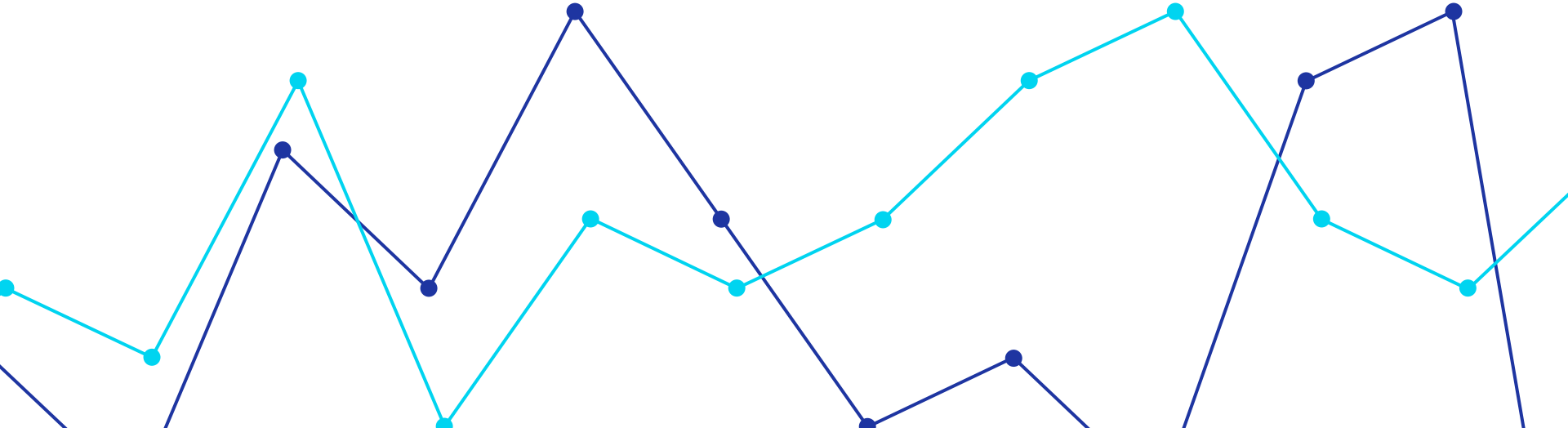


Aviation Risk Analysis for Strategic Aircraft Investment

A Data-Driven Approach to Safer Skies



Project Overview

Goal

Identify low-risk aircraft to guide aviation expansion.

Approach

Cleaned, imputed, and analyzed accident data from 1962–2023.

