Aviation Accident Risk Analysis

Data-Driven Aircraft Investment Recommendations (1962–2023)

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Business Problem

Bullet points:

- Company expanding into aviation operations

- Limited internal knowledge of aircraft safety risks

- Need to identify **lower-risk aircraft** for acquisition

- Goal: support investment decisions using historical data

Data Overview

Content:

- Source: NTSB Aviation Accident Dataset

- Time period: 1962–2023

- ~90,000 accident records

- Focused on aircraft manufacturer, injury severity, and trends
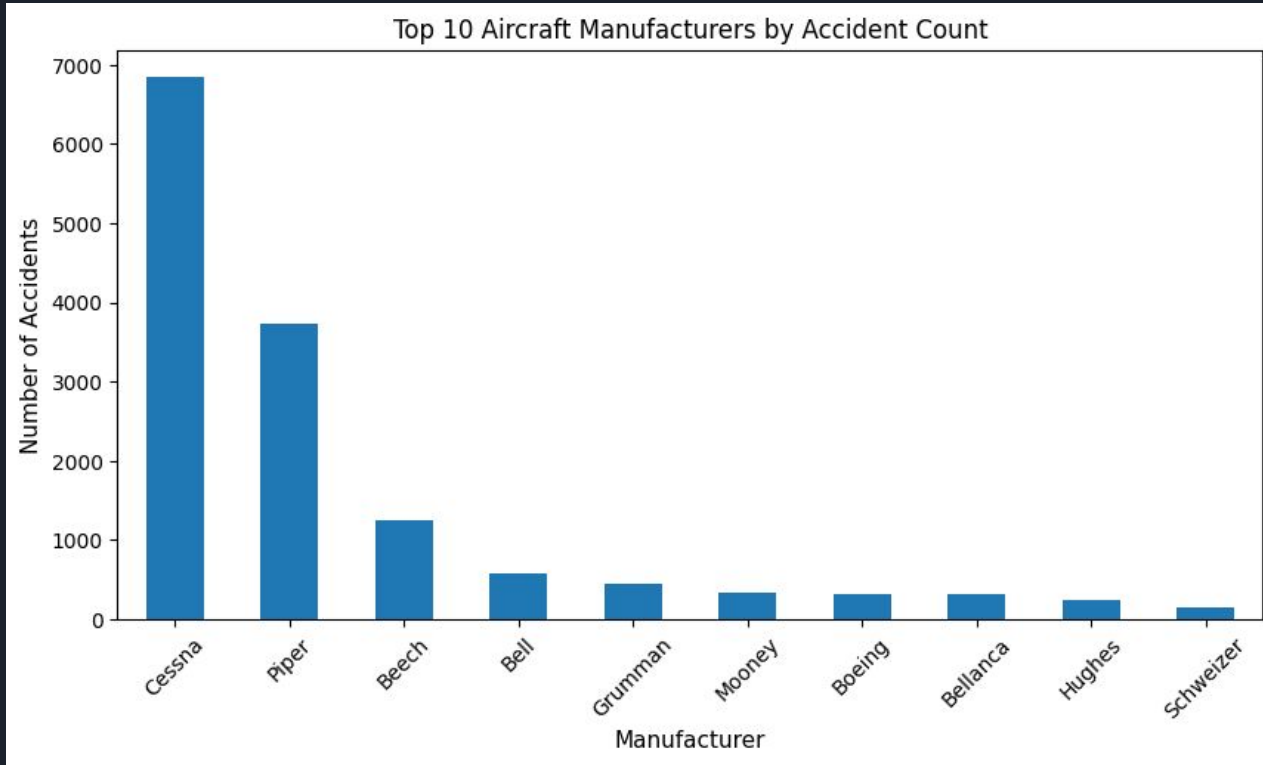
Methodology

Cleaned and standardized aircraft data with the use of Python.

Analyzed:

