FAIL-SAFE DESIGN AND SDC PHILOSOPHY AND PRACTICES

AAWG Meeting
Everett - WA, USA
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FAIL SAFETY AND SDC OBJECTIVE

This presentation provides a brief overview of Embraer philosophy and practices related to fail-safe design and Structural Damage Capability (SDC), with the sole purpose of supporting the Airworthines Assurance Working Group (AAWG) discussions on the subject.

FAIL SAFETY AND SDC PHILOSOPHY

Philosophy

Though not a certification requirement, fail-safe structural design is good practice

- complements damage tolerance
- provides additional level of safety
- results in more robust design

FAIL SAFETY AND SDC PHILOSOPHY

Philosophy

- Protection against unpredicted or unknown events
  - accidental damages
  - anomalous fatigue
    - off nominal physical conditions
      - manufacturing
      - service induced
  - unexpected normal fatigue damages
    - shortfalls in hypotheses and assumptions

FAIL SAFETY AND SDC PRACTICE

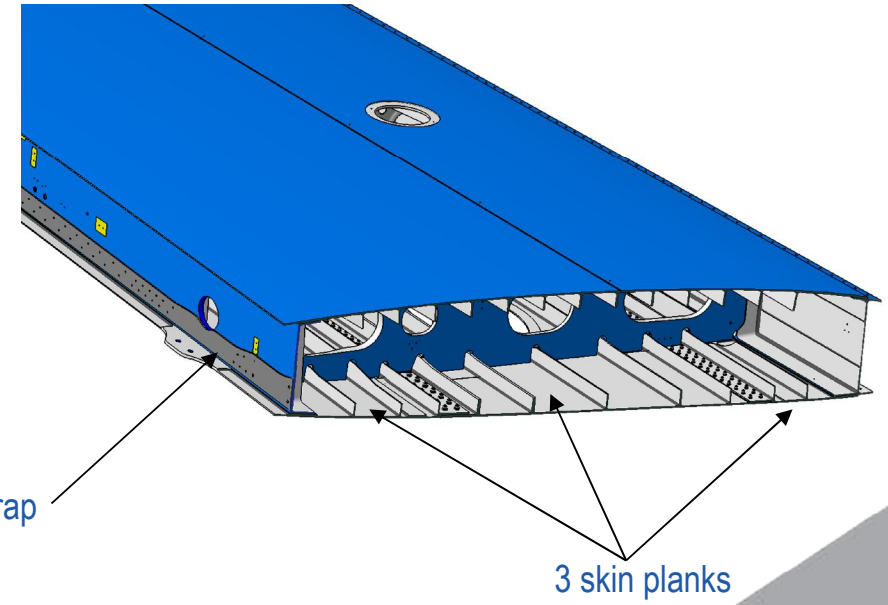
Practice

- Redundancy
  - multiple load path structures
- Damage containment features
- Residual strength
  - complete failure of a single element
  - partial failure contained
- No reliance on scheduled maintenance
  - damages detectable during normal operation or maintenance

FAIL SAFETY AND SDC PRACTICE

Example

- Wing box (metallic)
  - Machined spar
    - crack containment feature
  - Integrally stiffened skin
    - multiple load paths



FAIL SAFETY AND SDC PROPOSED APPROACHES

Compliance with Proposed Approaches

- 2003 GSHWG proposed change to § 25.571
  - similar to Embraer practice
- Design-based Part 25 - Subpart D rule (§ 25.6xx)
  - similar to Embraer practice
- § 25.571 as is, Guidance Material revised
  - no change in Embraer practice
- Existing designs would comply with any option

FAIL SAFETY AND SDC CONCLUSION

Summary

- By philosophy
  - safety by design is sought
  - fail-safe design is considered good practice
  - certain level of damage capability is required
- In general
  - current designs would comply with any of the three proposed rule or guidance material changes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