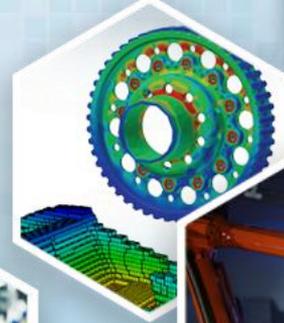


Welcome to the **High Rate Aerostructures Fabrication** IACMI Working Group

[Brian Rice, UDRI
Dale Brosius, IACMI]
October 6, 2021



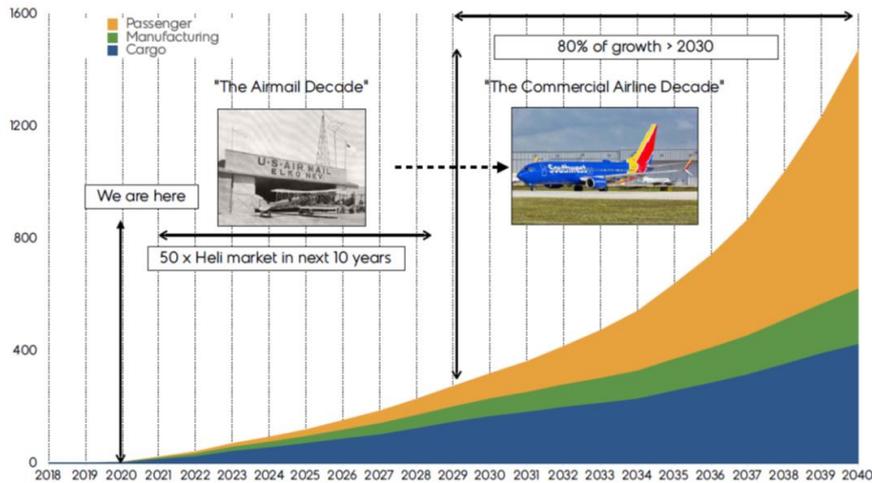
High Rate Aerostructures Fabrication Working Group Objectives



- Facilitate communications regarding issues and opportunities
- Maintain a technology development roadmap
- Communicate manufacturing R&D projects for funding opportunities
- Formulate and conduct directed manufacturing R&D
- Support technology transition through conferences and workshops

Growing Commercial and Military Applications

Advanced Aerial Mobility Market Size by 2040 (\$bn) Morgan Stanley



TAM - \$1.5T in 2040



United Airlines orders electric vertical aircraft, invests in urban air mobility SPAC



United has placed a \$1 billion order for 200 Archer eVTOL aircraft, with an option to purchase 100 more for \$500 million. Stellantis, the new name for the recently merged companies of PSA Peugeot and Fiat Chrysler, is working with Archer to manufacture the carbon-fiber fuselage of the eVTOL aircraft. Archer said its piloted eVTOL is designed to carry as many as four passengers up to 60 miles at speeds that could reach 150 mph. (Press release Feb. 10, 2021)



Featured Presentations – 16 February 2021



Review of Air Force STTR recent awards supporting e-VTOL

Dan Allman (Globe Machine) “Agile, Rapid and Low Cost Composites Manufacturing Technology”

Tom Margraf (Spintech Holdings) “Topology Optimized Structure to Replace Core Stiffened Composites”

Tom Margraf (Spintech Holdings) “Advanced Manufacturing of Propeller Blades”

Featured Presentations – 19 May 2021



Craig Neslen (Air Force – ManTech) “Low Cost Autonomous Aircraft – Design and Manufacturing”

Babak Raeisinia (Machina Labs) SBIR II Title "Rapid Metal Tooling for High-Rate, Low-Cost Production of Composite Parts"

Steve Schoenholtz (Triton Systems) SBIR II Title “Novel Additively Manufactured Composite Tooling”.

Tyler Alvarado (Continuous Composites) SBIR II Title “Topology Optimized Continuous Fiber AM of Complex Aerostructures.”

