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Structural Failure of Aircrafts

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Structural failure of Aircrafts

The malfunction of an aircraft building frame can have devastating results, resulting in losing people's lives and airplanes. The inquiry of flaws and inadequacies in aircraft components is thus critical to prevent future problems. Traditionally, the vast bulk of structural defects investigated have been metals, owing to the high prevalence of metal components in airplanes. Since the mid-1980s, nevertheless, a growing number of aircraft makers have used fiber-reinforced polymeric materials for structural parts. One of the prevalent structural defects was the disintegration of the wing of flight F-111 developed by General Dynamics for the United States Airforce in 1964.

The General Dynamics Corporation was awarded a tender in 1964 to design and manufacture the F-111 plane, which was later purchased by the United States Air Force (USAF) and others (Ball, 2017). The F-111 is a varying shape "swing-wing" combat-bomber that employs high-strength metal in main aircraft modules such as the flap carry-through frame, wing hinge fasteners, some central fuselage, and the exhaust nozzle carry-through composition. Flight F-111's wing disintegrated mid-air during a low-altitude training mission on December 22, 1969, a little over a year after starting work. The plane had only 107 airframe flying hours when it failed while lifting approximately 3.5g, just under half the structural limit load. The results of a quick on-site inquiry disclosed a fault in the bottom side in the aircraft's left-hand section hinge, which was occasioned by a defect in the high-strength steel used during manufacturing. This defect was present during production and had gone unnoticed given the wing's size. In service, a limited amount of brittle fracture happened before the overactive rupture of the tray, which contributed to the rapid wing damage. Because of the most strange defect that precipitated it, this disaster may have been regarded as a "detached instance." Ball (2017) suggests that the test crew witnessed lethargy and rupture issues during the aircraft testing regime. Fears about structural stability led to implementing a fracture monitoring system for the airframe's crucial metal components.

As suggested above, flight F-111 had some of the main components of high-strength steel, which failed the test leading to the aircraft losing its wing. In my view, manufacturing companies can correct the structural failure occasioned by high-strength steel to make the aircraft's main modules. In this scenario, it is apparent that General Dynamics Corporation did not take testing seriously. In my view, the high-strength metal was the best to use in the design of the crucial components, but it should be reinforced to make it stronger. I would not choose a different material because an aircraft's body is sensitive to weight. Planes are designed to be lightweight, and that is why aluminum and fiber-reinforced materials are used (Hoppe, 2018). However, main aircraft modules like the fuselage, landing gear, and wing hinges must be designed using high-strength steel or strong but lightweight alloys. Aluminum can be used because it is light, but using it will compromise the strength of the sensitive parts. The only viable solution in Flight F-111 is to redesign the parts using a higher-grade of metal or alloy that exhibits similar weight characteristics as that one used in the design of this aircraft. A higher grade of metal guarantees strength, and fractures and weak points will not develop. Furthermore, even if a higher gauge of metal is used to manufacture these components, the inspection and testing must be thorough in ascertaining that the final product does not have fractures or weak points that can compromise the integrity of the last aircraft. Redesigning the problem area will have little effect on the structural integrity since the same materials are used in the manufacturing process.

To sum it up, setbacks and flaws Inquests into aircraft engineering structures are essential to enhancing aviation safety. Recognizing the leading causes of errors and subsequent evaluation allows suggestions for corrective measures to be adopted, with the optimism that equal inadequacies will not happen in the future.

References

Ball, D. L. (2017). Observations on Materials Qualification for Military Aircraft Structures.

Hoppe, E. A. (2018). The FAA and the Ethical Dimensions of Regulatory Capture. In *Ethical Issues in Aviation* (pp. 97-112). Routledge.

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