

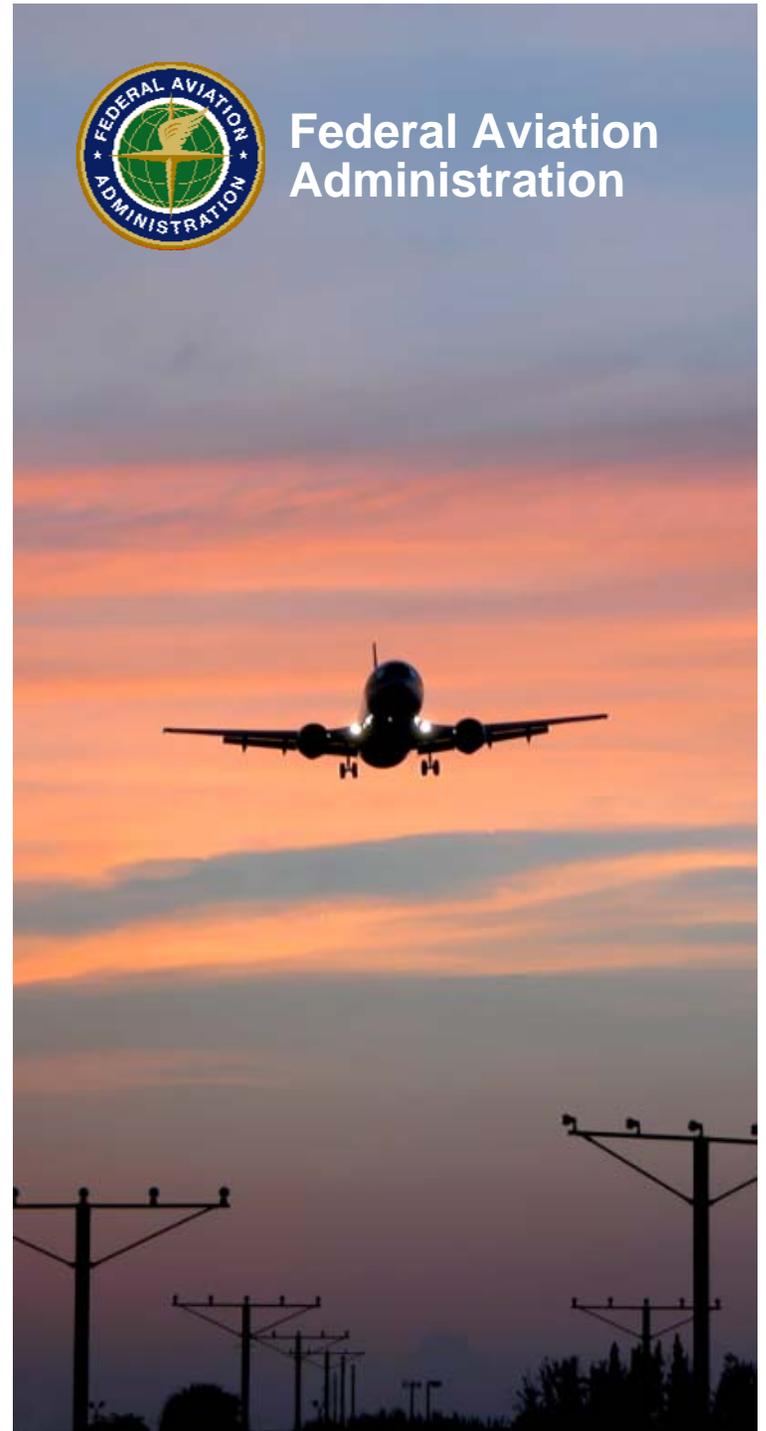
Continued Airworthiness

Center of Excellence - General Aviation

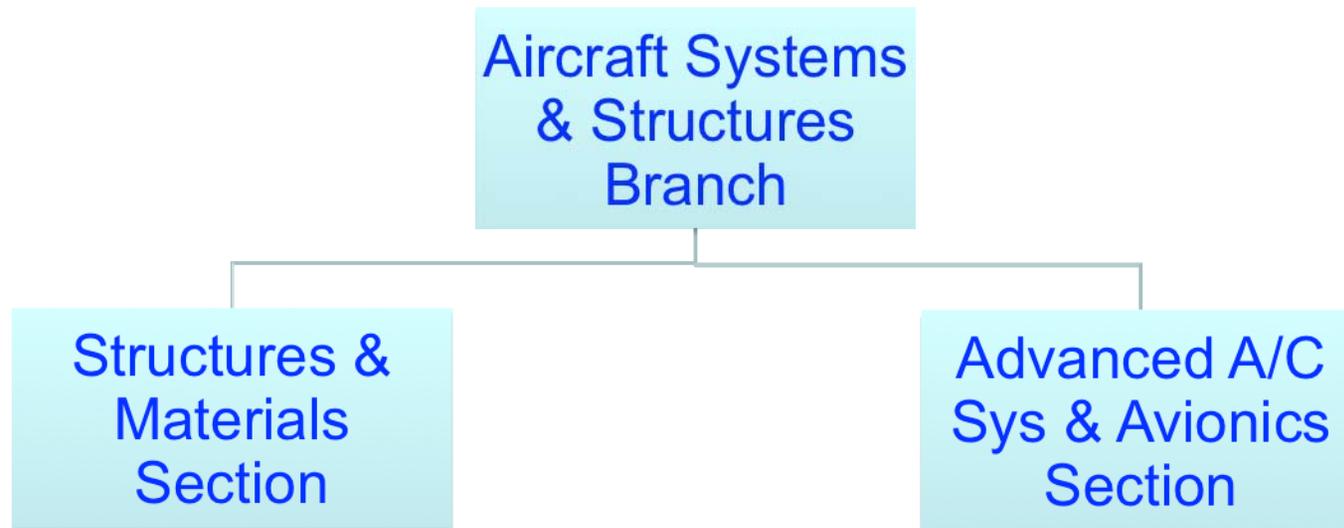
Presented to: COE-GA Public Meeting
By: Xiaogong Lee
Aircraft Systems & Structures
Branch
Date: November 17, 2011



Federal Aviation
Administration



Program Responsibilities



- ✓ *Advanced Materials (6BC)*
- ✓ *Structure Safety (6BA)*
- ✓ *Transport airplanes – Metallic (6EA)*
- ✓ *Small airplanes – Metallic (6EA)*
- ✓ *Maintenance & Inspections (6EA)*
- ✓ *Catastrophic Failure Prevention (6FA)*
- ✓ *Engine Inspections (6EA)*

- ✓ *Electrical Systems (6EA)*
- ✓ *Flight Control & Mech. Systems (6EA)*
- ✓ *Rotorcraft System (6EA)*
- ✓ *Software and Digital Systems (6DA)*



Structures & Materials - Metallic

- Ongoing
- Near Term
- Future Plan

Continued Operational Safety

- ◆ Risk Methods for COS
- ◆ RAM Survey for WFD
- ◆ Freeplay Limits to Preclude Flutter

Safety Regulations & Standards

