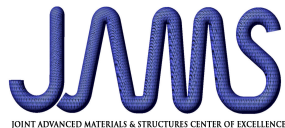


JAMS Technical Review Meeting

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FAA William J. Hughes Technical Center
Advanced Materials Research Program Manager
COE JAMS Program Manager

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5/23/2018
Long Beach, CA



Federal Aviation
Administration



FAA Research Process

FAA Stakeholders

FAA Administrator (AOA)

5 Lines of Business

Aviation Safety (AVS)

Air Certification (AIR)

Policy & Innovation (AIR-600)

Sponsors

9 Staff Offices

Next Generation Air Transportation System (ANG)

William J Hughes Technical Center (ANG-E)

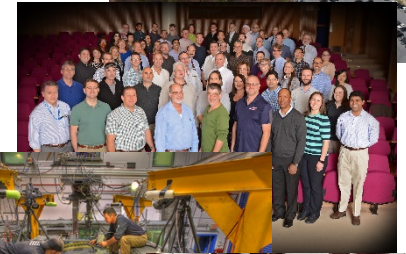
Aviation Research (ANG-E2)

Structures & Materials (ANG-E281)

Performers

Research Management and Technical Monitoring

NextGEN



FAA Research Process

Research Programs, Requirements, and Centers of Excellence

- FAA has a number of programs to conduct research about potential safety concerns in various key areas of interest.
 - e.g., UAS, Human Factors, Automation, Structures & Materials, Propulsion, Fuel, Fire, Aircraft Icing, Commercial Space Transportation, General Aviation, etc.
- Each program's scope and objectives are defined by a set of research requirements
- Some of these research programs are supported by FAA Centers of Excellence (COE)
 - e.g., UAS by COE ASSURE, General Aviation by COE PEGASUS
- JAMS supports the Structural Integrity of Composites research program.

FAA Research Process

Structural Integrity of Composites (SIC)

- **Program Objective:** Conduct research to support the FAA safety and regulatory activities in the technical areas of advanced composite materials and to ensure the safe use of composites in aircraft products:
- **Program Requirements:** Three years in advance, AVS proposes topics for research
 - Under Structural Integrity of Composites, AVS creates requirements for buckets for subjects such as:
 - **Fatigue and Damage Tolerance** of Composite Structures (SIC.01)
 - Composite **Maintenance Practices** (SIC.02)
 - **Crashworthiness** Issues Unique to Composites, (SIC.03)
 - Structural Integrity of **Adhesive Joints**, (SIC.05)
 - **Continued Operational Safety** (COS) and **Certification Efficiency** (CE) for Emerging Composite Technologies (SIC.12)
- Year before execution we modify the requirements as necessary, based on what we have learned in the interim

**FAA SIC
Research
Requirements
(FY 2017)**

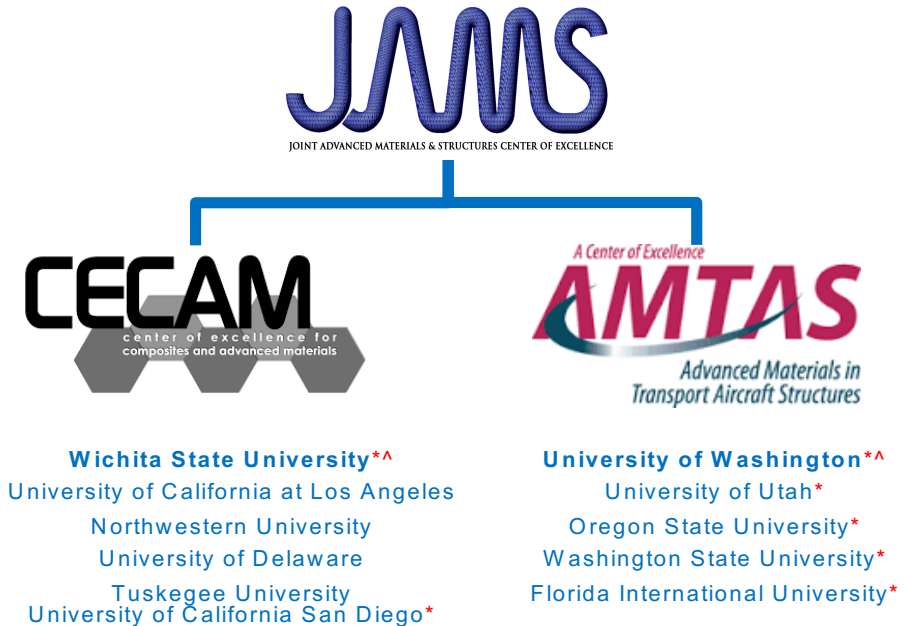
FAA Research Process

Structural Integrity of Composites (SIC)

