JAMS Technical Review Meeting

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COE JAMS Program Manager

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5/23/2018
Long Beach, CA
FAA Research Process

FAA Stakeholders

FAA Administrator (AOA)

5 Lines of Business

Aviation Safety (AVS)

Air Certification (AIR)

Policy & Innovation (AIR-600)

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

Sponsors
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
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.

Wichita State University
University of California at Los Angeles
Northwestern University
University of Delaware
Tuskegee University
University of California San Diego

University of Washington
University of Utah
Oregon State University
Washington State University
Florida International University

^ 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
<table>
<thead>
<tr>
<th>FAA Requirement</th>
<th>Project Title</th>
<th>PI</th>
<th>Intitute</th>
<th>FAA Tech Monitor</th>
<th>Start Date</th>
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</thead>
<tbody>
<tr>
<td>SIC 1</td>
<td>Failure of Notched Laminates Under Out-of-Plane Bending</td>
<td>J. Parmigiani</td>
<td>OSU</td>
<td>L. Pham</td>
<td>2007</td>
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<td>SIC 1</td>
<td>Impact Damage Formation on Composite Aircraft Structures</td>
<td>H. Kim</td>
<td>UCSD</td>
<td>L. Pham</td>
<td>2008</td>
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<tr>
<td>SIC 1</td>
<td>Impact Damage Tolerance Guidelines for Stiffened Composite Panels</td>
<td>H. Kim</td>
<td>UCSD</td>
<td>L. Pham</td>
<td>2018</td>
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<td>Composites - Damage Tolerance Test Method Development for Sandwich Composites</td>
<td></td>
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<tr>
<td>SIC 1</td>
<td>Moisture Diffusion in Sandwich Composites</td>
<td>M. Tuttle</td>
<td>UW</td>
<td>Z. M. Chen</td>
<td>2015</td>
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<tr>
<td>SIC 1</td>
<td>Damage Tolerance Testing and Analysis Protocols for Full-Scale Composite Airframe Structures under Repeated Loading</td>
<td>W. Seneviratne</td>
<td>WISU</td>
<td>L. Pham</td>
<td>2012</td>
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<tr>
<td>SIC 1</td>
<td>Environmental Factor Influence on Composite Design and Certification (Sandwich Disbond)</td>
<td>W. Seneviratne</td>
<td>WISU</td>
<td>Z. M. Chen</td>
<td>2012</td>
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<td>SIC 2</td>
<td>Development of Safety Management of Composite Certification Guidance Project</td>
<td>J. Tomblin</td>
<td>WISU</td>
<td>A. Abramowitz</td>
<td>2015</td>
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<tr>
<td>SIC 2</td>
<td>SRM Repairs Round Robin Evaluation</td>
<td>R. Lovingfoss</td>
<td>WISU</td>
<td>A. Oztekin</td>
<td>2013</td>
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<tr>
<td>SIC 2</td>
<td>Inspection and Teardown of In-Service Bonded Repairs Project</td>
<td>W. Seneviratne</td>
<td>WISU</td>
<td>A. Oztekin</td>
<td>2016</td>
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<tr>
<td>SIC 2</td>
<td>In-Service Adhesive Bond Assessment</td>
<td>W. Seneviratne</td>
<td>WISU</td>
<td>A. Oztekin</td>
<td>2017</td>
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</table>
## COE JAMS
### Research Current Research Portfolio – Part 2

<table>
<thead>
<tr>
<th>FAA Requirement</th>
<th>Project Title</th>
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<th>Institute</th>
<th>FAA Tech Monitor</th>
<th>Start Date</th>
</tr>
</thead>
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<tr>
<td>SIC 3</td>
<td>Development of a Building Block Approach for Crashworthiness Testing</td>
<td>D. Adams</td>
<td>UU</td>
<td>A. Abramowitz</td>
<td>2015</td>
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<tr>
<td>SIC 3</td>
<td>Certification by Analysis – Structural Crashworthiness</td>
<td>G. Olivares</td>
<td>WISU</td>
<td>A. Abramowitz</td>
<td>2015</td>
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<td>SIC 3</td>
<td>Transport Airplane Ditching</td>
<td>Gerardo Olivares</td>
<td>WISU</td>
<td>A. Abramowitz</td>
<td>2015</td>
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<tr>
<td>SIC 3</td>
<td>Airframe Crashworthiness Testing and Simulation FY 17 - Composites and Metallic Business</td>
<td>G. Olivares</td>
<td>WISU</td>
<td>A. Abramowitz</td>
<td>2016</td>
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<tr>
<td>SIC 5</td>
<td>Effect of Surface Contamination on Composite Bond Integrity and Durability Project</td>
<td>D. McDaniel</td>
<td>FIU</td>
<td>A. Oztekin</td>
<td>2007</td>
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<tr>
<td>SIC 5</td>
<td>Durability of Adhesively Bonded Joints for Aircraft Structures Project</td>
<td>D. Adams</td>
<td>UU</td>
<td>A. Oztekin</td>
<td>2011</td>
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<tr>
<td>SIC 5</td>
<td>Improving Adhesive Bonding of Composites Through Surface Characterization</td>
<td>B. Flinn</td>
<td>UW</td>
<td>A. Oztekin</td>
<td>2014</td>
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<td>SIC 5</td>
<td>Durability of Bonded Aerospace Structures</td>
<td>L. Smith</td>
<td>WSU</td>
<td>A. Oztekin</td>
<td>2013</td>
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<tr>
<td>SIC 5</td>
<td>Adhesive BOND Qualification Guidance for Aircraft Design and Certification</td>
<td>W. Seneviratne</td>
<td>WISU</td>
<td>A. Oztekin</td>
<td>2017</td>
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<td>SIC 12</td>
<td>Lightning Strike of Composite Structures</td>
<td>J. Phillips</td>
<td>WISU</td>
<td>L. Pham</td>
<td>2016</td>
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<tr>
<td>SIC 12</td>
<td>Certification of Discontinuous Fiber Composite Material Forms for Aircraft Structure</td>
<td>M. Tuttle</td>
<td>UW</td>
<td>A. Oztekin</td>
<td>2017</td>
</tr>
</tbody>
</table>
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 Abramowicz – Technical Monitor (TM)
• Lynn Pham – TM
• Zhi-Ming Chen, PhD – TM

JAMS Core Member Univ
Project PIs, Researchers, and Students

Industry & Cost-Sharing Partners