Tools

Python (Pandas, Seaborn), Tableau

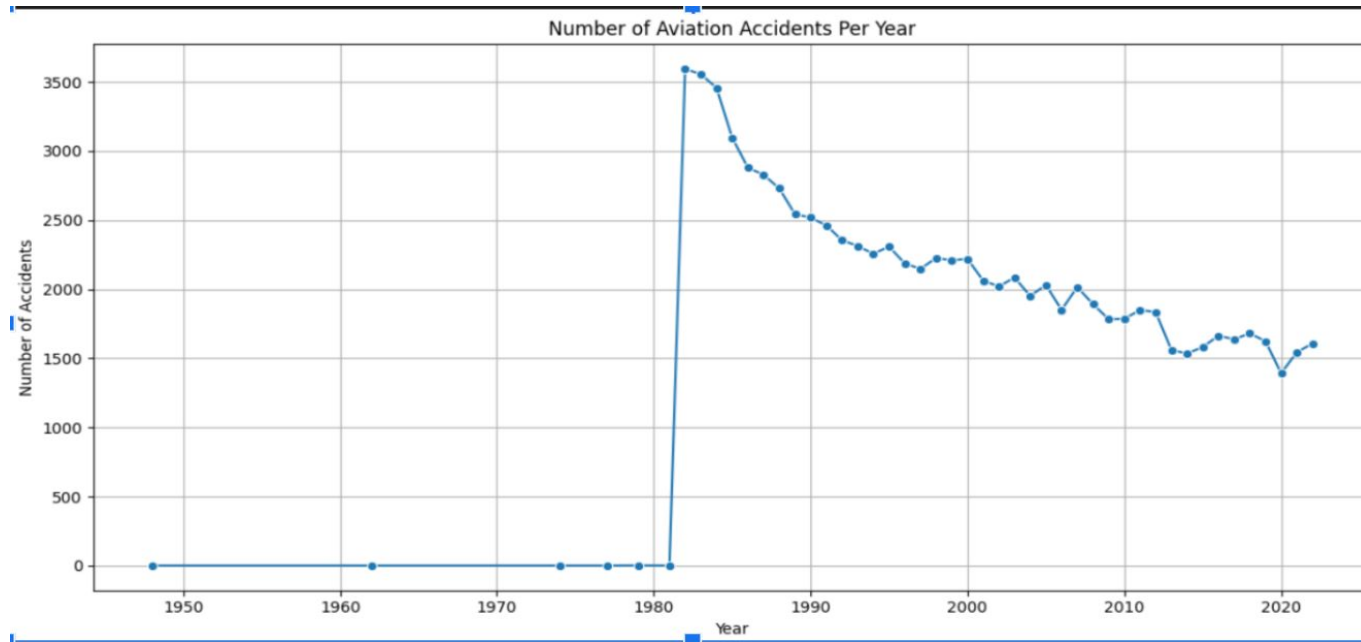
Problem

The company is entering the aviation sector but lacks safety insight.

Key Question: Which aircraft models and conditions present the lowest risk?

Our mission: Extract data-backed recommendations to guide procurement decisions.

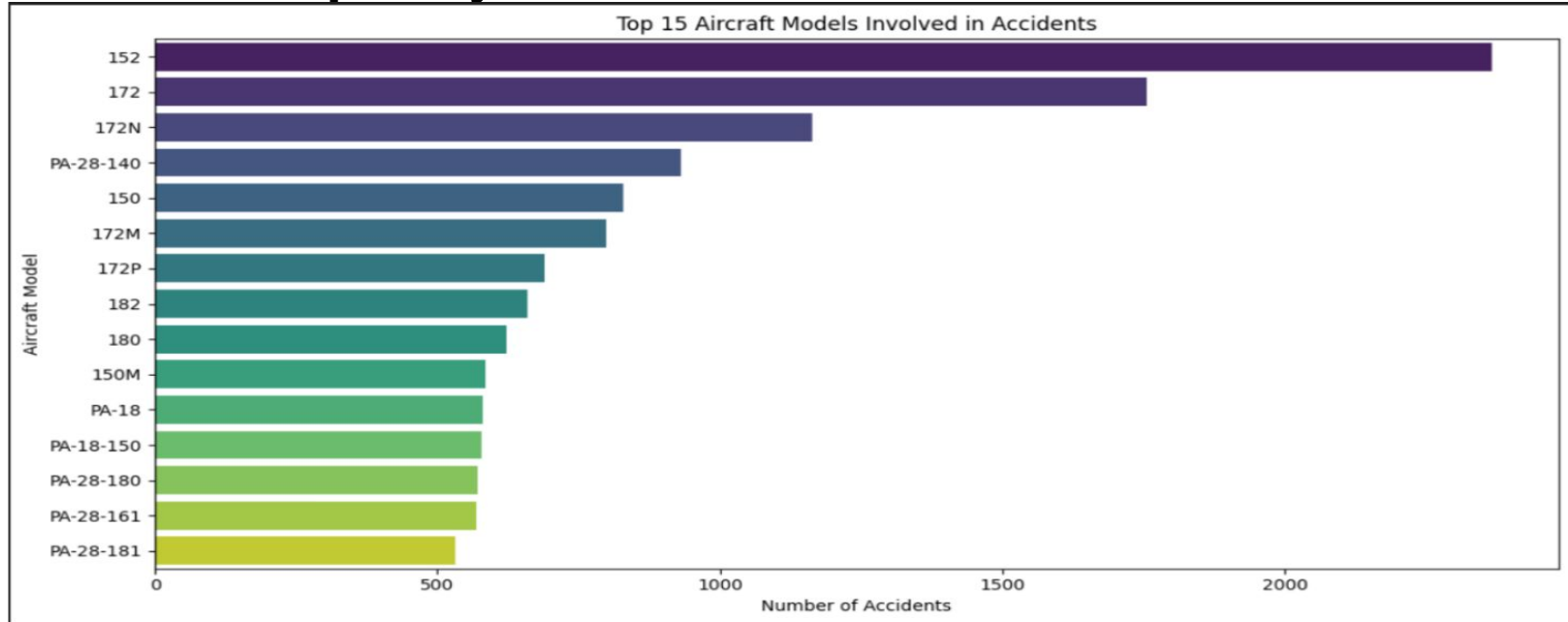
Aviation Accidents Overtime



Insight from the graph: Noticeable decline in aviation accidents over the past two decades.

