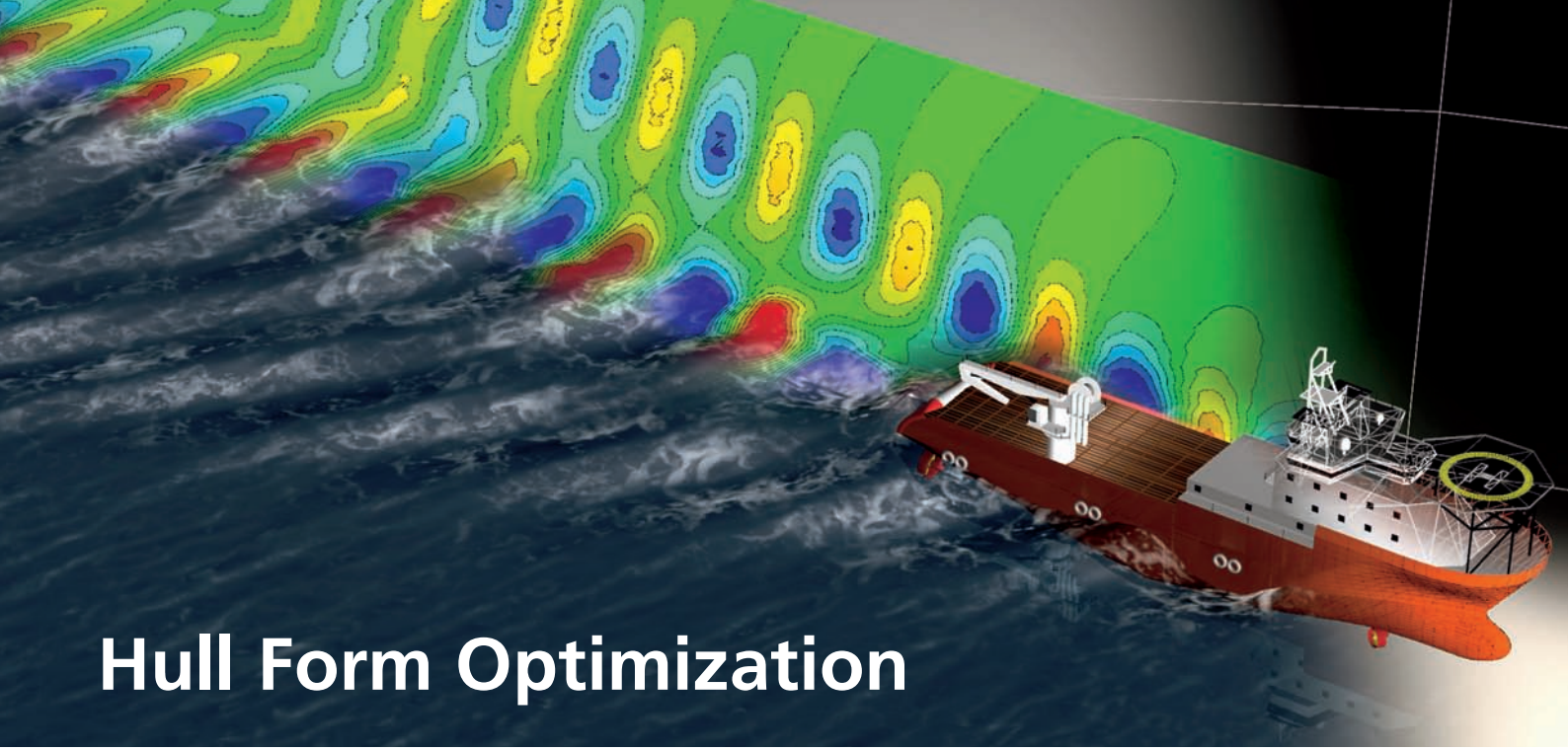


Hull Form Optimization

First principle approach to ship efficiency

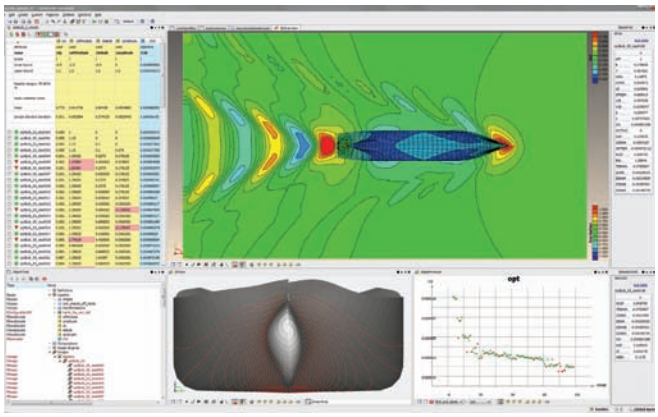
Join experience and numerical simulation technology for the benefit of your product. The formal investigation of many design variants by means of Computational Fluid Dynamics (CFD) broadens your options for the selection of better designs. Designers' experience is the basis for an effective definition of the design space and the smart formulation of constraints. Usually ship designers have good ideas about "What to try next" to improve a design after reviewing the results of a moderate or not yet satisfying CFD-computation or a model test. The application of the *FRIENDSHIP-Framework* allows them to evaluate these ideas with very little effort and almost no extra cost. It has been shown clearly during many design campaigns that ships that have undergone a formal optimization process are superior to those traditionally developed. No matter if you start from an existing design or if you explore a completely new concept – the *FRIENDSHIP-Framework* will allow you to speed up your design process and lead you to better designs with less effort and less money spent. Get prepared to face the competition of the tighter market of the future.

