Composite Safety and Certification Initiatives

Federal Aviation Administration

- *Background*
  - *Objectives*
  - *Recent Accomplishments*
  - *Support from JAMS*
- *Challenges for JAMS*
  - *Future relevance*
  - *Expand industry involvement*
- *Safety Management*
  - *Role of CACRC & CMH-17*
  - *New WSU project*

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CS&TA

Federal Aviation Administration

July 10, 2007

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

FAA and NASA R&D is currently active in most of these areas

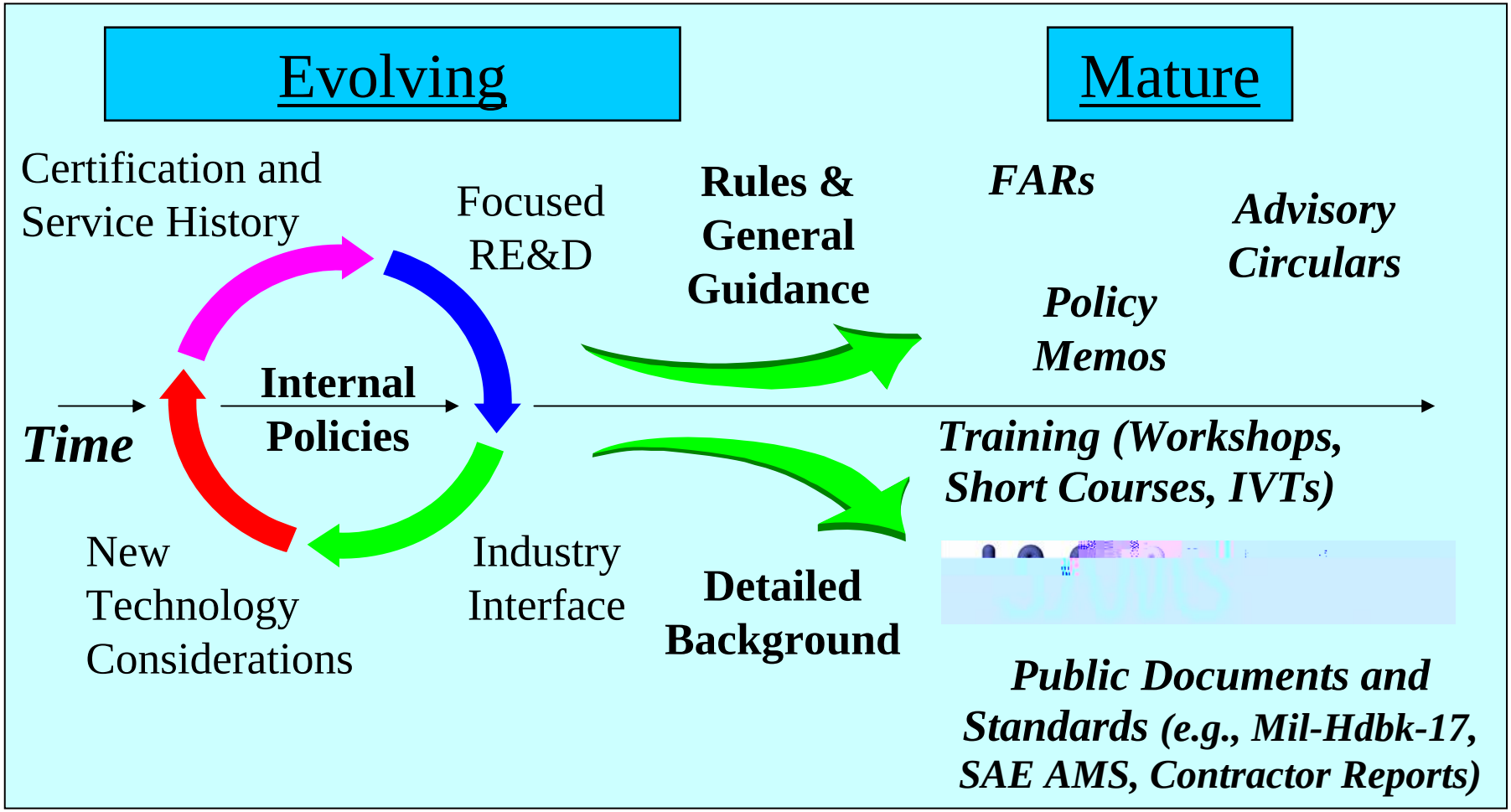
Bonded Joint Processing Issues

Flammability & Crashworthiness

Support to cabin safety research groups

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

FAA Approach to Composite Safety and Certification Initiatives



FAA Composite Team Members

Represented Group	Team Member Name	FAA Organization Number & Routing
FAA Tech. Center	*Curtis Davies*	*AAR-450 (FAA Technical Center)*
	TBD (Peter's replacement)	*AAR-450 (FAA Technical Center)*
International	John Masters	AEU-100 (Brussels Aircraft Certification Staff)
Directorates	Lester Cheng	ACE-111 (Small Airplane Directorate)
	Bob Stegeman	ACE-111 (Small Airplane Directorate)
	Charles Harrison	ASW-110 (Rotorcraft Directorate)

