Aircraft Risk Analysis

Analyzing Aviation Accident Data for Business Decision-Making

Project Overview

- Objective: Identify the lowest-risk aircraft for commercial and private operations.
- Data: National Transportation Safety Board (NTSB) accident reports (1962-2023).
- Methods: Data Cleaning, Analysis, Visualization, and Business Recommendations.

Business Understanding

- The company is expanding into the aviation industry.
- Understanding accident trends can help in selecting safe aircraft.
- Insights will drive purchasing decisions for new aviation ventures.

Data Understanding

- Dataset: NTSB Aviation Accident Database.
- Covers accidents from 1962 to 2023.
- Key attributes: Aircraft Make, Model, Phase of Flight, Injury Severity, etc.

Data Cleaning

Issues Identified:

- Missing values in critical columns (e.g., Latitude, Longitude, Flight Purpose)
- Inconsistent data types (e.g., Date as string)

Actions Taken:

- Removed high-missing-value columns
- Imputed missing values (mean/median for numerical, mode for categorical)
- Converted data types appropriately

Exploratory Data Analysis (EDA)

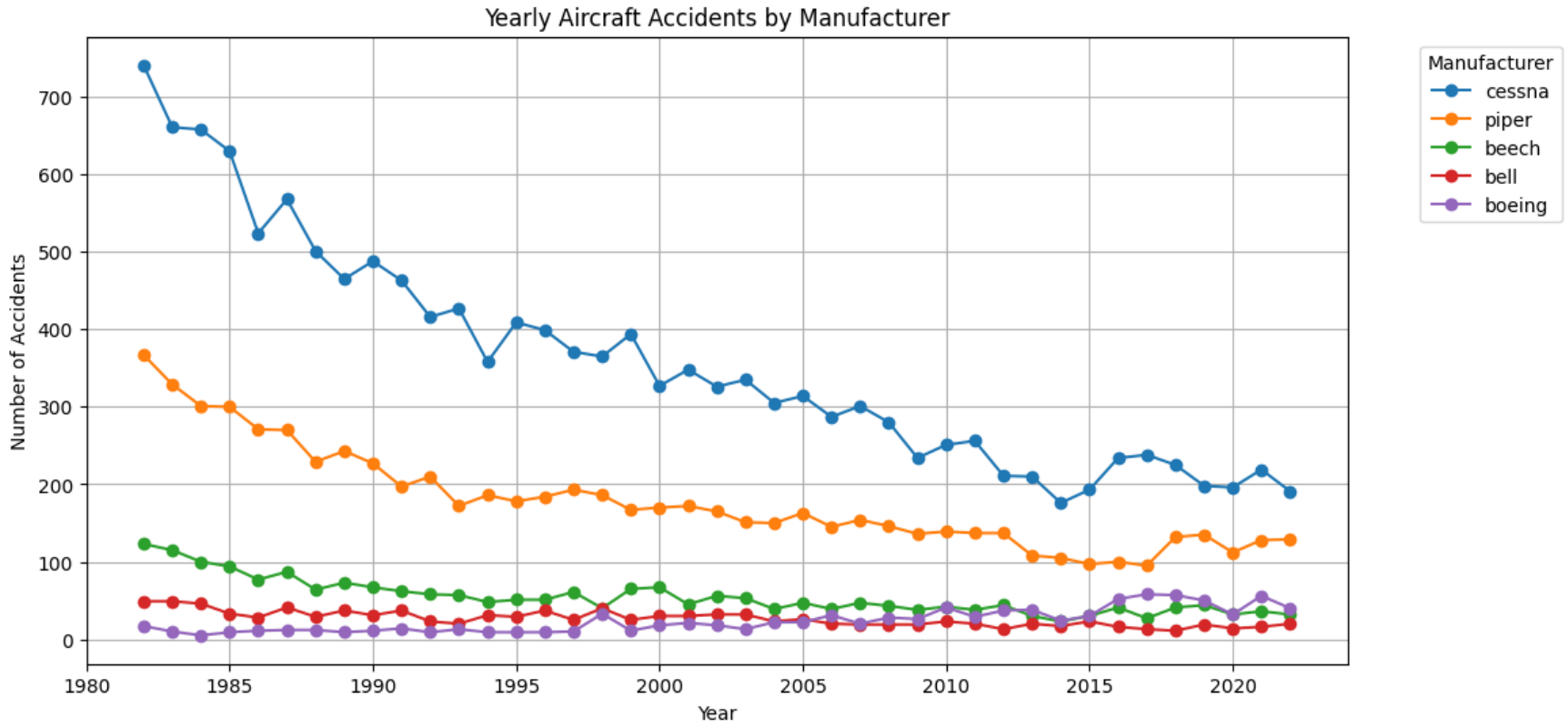
- Accident Trends Over Time (Graph showing yearly accident count)
- Accidents by Aircraft Make (Top 10 most involved aircraft)
- Fatality Rates by Aircraft Model(Comparison of fatality-to-accident ratios)
- Yearly aircraft accident by models