Recommendation: Focus on newer aircraft with better safety standards and regulatory support.

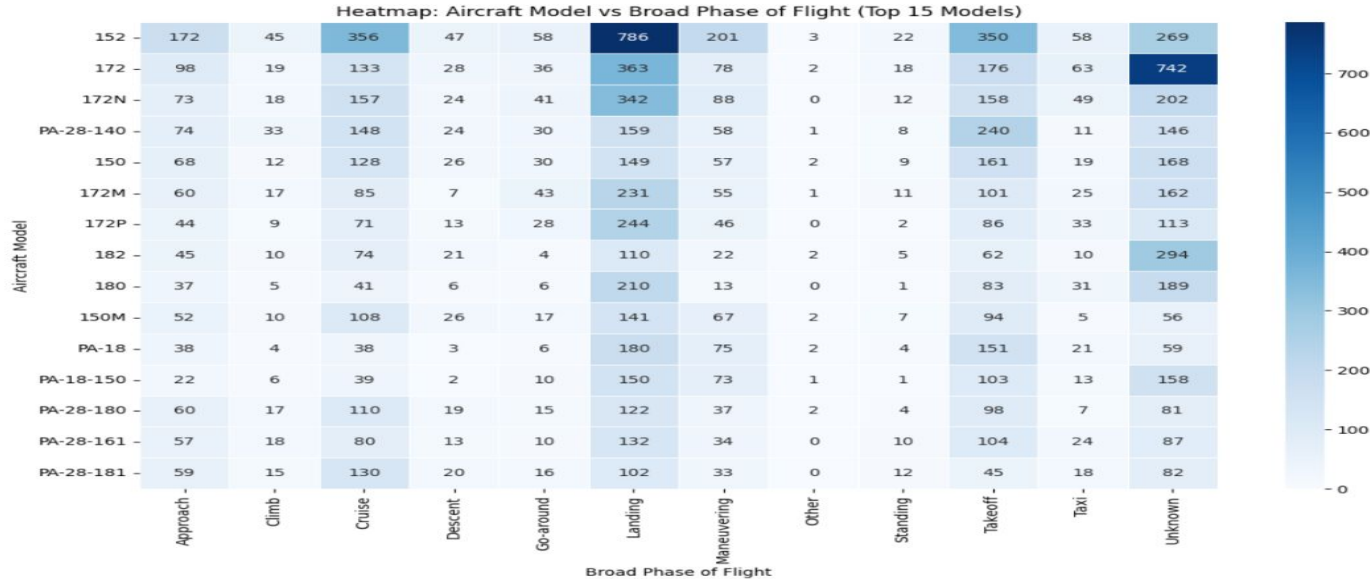
Most Frequently Involved Aircraft Models in Accidents



Insight: Models like 172, PA-28, and A36 are most frequently involved in accidents, likely due to high operational use.

Recommendation: Avoid overrepresented high-risk models such as 172 and A36, and cautiously evaluate PA-28 based on its survivability.

