

Airline/Operator Input on Modifications

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OPERATOR MAINTENANCE TOPICS

- Typical Modifications
- Instruction for Continued Airworthiness (ICAs)
 - Maintenance Program
 - F&DT
 - Aircraft Maint. Manual
 - Structural Repair Manual
 - CMM
- Aftermarket Support

Typical Structural Modifications

- Winglets
- Interior Modifications
 - Floorboards/ first class seat pallets
 - Cargo handling systems
 - Crew rests
- Replacement Components
 - Radomes
 - Fan Cowls
 - Hush kits
- Sat-com Radomes
- Freighter conversion -Upper deck cargo door, 9G Bulkhead, etc.

ICAs – Fatigue and Damage Tolerance (F&DT)

Unclear classification of affected areas

- Fatigue Critical Affected Structure (FCAS) vs. affected Fatigue Critical Baseline Structure (FCBS)
- “Affected area” not defined at all. The affected area should be defined in the ICA document as well as any maintenance manual supplement for mechanics

Unclear definition of extent of affected areas

- The end of the STC-affected area and thus where we can apply the TCHs SRM allowables and where we should be going back to the STCH.
- Example - Large antenna installation: Maintenance & repair of added alteration structure (doublers, intercostals, etc) is clearly handled by STCH, but what about skin immediately adjacent to antenna? Where is the boundary of affected structure?

Mismatch for Proximity limits for repairs to the modified structure.

- If the STCH has defined an affected area less than the TCH, the operator ends up with structure on the aircraft that is neither supported by the TCH or the STCH.
- Example, if Aircraft OEM has a min distance between repairs of 12" and the STCH has defined an affected area of 1" around the doubler, who address's damage in the area in-between? These aspects should be addressed at certification but often are not.

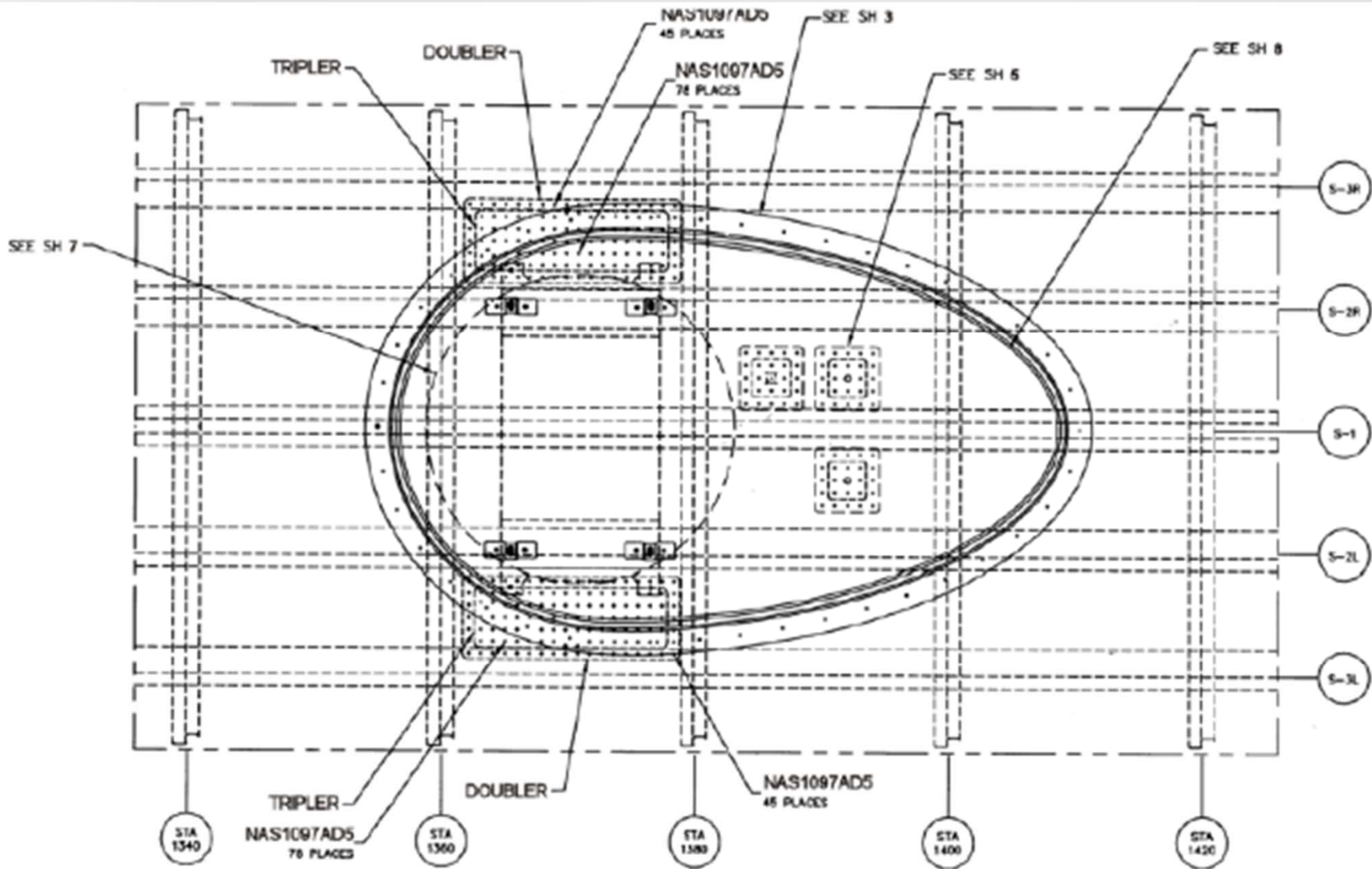
ICAs – F&DT Inspections/ Maintenance Program

