

Review Panel

Panel Members

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Module D

Composite Damage Types and Sources

- D1: Identify Sources and Characteristics of Damage to Composite Sandwich and Laminate Stiffened Structures
- D2: Describe Damage Types and their Significance to Structural Integrity
- D3: Understand the information and analysis necessary for repair design and process development/substantiation
- D4: Distinguish differences in repair disposition procedures for those damages covered by source documentation, and those that aren't
- D5: Describe the regulatory approval process for damages not covered by source documentation
- D6: *[LAB #1]*: Damage laminate coupons in a controlled laboratory environment and visually inspect the extent of the front and any back side surface damage

Summary of Review Panel Comments/Observations

General Comments:

- Careful review of the course content against regulatory processes should be made when course content is more completely defined to ensure course content is consistent with regulatory processes
- Modules should identify significant differences between EASA and FAA regulatory requirements
- Flow of sub-modules could be improved and a module specific to damage location, mapping, ADLs and assessment be created-proposed flow (F. Smal):
 - D1-Identify sources...
 - D2-Describe damage types...
 - Dn-Damage assessment (location, mapping, ADL interpretation, a/c release)
 - D4-Repair disposition...
 - D3-Understand the information necessary...
 - D5-Describe regulatory approval process...
- How will the composites message be transmitted to the wider aircraft operational community (i.e. pilots, baggage handlers, fuelers, cargo handlers, etc)

Summary of Review Panel Comments/Observations

Specific Comments

Module D1

- Clarify process allowed anomalies vs. anomalies requiring Material Review Board (MRB) review
- Clarify the liaison process, its regulatory basis, and the regulatory relationship
- Add discussion regarding the FARs on lightning strike and HIRF
- Clarify the current flow differences between metallics and composites
- Missing damage introduced during paint stripping either by mechanical or chemical means
- Describe indicators/issues with heat damage detection

Module D2

- Describe the general philosophical approach to the design of CFRP primary structure (i.e. Undamage-BVID-VID-Discrete Source)
- Discussion of matrix cracking appears too detailed for a maintenance level discussion
- Delete in-depth discussion of relationship between matrix cracking and potential subsequent finish cracking

Summary of Review Panel Comments/Observations

Specific Comments (continued)

Module D3

- Clarify the regulatory relationship vis-à-vis acceptance and approval of repairs (repair will be inspected by an authorized maintenance organization inspector, not by a regulatory agency or DER)
- Add discussion of the CACRC Analytical Repair Techniques T/G document as a method for validation of a repair
- Add discussion on purchasing of repair materials (i.e. approved sources, purchaser quality control, etc). See AC 145-6

Module D4

- Paragraph 3 is very awkward and needs a complete re-write to clarify the classification of repair as a function of a repair materials exhibited durability and mechanical properties-not cure temperature or the structure it is being applied to.

Module D5

- Add discussion on damage tolerance requirements on repairs to Principle Structural Elements

Module H

Describe Composite Damage and Repair Inspection Procedures

- H1: Describe NDI techniques currently available in the field
- H2: Describe critical steps necessary for making damage dispositions, including inspection and a draft process for QC plan for repair
- H3: Describe the critical steps necessary for inspecting a completed bonded repair, including NDI and interpretation of results
- H4: *[LAB #2]:* Demonstrate, and have students perform various damage assessments, including visual inspection, tap test and ultrasonic inspection
- H4: *[LAB #4]:* Demonstrate, and have students perform various post-repair acceptance inspections, including visual inspection, tap test and ultrasonic inspection

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Specific Comments

Module H1

- Too general and vague with regards to OEM inspection-more specifics needed here on the relationship between OEM production NDT techniques and in-service NDT techniques
- Refine discussion on moisture meter-applications are incorrect, technology has been supplanted by thermography (digital and liquid crystal)-Describe thermographic techniques
- Add discussion about CACRC developed NDI calibration standards
- Add following NDI techniques:
 - UT Resonance
 - Rapid Image Based NDI (MAUS, etc)

Module H2

- Emphasize the key link in validating bonded repairs is the QC process in relationship to FAA approved repair data (i.e. SRM)
- Clarify and remove inconsistencies between described processes and regulatory requirements for A/C release
- Add leak check requirement and rectification process (not bag removal) to QC plan for repair

Module H3

- Emphasize that inspection and interpretation of results must be done i.a.w. OEM SRM and NDT manuals using approved standards
- Inspection for conductivity/grounding for lightning strike protection