Mil Hdbk 17 Bonded structures workshop

Manufacturing implementation and experience
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• **Primary objective**
  – Collect, document, and get industry consensus of *critical issues regarding manufacturing implementation and experience of bonded structures (preferably with ranking)*

• **Secondary objective**
  – How to address critical issues
    • Proven engineering practices
    • Provide directions for R&D
    • Identify needs for engineering guidelines, standard tests and specs
Importance of manufacturing

- “Adhesive bonds seldom fail because of poor design or materials selection – they fail because of deficiencies in the manufacturing process and its implementation”
- “Adhesive bonding is a process where there is no post-event method for measurement of the success of the process”
- “Passing NDI is necessary but not sufficient to ensure bond integrity”
- “Bond integrity must be obtained by management of all aspects of the bonding process during manufacturing”

Quotes adapted from:
Some issues in manufacturing implementation

- Handling of the adhesive
  - Storage, aging
- Surface preparation
  - Environmental cleanliness and control, contamination
- Dispensing adhesive
  - Sequence and timing of bonding process steps, gap filling
- Dimensional control (adhesive layer thickness)
  - Dimensional control of substrates, verification of fit
- Bonding fixtures
  - Application of preloads, bondline thickness control, defects
- Cure control
  - Local variations in temperature and pressure, porosity
- NDI/quality control
  - Cured bondline evaluation, tracking outcome and bond process variables
- Scaling of processes to larger/smaller structures
  - Scaling of a developed process to a larger (smaller) structure
- General
  - Equipment maintenance, training of personnel, documentation of process, handling/storage/disposal of materials