel the ideal trim is different. MARIN can offer CFD calculations and model tests to determine the influence of trimming on the power requirement, thus fuel consumption. Typically a matrix of 3 - 5 displacements, 3 - 5 trimmed conditions and about 6 speeds will give sufficient information to optimize the trim for minimum fuel consumption."

www.marin.nl

About FORCE Technology

FORCE Technology is a leading technology, consulting and service company on the international market. Force Technology's maritime division is the former Danish Maritime Institute, founded in 1959, and experts in both scale model tests and computer modelling. FORCE Technology offers both deep water towing tank and shallow water manoeuvring basin analysis, wind tunnel analysis and CFD analysis.

About OSK-ShipTech A/S

Ole Steen Knudsen A/S was established in 1966 and has for several years been one of the leading Naval Architect companies in Denmark. OSK-ShipTech A/S is today a major player in marine consulting and working for the biggest companies in the Marine and Offshore Wind business on an international scale.

About MARIN

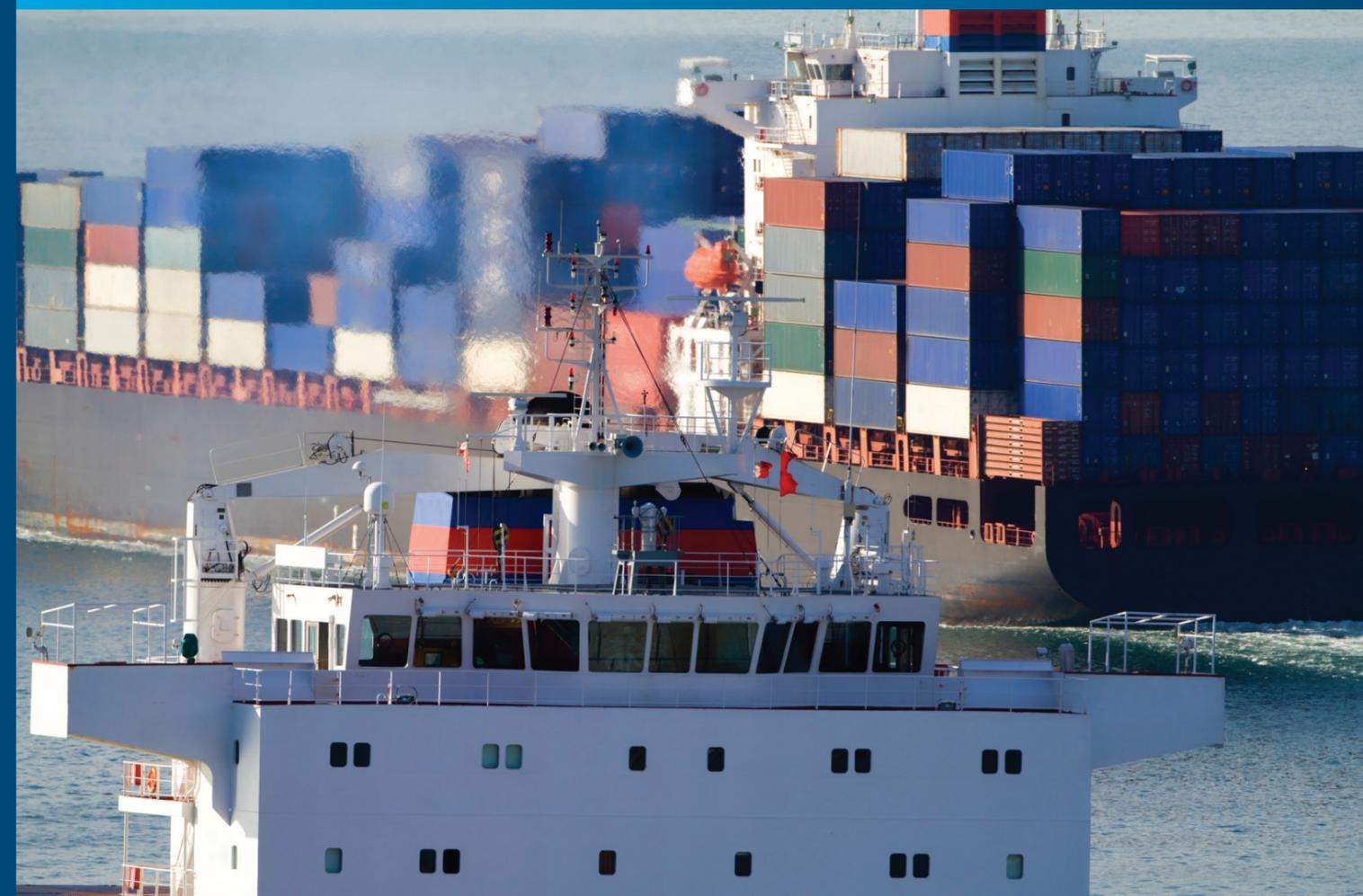
MARIN, the Maritime Research Institute Netherlands, was founded in 1932 and currently has approx. 300 employees. MARIN has become a reliable, independent and innovative service provider for the maritime sector and a contributor to the wellbeing of society. It takes initiative to couple our own expertise to various application areas to broaden its ability to solve problems. By maintaining its leadership position in hydrodynamic and nautical research and development, it makes its accumulated knowhow and experience available for Concept Development, Design Support, Operations Support and Tool Development. This commitment to high-quality technological innovation enables you to meet the challenges facing your industry today.



