Cessna Bonding Experience

An Overview of 40 Years of Experience
Cessna Experience

- 1960s - Secondary structure
- 1970s - Primary structure, integral fuel tanks
- 1980s - Fully bonded airframe
- 40 Years Experience and 6000+ airplanes
What is Primary?

- Doublers bonded to skins
- Ribs, rib caps, and frames bonded to doublers/skins
- Stringers bonded to doublers/skins
- Spar assemblies (webs and caps)
- Engine beam assemblies
- Flight control surfaces
Critical Safety Issues and/or Certification Considerations

- Joint design and durability
  - Corrosion
  - Allowables

- Manufacturing defects
  - Those that can be inspected and quantified
    - Voids
    - Thickness
  - Those that are difficult to quantify
    - Oxide integrity
    - Surface contamination
Single and Twin, Piston Engine Aircraft
Twin Engine Turboprop
~ 1970 to Present

- Clad alloys
- Acid etch surface treatment
- Chromate bond primer
- Paste and film adhesives
- Primarily mechanical pressure or vacuum bag, oven cure, some autoclave
Early Model 500 Citation Aircraft
~ 1970 to mid 1980’s

- Clad alloys
- Acid etch surface treatment
- Chromate bond primer
- Paste and film adhesives
- Primarily autoclave cure
Current Generation Citation Aircraft
~ 1980 to Present

- Bare alloys
- Phosphoric acid anodize surface treatment
- Chromate bond primer
- Primarily film adhesive
- Primarily autoclave cure
Why?

“Adhesive bonding was used to increase the efficiency of the structure with regards to strength, durability, and damage tolerance. The airframe is more weight efficient and has smoother exterior surfaces. The overall benefit is improved performance and lower life cycle costs.”

Citation III Bonded Structure
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