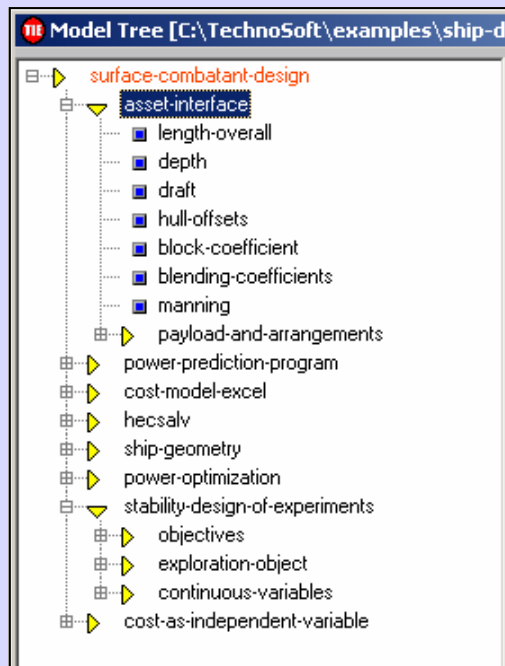




An MDO Environment for Conceptual Naval Ship Design

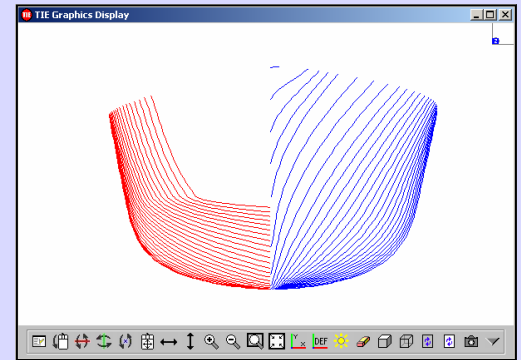
As part of a research program funded by the U.S. Office of Naval Research, TechnoSoft is developing a Multidisciplinary Design Optimization (MDO) environment for conceptual naval ship design. The goal of this program is to introduce a product to the naval architecture industry that can help early phase ship designers to more effectively explore the design landscape while simultaneously accounting for cost, risk, and mission effectiveness.

TechnoSoft's Tool Integration Environment (TIE) provides the perfect framework to enable the flexible integration of various disciplinary design and analysis tools, such as file-based programs and Excel spreadsheets that are commonly used to compute resistance, propulsion, stability, seakeeping, cost, and mission effectiveness.



TechnoSoft is using its proven Adaptive Modeling Language (AML) to build a knowledge-based modeling environment for ship geometry, including the hull-form, internal compartments, and deck-house.

This novel ship design environment will leverage many legacy tools, including the Navy's own ship synthesis tool, the Advanced



Surface Ship Evaluation Tool (ASSET). ASSET contains a wealth of naval architecture knowledge that is employed to make sure that the designer's inputs are consistent with the ship's purpose, and to make educated guesses for inputs which are not provided.

Once all of the relevant ship design and analysis tools are integrated, a host of design exploration methods will be available for easy use. These methods will include genetic algorithms, design of experiments, parametric studies, Monte Carlo simulations, and gradient-based optimizations. By automating most of the design iteration, data collection, and design space visualization tasks, it is hoped that naval architects will be able to explore a larger set of ship design approaches in order to arrive at a better design quicker.

In the end, using optimization and stochastic methods in combination with an integration environment should yield significant improvements in ship design decision-making processes.