MARINE ALIGNMENT

FUELSAVER

Save fuel based on validated trim and ballast solutions





The FuelSaver module is designed to be based on either of the below techniques.

Model test results - typically obtained from towed and self-propelled model testing in water. Such tests are often made on the design stage for a series of sister ships.

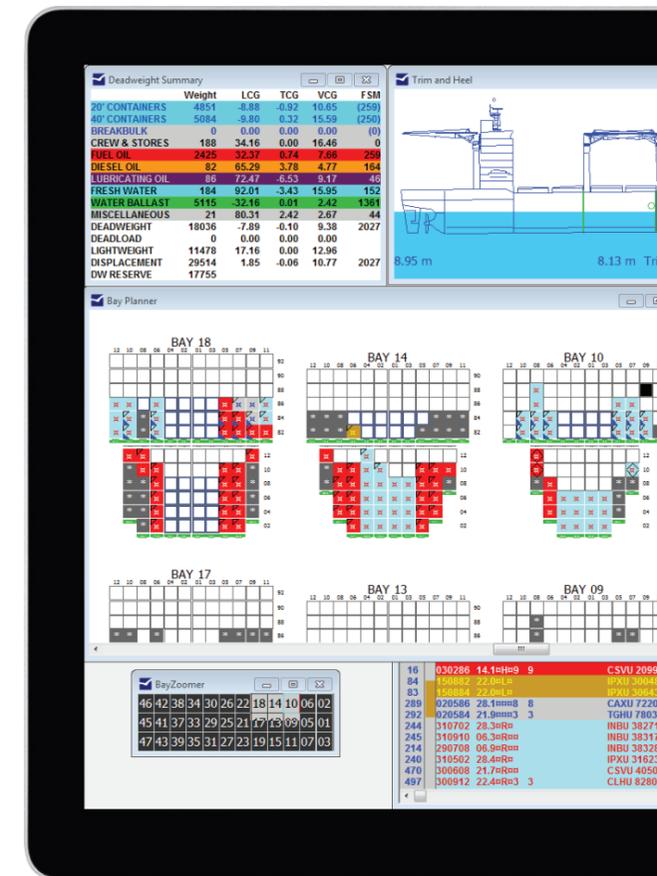
Often these tests are concentrated around the design point for the ship, i.e. to prove that the specified speed at the design draught can be obtained with the expected engine power.

In such cases it is important to advise the yard or designers that more combinations are required in order for the Easeacon FuelSaver to calculate better trim and ballasting alternatives.

Computational Fluid Dynamics (CFD) - an alternative to model tests in water - are based on Reynolds Average Navier-Stokes (RANS). RANS-CFD is the fastest developing area in marine fluid dynamics. Based on fundamental laws (first principle) of mass and momentum conservation, CFD methods provide versatile and increasingly fast solutions.

If a suitable mathematical 3D-model is already available, e.g. from the design stage, this technology is especially suitable to calculate the correlations between speed, draught, trim and power need.

Generally, a set of test data should comprise of approx. 120 points of correlated values of trim, draught, speed and power in order to establish an adequate basis for the FuelSaver optimizations.



FUELSAVER

Based on genetic algorithms, FuelSaver saves fuel by finding a series of ballast solutions which are both checked for strength and stability, and optimized with regards to the fuel consumption at a specified speed by adjusting the draught and trim.

Not only will you be given solutions within your selected trim range, but FuelSaver can also indicate if you may save even more fuel by changing your selected criteria.

- ✓ All ballast solutions are checked for strength and stability
- ✓ Set your own criteria of minimum GM, trim, etc.
- ✓ Check savings and print reports to support fleet performance initiatives
- ✓ Fuel savings of up to 2% are easily obtained - in the initial phase, save even more
- ✓ Supports ISO 14001 compliance
- ✓ Improve your ship's charter value

CALCULATION EXAMPLES

Below are two calculation examples of approximate savings when using the Easeacon "FuelSaver". The following assumptions have been applied in both cases.

Assumption	34,000 DWT Multi Purpose Vessel	13,000 TEU Container Vessel
ME usage	ME 12890 BHP	ME 93323 BHP
Fuel consumption at design condition	37 t/day	247 t/day
Yearly fuel consumption (at 80% ME usage)	37 t/day x 365 days x 80% = 10,804 t	247 t/day x 365 days x 80% = 72,124 t
Savings per year (at 2% fuel saving)	10,804 t x 2% = 216 t, equal to USD 137,211	72,124 t x 2% = 1442 t, equal to USD 915,975