- Accident frequency

- Fatality rates

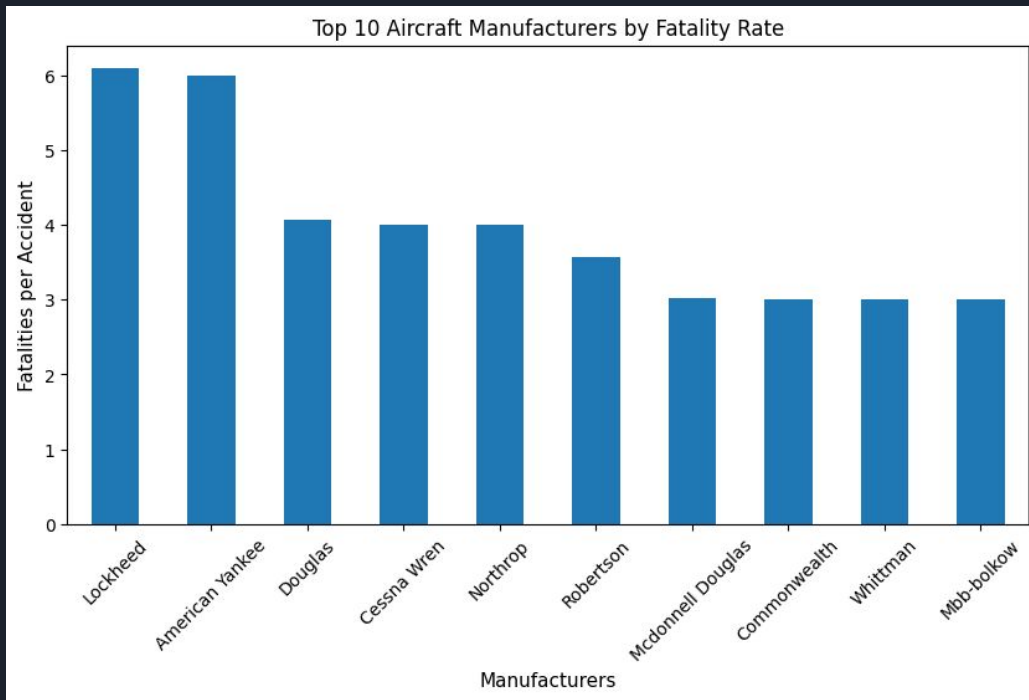- Long-term safety trends

- Injury severity outcomes

Visualized insights using Python and Tableau.

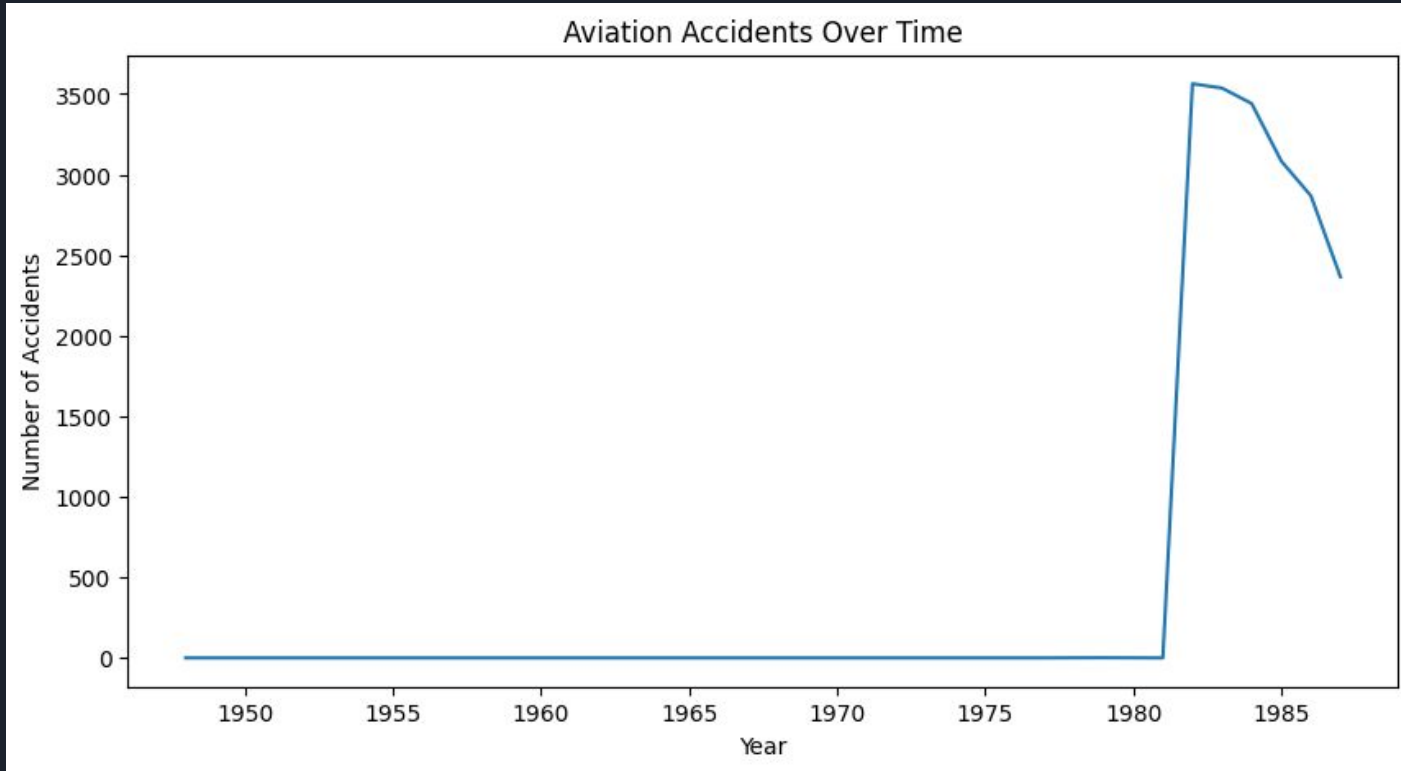# Insight 1 – Accident Exposure by Manufacturer

