Composite Modification Workshop
Wrap-Up

Wichita, KS
August 22-23, 2017
Organization of AC

- We discussed two ways to organize the content
  Option 1, Divide by application, and discuss applicable rules:
  - Modified Structure
    - M&P
    - Static Strength
    - F&DT
    - Other
  - Composite Part
    - M&P
    - Static Strength
    - F&DT
    - Other
  - Installation
    - M&P
    - Static Strength
    - F&DT
    - Other
Organization of AC

Option 2, Divide by regulation, and divide by application:

- **M&P**
  - Always consider
  - Modified Structure
  - Composite Part
  - Installation

- **Static Strength**
  - Always consider
  - Modified Structure
  - Composite Part
  - Installation

- **F&DT**
  - Always consider
  - Modified Structure
  - Composite Part
  - Installation

- **Other**
  - Always consider
  - Modified Structure
  - Composite Part
  - Installation
The Use of Buckets

- Should we have buckets?
- How do we define them?
- What do we call them?
M&P Feedback

- Current draft content does NOT address the three concerns related to modified baseline structure in an organized/consistent way
  - Define what you are working with
    - Reverse engineer baseline material, process, design values
  - Define new material to be added
    - Create material control, process control, design values
  - Determine compatibility between baseline structure and new materials
    - Surface preparation, effect of new cure cycle, process control for drilling and similar procedures, protection of structure, in-process NDI procedures
M&P Feedback

- Will include some degree of “design guidance” in saying “Consider….”
- Will consider referencing different requirements for one-off designs
- Include requirements for process specifications for more than just composite fabrication
  - Lightning protection, fastening, etc.
- Clarify, when talking about bond redundancy under 2x.613, whether or not mean or b-basis properties must be used
Structural Mod Workshop: M&P

- Many discussions addressed challenges of reverse engineering base structure processes
  - As may be needed to cover substantiation that required both the base structure and new parts in the modification
- Considerable comments collected on details relating to draft text
Static Strength Feedback

• Clarify Loads Considerations
  - Review 25.305(c) language and policy (confusing sentence)
  - Consider including affirmation of existing regulatory load requirements, event loads, addition of excitation(?), significant changes in stiffness --- properly enveloped?
  - Consider Coupled Loads at Attach Points
  - Consider Stability (buckled, post-buckled)
  - Clarify aerodynamic loads and internal pressures are combined
  - Consider some illustrations/examples for more complex (potentially confusing) paragraphs

• Validation & Testing
  - Discussion about validation, FAA team asked for further input regarding validation testing outside of cert projects – boundaries, etc.

• Consider Pre-Mod Inspection, Post-Mod Inspection to characterize the structure (mfg defects such as porosity/delamination). Several concerns with this, but maybe acceptable under some conditions.
Static Strength Feedback

• **Re-evaluate Rotorcraft Loads/Discussion**
  - Torquing Event (Hover condition)
  - Review against existing policy

• **Review Decompression Policy (and simply reference it if possible)**
  - Single Bay vs $H_0$ vs some other rationalized value
  - Types of Radome Vents – fixed vents, actuating panels, non-actuating panels (pinned)
  - Concern over “undetected pressure leak” (latent)

• **Consider examples for each type – Critical, Secondary Structure, Non-Critical Component (especially in regulatory list)**

• **Further Discussion about required damage levels for “Secondary Structure” and “Non-critical Components”**
Structural Mod Workshop: Fatigue and Damage Tolerance (+ Bird Strike & ICA)

- Significant effort needed to cover Fatigue and DT for structure outside that currently identified as “critical structure” per AC 20-107B
  - Part of the challenge involved in justifying certain structure needs to have bird strike testing
  - Essential partly because we are trying to cover many different classes of the structure in the AC
- Bird strike efforts for transport radome structure benefits from analysis calibration supporting dynamic bird strike tests
General Feedback

• **Keep the feedback coming!**
  - Hard copy comment forms
  - Email comment forms
  - Other emails / thoughts

• **Current schedule is a draft for internal FAA review at the end of the calendar year, then go for public comment**
Structural Mod Workshop: General

• One of the best forum ever held on the subject of structural mods involving composites
  ➢ Number of participants was ideal
  ➢ Venue was near perfect
  ➢ Inputs collected were all valuable
  ➢ Every participant has earned a ticket to next year's workshop to be hosted by Hawaiian Airlines in Honolulu

• Timing/approach for a Mod Workshop next year
• Many thanks to WSU for this year's workshop