SNAME Annual Meeting 2011
Houston, TX

Joint T&R Session

November 18, 2011

Current Needs in Structural Research

Peter W. Witherell
CSC Advanced Marine Center
Boston, MA

Some Proposals from a Designer's View

#1. Responding to a frequent U.S. Navy problem of actual ship acquisition and life cycle costs exceeding budgeted allowances, what might be done in the structural area to curtail unbudgeted cost growth?

- Take better advantage of mission modularity and reconfigurable spaces during the acquisition process?
- Develop more credible life cycle structural maintenance plans as part of the design process?

#2. For ship structural design with 5xxx-series aluminum alloys, what are the most cost effective ways of combating potential sensitization and intergranular corrosion?

Recent research has shown that even ASTM B928/ B928M marine-grade aluminum alloys are subject to $Mg_2 Al_3$ precipitation at grain boundaries at temperatures above 120^{o}F (hot sun). Do we try to prevent sensitization through new alloys, new tempers, greater use of FSW welding, coatings, or some other means?

#3. Sandwich panels, particularly those using aluminum honeycomb, have gained acceptance for shipboard non-structural uses, but what about structural applications of aluminum, stainless steel, and even steel sandwich to reduce weight and save on life cycle costs?

- SR.N4 hovercraft, constructed of AL 2024 honeycomb-cored sandwich panels, ferried passengers and cars across the English Channel from 1968-2000. Panels were painted and bolted together to form the overall structure.

- Fellow panelist Peter Noble reports that steel Sandwich Plate Systems (SPS) are being used to repair Floating Production and Storage Offloading Units (FPSOs).

- What else?

#4. Technical research related to ship structures is typically applied in structural design as a result of new rules/guidelines generated by regulatory bodies and classification or professional societies (e.g., U.S. Navy, ABS, AWS, AISC, ASTM, etc.). As a result of this indirect and parochial application of research to design, ship structural design improvements based on global technical research and shipbuilding practices are bound to be uneven and slow in development.

How might things like welding procedures, structural shapes for shipbuilding, ship design loads and material strength properties be standardized to a greater degree (globally), enabling more cost effective structural design?