

DT&M Workshop Session: Bonded Repair (BR)

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Prologue

- Facts
 - ND bond strength validation methods do not exist
 - Bond problems occasionally observed in service
- Reaction
 - Must assume *bond failure* in sizing PSE repairs
 - Essentially means non-OEM entities cannot define PSE repair
- Meanwhile...
 - Shops with rigorous bond process controls have **many** repairs flying without incident

Can we level performance of bond shops to mitigate reason for fear and doubt in bonding?

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Bonded Repair (BR) Session Objective

- Garner industry input on BR state-of-practice
 1. Strategies to minimize occurrence of *weak-bond*?
 2. Is fleet knowledge transfer sufficient to prevent misuse of BR?
 3. Strategies to mitigate risk of insufficient **PSE BR** substantiation?
 - a) Thoughts on current efforts and going-forward plans?
 - b) Does the effort seem prudent or pointless?

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Bonded Repair (BR) Session Objective

- Garner industry input on BR related topics
 1. What are best strategies to minimize *weak-bond occurrences*?
 - a) Knowledge transfer and competency verification?
 - b) Technician certifications? What is feasible?
 - c) Service provider *facilities* certifications?
 - d) Service provider *management* certifications?
 - e) Right-process at right-time?
 - Unification of BR materials, processes and practices?
 - f) Other

BR Session Presentation Request (non-OEM)

- Objective it to explore the industry position on need for technician/engineer/management training and certification.
- WS discussion on the following subjects would be helpful.
 - History of robust bonded repair performance with worker credentials
 - Bonded repairs that performed poorly and had to be replaced
 - Examples of MRO's cutting corners to win work
 - Performance issues associated with plethora of repair materials and non-harmonized work instruction
 - Observed inconsistent BR performance and associated technician training and experience
 - Other perspectives to help bring forward consensus on the need, or lack thereof, training/certifications