Joe Spangler (Teijin) “Composite Material Innovations for Aerostructures”

Featured Presentations – 11 August 2021



Dr. Robert Yancey, Hexcel Business Development Director

Road Mapping Discussion

- High Rate Material Systems
- Automation and Factory of the Future
- Certification
- Application Areas

Panel Discussion – 5 October 2021



Panel: High Rate Aerostructures Manufacturing Challenges and Opportunities

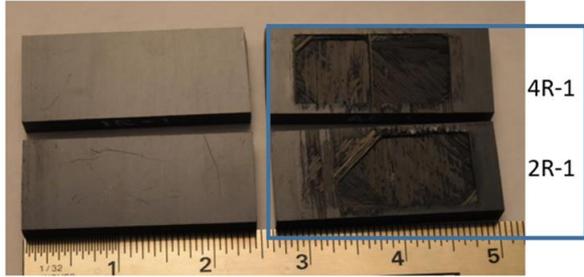
Craig Neslen	(Air Force)	(Low cost composite structures)
Timothy Luchini	(Boeing)	(UAM composite structures)
Greg Gemeinhardt	(GE Aviation)	(Jet engine composite structures)
Stephen Heinz	(Solvay)	(Transition of new materials)
Dominic Bloom	(iCOMAT)	(Transition of new preforming technology)
Tom Margraf	(Hawthorne)	(Part manufacture, new methods)

Format: Present 10-15 minutes, 5 minutes for Q&A, then after all panelists have spoken open Q&A for the full panel.

VACNT Development

Untested samples

Tested samples, VACNT



Rain Erosion

- Erosion
- Elimination of MLE
- Impact
- Mechanical
- EME
- Impact
- Mechanical
- EME

Propellers

Thin skin honeycomb structure

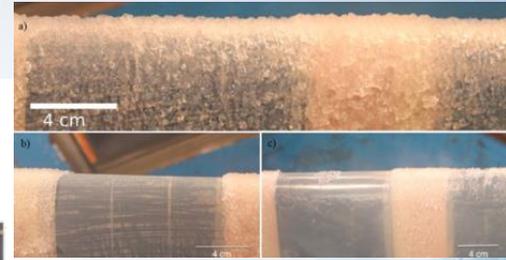


E-VTOL Possibilities for NanoStitch

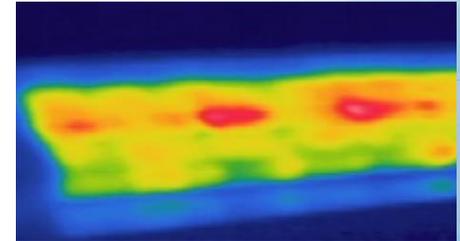
- Reduction in Cost of Manufacturing
- Reduction in Cost of operation / ownership
- Increased robustness

Systems bays / Batter trays

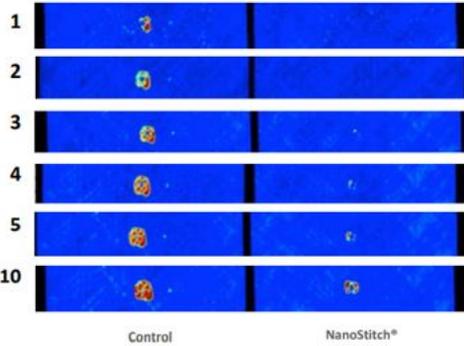
- + Impact
- + Mechanical
- + EME
- + Thermal



Anti-Icing



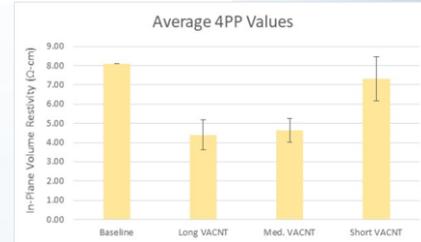
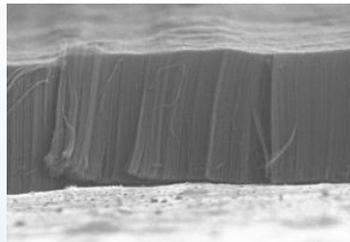
Impact Fatigue Damage Progression (3.3 J/mm)



Leading edges

- Erosion
- Elimination of MLE
- Impact
- Mechanical
- EME

Impact Damage growth after repeated hits



Increase conductivity

Future Plans



Forming project ideas aligned with available funding model