- The FAA Technical Center turns AVS requirements into requests that go out to JAMS
 - Multiple line items / projects per “bucket”
- We have moved to a system where we expect **detailed project plans** with **milestones and deliverables**, and request **written reports every year** that are published by the technical center
- In FY16, FY17, and FY18 we had congressionally mandated additional funds which sponsor JAMS research that supports certification efficiency, more than continued operational safety
 - We try to accelerate items identified in the Requirements

Joint Centers of Excellence for Advanced Materials & Structures – COE JAMS

- In 2003, JAMS was established as a congressionally mandated Joint FAA COE.
- JAMS is the primary funding vehicle that FAA uses to sponsor research that supports Structural Integrity of Composites program.

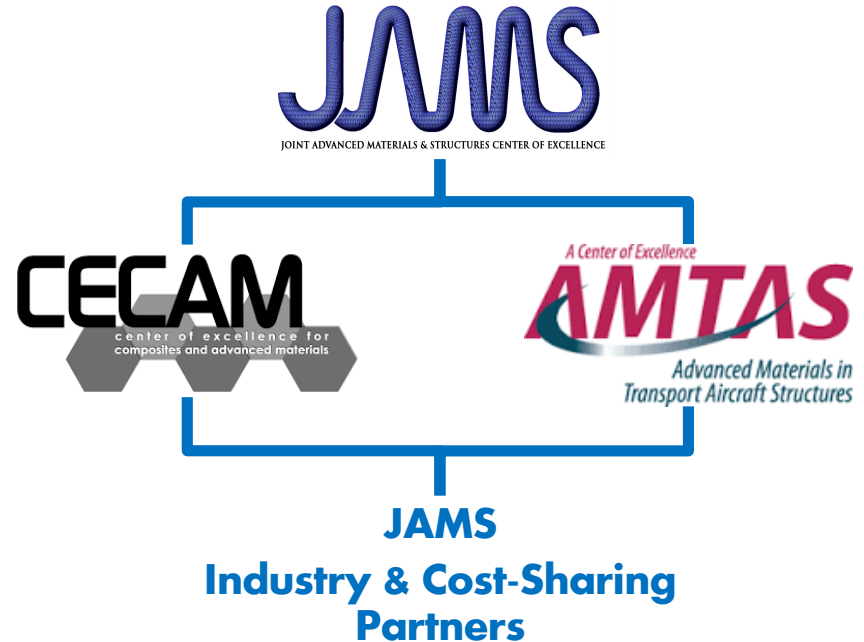


^ JAMS Co-leads

* Currently Active Members

Joint Centers of Excellence for Advanced Materials & Structures – COE JAMS

- In FY 2017, FAA supported 13 projects and awarded nearly \$4.9 million, to support related research. The COE members and affiliates generated matching contributions
- **Students** are the workforce of the JAMS Program
 - They are an important part of the technology transfer effort between JAMS and the industry



	FAA Requirement	Project Title	PI	Intitute	FAA Tech Monitor	Start Date
Fatigue & Damage Tolerance	SIC 1	Failure of Notched Laminates Under Out-of-Plane Bending	J. Parmigiani	OSU	L. Pham	2007
	SIC 1	Impact Damage Formation on Composite Aircraft Structures	H. Kim	UCSD	L. Pham	2008
	SIC 1	Impact Damage Tolerance Guidelines for Stiffened Composite Panels	H. Kim	UCSD	L. Pham	2018
	SIC 1	Development and Evaluation of Fracture Mechanics Test Methods for Sandwich Composites - Damage Tolerance Test Method Development for Sandwich Composites	D. Adams	UU	Z. M. Chen	2008
	SIC 1	Moisture Diffusion in Sandwich Composites	M. Tuttle	UW	Z. M. Chen	2015
	SIC 1	Damage Tolerance Testing and Analysis Protocols for Full-Scale Composite Airframe Structures under Repeated Loading	W. Seneviratne	WISU	L. Pham	2012
Composite Maintenance Practices	SIC 1	Environmental Factor Influence on Composite Design and Certification (Sandwich Disbond)	W. Seneviratne	WISU	Z. M. Chen	2012
	SIC 2	Development of Safety Management of Composite Certification Guidance Project	J. Tomblin	WISU	A. Abramowitz	2015
	SIC 2	CACRC Bonded Repair Round Robin and Process Parameter Evaluation	R. Lovingfoss	WISU	L. Pham	2012
	SIC 2	SRM Repairs Round Robin Evaluation	R. Lovingfoss	WISU	A. Oztekin	2013
	SIC 2	Inspection and Teardown of In-Service Bonded Repairs Project	W. Seneviratne	WISU	A. Oztekin	2016
	SIC 2	Composite Repair Materials Guidance for Aircraft Maintainability and Safety Assurance	R. Andrulonis	WISU	A. Oztekin	2016
	SIC 2	In-Service Adhesive Bond Assessment	W. Seneviratne	WISU	A. Oztekin	2017

