Composite Bonding Workshop

Manufacturing Implementation & Experience
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Complexities of Large Integrally Bonded Structures

- Material Types
  - Honeycombs of Various Types
  - Monolithic Layups

- Bonding Material Types
  - Paste Bonds
  - Film Adhesives

- Different Cure Processes
  - Autoclave Cure
  - Oven Cure
  - R/T Sets

- Different Joint Types
  - Single / Double Shear
  - Out – of - Plane

- Hybrid Structures
  - Metal and Composites

- NDT NIGHTMARE
  - C-Scans, A-Scans
  - X-Rays
X-37 Composite Details
X-37 Composite Details
Bonded Assembly
Bonded Assembly Sequence
Mechanical Assembly
Core Collapse Problem with 3.5 pcf Honeycomb

Tank Skin

Conclusion:
3.5 Core not Compatible with cocure process
Complex Shape Problems
Longerons and Shear Clips
EXCELLENT RESULTS

Part had only a .2 deviation (Potato Chip Twist) End to End
Complex Shape Problems
Longerons and Shear Clips

Several Different Bagging Methods being Investigated

Paste Bond of Frames Completed
Conclusions

- Bonded Structures will Challenge All Aspects of Manufacture, Inspection, Analysis
- Certification will become much more a Joint Alliance Between All Areas

Planning and Execution of a Robust Design both Manufacturing and Engineering are ESSENTIAL TO SUCCESS!