- Effects to baseline structure F&DT-based programs
 - Many alteration DAH do not have deep awareness/access to baseline inspection programs
 - Effects to baseline ALS should be addresses at certification, and not when affected inspections are due
- Inspection interval should match baseline aircraft checks especially when major disassembly is required

ICAs – Airworthiness Limitation Section (ALS)

- Poor quality in approved ALS ICA:
 - Inaccurate, incomplete instructions which may not be discovered until inspection is to be performed
 - No NDI method or criteria identified
 - Inspection detail is vague or entirely incorrect
 - Over inspection – inspection fatigue
- Lack of revisions after feedback on ALS ICA quality issues – seeing repeat errors

How are we to inspect:



VIEW A-A, REF SH 1
VIEW LOOKING DOWN FROM TOP OF AIRCRAFT

How are we to inspect these:

Inspect the following:

Doublers

The doublers and the fuselage skin in the vicinity of the added doublers.

Radome Ring and Antenna Fastener Holes

The fuselage skin in the vicinity of the radome ring and the antenna mounting brackets fastener holes.

Doubler and Fuselage Skin Inspection

- 1) Using the circular patterns included in this supplement, manufacture templates from 2024-T3-0.063.
- 2) Using eddy current inspection techniques, inspect rivet and connector holes for cracks using the manufactured templates.
- 3) Using the appropriate template, start with the smallest diameter inspection guide and increase the circular search pattern progressively by one size until each hole has been inspected out to the third inspection guide.
- 4) If any cracks are detected, the skin panel and doubler must be replaced or other approved repair accomplished.

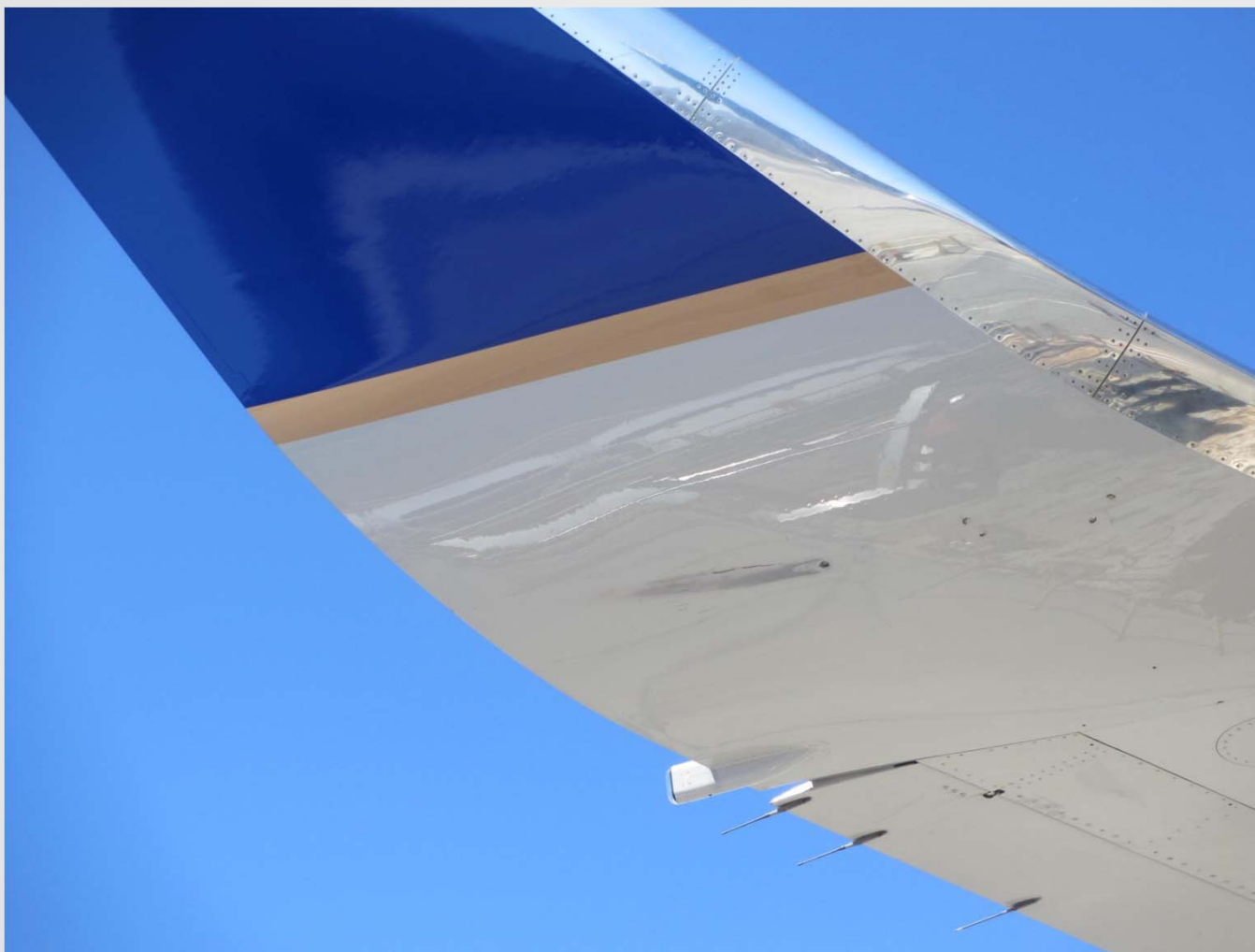
ICAs – Structural Repair Manual (SRM)

