

Composite Safety and Certification Initiatives



Federal Aviation
Administration

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Larry Ilcewicz

CS&TA

Federal Aviation
Administration

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Ongoing FAA Composite Safety and Certification Initiatives

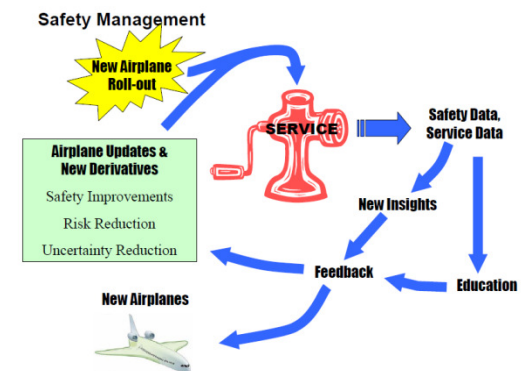
- Actively working with industry since 1999

Objectives

- 1) Work with industry, other government agencies, and academia to ensure safe and efficient deployment of composite technologies used in existing and future aircraft
- 2) Update policies, advisory circulars, training, and detailed background used to support standardized composite practices

- Safety management (airworthiness) Task Groups initiated within composite standards organizations (CMH-17, CACRC)
 - Some direct JAMS funding support

Approach Following Principles of Safety Management



JAMS Safety Management Project

- Contracted support in leadership of CACRC & CMH-17
 - CACRC Co-Chairman and Training & Airworthiness TG
 - CMH-17 Safety Management WG (Incl. Damage Tolerance TG)
 - CMH-17 Sandwich WG
 - CMH-17 shared databases and spec initiatives
 - Technical transfer of selected JAMS projects
- Development of CMH-17 V3/Ch.3 Certification Tutorial
 - Offered since August 2008
- FAA/EASA/Industry Damage Tolerance Workshops
 - Technical and logistical support
 - Speakers not funded by their companies
- AC 20-107B development
 - Advice and review



FAA Composite Team Members

Represented Group	Team Member Name	FAA Organization Number & Routing
FAA Technical Center	<i>Curtis Davies</i>	<i>AAR-450 (FAA Technical Center)</i>
	<i>Michael Shiao</i>	<i>AAR-450 (FAA Technical Center)</i>
	Lynn Pham	AAR-450 (FAA Technical Center)
Directorates	<i>Lester Cheng</i>	<i>ACE-111 (Small Airplane Directorate)</i>
	Bob Stegeman	ACE-111 (Small Airplane Directorate)
	Sharon Miles	ASW-110 (Rotorcraft Directorate)
	<i>Mark Freisthler</i>	<i>ANM-115 (Transport Airplane Directorate)</i>
	<i>Allen Rauschendorfer</i>	<i>ANM-115 (Transport Airplane Directorate)</i>
	Jay Turnberg	ANE-110 (Engine & Propeller Directorate)
DC Certification	<i>Dale Hawkins</i>	<i>AIR-120 (Aircraft Standards Division)</i>
Flight Standards	<i>Otto Hill (& Rusty Jones)</i>	<i>AFS-320 (Aircraft Maintenance Division)</i>
	Gary Goodwin	ANM-200 (Seattle AEG)
	Roger Caldwell	ANM-100D (Denver ACO)
	Ed Garino	ACE-117A (Atlanta ACO)
	Hassan Amini	ACE-117A (Atlanta ACO)
ACOs,	Fred Guerin	ANM-120L (Los Angeles ACO)
	<i>Ken Paoletti</i>	<i>ANM-120S (Seattle ACO)</i>
MIDOs,	<i>Angie Kostopoulos</i>	<i>ACE-116C (Chicago ACO)</i>
	Richard Noll	ANE-150 (Boston ACO)
	John Harding	ANM-108B (Seattle CMO)
	<i>David Swartz</i>	<i>ACE-115N (Anchorage ACO)</i>
CS&TA	<i>Larry Ilcewicz</i>	<i>ANM-115N (CS&TA, Composites)</i>

Those shown in Blue Italics are most active in CS&CI. (Not intended to be inclusive. More team members are encouraged and currently needed.)

CSTA and STS Advisors:
Al Broz, Robert Eastin,
Terry Khaled, Dave Walen,
Chip Queitzsch



Important Teammates

- **Partnerships with industry have been essential**, e.g., CMH-17, SAE P-17, CACRC, ASTM, SAMPE, AGATE, SATS, RITA, SAS/IAB/AACE



Training
Databases
Standardization
Engineering guidelines

- **NASA research and other support**
 - Significant research support since 1970/1980s
 - AA587, A300-600 accident investigation



- **DOD and DARPA research**
 - NCAMP support to material standardization



- **EASA and other foreign research/standardization**

Composite Technical Thrust Areas

Advancements depend on close integration between areas

Material Control, Standardization
and Shared Databases

Structural Substantiation

- Advances in analysis & test building blocks
- Statistical significance
- Environmental effects
- Manufacturing integration