- ◆ MMPDS (MIL-HDBK-5)
- ◆ NASGRO

Emerging Technologies

- ◆ Bonded Repair Technology
- ◆ Structural Health Monitoring
- ◆ Damage Arrest Integral Structure
- ◆ Aluminum Lithium
- ◆ Emerging Metallic Structures
- ◆ Active Flutter Suppression



In-House Programs

- ◆ Full-Scale Aircraft Structural Test Evaluation and Research (FASTER)
- ◆ Airframe Computational Modeling (ACM)
- ◆ FAA-Drexel Fellowship Program

General Aviation Picture Today

CAR 3

- About 150,000 airplanes
- Average age > 35 years
- Majority are aluminum
- Designed w/o fatigue rqmt's
- Flown 100-150 hrs avg. annually

Part 23

- Similar to CAR 3
- < 10,000 airplanes

Bulletin 7 CAR 4 & 4a

- Wood
- Tube & Fabric
- Aluminum

Experimental

- Over 20,000 airplanes
- Flown 60-70 hrs annually
- Fastest growing segment
- War birds (WWII, Korea, Vietnam)
- Exhibition (gliders, racing)

Other

- Gliders
- Balloons
- Airships
- Light-Sport

Special Use

- Agricultural
- Firefighting
- Survey, etc.

