



Federal Aviation
Administration

FAA / CAAs “Composite Meeting”

- Bonded Repair Size Limits (BRSL) - Policy Statement

Larry Ilcewicz
Lester Cheng
FAA Composite Team

Singapore, Singapore
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FAA / CAAs “Composite Meeting” - BRS� Policy Statement -

- AVS Plan: Bonding Initiatives (Overview)
- BRS� – Development Background
 - ^ Joint Efforts of Regulators & Industry
 - ^ Clearance Record Process (CRP)
 - ^ Public Commenting Process (PCP)
 - ^ FAA/EASA Coordination and Issuance
- BRS� – Post Issuance Efforts
 - ^ PS/CM Harmonization & Proposed Revision
 - ^ Implementation Support & Further Plan
- BRS� PS / CM Coordination

Overview of AVS Composite Plan

- Based on safety management approach
- The Plans are linked to:
 - Best Industry Practices
 - Research
 - Certification and field experiences
 - Projected technology advances in aircraft structure
- Priority given to structural issues, related manufacturing procedures and maintenance practices coming from service experience and industry input.

| Continued Operational Safety (COS) | Certification Efficiency (CE) | Workforce Education (WE) |
|--|--|--|
| COS A: Bonding Initiatives | CE A: Hybrid F&DT Substantiation | WE A: Composite Manufacturing Technology |
| - Bonded Repair | | |
| - Bonding Quality Control | CE B: Advanced Composite Maintenance | WE B: Composite Structure Technology |
| - Sandwich Disbond Growth | CE C: Composite Structural Modifications | WE C: Composite Maintenance Technology |
| COS B: HEWABI | CE D: Composite Quality Assurance | Composite Basics |
| COS C: Failure Analysis of Composites Subjected to Fire | CE E: Bonded Structure Guidance | Composite DER |
| | CE F: General Composite Structure Guidance | |
| <u>Support to future COS Initiatives</u> Aging Composite Aircraft Teardown | Transport Crashworthiness | |
| | Lightning Protection | |
| | CMH-17 Revision H | |



AVS Plan: Continued Operational Safety (COS) - Bonding Initiatives (BI) -

- Bonded Repair
 - **BRSL Policy (FY 13-15)**
 - Metal & Composite Bonding Best Practices
 - Repair Substantiation & M&P Control
 - Research Support
- Bonding Quality Control
 - Standards for Metal Bonding QC (FY 11-15)
 - Standards for Composite Bonding QC (FY 13-)
 - Research Support (e.g., Test Standards Development)
- Sandwich Disbond Growth
 - Document Best Practices
 - Standards for Sandwich Disbond Crack Growth
 - Research Support

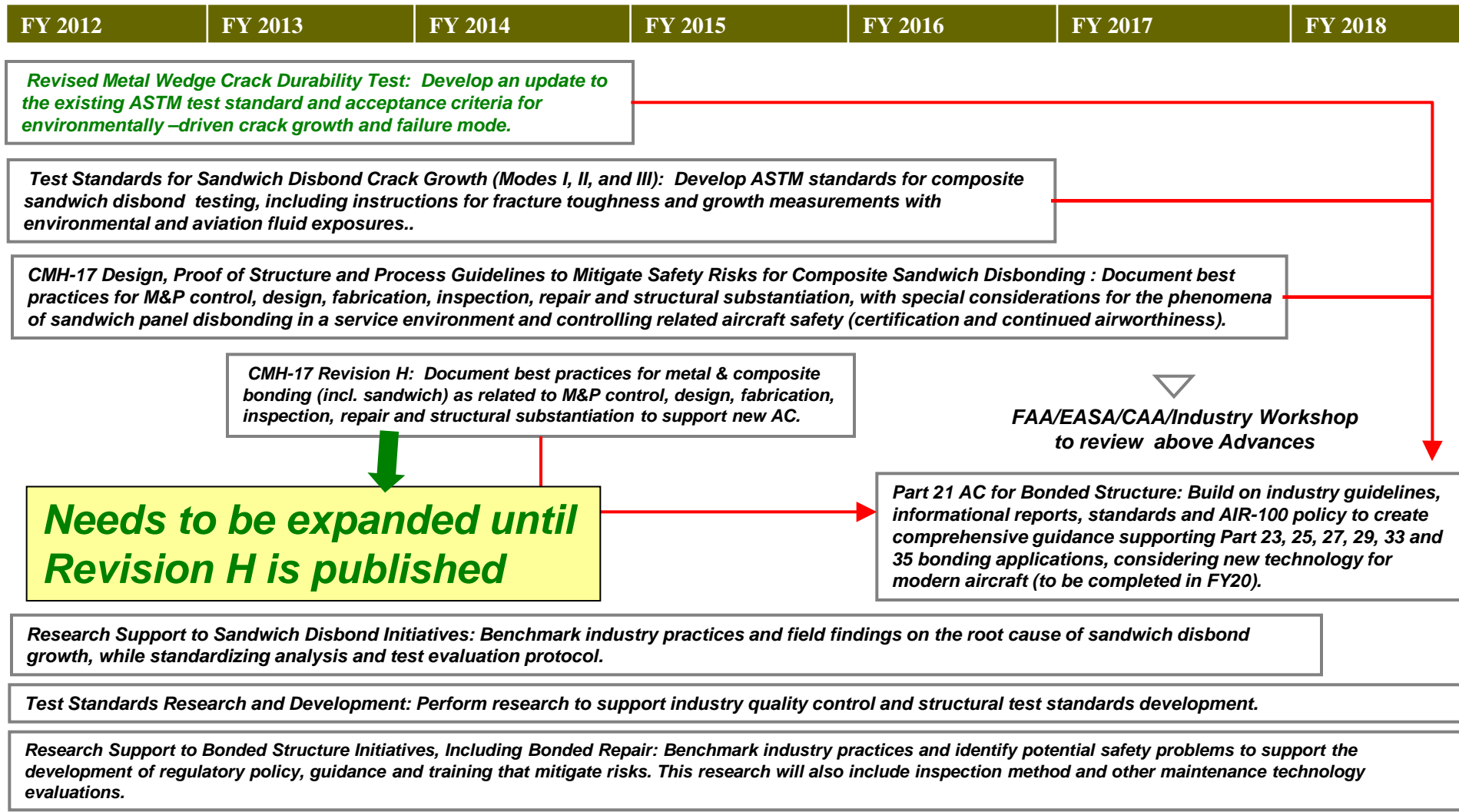
AVS Plan: Certification Efficiency (CE) and Workforce Education (WE) Related to BI