Progress to Date

- 2 Advisory Circulars
- 6 Policy Memos
- 9 Workshops
- 3 Training Initiatives
- 2 Technical Reports
- CMH-17 Updates
- SAE CACRC Standard
- **~50 FAA R&D Reports**

Damage Tolerance and Maintenance Practices

- Critical defects (impact & mfg.)
- Bonded structure & repair issues
- Fatigue & damage considerations
- Life assessment (tests & analyses)
- Accelerated testing
- Structural tear-down aging studies
- NDI damage metrics
- Equivalent levels of safety
- Training standards

Bonded Joint
Processing Issues

Advanced Material
Forms and
Processes

Flammability &
Crashworthiness

*Support to cabin
safety research groups*

Significant progress, which has relevance to all aircraft products, has been gained to date

Future milestones for Composite Safety & Certification Policy, Guidance & Training

Release CMH-17 Revision G

- *Advances in statistics, test methods and data reduction protocol*
- *Major Volume 3 re-organization*
- *New Volume 6 (Sandwich)*
- *New certification & compliance chapter*
- *New crashworthiness chapter*
- *New safety management chapter*
- *Updates to damage tolerance & maintenance*

Implement Composite Maintenance Awareness Course

High Energy Blunt Impact Awareness

Release AC 20-107B (Composite Aircraft Structure)

NCAMP shared databases and specifications (CMH-17, SAE AMS)

Additional composite maintenance guidance

FAA/Industry education initiatives

Composite damage tolerance guidance

Crashworthiness AC

2009	2010	2011	2012	2013
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Draft AC 20-107B Outline

1. Purpose
 2. To Whom This AC Applies
 3. Cancellation
 4. Regulations Affected
 5. General
 6. Material and Fabrication Development
 7. Proof of Structure – Static
 8. Proof of Structure – Fatigue and Damage Tolerance
 9. Proof of Structure – Flutter
 10. Continued Airworthiness
 11. Additional Considerations
- Appendix 1
- Appendix 2
- Appendix 3 (EASA CS 25.603, AMC No. 1, Para. 9 and No. 2: *Change of Material*)

AC 20-107A 11 pages
AC 20-107B 36 pages
(new sections highlighted by blue)



Future plans and schedule milestones for AC 20-107B Development

- **Joint FAA/EASA/TCCA Draft AC 20-107B Development Meetings (Cologne, Germany - 4/08 and Seattle, WA - 6/08)**
- **Joint FAA/EASA/TCCA/Industry AC 20-107B Draft Review Meeting (CMH-17 Meeting, Ottawa, Canada): 8/08**
- **Release updated Draft AC 20-107B to FAA Clearance Record Process: 9/08**
- **Series of industry reviews: 11/08 to 5/09**
- **Start formal public commenting process (NPRM): 5/09**
- **Official release: 9/09**
- **Series of ACO/local industry reviews: 2010 and 2011 (review of AC content)**



FAA/Industry Training Initiative

- FAA plans to continue work with industry in creating practical composite training (three levels of competency)
 1. Introduction for practitioners (same for design, mfg. and maintenance)
 2. Foundational safety awareness (e.g., recent manufacturing & repair class)
 3. Specific skill-building in areas critical to safety & certification
- Realizing a need for continuous education/distance learning
 - Affordable use of practitioners for curriculum approval & assessments
- First two levels are essential for FAA and industry focal involved in safety & certification oversight
- Level 3 training needed in areas of expertise for those performing manufacturing, maintenance and structural design tasks
 - Dominated by industry SME needs
- Graduate student and/or professor/industry coop projects for level 3 technology transfer
 - Advanced industry/university interactions (may require proprietary agreements)



Review of Existing JAMS Projects

Overall Grade
B

**Conversion of
R&D Results
to Practice**
C

Grading Considerations

- Quality of R&D performed to date: A
- Relationship with safety issues: B
- Understands industry application needs & achieves tech. transfer: C

Areas Needing Improvement

- Researcher involvement in process (e.g., CMH-17, CACRC, workshops, standards and course development)
- Proactive industry involvement
- Availability of FAA and industry resources for implementation
- Published results (Tech. Center Reports)

Challenges for JAMS - *Still Need More Quality Industry Involvement*

- Help JAMS identify key R&D areas, realizing the need for a safety & certification emphasis
 - Outline existing industry problems and near-term applications
 - Cost sharing partners should have proactive involvement in project from start to finish (word about **Direct!** vs. **In-kind?**)
- Actively participate in ongoing projects
 - Provide advice/guidance to the PI and researchers
 - Interface with FAA personnel directing the project
 - Help convert results to practice (deliverables to support industry and FAA needs – **avoid “throwing report over the fence”**)
- Review JAMS detailed project descriptions & presentations
 - Provide feedback and suggestions for improvement (feel free to “grade” the efforts)