Accident Trends Over Time

Yearly Accident Trends

- Number of accidents peaked in the 1970s & 1980s, then declined.

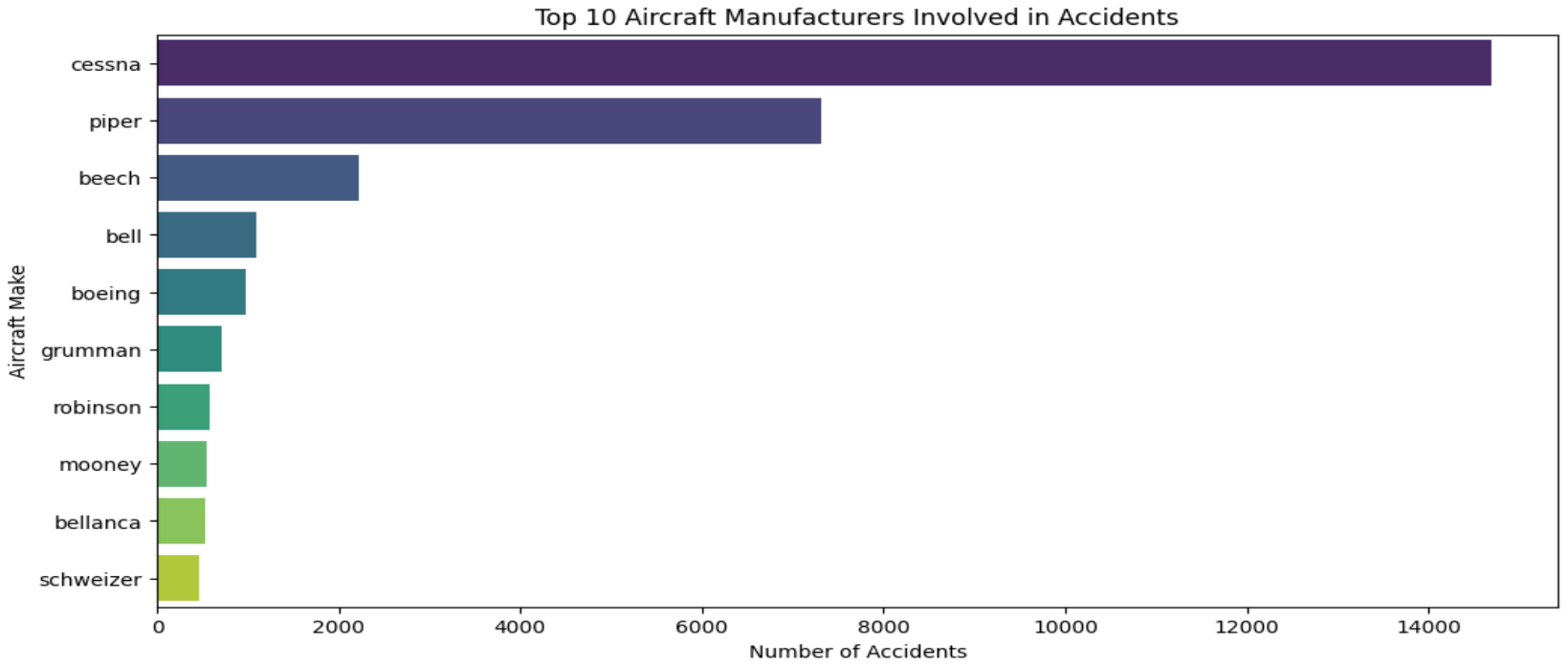
Yearly Aircraft Accidents by Manufacturer



Accidents by Aircraft Make

Which Manufacturers Appear Most?