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

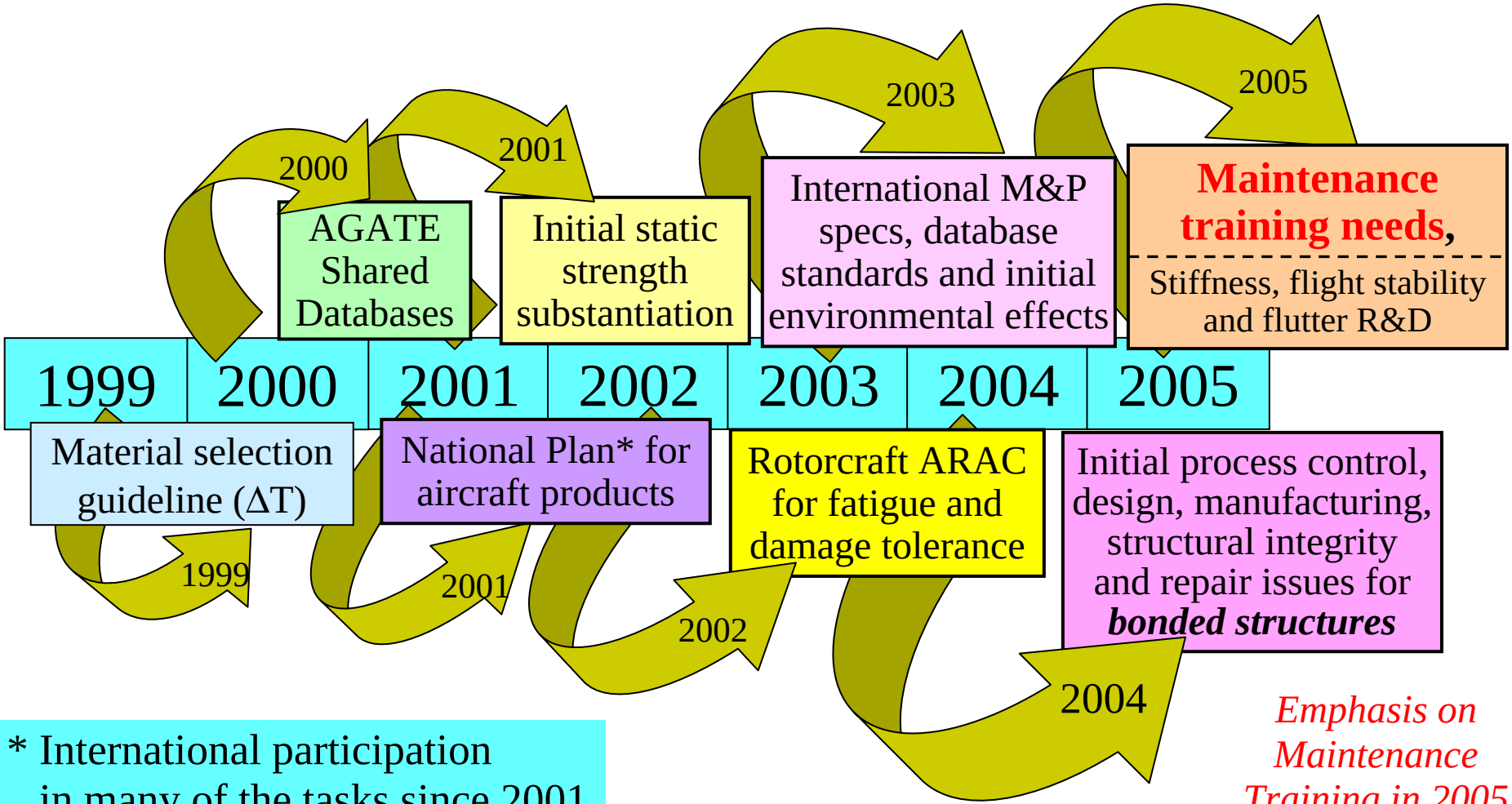
Important Teammates

- NASA has been a leader for composite applications
  - Significant research support since 1970/1980s
  - AA587, A300-600 accident investigation
  - NCAMP support to material standardization
- 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

- DOD and DARPA research
- EASA and other foreign research/standardization

Past Milestones for Composite Safety & Certification Policy, Guidance & Training

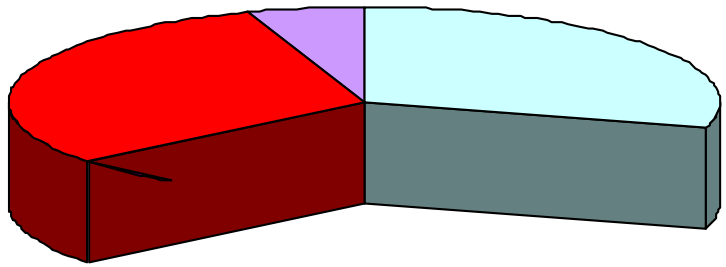


* International participation in many of the tasks since 2001

Emphasis on Maintenance Training in 2005