Refinement of existing hulls

Take your existing designs from the drawer as a starting point and apply sophisticated transformations on them to meet the new constraints or operating conditions. Import geometry from IGES, offsets or scans. Apply standard or specially tailored modifications to the hull and account for substantial gains in a couple of hours. Consider design constraints like stability or hard points instantly and let the system take care of leading you into the right direction.

Exploration of new terrain

Evolving markets and changing economic conditions repeatedly ask for completely new concepts in ship design. Be it the new dimension of the Panama Canal, a dramatic increase or decrease in fuel price or the political cost of CO_2 emissions – all reasons for stepping on new terrain and finding solutions to optimal hydrodynamic ship design.



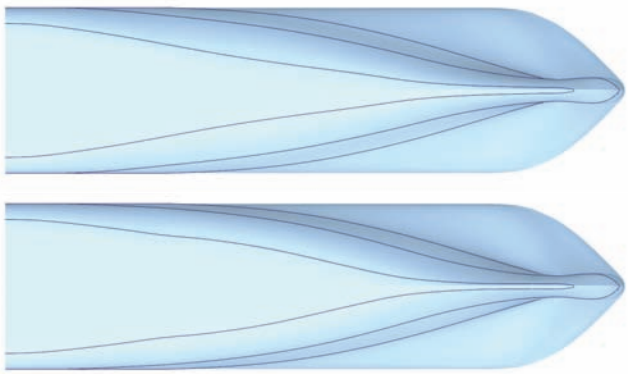
FRIENDSHIP SYSTEMS
A GL company

Size and speed of ships permanently change, and a reliable database for the ships of the future has yet to come. While the competition among designers grows, the demands from ship owners and operators on efficiency will constantly increase.

Systematic investigations of the ships main dimensions can be easily conducted utilizing the *FRIENDSHIP-Framework* in combination with a flow solver or regression models. A sequential combination of exploring global quantities and local shape details in a formal procedure will make sure that the resulting design remains in the competition for the customers' satisfaction.

An example for a hull design element discovered with the *FRIENDSHIP-Framework* is the InSAC. It improves transport efficiency without impairing operational qualities and, too, reduces resistance while increasing payload. Based on an innovative layout of the sectional area curve (InSAC), this design element creates several operational assets. The novel volume distribution influences a ship's free wave pattern advantageously, reducing the energy loss in the free waves generated by the steadily advancing vessel.

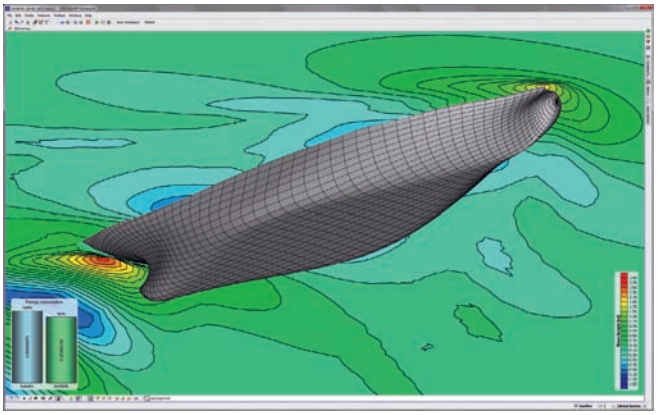
Tangible benefits result from the options the application of the InSAC brings about. Installing smaller engines, unloading the propulsion plant, utilizing added displacement or further pushing the speed of the design process are among the benefits you gain from applying the *FRIENDSHIP-Framework* and its functionality in your design process. It will put you a decisive step ahead.



Conventional and new waterlines with InSAC

Speed up your processes – reduce design costs

Our customers experience faster time-to-market and products of higher quality. The introduction of an integrated approach of modeling and simulation as supported by the *FRIENDSHIP-Framework* constitutes a major chance in design philosophy. The investment made in software and training is quickly turned into higher qualification of your employees and enhances your design processes to maintain and increase the competitiveness of your company in the global market.



Engineering with the *FRIENDSHIP-Framework* takes you a decisive step ahead – meeting future challenges in market regulations and competition. Applying the software system means arriving at optimal functionality and maximum efficiency in less time and less cost.

The *FRIENDSHIP-Framework*. Better Products. Faster Processes. Higher Profits.

FRIENDSHIP SYSTEMS GmbH
Benzstrasse 2, 14482 Potsdam, Germany
Phone +49 331 96766-0 · Fax +49 331 96766-19
info@friendship-systems.com · www.friendship-systems.com

0E825 · 2009-06-01