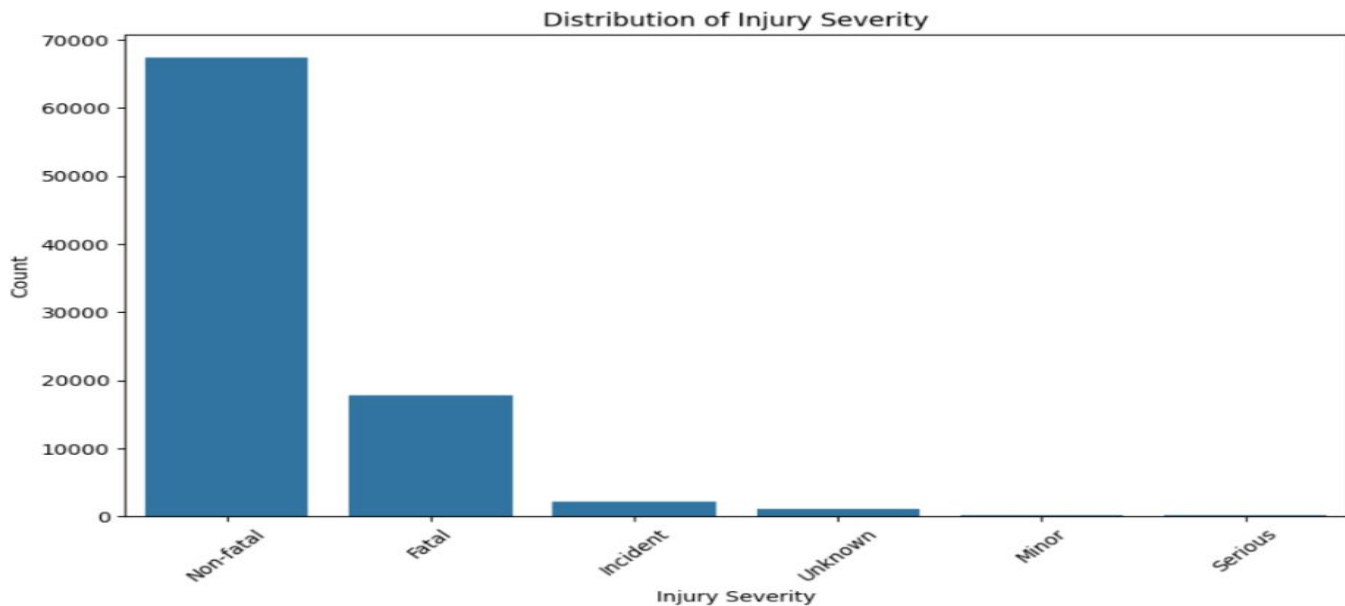
Heatmap – Aircraft Model vs Phase of Flight



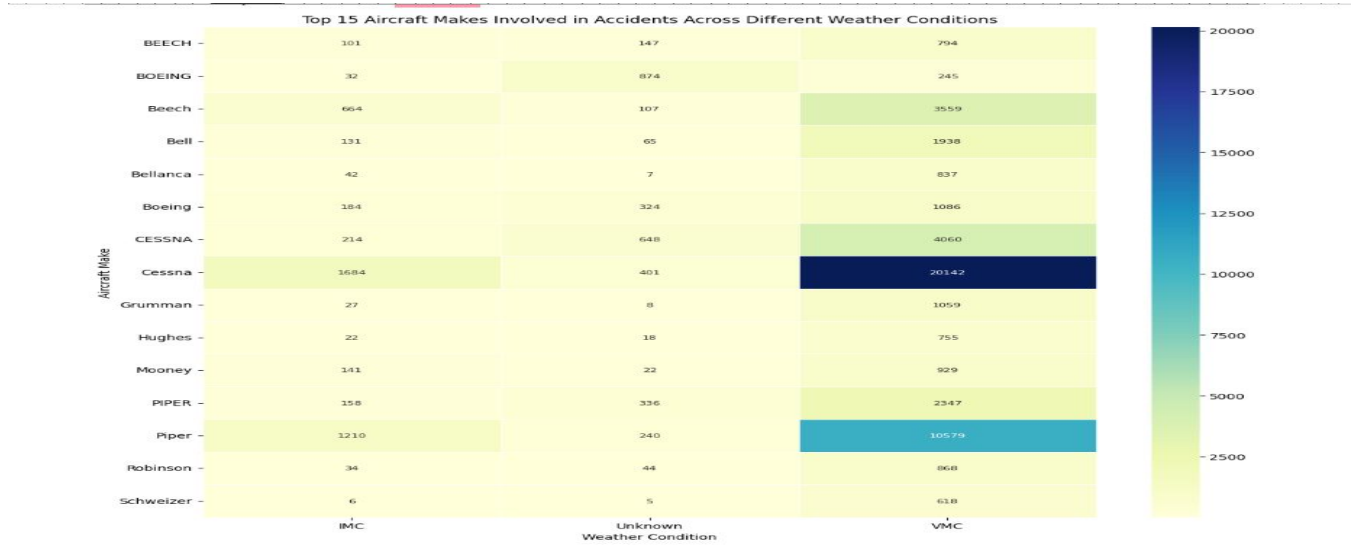
Insight: Most accidents occur during takeoff and landing, with models like PA-28, 172, and A36 heavily represented.