	FAA Requirement	Project Title	PI	Institute	FAA Tech Monitor	Start Date
Crashworthiness	SIC 3	Development of a Building Block Approach for Crashworthiness Testing	D. Adams	UU	A. Abramowitz	2015
	SIC 3	Certification by Analysis – Structural Crashworthiness	G. Olivares	WISU	A. Abramowitz	2015
	SIC 3	Transport Airplane Ditching	Gerardo Olivares	WISU	A. Abramowitz	2015
	SIC 3	Airframe Crashworthiness Testing and Simulation FY 17 - Composites and Metallic Business J	G. Olivares	WISU	A. Abramowitz	2016
Adhesive Joints	SIC 5	Effect of Surface Contamination on Composite Bond Integrity and Durability Project	D. McDaniel	FIU	A. Oztekin	2007
	SIC 5	Durability of Adhesively Bonded Joints for Aircraft Structures Project	D. Adams	UU	A. Oztekin	2011
	SIC 5	Improving Adhesive Bonding of Composites Through Surface Characterization	B. Flinn	UW	A. Oztekin	2014
	SIC 5	Durability of Bonded Aerospace Structures	L. Smith	WSU	A. Oztekin	2013
	SIC 5	Adhesive Qualification Guidance for Aircraft Design and Certification	W. Seneviratne	WISU	A. Oztekin	2016
	SIC 5	Adhesive BOND Qualification Guidance for Aircraft Design and Certification	W. Seneviratne	WISU	A. Oztekin	2017
COS & CE	SIC 12	Lightnign Strike of Composite Structures	J. Phillips	WISU	L. Pham	2016
	SIC 12	Polymer-Based Additive Manufacturing (PBAM) Guidance for Aircraft Design and Certification	R. Andrulonis	WISU	A. Oztekin	2016
	SIC 12	Advanced Fiber Reinforced Polymer Composite Materials Guidance for Aircraft Design Certif	R. Andrulonis	WISU	A. Oztekin	2016
	SIC 12	Ceramic Matrix Composite (CMC) Materials Guidance for Aircraft Design and Certification	R. Andrulonis	WISU	A. Oztekin	2016
	SIC 12	Guidelines for Formulating and Writing Process Control Documents and Process Specificatio	R. Lovingfoss	WISU	A. Oztekin	2017
	SIC 12	FAA CSET, CMT, CMfgT and Adhesive Online Courses – Modifications and Implementation	R. Keshavanaray	WISU	A. Oztekin	2016
	SIC 12	Certification of Discontinuous Fiber Composite Material Forms for Aircraft Structure	M. Tuttle	UW	A. Oztekin	2017

FAA SIC Research Program

FAA Team & JAMS Stakeholders

Federal Aviation Administration

Program Sponsor

- Sets research scope and objectives
- Develops research requirements
- Primary end user of program output within the FAA

Aviation Safety (AVS)

- **Larry Ilcewicz**, PhD - Chief Scientist and Technical Advisor (**CSTA**) for Composites
- **Cindy Ashforth** – Senior Technical Specialist (**STS**) for Composites

Performer

- Supports program sponsor
- Manages research program activities
- Coordinates communication between Sponsor and PI
- Evaluates and awards grants requests and research contracts
- Oversees research progress
- Publishes research output (FAA Tech Reports)

William J. Hughes Technical Center Aviation Research Division

Structures and Materials Section (ANG-E281)

- **Ed Weinstein**, PhD – Section Manager
- **Ahmet Oztekin**, PhD – JAMS/SIC Program Manager
- **Allan Abramowitz** – Technical Monitor (TM)
- **Lynn Pham** - TM
- **Zhi-Ming Chen**, PhD - TM

JAMS Core Member Univ

Project PIs,
Researchers, and
Students

Industry & Cost-Sharing Partners