

Aircraft Risk Analysis for Portfolio Expansion

Translating Risk Insights into Smart Procurement Decisions

Business Problem

- The aviation industry is increasingly focusing on safety and cost-efficiency, especially when expanding its aircraft portfolio. Making well-informed procurement decisions based on aircraft safety and risk data is critical to reducing injury-related costs, operational disruptions, and insurance premiums.
- This project aims to analyze past aircraft incidents, injuries, and damage patterns to guide smarter, safer aircraft purchases. The goal is to ensure that our growing fleet of aircraft operates with the lowest possible risk and maximum cost efficiency.
- By identifying risk factors related to different aircraft models, we can make informed decisions that minimize long-term injury costs, maintenance risks, and operational disruptions.

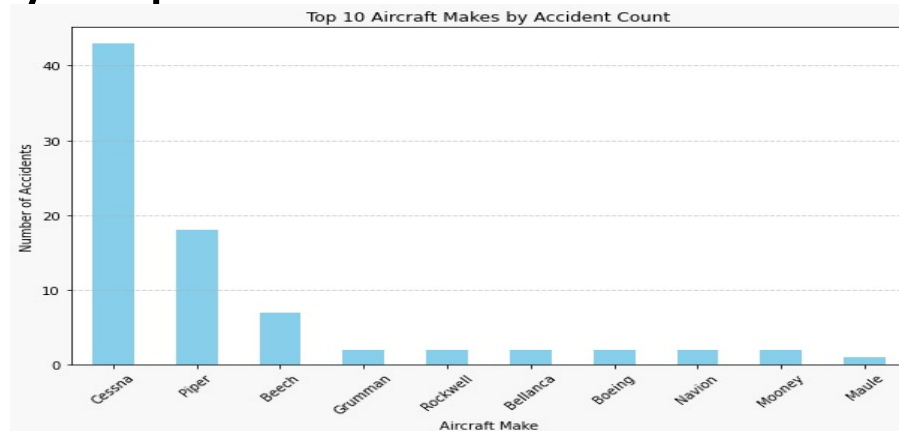
Data Overview

- The analysis is based on Aviation Data from the National Transportation Safety Board Database (1962-2023), which includes records on aircraft damage, injuries, and weather conditions during operations.
- The dataset includes key features such as aircraft make/model, engine type, severity of injuries (minor/serious), damage levels, weather conditions, and incident types. This data provides insight into how different aircraft perform in real-world conditions and their associated risks.
- Note: Some data points were missing for certain aircraft models and weather conditions. These gaps have been accounted for in the analysis, and conclusions are based on the available, reliable records. Data represents a sample of incidents, and findings may not fully capture every potential risk scenario.

Key Findings

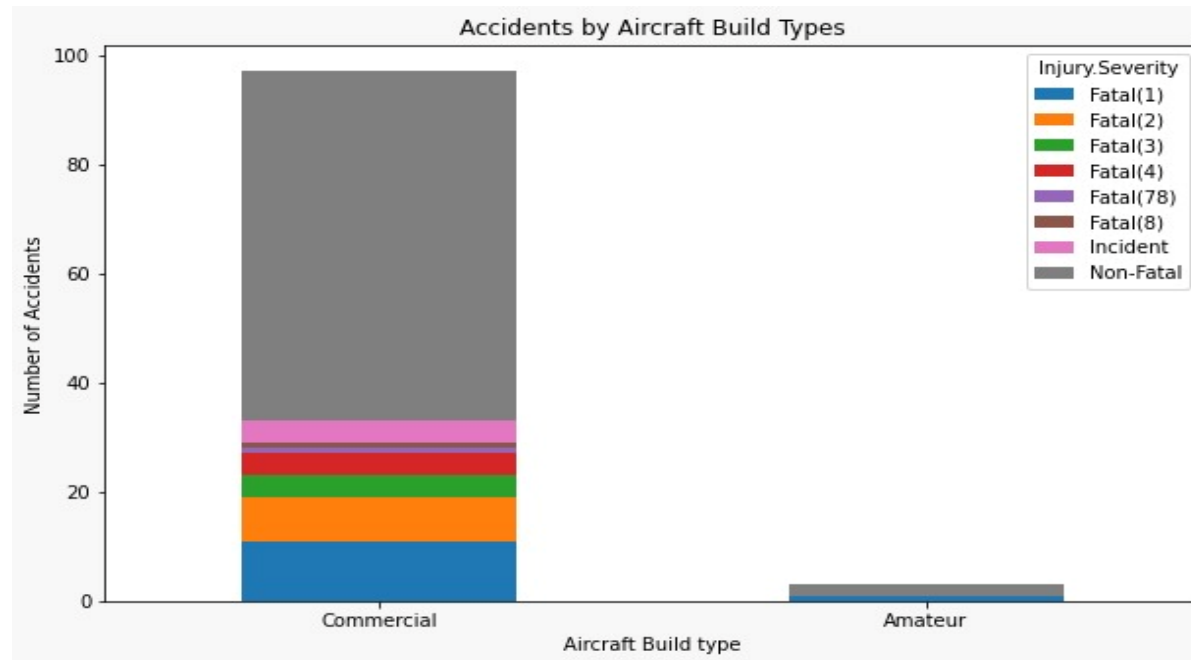
1. Aircraft Makes with the Highest Accident Rates:

- The top 10 aircraft makes with the highest number of accidents reveal a significant concentration of risk. Aircraft make Cessna has the highest number of accidents, indicating a potential concern for procurement decisions.
- Notably, Makes Piper and Beech follow closely behind, which suggests that these models may require further evaluation for fleet expansion.



2.Accidents Severity Outcomes in Aircraft Build Types

- Comparing the Injury severity by Aircraft build types(Amateur vs Commercial) Its clear commercially built aircraft pose more risk both in number of accidents and injury Severity
- 99.9 % of the aircraft were commercially manufactured.



Other Key Findings

Key Finding 3 — Injury Severity vs. Aircraft Damage

- Accidents that resulted in substantial or destroyed aircraft damage are highly correlated with serious or fatal injuries.
- Minor or no damage usually results in minor or no injuries.

Key Finding 4 — Weather Conditions vs. Injuries

- Adverse weather (e.g., rain, fog, wind) is associated with higher injury counts.
- Clear weather accidents tend to have lower injury rates, but still occur frequently. Aircraft damage strongly predicts higher injury severity. Poor weather significantly increases injury severity risk during accidents

Other Key Findings

Key Finding 5 — Aircraft Make, Engine Type vs. Injury Severity

- Certain aircraft makes and engine types (especially older or single-engine designs) show a higher number of serious/fatal injury accidents.
- Modern, multi-engine aircraft seem to have slightly better injury outcomes.
- Aircraft design and engine configuration influence injury outcomes.

Key Recommendations

- **Recommendation 1:**The Cessna type of aircraft had more injuries than any other model .
- **Recommendation 2:**Aircraft with reciprocating engine types caused more injuries.
- **Recommendation 3:**Select aircraft certified for all-weather operations to mitigate weather-related risks.

Thank you

Questions?

Contact Information

Leah Mukundi

Aviation risk Consultant

Email: mukundileah@gmail.com

LinkedIn: www.linkedin.com/in/leahmukundi