

NORTHROP GRUMMAN

DEFINING THE FUTURE

Composites Lessons Learned

PDMT Panel Meeting

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Mark Losset & Harold Brashears

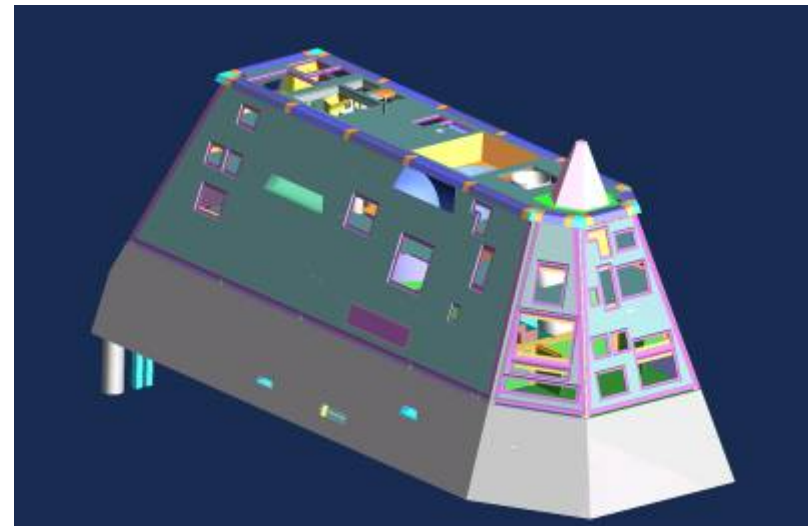
Program Engineering
Northrop Grumman Ship Systems

Concept: Learn from the Past

- **Composite structures have been exposed to environmental insult for many years**
 - Advanced Enclosed Mast System
 - On USS Radford exposed to marine environment for ten years
 - Integrated Topside Demonstration System
 - Exposed to marine environment in South Mississippi, including Katrina
 - Integrated Deck House Test Article
 - Exposed to summer heat in desert

Goals: A Unique set of Data

- By documenting the design criteria, exposures, coatings, and conditions, the project will allow designers to learn from past efforts and improve future structures. The goals of this project are to provide a unique set of data that will contribute to significant advances in the design and fabrication of future naval composite structures.



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Tasks

- **A ship check examination of the structures will be performed to ascertain areas of interest from an aging perspective.**
- **The overall condition of the structures will be documented.**
- **During the disposal of the Radford samples of the AEM/S mast will be obtained.**
- **These samples and samples from other structures will be examined with both with physical and chemical tests.**
- **The test program will document the effect of long term environmental exposure.**

Lessons to be Learned

- **Expected maintenance and life cycle costing**

Examination of candidate structures will provide real-life data to estimates of maintenance costs.

- **Exposure to weather / UV**

Testing of exposed aged laminates, both coated and bare, will provide information relevant to degradation of the composite due to UV and weather.

- **Potential weight savings**

Design criteria for aged composites are uncertain, resulting in over engineering. Specific information may allow lighter laminates and save both weight and manufacturing cost.



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Deliverables & Benefits

- **Deliverable - A unique set of data and retained samples that will contribute to significant advances in the design and fabrication of future naval composite structures.**
- **Benefit – Provide significant information that will contribute to advances in design criteria, long term maintenance, and fabrication methods for Navy composite structures.**