

## CFD analysis

Computational fluid dynamics (CFD) is a computer-based analysis method that solves fundamental equations of fluid flow numerically within an analysis domain. Many different aspects of fluid flow are able to be examined, resulting in an in-depth understanding of the underlying fluid mechanics. EBDG uses an advanced form of CFD that accounts for fluid viscosity effects including turbulence and flow separation.

EBDG views CFD as a powerful component of our design process. Our CFD analysis has guided both physical design as well as the operating conditions of vessels to obtain improved fuel economy for operators.

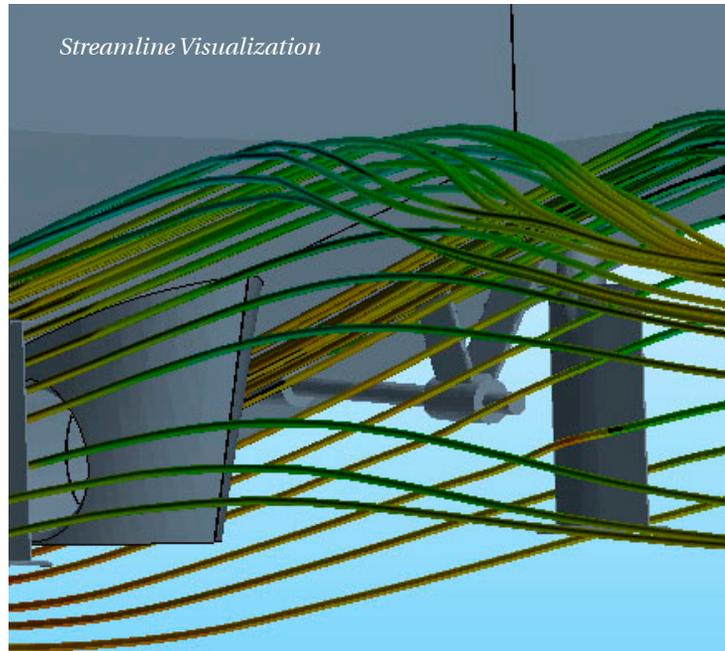
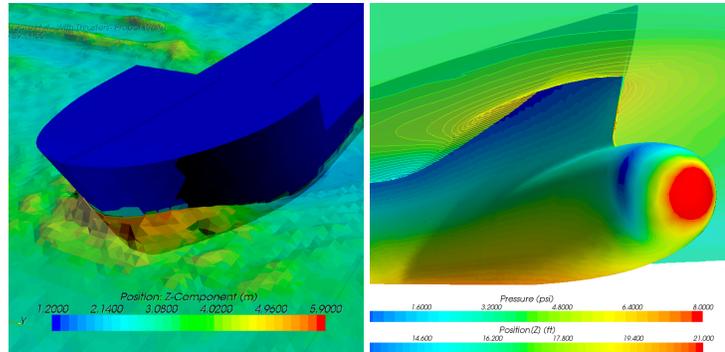
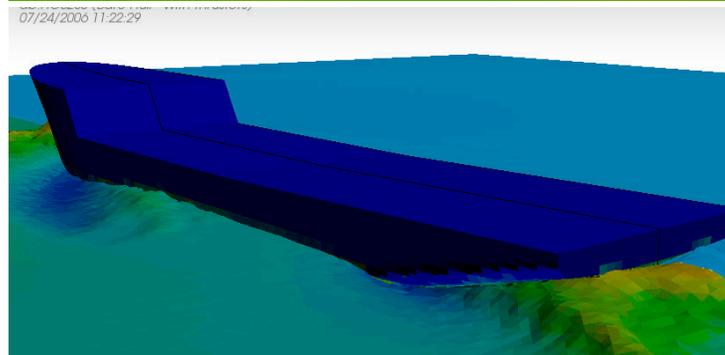
### Applications of CFD

- Hull Resistance and Appendage Drag Prediction
- 6 Degree of Freedom Motions
- Ventilation and Piping System Performance
- Gas Dispersion Studies
- Superstructure Aerodynamics
- Rudder and Propeller Studies
- Exhaust Plume Analysis
- Dynamic Vessel Tow Characteristics
- Flow Induced Vibration
- Vessel Operating Trim Optimization

### Approach

Our CFD strategy is to apply analysis capabilities to both new-build vessel designs and existing structures. With the continual increase in computer processing power and the software to take advantage of multiple processors (cloud computing) we can harness the power of a super computer to perform our simulations. And by continually honing our in-house tools and procedures we can efficiently perform advanced analysis with accuracy and speed.

We have applied CFD both as an alternative and as a complement to physical model testing, saving our clients substantial financial resources and time. This approach results in tangible benefits for our clients.



