AIRBUS
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AIRBUS Philosophy for Fail-Safety

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Purpose of this Presentation

This presentation provides an overview of the AIRBUS design philosophy with respect to Fail-Safety and Damage Tolerance.

AIRBUS Design Philosophy

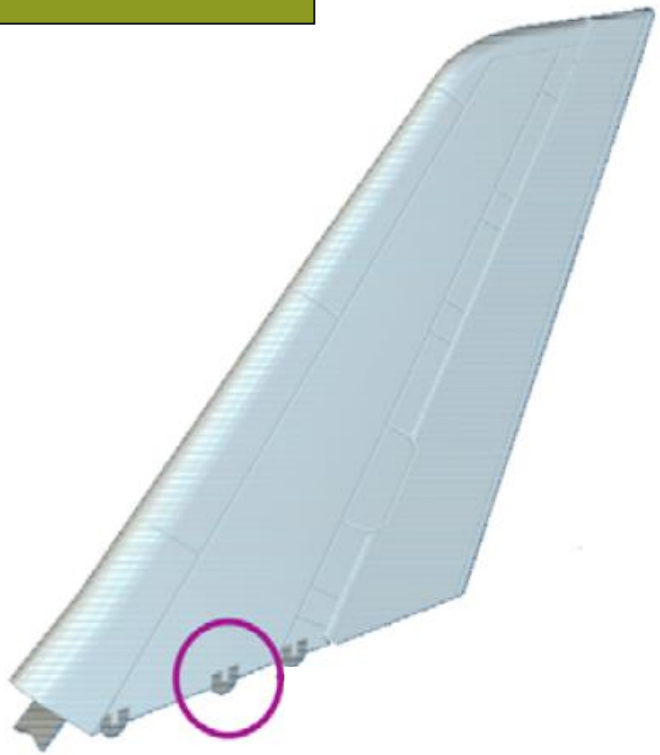
- Fail-Safe Design has been applied on all AIRBUS Products since A300.
- Fail-Safe has been supplemented by Damage Tolerance.
- AIRBUS Structure Design Manual describes design practices / principles and associated material selection to achieve a Fail-Safe Damage Tolerant design.
- Allowable Stress levels are defined and applied early in the design phase to ensure criteria such as durability, inspectability, Damage Capability are addressed.

Design precautions and level of SDC

Type of structure	Design precautions	Level of Fail-Safety and DT demonstration
Structures with discrete attachment elements (e.g. doors, control surfaces, engine mounts)	Design with sufficient number of attachment elements to ensure redundancy in case of complete failure of element(s)	RS with complete failure of (at least) one attachment. DT for inspection requirement
Generic stiffened panel structures (fuselage or boxes, metal or composite)	Appropriate material selection. Appropriate stiffening ratio. Crack stoppers or tear straps.	RS with severed element. DT for inspection requirement
Structure with large discontinuities (e.g. door surround)	Fail-safe doubler	RS with complete failure of doubler. DT for inspection requirement
Other areas where redundancy is not practicable (e.g. wing spar)	Design features added to retard / contain damage.	RS with crack up to DCF. DT for inspection requirement

Example of Fail-Safe design – Structure with discrete attachments

VTP



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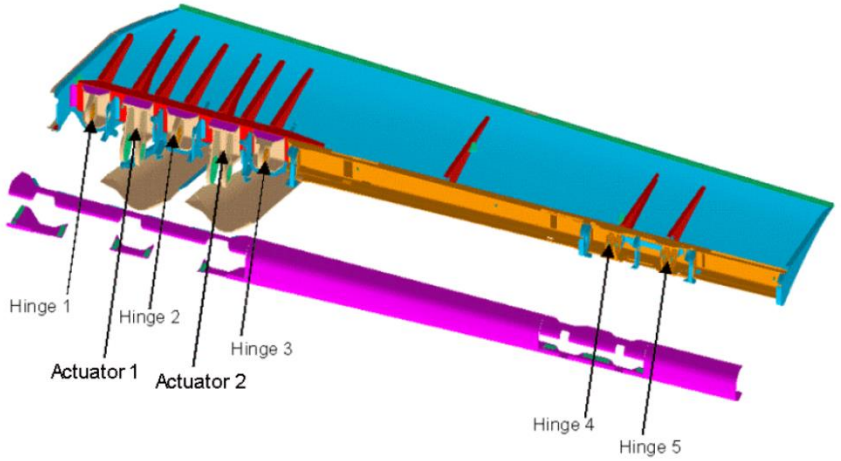

