

Industry Standards, Specifications & Guidance – or Not

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Overview



- Issues = we all have them
 - Awareness, participation are required to problem-solve
 - A4A NDT Forum Roll call Today!
- STCs => Instructions for Continued Airworthiness (ICA)
 Policy Statement for Antennas, Radomes, other External mods.
- New Technology issues
 - Composites, training
 - SHM, POD/reliability => philosophical shift to CBM
 - Mods
 - DR/CR Training stds
- ATA 120 Specification Removable Structural Components
- OEM participation
 - Industry committees, standards

Awareness, participation required; otherwise dictated to

Issues

TechOps Sat Antennae ring with 757 Tearstrap AD

- ICA package approved for Antennae STC without AD considered •
- Eventual AMOC against AD 2008-06-14.



Issues

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Many errors found in instructions:

- STC on Satellite Antennae Instructions for Continued Airworthiness, stated to perform a HFEC around faster
 - Make the circle template from Al 2024-T3.
- Visual/FPI/HFEC for sub-surface flaw
- Lower Lobe Crew Rest floor beam FEA model
- Similar instruction errors found in Wi-fi Antenna mods, and even Winglet Installation Mods
- Very evident that proper Level III oversight did not occur
- FAA approved these as part of STC packages
- ICAs are the most critical part!

We know we have issues, questions on ICAs

Proposed Policy Statement



U.S. Department of Transportation Federal Aviation Administration

Policy Statement

Subject: Structural Certification Criteria for Antennas, Radomes, and Other External Modifications

Date: PROPOSED Policy No: PS-ANM-25-17

Initiated By: ANM-115

Summary

This policy statement identifies applicable structural requirements and acceptable means of compliance for certification of external modifications, such as antennas, radomes, cameras, and external stores, on transport category airplanes.

Current Regulatory and Advisory Material

This policy statement provides guidance on application of the following structural requirements to external modifications: Title 14, Code of Federal Regulations (14 CFR) 25.23, 25.301, 25.305, 25.307, 25.365, 25.571, 25.581, 25.603, 25.605, 25.609, 25.613, 25.629, 25.841, 25.901, 25.903, 25.1419, 25.1529, 26.45, 26.47, and appendix H of part 25.

Areas which may impact NDT

Damage-Tolerance and Fatigue Evaluation of Structure - Sections 25.571, 26.45 and 26.47.

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Instructions for Continued Airworthiness - Sections 25.1529, and Appendix H of Part 25.

The applicant must demonstrate compliance by developing an appropriate maintenance and inspection program.

- Damage Tolerance => SSID, ALI programs
 - OEM driven, approvals
 - STC's = STC holder (or you are on your own)
- EX: APB 767-300ER Winglet Modification (STC)
 - Several Chapter 57 ALI items are required before mod
 - Inspection threshold \neq 37,500 cycles
 - NDT ref stds, equipment may need to be procured

External Mods require DT evaluation => Inspections

"Bird Striker" => New inspections

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• Recently, the FAA clarified the existing regulation on bird-strike stating that existing radomes are now in bird-strike territory making them subject to more stringent regulation.

Bird Strike - Section 25.571(e)(1).

- 2.6.3.2 Unless it is shown that such a part will not depart the airplane due to any foreseeable circumstance, including fatigue, environmental or accidental damage or bird strike, the FAA assumes the part will come off the airplane and will follow the worst case trajectory, striking the airplane downstream. The FAA will not accept a probability analysis that the part will not strike the airplane downstream.
- 2.6.3.3 While § 25.571 only addresses structural elements that contribute significantly to the carrying of flight, ground, or pressurization loads, the process defined in § 25.571 may be used to show that all parts of an external modification will remain attached to the airplane. Directed, damage-tolerance-based inspections or other procedures should be used to prevent failure of the attachments of the external modification to the airplane.



UT inspection required for bond/delamination

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New Technology Will Affect NDT

- Composite NDT Training course
 - AC 65-33
 - AC 65-31B
 - Proficiency specimens

2nd Composite NDI Training Workshop August 19-20, 2015

Hosted by: FAA, FAA Airworthiness Assurance NDI Validation Center (AANC) at Sandia Labs & Delta Air Lines Meeting Location: Delta Air Lines Operations Center 3, 980 Virginia Avenue, Atlanta, Georgia 30354

- SHM POD Workshop
 - April 2015 = Boston
- Drone inspections
 - "Flying borescope"
 - Visual = NDT?
- International Workshop on SHM
 - Stanford, Sept 2015

FAA already working future issues

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SHM to CBM

- Technology ready, *philosophy* is not
 - Industry education, awareness
 - MSG3 documents => `NDT' replaced with `NDT/SHM'
 - NDT, SHM not in CFRs (and should not be)
 - Easier acceptance when Industry Stds (ARP 6461) are utilized

