Monitoring and Identification of Progressive Damage in Aerospace Composites using Non-Destructive Testing

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**Research Objective:**
Monitoring and quantifying the initiation and propagation of failure mechanisms in fiber metal laminate Glare 2A. Glare 2A is used on the upper fuselage of Airbus 380 (left) aircraft and consists of 3 layers of glass fiber epoxy composite + 3 layers of Aluminum 2024 (right).

**Approach:**
Mechanical testing coupled with non-destructive testing (left) was done to characterize the failure mechanisms of Glare 2A. Computational modeling was done to investigate the stress distribution corresponding to different failure mechanisms.

**Results:** Failure mechanisms (acoustic emission (AE)) were characterized during tensile testing.

- **Al Yielding** = 150 kHz
- **Al Cracking** = 400 kHz
- **Fiber breakage** = 450 kHz
- **Matrix cracking** = 50-100 kHz

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