Northrop Grumman Ship Systems

ShipTech

February 2007

Dick Hodges
Composites Engineering

NORTHROP GRUMMAN
Ship Systems

Composites for Navy Vessels

- Commercial vs Navy Vessels
- Composites Acceptability
  - Traditional steel design
    - research->test articles->full size components
  - Shipyard knowledge/experience has made great strides forward
- Costs – Initial Acquisition vs Total Ownership Cost
- Paradigm shift in technology is occurring now

Composites Technologies

- Manufacturing Processes
  - Hand Layup
  - VARTM
  - Low Cost Joints
  - Other (automated processes)
  - Pultrusion
- Materials
  - laminates
  - resins
  - phenolics
  - nano-composites
  - additives
- Process Enhancements
  - modeling and simulation
  - laser placement
  - fixturing

Challenges

- Material System Qualifications
- Analytical vs Testing Validation
- Composites Costs
- NAVSEA vs ABS regulation/approval
- Variations in allowables – readily optimized variables

Technical Issues

- costs for panels, molds, and assembly
- outfitting techniques
- foundation designs
- composite–to–steel joints
- thermal isolation
- fire resistance or fire proof resins
- improved material properties

Competition

Our competition today is composite military vessels built by foreign shipyards which are already in service.

The goal of the composites community in the U.S. should be to continue to improve the composites' products and processes and reduce costs through production.