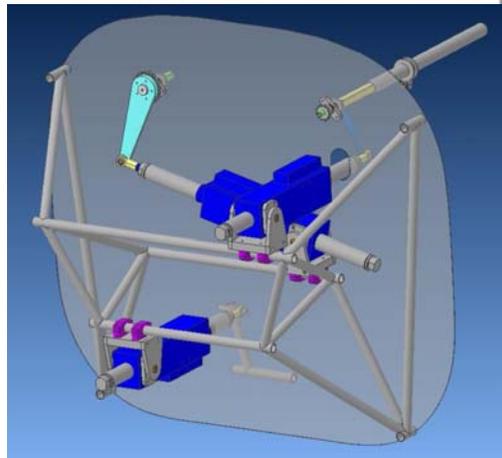
Risk Assessment and Risk Management for GA COS

- **Driver**
 - Over 150,000 active small airplanes with no fatigue requirements with average age of over 35 years
- **Needs (SMS requirements)**
 - Quantified safety risk
 - Data-driven decisions
 - FAA MSAD program requires tools to evaluate data and manage risk
- **Outcome**
 - Methods for managing fatigue concerns of GA airplanes
 - Quantitative tools to assess and manage risk of age-related structures safety



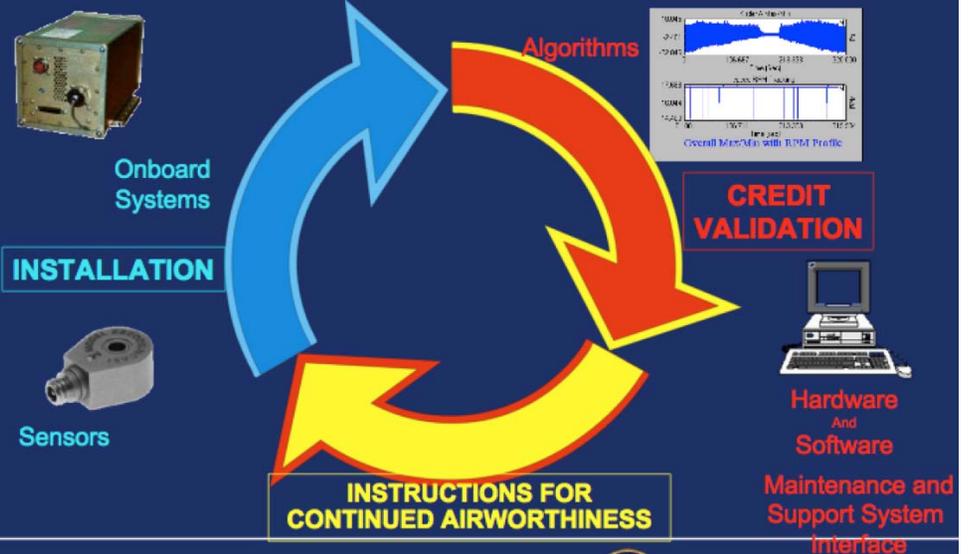
Systems & Avionics

GA Flight Env. Protection



Rotorcraft HUMS (Part 27)

CERTIFICATION APPROACH



GA Accident Prevention: Basic Envelope Protection

- **Description:**
 - Assess feasibility of using current A/P technology to provide envelope protection.
- **Objectives:**
 - Reduce the number of GA Loss of Control accidents.
 - Use automation to aid pilot; when needed
 - Safer single pilot flight operations
- **Approach:**
 - Define concept for using A/P
 - Evaluate concept effectiveness and identify design/safety requirements
 - Develop recommendations for design & certification



Rotorcraft Research

- **Usage Monitoring System (UMS):**
 - Needs
 - Certification approach, end-to-end/close-loop
 - Installation/Qualification: airworthiness requirements
 - Credit Validation: direct and/or indirect evidences
 - Instruction Continued Airworthiness (ICA)
 - Approach
 - Work with Army AED & industry (OEM, Operators)
 - Focus on civil applications, i.e. update the AC
 - Collaborate with HAI with emphasis on Part 27 helos
- **Advance Controls**