Limit Load sustained with any attachment failed

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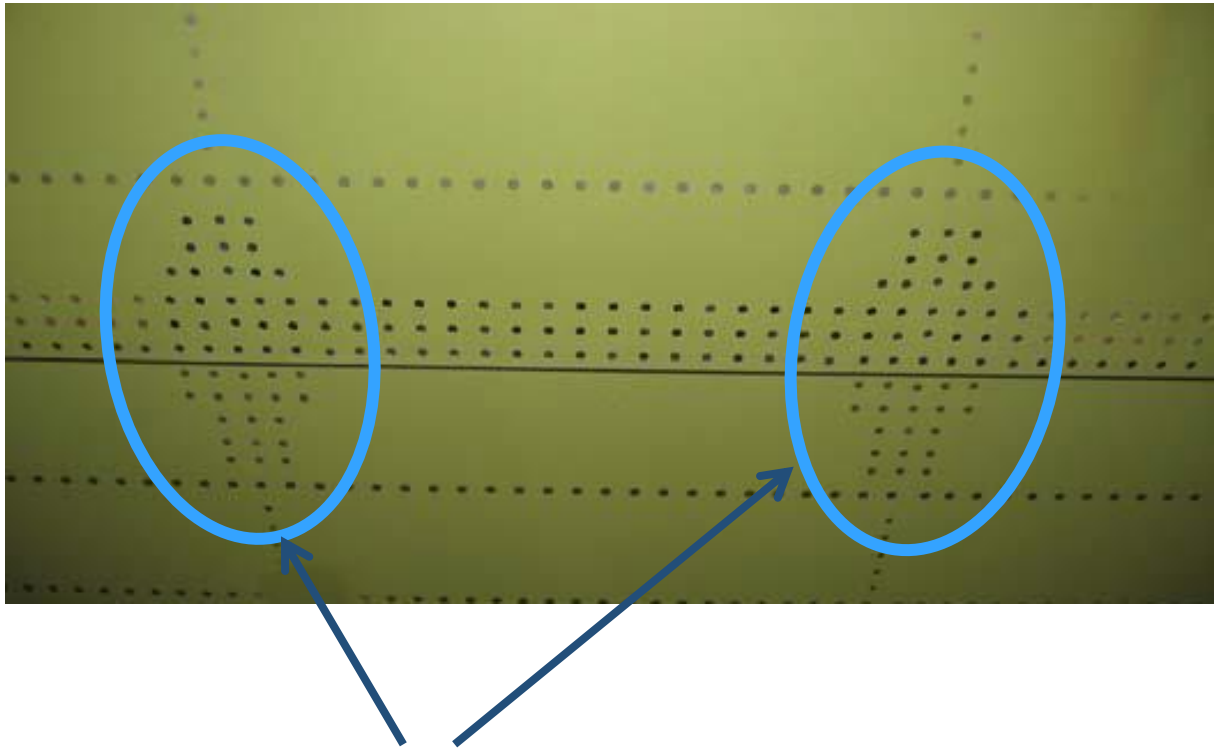
Example of stiffened panel structure

