

## Project #4: Advanced Hull Forms

Date issued: November 17, 2004

Date due: December 3, 2004

1. Background. The majority of the course content for 13.400 covers basic naval architecture disciplines applied to a monohull surface ship with flared bow and significant freeboard. While solid grounding in the rudimentary concepts is important, a look to the future of naval ship design reveals that non-traditional hull forms will be an integral part of the Navy in the 21<sup>st</sup> century. For example, the DD(X) hull form is a tumblehome and the two competing industry teams involved in the Littoral Combat Ship (LCS) design have chosen a trimaran hull (General Dynamics - BIW) and a semi-planing hull (Lockheed Martin).

2. Discussion. Each of the above innovative designs, departures from “traditional” U. S. Navy ship designs, must, in the mind of the designer, hold advantages in some aspect of ship performance over a monohull. However, there may also be some disadvantages, not as likely to be highlighted, that come along with these innovations. The prudent ship designer and program manager will do well to be aware of both sides of these issues, and ensure the funding sponsor and warfighters are similarly informed .

3. Assignment. Choose **one** of the above in-process ship designs, and, using the ample resources available to you at MIT and in open literature and/or on-line, conduct adequate research to enable you to:

- Provide a qualitative analysis of the ship designers’ claims for performance. The questions you should be answering (implicitly, not necessarily explicitly) include (but are not limited to):
  - What requirement(s) has the Navy imposed that caused the shift away from traditional monohull designs?
  - Are there other navies of the world who already have vessels with similar characteristics?
  - Are there technological risks that need to be addressed? If so, how does the designer plan on mitigating them?

- Provide a counterpoint of potential disadvantages of the design. Issues of interest include, but are not limited to:
  - What “penalties” will the warfighters pay? ie, Highlight differences from what the ship drivers of today are accustomed to versus what the new designs will deliver.
  - Are any laws of physics being broken?
  - Did you discover any possible disadvantages not covered in the literature?

4. Deliverable. Form your research, observations and thoughts into a 3-5 page term paper containing an Introduction, Discussion, Conclusion, and Bibliography. Diagrams and photographs are not required; if included, do not consume your 3-5 pages with space-filling pictures, ***this is a research and writing exercise.***

5. Collaboration. Unlike the other analytical-based projects in this course where comparison of intermediate results with classmates was encouraged, the paper needs to be entirely your own work. Grading will be based on overall content, quality of knowledge-based conclusions, and clarity of writing style.