Joint Efforts by Industry & Regulatory Experts to Standardize a Course on Critical Composite Maintenance & Repair Issues

- 2004: Initial workshops to define framework (incl. course objectives on the key areas of awareness for engineers, technicians & inspectors)
- 2005: 11 course modules drafted for workshop review
- 2006: Update modules and develop course standards with SAE CACRC
- 2007: Coordinated FAA/industry release of course standards



Presented at 7/10/07 JAMS Meeting

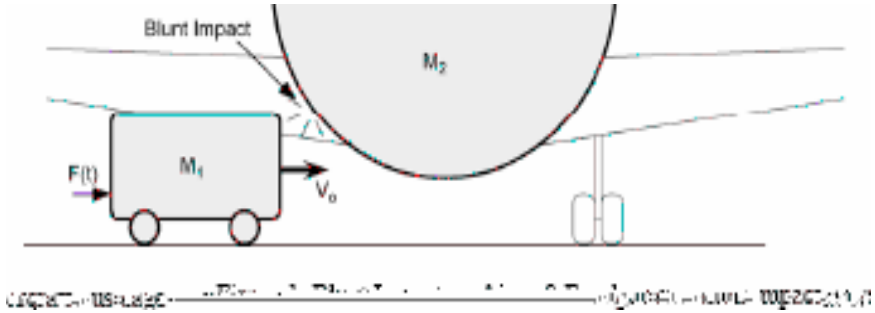
Other Examples of JAMS R&D Directly Related to CS&CI in Damage Tolerance & Maintenance

Future composite guidance, policy and training development in areas driven by industry needs

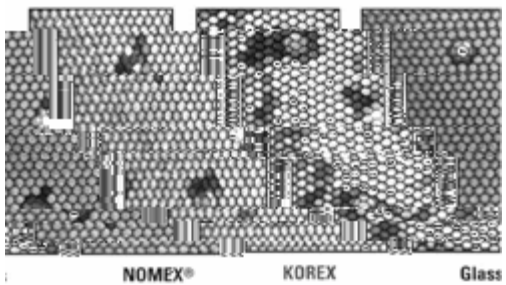
Related research (examples shown below)