Recommendation: Limit use of these models for high-risk flight phases unless paired with intensive training and standard procedures.

Bar Plot – Injury Severity Distribution by Aircraft Make



Heatmap — Aircraft Make vs Weather Conditions



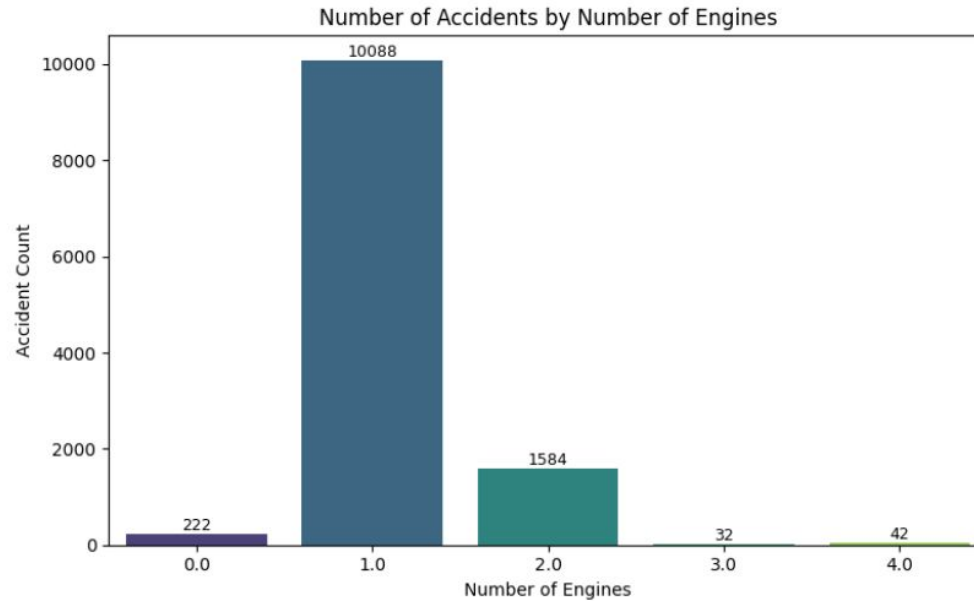
Insight: Cessna shows high accident rates even in clear weather (VMC), while Beech and Mooney trend higher in poor weather (IMC).

Recommendation: For VMC operations, favor Piper over Cessna; for IMC, select aircraft with strong IFR capabilities like Boeing models.

Final Recommendation Summary

- **Avoid High-Risk Models:** Aircraft like the Cessna 172, 152, A36, and BE-35 are frequently involved in severe or fatal accidents and should not be included in the entry fleet.
- **Prefer Survivable General Aviation Options:** The Piper PA-28 shows a more balanced injury profile and is a viable option for low-cost, non-commercial operations under good weather.
- **Invest in Proven Commercial Aircraft:** Boeing models (737-800, 757-200, DC-9) appear infrequently but are linked to low fatality rates, making them ideal for commercial-scale expansion.
- **Mitigate Risk During Critical Flight Phases:** Most accidents occur during takeoff and landing — aircraft commonly involved in these phases (e.g., PA-28, 172, A36) require enhanced simulator training and SOP enforcement.
- **Align Aircraft Choice with Weather Capability:** Avoid assuming clear weather reduces risk — aircraft like Cessna still crash under VMC. For IMC operations, select aircraft with strong IFR performance and engineering resilience

Accident Frequency by Engine Count



Insight: Single-engine aircraft are far more involved in accidents compared to multi-engine ones.
Recommendation: Choose multi-engine aircraft for commercial and high-passenger-capacity operations to enhance safety margins.