- Composite Quality Control (CE)
 - Update AC 21-26 “Quality System for Manufacture of Composite Structures”
 - Update online job aid for audit & surveillance of composite repair facilities.
- Bonded Structures Guidance (CE)
 - Part 21 AC for Bonded Structure including Bonded Repair Best Practices
- Workforce Education (WE)
 - Composite Manufacturing Technology
 - Composite Structures Technology
 - Composite Maintenance Technology



Work Flow – Bonding Initiatives

Example of Working Plan Details



BRSL – Development Background

- Joint Effort of Regulators & Industry
 - Seattle Working Meeting (Apr/12)
 - Toulouse Working Meeting (Sep/12)
 - Washington DC Working Meeting (Jul/13)
- AIR-100 conducted internal review (Clearance Record Process) (May-Jul/14).

Comments Received:

- Composite CSTA [6/16/14]
- RCD (ASW-100) [6/25/14]
- SAD (ACE-100) [Jun/14]
- TAD (ANM-100) [Jun-Aug/14]

BRSL – Public Commenting Process

- AIR-130 conducted 30-day Public Commenting Process (9/10/14 – 10/10/14).

Comments Review/Disposition:

- Comments inputs may be categorized from four distinct sectors of industry –
 - OEMs (Manufacturers): Boeing, Airbus, Bombardier, Textron, Cirrus, Spirit
 - Airlines (Operators): AA, DAL, UA, UPS
 - MROs (Repair Stations): TAC, AQRD, ARR, NORDAM
 - Trade Organizations: ARSA, A4A

BRSL – Public Commenting Process (cont.)

Comments Review/Disposition (cont.):

- Nature of comments seems to reflect sector's perspectives where commenters situate.
- Team completed review/disposition.
- Team established final BRSL draft (11/14/14).

[Disposition files are maintained for record.]

FAA/EASA shared comments/dispositions for harmonization.

BRSL – Finalization and Issuance

- Harmonization of FAA PS and EASA CM started in 2013 and continues -
 - Policy sections for both documents are essentially identical.
 - Public commenting for both started at nearly the same time.
- FAA AIR-100 issued BRSL PS (11/24/14)
 - Wording mistake discovered in FAA policy section after issuance through communications with EASA.
 - FAA updated the BRSL Policy [**PS-AIR-20-130-01**]
- FAA continues harmonization support to EASA CM
 - FAA (Lester) & EASA (Simon) met in Cologne (Wk. of 2/16/15).
 - Final release of EASA CM (Date TBD).

BRSL – Summary [PS-AIR-20-130-01]

A. Summary

This policy reviews the regulatory basis and establishes the guidance in setting size limits for bonded repair to **critical composite (monolithic and sandwich structures) and metallic structure**. **Bonded repair of critical structure must first be constrained to the sizes allowed by substantiating design data.** This policy informs Aircraft Certification Office (ACO) engineers and designees that due to inspection limitations, **bonded repair must be further limited to a maximum size whereby limit load residual strength can be demonstrated with a complete or partial failure of the bond within the repair or base structure arresting design features.** This policy is **not intended for minor repairs.**

BRS� – Implementation & Further Plan

- Update FAA/AFS Order 8900.1 (*FAA Flight Standards Division Information Management System*) to outline bonded repair size limits (to be discussed by Rusty Jones)
- Further Plan Includes –
 - ^ CACRC metal & composite best practices for bonded repair
 - ^ CMH-17 bonded repair structural substantiation guidelines
 - ^ NIAR/WSU and Heatcon research on bonded repair
 - CACRC round robin experiments
 - Industry views on critical in-process and post-process inspections
 - ^ DER short course for bonded repair
- Part 21 AC for Bonded Structures including Bonded Repair Best Practices (Culmination)

Composite Safety & Certification Meeting - Bonded Repair Size Limits (BRSL) -

- **Thanks for Opportunity.**
- **Questions and/or Thoughts?**
- **Further Discussion.**