<u>3 phases envisioned</u>:

- Part 1: S-SHM for `alternate inspection approvals'
 - "Hot spot monitoring"
 - Perform SHM reading at same scheduled interval (S-SHM)
- Part 2: Blend of S-SHM and `predictive/prognostics'
 - Early warning system (Proactive mtc.)
 - Extension of intervals (escalation)
- Part 3: 'Condition based maintenance'
 - Philosophy shift.
- Speed is dependent upon OEM and FAA 'side-by-side' timeframe.
 - Get comfortable with new technology/philosophy.
 - Operator pay-back, financials directly dependent upon this.

SHM a branch of NDT or competitor?



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Misc. Technology Issues

- Wifi/SATCOM mods
 - Passenger entertainment driven, but also mtc impact
 - Possible for more MTC info in real time
 - Sensors, Health monitoring
- NAS 410 Revision
 - DR/CR separate quals
 - Limit on multi-method certs
- Remote Inspection
 - Expert in different location
 - Level I/Level II/No quals?
- C-scans, Arrays, Images (DR/CR/IR)
 - Software, 'assisted defect recognition'
 - Impact: workload decrease, POD ?
 - Change to 'direct reading instrument'?



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Misc issues could affect inspection depts

ATA 120 - RSC





The damage tolerance maintenance based programs were further enhanced by AASR (Title 14 Code of Federal Regulations (CFR) Part 26 Subpart E, 14 CFR § 121.1109 and 14 CFR § 129.109).

The purpose of this document is to provide the industry with recommendations to assist in addressing inspection, record keeping requirements and maintenance actions on structural parts (other than life-limited parts for which industry policies already exist) which may be typically interchanged between different airplanes by operators.

New ATA document on Removable Components

ATA 120 - RSC





Suggested methodologies for Utilization

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ATA 120 - RSC



- Example 1: A particular ALI has an inspection threshold of 40,000 FC. A given operator determines that all affected RSCs in their fleet have a maximum estimated/assigned utilization of 25,000 FC. That operator would begin the aircraft level maintenance action within 15,000 FC even if their fleet leader had less than 25,000 FC.
 - Potential Control: Require the maintenance action of parts sent out for repair/overhaul such that the maintenance action status of the RSC is current when it is installed on an aircraft.
- Example 2: A particular ALI has an inspection threshold of 40,000 FC. The fleet leader for a particular operator has 10,000 FC, but because of the age of the worldwide fleet and the fleet interchangeability of the RSC, the operator determines that the maximum estimated/assigned utilization (ref utilization section) of the RSC on their aircrafts could exceed 40,000 FC. The operator would define in their maintenance program to forego the aircraft level maintenance action threshold and move directly into the repeat maintenance action program.
 - Potential Control: Require maintenance action of part at time of installation for both installations from stock and rob/swap installations.

RSC => potential impact on inspection thresholds!

OEM Participation (lack of)

 Noticeable decline in OEM participation at Conferences, Committee Mtgs, Working Groups

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- Particularly with Engine OEMs
- Noticeable increased frequency of OEM consternation, lack of cooperation, or denied requests
 - Proprietary Info
 - "Packaged" support from OEM
 - Competition instead of customer?
 - Required equipment sole sourced
- Each OEM doing their own thing at expense of stds
 - OEM does not exist anymore (mergers, acquisitions)
- Increased costs forced on airlines/MROs
- Innovation, new technology stifled

Deterioration of OEM support is a negative impact

OEM Participation (lack of) Ex: UV light requirements



- Industry specs headed toward upper intensity limit
- One OEM requires use of higher intensity during FPI

Ex: Lack of standardization in language

• One OEM specifies penetrant inspection 6 different ways! (would be solved with Industry Committees)

Ex: Red dye penetrant still being called out

- Industry specs revised years ago = No red dye on aircraft or engine parts!
- Lack of industry standard language

Ex: Forced procurement (AD)

• Expensive equipment, ref std, required by AD

OEMs causing much consternation among industry

Summary



- Level IIIs (and inspectors) on alert!
 - Read paperwork
 - If errors, push-back, don't accept
 - STC holder, OEM, etc. responsible
- Make case to include Level III in 'reviews' or 'pre-work' plans
 - Ask for "validation" of technique, ICAs for STCs
- Ask questions of Engineering/Planning (RSC!)
- Communicate with Chief Inspector, Compliance Group
 - CASS, ASAP, SMS, other methodologies
 - AMOC requests
- Think about how new technology can impact future
 - Manpower (trained & qualified)
 - Equipment
- FAA (Rusty) available for help