CTDT&M WS Agenda

Bonded Repair Sessions

2015 FAA/Bombardier/TCCA/EASA/Industry Composite Transport Damage Tolerance and Maintenance Workshop

Tuesday (Sep. 15)		Wednesday (Sep. 16)		Thursday (Sep. 17)	
Regulatory Perspectives (FAA, EASA, TCCA)		Session 3: High Energy, Wide Area, Blunt Impact (HEWABI)		Session 6: Damage Tolerance (Special Subjects)	
8:30-9:00	"Welcome/Introduction/Workshop Objectives" - Bombardier and Larry Ilcewicz (FAA)	8:30-8:50	"HEWABI as Related to Safety and Certification" - Larry Ilcewicz (FAA)	8:30-9:00	"Composite Fatigue & Damage Tolerance Design & Service Experience" - Kevin Davis (Boeing)
9:00-9:30	"FAA Composite Plan" - Cindy Ashforth (FAA)	8:50-9:20	"UCSD FAA Research" - Hyonny Kim (UCSD)	9:00-9:30	"Validation of Thermal Loads for Hybrid Structure" - Jean-Philippe (Bombardier)
9:30-10:00	"EASA Composite Safety Issues" - Simon Waite (EASA)	9:20-9:40	"EASA Research" - Simon Waite (EASA)	9:30-9:45	"Thermal Loads of Horizontal Tail Plane Structure" - Jan Waleson (Fokker)
10:00-10:30	"2015 Industry/Authorities FAA Composite Transport DT and Maintenance Workshop – TCCA Perspectives" - Maurizio Molinari (TCCA)	9:40-10:00	"Airline Experiences" - Eric Chesmar (United), Ray Kaiser (Delta)	9:30-9:45	"Perspectives on Damage Detection and Inspection" - Larry Ilcewicz and Rusty Jones (FAA)
10:30-10:45	Break	10:00-10:30	HEWABI Recap Session	10:00-10:15	Break
Session 1: Sandwich Disbond Assessments		10:30-10:45	Break	10:15-10:45	"Composite Damage Tolerance Special Topics Recap" - Led by Larry Ilcewicz (FAA), D.M. Hoyt (NSE) and Waruna Seneviratne (WSU)
10:45-11:30	"CMH-17 Honeycomb Sandwich Disbond Growth Team Status - Mid 2015" - Ralf Hilgers (Airbus) and Ronald Krueger (NIA)	Session 4A: Composite Fatigue and Damage Tolerance		Session 7A: Smarter Damage Tolerance Testing	
11:30-11:45	"Sandwich Disbond Repair" - Led by Larry Ilcewicz and Ralf Hilgers (Airbus)	10:45-11:00	"Introduction for Sessions 4 through 6" - Larry Ilcewicz (FAA) and D.M. Hoyt (NSE)	10:45-11:00	"Smarter DT Testing - Boeing Perspectives" - Kevin Davis (Boeing)
Session 2A: Bonded Repair 2A (Part 1)		11:00-11:15	"Perspectives on Fatigue and Damage Tolerance Standardization" - Mark Nienhaus (Textron Aviation)	11:00-11:15	"Smarter Testing - Airbus Approach" - J-Leon Dufour, S. Rabois, and John van Doeselaar (Airbus)
11:45-12:00	"Sessions 2A and 2B - Introduction and Objectives" - Michael Borgman (Spirit AeroSystems, Inc.)	11:15-11:30	"TBD" -Reserved for ATR, Dassault or Gulfstream	11:15-11:30	"Smart Testing - Bombardier Thoughts" - Salomon Haravan (Bombardier)
12:00-12:30	"Operator Field Experiences" - Eric Chesmar (UAL)	11:30-12:00	"Boeing Composite Fatigue & Damage Tolerance Certification Experiences" - Allen Fawcett (Boeing)	11:30-11:45	"Smarter DT Testing - Summary" - Kevin Davis (Boeing)
12:30-1:15	Lunch	12:00-12:30	"Airbus Composite Fatigue and Damage Tolerance Certification Experiences" - L. Ratier and C. Fualdes (Airbus)	11:45-12:30	Lunch
Session 2A: Bonded Repair 2A (Part 2)		12:30-1:15	Lunch	Session 7B: Use of Probabilistic Methods	
1:15-1:45	"Airbus Bonded Repair Applications to Pressurized Fuselage" - J. Charles and C. Fualdes (Airbus)	Session 4B: Composite Fatigue and Damage Tolerance		Intro (J. van Doeselaar Airbus) 5 min Bombardier thoughts - Salomon Haravan- 10 min with Q&A Boeing thoughts - Alan Fawcett- 15 min with Q&A Airbus thoughts - Emilie Morteau; Chantal Fualdes- 15 min with Q&A WS participant experiences/closing remarks + Q&A (Airbus led) - 15 min	
1:45-2:15	"Substantiation Approaches for Bonded Repairs" - Allen Fawcett (Boeing)	1:15-1:45	"Rear Pressure Bulkhead Large Damage Capability Demonstration" Jean-Philippe Marouze (Bombardier)	12:30-1:30	
Session 2B: Bonded Repair 2B (Part 1)		1:45-2:15	"Aviation Rulemaking Advisory Committee (ARAC) Tasking on § 25.571" - Walt Sippel (FAA) and Mike Gruber (Boeing)	Session 7C: Major Structural Modifications, Alterations & Repairs	
2:15-2:45	"Lessons Learned from CACRC Depot Bonded Repair Round Robin Exercise" - Dr. John Tomblin & Lamia Salah (WSU)	2:15-2:45	"NIAR Research on Certification of Composite-Metal Hybrid Structures" - Dr. Waruna Seneviratne and Dr. John Tomblin (WSU)	"Issues Associated with Modification and Repair of Primary Aircraft Composite Structures" - Steve Forness (Air Flight Technical)	
2:45-3:15	"Effect of Processing Parameters on Bonded Repair Quality and Strength" Dr. Pascal Hubert (McGill Univ.); Dr. Rushabh Kothari, David Wilson, Geoff Walsh (Bombardier)	2:45-3:15	"CMH-17 Durability & Damage Tolerance Roadmap" - D.M. Hoyt, Patrick Enjuto, and Tom Walker (NSE)	1:30-2:00	
3:15-3:30	Break	3:15-3:30	Break	2:00-2:30	"Examples of Substantiation Testing and Documents to Support Large Areas of Composite Repair" - John Welch, Jim Epperson (Spirit Aerosystems)
Session 2B: Bonded Repair 2B (Part 2)		Session 5: Damage Tolerance (Special Subjects)		2:30-2:45	Break
3:30-4:00	"Bonded Repair Service Provider - Service History and Substantiation" - John Welch (Spirit Aero Systems)	3:30-4:00	"The Aging Composite Airframe" - John Halpin (Consultant)	2:45-3:45	"Near-Term Emerging Technology Recap" - Led by Boeing (TBD), Airbus (TBD), Bombardier (TBD) and Cindy Ashforth (FAA)
4:00-4:30	"Composite Operational Issues" - Rusty Jones (FAA) and Simon Waite (EASA)	4:00-4:30	"Some Thoughts on Strategies for Building Block Approach Development" - Eric Pomerleau and Dr. Isabelle Paris (Bombardier)	3:45-4:00	Recap/Actions/Closure - Larry Ilcewicz (FAA)
4:30-4:45	"Standards for Substantiation of Bonded Repairs" -Michael Borgman (Spirit Aero Systems)	4:30-5:30	"Composite Fatigue and Damage Tolerance Recap" - Led by Larry Ilcewicz (FAA), D.M. Hoyt (NSE) and Waruna Seneviratne (WSU)		
4:45-5:45	"Bonded Repair Recap" - Led by Larry Ilcewicz & Rusty Jones (FAA) and Mike Borgman (Spirit)				