Allowable Damage:

- Coverage of in-service damage expected to be similar to OEM, i.e. include all same typical damage:
 - Scratches, gouges, dents, blend-out, holes
 - Lightning
 - Damage assessment and removal
 - Inspection methods
 - Heat Damage?
 - Impact threats
 - Dents especially hail

Winglet Lightning Damage

- 5 spots of damage common to fasteners
- Aluminum Trailing Edge burn



Winglet Lightning Damage

- No instructions for criteria for heat damage
- No instructions to check fasteners or criteria



ICAs – Structural Repair Manual (SRM)

- PSE definition for added parts?
 - PSE drives Major/Minor repair classification, and therefore need for FAA-approval of repair data
 - PSE drives SDR reporting, Required Inspection Items, etc
- Operator must create and maintain list of Fatigue Critical Altered Part, and repairs must meet F&DT requirements
- Applicability of existing repairs
 - Obvious & non-obvious existing repairs (blends)
 - STC holders often have not considered effect of existing repairs/alterations on modified A/C
- Applicability of future repairs
- Need usable repairs
- Repair material should be industry standard, not proprietary

ICAs – Component Maint. Manual (CMM)

- CMMs should be written for all parts that can be economically recovered and made serviceable
- CMMs should be available to all MROs
- Repair material and processes should use industry standards (not proprietary)
- Illustrated Parts List should be complete
 - Fasteners
 - Sub-assemblies
- Tools and Test Equipment should be available for purchase, or drawings available

STC Holder Aftermarket Support

- Spares
- Repair and materials
- Technical support for 1-off repairs
 - If not repairable, then access to drawings
- Manual revisions

STC Holder Aftermarket Support

Bankruptcy:

Who has responsibility for the on-going airworthiness of the STC product should the STCH go out of business?

- Ultimately it is the Operator, but Operators are unlikely to have capability for composite STC's as often the original design data is not available to the operator and there will be few, if any other STCHs able to reverse engineer the composite STC.
- Should the FAA or OEM need to hold a full set of the design/cert data that can be used should an STCH go out of business?

OEM Support

Provisions for typical modifications

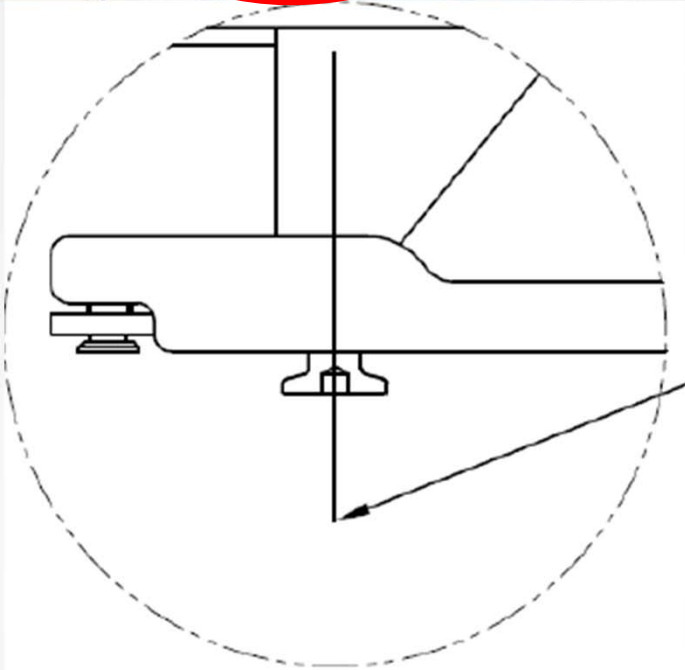
- Sat-com radomes
- Interior monuments
- Seat track interface geometry
- Seat track loading capability

Damage Tolerance Analysis

Decompression Analysis

OEM Support

Seat track interface geometry
– poor fit results in SCC



QUESTIONS?

EXTRA SLIDES

DIFFICULT INSPECTION OF DAMAGE

Vertical Stab Empennage Skin Panel - metalbond, PSE
Far-side skin disbond



Operator Input on Modifications

DIFFICULT INSPECTION OF DAMAGE

Rudder – FCBS and PSE – Farside disbond