From the visual, we are able to decipher that some manufacturers appear far more frequently in accident records, indicating higher exposure.
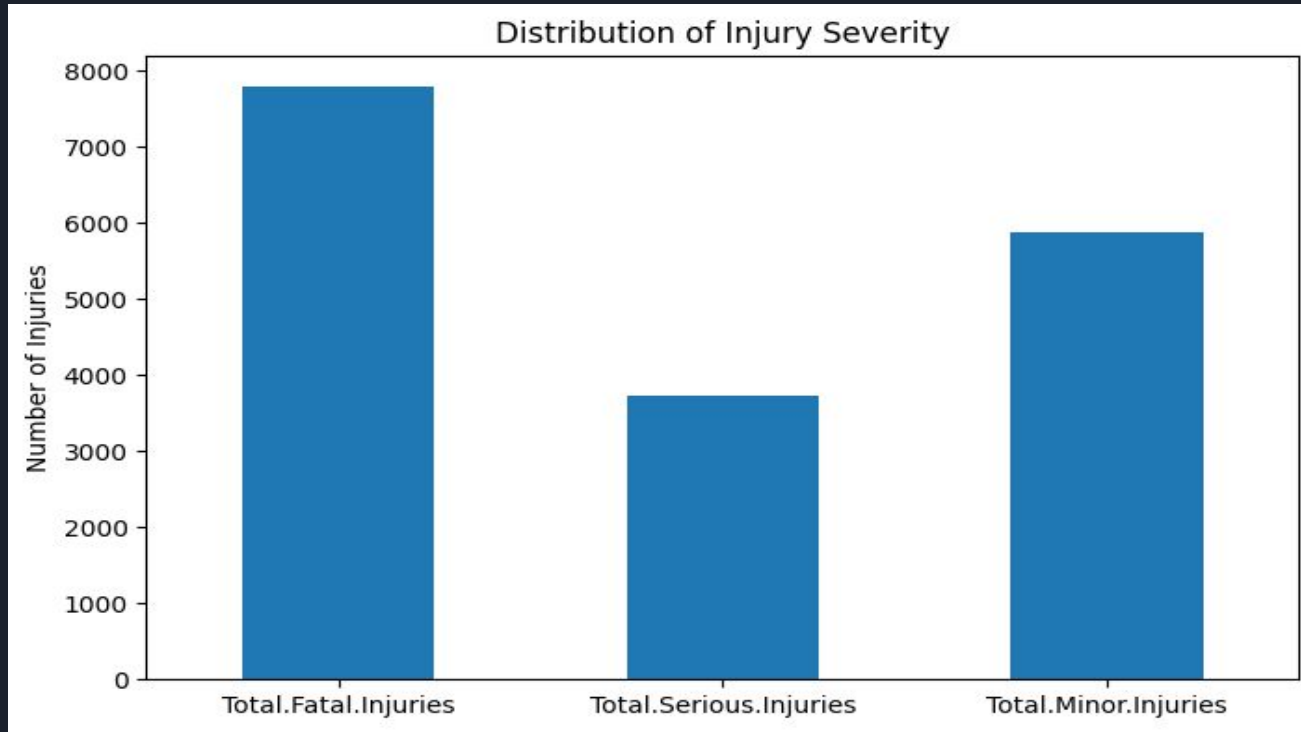
Insight 2 – Fatality Severity Risk

The key takeaway from this visual is that accident frequency alone does not capture risk; fatality severity varies significantly.

Insight 3 – Safety Trends Over Time

We see from the visualisation above that long-term accident trends show periods of improving aviation safety.

Insight 4 – Injury Severity Distribution

From the visual we can take away that, most accidents are survivable, but fatal outcomes carry disproportionate risk.

Business Recommendations

Based on historical accident risk, the following aircraft characteristics are recommended for acquisition:

- Aircraft from manufacturers with lower accident exposure

- Aircraft with lower fatality rates per incident

- Aircraft aligned with long-term safety improvements

- Aircraft associated with less severe injury outcomes

Future Work

- Incorporate **flight exposure data** (hours flown or fleet size) to normalize accident risk more accurately

- Expand analysis to include **maintenance records and aircraft age** to better assess operational risk

- Segment risk by **commercial vs private use** to support targeted aircraft acquisition strategies

- Integrate **cost data** (insurance, maintenance, downtime) to quantify financial impact of accident risk

Thank You

Thank you for your time and attention.

Feel free to reach out if you have any questions or concerns to:
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Appendix - Interactive Dashboard

For a hands-on exploration of the analysis, an interactive Tableau dashboard is available.
The dashboard allows stakeholders to explore aircraft risk, fatality severity, and safety trends using dynamic filters.

🔗 **Tableau Public Link:**
https://public.tableau.com/app/profile/carl.collins/viz/Aviator-Analysis-Visuals/Dashboard1

Appendix - Key Columns Used in Analysis

The analysis focused on a subset of variables relevant to aircraft risk assessment.

The following columns were used throughout data cleaning, analysis, and visualization:

Aircraft Identification

- `Make`

- `Model`

- `Aircraft.Category`

Accident Severity

- `Total.Fatal.Injuries`

- `Total.Serious.Injuries`

- `Total.Minor.Injuries`

- `Total.Uninjured`

Time & Trend Analysis

- `Event.Date`

- `Event.Year` (derived)