CTDT&M WS: Bonded Repair Sessions

2015 FAA/Bombardier/TCCA/EASA/Industry Com

Tuesday (Sep. 15)

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Regulatory Perspectives (FAA, EASA, TCCA)		Session 3: High Energy	
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9:00-9:30	"FAA Composite Plan" - Cindy Ashforth (FAA)	8:50-9:20	"UCSD FAA Reser - Hyonny Kim
9:30-10:00	"EASA Composite Safety Issues" - Simon Waite (EASA)	9:20-9:40	"EASA Research - Simon Waite
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Session 2A: Bonded Repair 2A (Part 1)		11:00-11:15	"Objectives on - Ralf Hilgers
11:45-12:00	"Sessions 2A and 2B - Introduction and Objectives" - Michael Borgman (Spirit AeroSystems, Inc.)	11:15-11:30	"Guided for - Ralf Hilgers
12:00-12:30	"Operator Field Experiences" - Eric Chesmar (UAL)	11:30-11:45	"Boeing Compos - Allen Fawcett
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Session 2A: Bonded Repair 2A (Part 2)		12:30-1:15	Lunch
1:15-1:45	"Airbus Bonded Repair Applications to Pressurized Fuselage" - J. Charles and C. Fualdes (Airbus)	Session 4B: Composite	
1:45-2:15	"Substantiation Approaches for Bonded Repairs" - Allen Fawcett (Boeing)	1:15-1:45	"Rear Pressure - Jean-Philippe Ma
Session 2B: Bonded Repair 2B (Part 1)		1:45-2:15	"Aviation Rules - Walt Sippel
2:15-2:45	"Lessons Learned from CACRC Depot Bonded Repair Round Robin Exercise" - Dr. John Tomblin & Lamia Salah (WSU)	2:15-2:45	"NIAR Research o - Dr. Waruna
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First Speaker

Eric Chesmar (UAL)