Part 23
Advanced Flight Path Control Certification

Highly Augmented Flight Controls

Presentation to: On Demand Mobility Workshop
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Objectives

1. Stimulate discussion through questions
   • Opportunity for certification of flight control systems to be treated differently

2. Provide update on current FAA efforts
   • Fixed Wing
   • Rotorcraft (John Vanhoudt)
1. What is the difference between Part 25 and Part 23?
   - 19,000 pounds and 19 seats

2. How did the FAA certify Part 25 Fly By Wire?
   - Current Rules do not address modern FBW
   - FAA did not “dictate” design
   - FAA accepted Boeing + Airbus approach
     - But FAA Levied Special Conditions (7)
     - Fit into existing regulatory structure
3. Should we treat FBW AFPC cert differently for Part 23?

• Scalable level of risk
• Assumptions for operators
• Whole vehicle parachutes
• New methods of design/architecture
  ➢ Run time assurance, Redundancy
• Opportunity to reduce fatal accidents
  ➢ Safety Record in General Aviation
  ➢ Built in Envelope protection
4. Part 25 FBW Fatal accidents
   - Did special conditions + existing rules address root cause and human factors issues?

5. Traditional Flight Control Handling Qualities Testing
   - Currently, still rely on Mil STD techniques
   - How should we test new designs?
     - focus on inherent characteristics of modern flight control systems
Discussion Topics (4 of 4)

6. How can we make FBW AFPC affordable in GA?

7. What will be required to implement FBW AFPC in a significant portion of the GA fleet?
Develop **MOC** for specific Technology

- Small Airplane Safety Enhancement Program (SASEP)
- Technological selected in conjunction with GA-JSC (General Aviation Joint Steering Committee)
  - AOA, Enhanced Envelope Protection, Digital Parachute
  - Flight Path Trajectory Management
  - Highly Augmented, Manually flown

Technologies selected based on feasibility and effectiveness to reduce Fatalities (i.e. LOC)

- Retrofit Fleet *and* New Aircraft
- Make Implementable and Affordable
Advanced Flight Path Control Disconnects

1) Good designs
   -- may not comply with existing Rules
2) Testing to show compliance to existing Rules
   -- may not be sufficient to expose unsafe designs
3) Handling Qualities and Integration Testing
   -- needed for standardization and Human Factors

FAA Funding in place to address these issues
Looking for collaboration with Industry / NASA / Academia
Current Rotorcraft Research

- FAA Research Contract with Hoh Aeronautics, Inc
- Bell 525 – first civilian rotorcraft with Adv Flt Ctrls
- Developing a minimum set of performance specs
  - Handling Qualities via analysis (incl PIO)
  - Degraded modes
  - Qualified bench testing for credit
- Output documents
  - Policy and Guidance (AC and Handbook)
  - Regulations
Highly Augmented Flight Controls

Questions?
• BACK UP SLIDES
We are Human – We make mistakes, so…

- Let **Machines** do what they do best
  - Tedious Tasks (like monitoring)
- Let **Humans** do what they do best
  - Critical Thinking
  - Judgment
  - Strategic Planning

- Don’t Let OLD Rules Block New Technology
- Research Looking at New ways to Certify:
  - Flight Controls + Displays + Crew Interface
FAA Research Goals

- High Level Rules
  - Specified in Part 23 Re-write
- Recommendations for Lower Level Guidelines
  - Methods of Compliance (MOC)
- Recommendations for Updates
  - Policy and Guidance
Selected Technologies

- Angle of Attack
- Energy State Awareness
- Improved Envelope Protection
- Simple Autopilots and Cockpit Automation
- Enhanced Displays
- Electronic Parachute (Emergency Auto-land)
- Flight Path Trajectory Management
  - Highly Augmented, Manually Flown
SUMMARY

• Focused on Implementation of New Technology
  • highly augmented flight path control with
  • sensors and displays to help pilot maintain Situational Awareness
  • include envelope protection and automation