Structural Substantiation Protocol

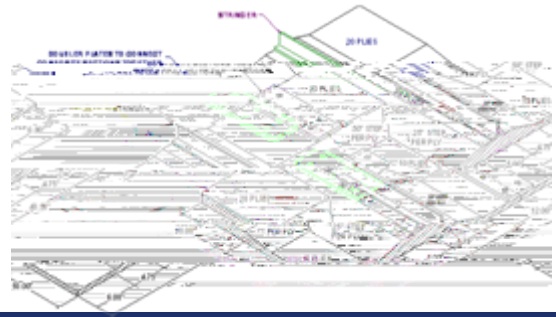
Impact Threat Assessment



Sandwich Fluid Ingression



NDI Standards



FAA Perspectives on JAMS Research & Educational Developments

FAA is primarily interested in studying service incidents and emerging safety threats but will also evaluate new technology being used in product certification

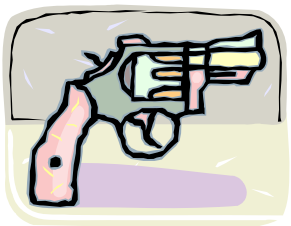
- Primary goal: study "real-world" issues for advanced materials & structures, with emphasis on the factors affecting safety
- Secondary goals: evaluate new technology applied in product certification (e.g., composite fuselage damage tolerance)

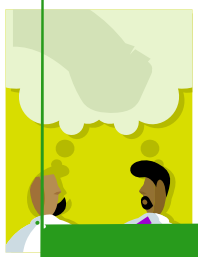
  Supporting technologies such as test methods, process controls and analysis methods can also be studied to ID limits & establish protocol for use *(pre-requisites: must have relevance to safety and industry is close to using them for certification & airworthiness assessments)*
- Deliverables should ultimately lead to guidance, policy, standard training materials and protocol for acceptable industry practices

Challenges for JAMS
Future Relevance

- Emphasis must be on safety & certification
  - Experts from industry & regulatory bodies must be active in JAMS research & educational developments such that deliverables have relevance and utility
  - Need an assessment of whether that is happening in a continuous review of our programs throughout the year
- Most FAA research projects are expected to have a near-term focus ***(results used in the field within 1 to 2 years)***
  - Safety & certification R&D with a low risk of failure
- Longer-term projects must retain an emphasis on safety & certification - *not developing technology for industry*
  - Payoffs from more demanding R&D (not higher risk of failure)

The FAA can't afford to go for the home run with limited R&D resources and a high potential for strikeouts that don't mitigate the risk of aircraft accidents.



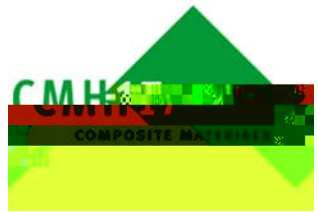


Silver bullets, The Holy Grail and a Pot of Gold at the End of the Rainbow only seem to work in the movies

Links with Mil-17 (CMH-17), SAE CACRC and Safety Management

Existing Pro

- Mil-17 (Composite Materials Handbooks, CMH-17)
  - ~ 100 industry engineers meet every 8 months
  - FAA/EASA/Industry WG deliverables to update CMH-17, Vol. 3 Chapters on Damage Tolerance & Supportability for Rev. G
  - New CMH-17 Safety Management WG has been initiated
  - *FAA strategy: use CMH-17 as a forum to develop guidance and establish educational services to offset costs*



- SAE CACRC (Commercial Aircraft Composite Repair Committee)
  - ~ 50-75 industry engineers meet every 6 months (~7 WG)
  - Airlines have dropped out of CACRC over time, requiring more OEM and MRO leadership for organization to survive
  - New CACRC Safety Management WG has been initiated
  - *FAA strategy: use CACRC as a forum to develop guidance and support industry composite maintenance standards & training efforts*

New Wichita State Univ. Project

Development and Safety Management of Composite Certification Guidance

- Engage industry on technical matters of relevance in mitigating the risk of accidents, incidents and emerging safety threats
- Facilitate the development of strategies for CMH-17 and CACRC
- Support workshops, industry meetings and web-based forum

- FY07/FY08 tasks supporting the following initiatives
  - Joint CACRC/CMH-17 Safety Management WG Mtg. (Wichita, 11/07)
  - CMH-17/NCAMP strategies for data review and dissemination
  - New CMH-17 Tutorial (V3/C3:Aircraft Structure Certification & Compliance)
  - Updates to main composite advisory circular (AC 20-107B)