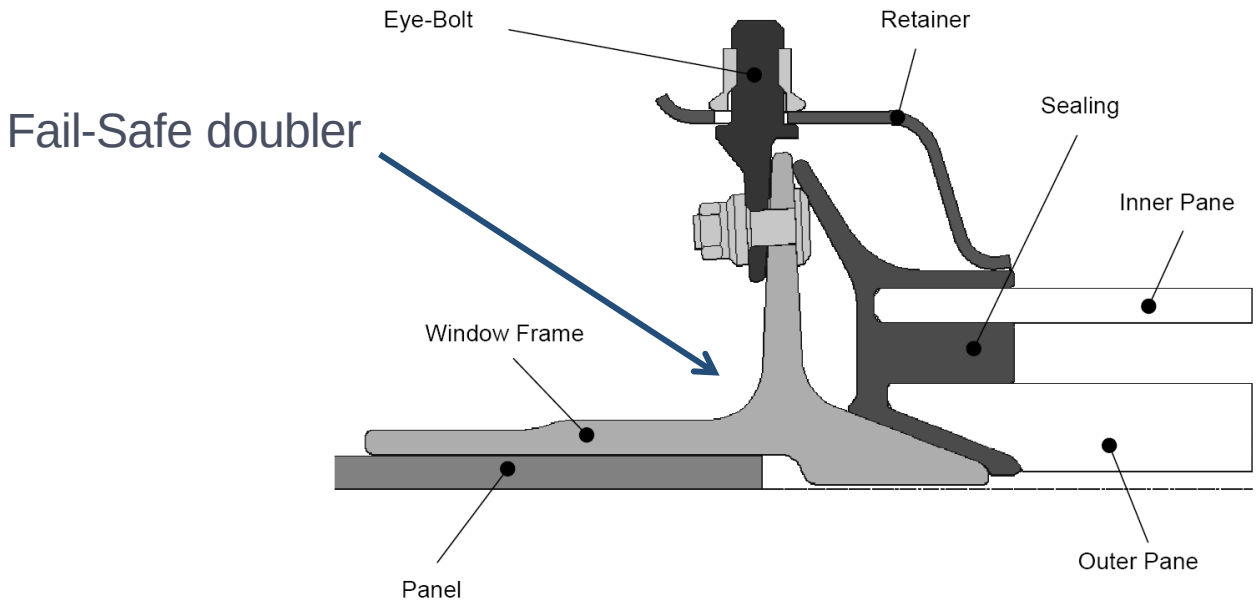
Fuselage Skin



Crack stoppers: increase Residual Strength, crack turning effect

Example of Structure with discontinuities

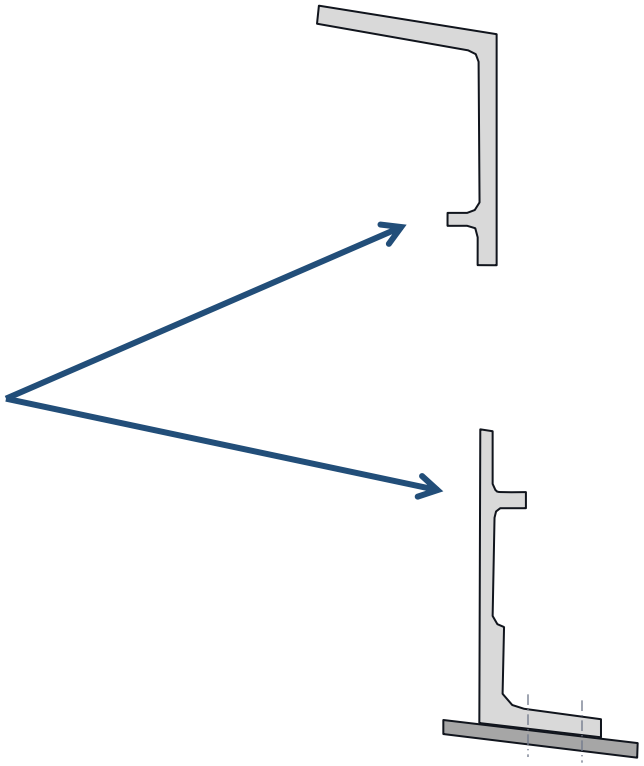
Window Frame



Example of structure where redundancy is not practicable

Wing Rear Spar

Damage Containment features



Summary

- AIRBUS Design Philosophy: not Fail-Safe alone or DT alone, but both combined as far as practicable.
- Level of Fail-Safety and Damage Tolerance introduced at design provides adequate protection against many kind of threats (including rotorburst).
- Design efficiency against many sources of damage confirmed by good Safety records.
- Existing AC/AMC 25.571 provides the required guidance to obtain this design philosophy.
- AIRBUS Design Criteria are aimed to introduce a good level of SDC.