

## Design Improvement of Aircraft Turbofan Engine Following Bird Ingestion Testing

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**Abstract :** Aircraft gas turbine engines are subject to damage by airborne foreign objects such as birds and garbage dumps. In order to assess their effect on engine performance, a complete foreign object damage (FOD) test was carried out and a component failure analysis was used to verify airworthiness standards (AWS) requirements for engine certification as set by international regulations. Ingestion damage due to 1.8 Kg (4 lb.) bird strike on an engine is presented in some detail. Based on the observed damage, improvements to the engine design were suggested in two different locations: the front bearing housing and the low compressor shaft. When these improvements were implemented, the engine showed an acceptable containment capability that meets AWS requirements.

**Keywords :** aircraft engine, airworthiness standards, bird ingestion, foreign object damage

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