# case studies

## Resistance Analysis

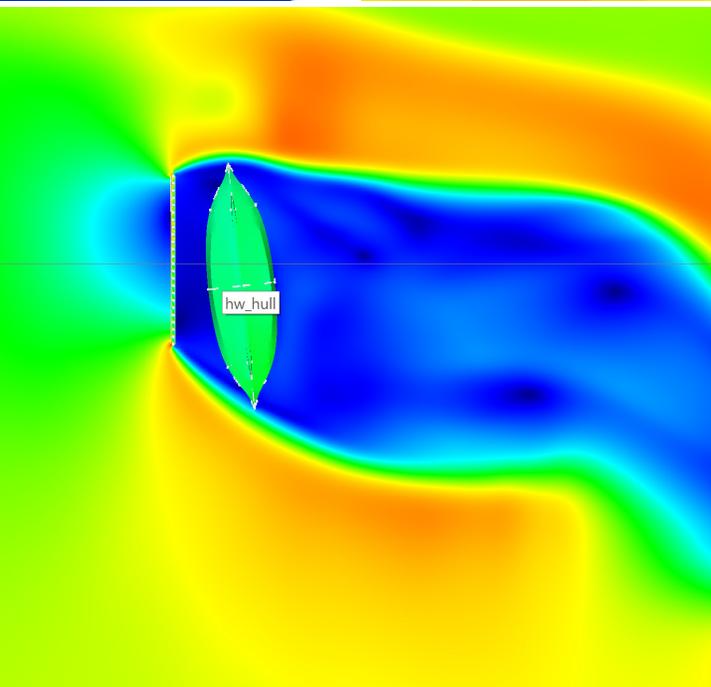
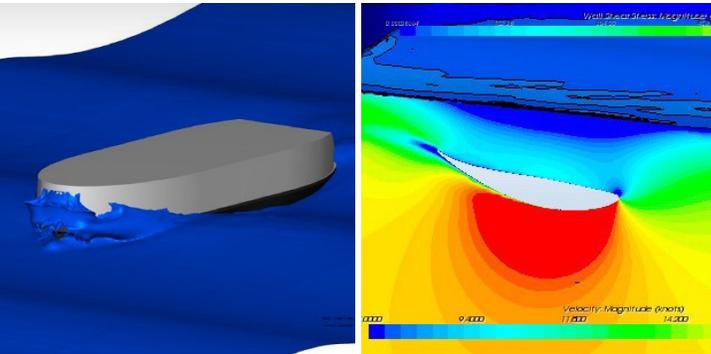
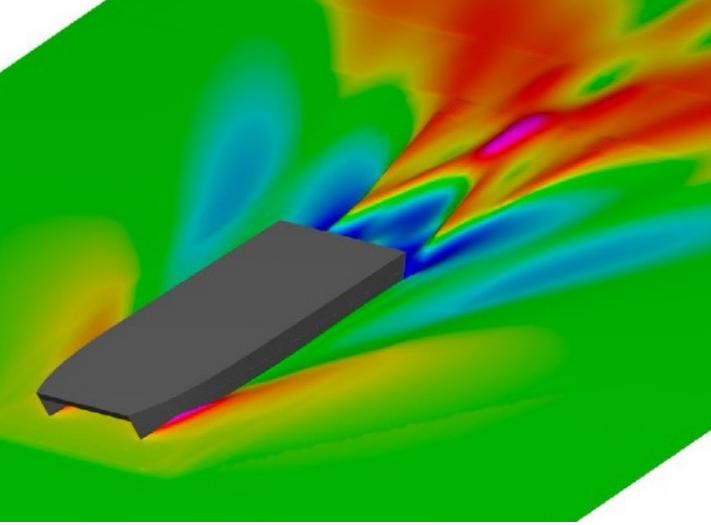
EBDG performed a resistance analysis for a high-speed ferry as part of a project with Sandia National Laboratory. CFD allowed EBDG to determine the planing dynamics and resistance of the vessel with much more accuracy than with traditional parametric analysis.

## Time-Domain Seakeeping Analysis

EBDG performed a time-domain seakeeping analysis of the M/V WOODS HOLE for The Steamship Authority. The vessel response in extreme wave events was analyzed to determine if the operating limits of the vessel could be increased. The use of CFD allowed EBDG to accurately examine green water and spray on the bow of the vessel.

## Foil Design For A 211 FT Yacht

EBDG designed a foil for adjusting the running trim of a 211ft yacht for Delta Marine Industries. CFD made it possible to rapidly analyze multiple concepts for the foil design. EBDG employed CFD not only to determine the performance of the individual foil, but to examine the interaction between the foil and the vessel to attain a realistic prediction of the vessel performance.



# our team is your team

EBDG is committed to delivering the best service in the marine industry, and our dedicated team brings skill, integrity, and professionalism to every project. Our team of marine analysts partner with EBDG's growing team of naval architects, marine engineers and infrastructure experts to deliver solutions that are better to build and better to operate.



better to build · better to operate