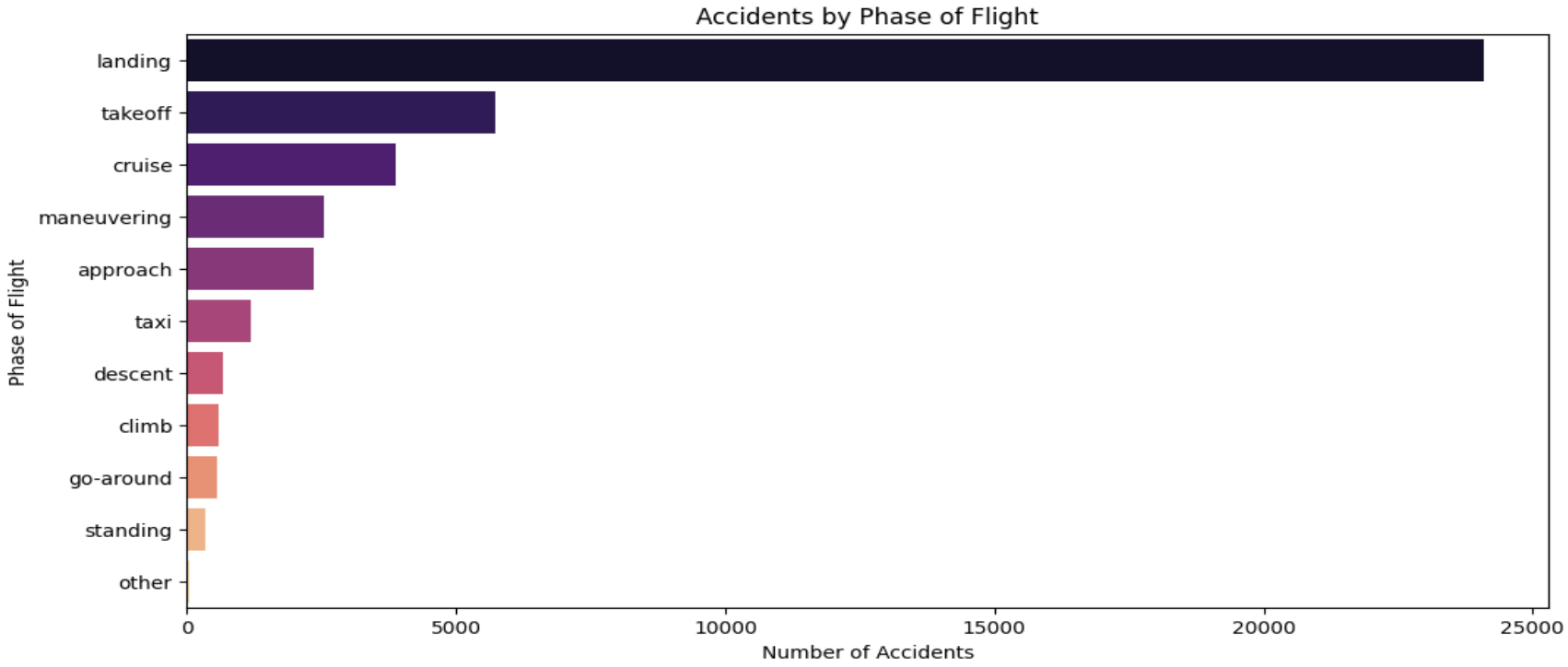
- Certain aircraft **(e.g., Cessna, Boeing, Piper)** are more frequently involved in accidents.



Accidents by Phase of Flight

When Do Most Accidents Happen?

- **Takeoff & Landing phases** account for the highest number of accidents.



Key Insights

- Most accidents occur during takeoff and landing.
- Certain aircraft models and manufacturers have higher accident rates.
- Fatal accidents are less frequent but have severe consequences.

Business Recommendations

- 1. Prioritize low-risk aircraft with strong safety records.
- 2. Invest in pilot training for critical flight phases.
- 3. Enhance aircraft maintenance programs.
- 4. Avoid high-risk aircraft models based on historical data.

Conclusion

Key Takeaways:

- - Data-driven selection of safer aircraft can reduce operational risks.
- - Certain makes/models have a significantly lower accident rate.