Aircraft Risk Analysis For Business Expansion.

Identifying the Safest Aircraft for Commercial and Private Use.

Introduction: Expanding into the aviation industry-The challenge

- Our company is diversifying into the aviation industry.
- We need to ensure we invest in low-risk aircraft to minimize potential losses.
- This project analyzes accident data to identify aircraft models with the lowest risk.
- Our findings will guide strategic purchasing decisions.

Business Problem.

What are we solving?

- The company lacks experience in aviation risk management.
- Aircraft accidents can lead to significant financial and reputational damage.
- We need data-driven insights to select safe, reliable aircraft for commercial and private operations.

Data Overview.

Where did we get our insights from?

For this analysis we used a dataset from the National Transportation Safety Board that includes aviation accident data from 1962 to 2023 about civil aviation accidents and selected incidents in the United States and international waters.

Key Variables in this dataset include:

- Aircraft make and model
- Phase of flight during accidents
- Number of casualties per incident/accident.

Methodology.

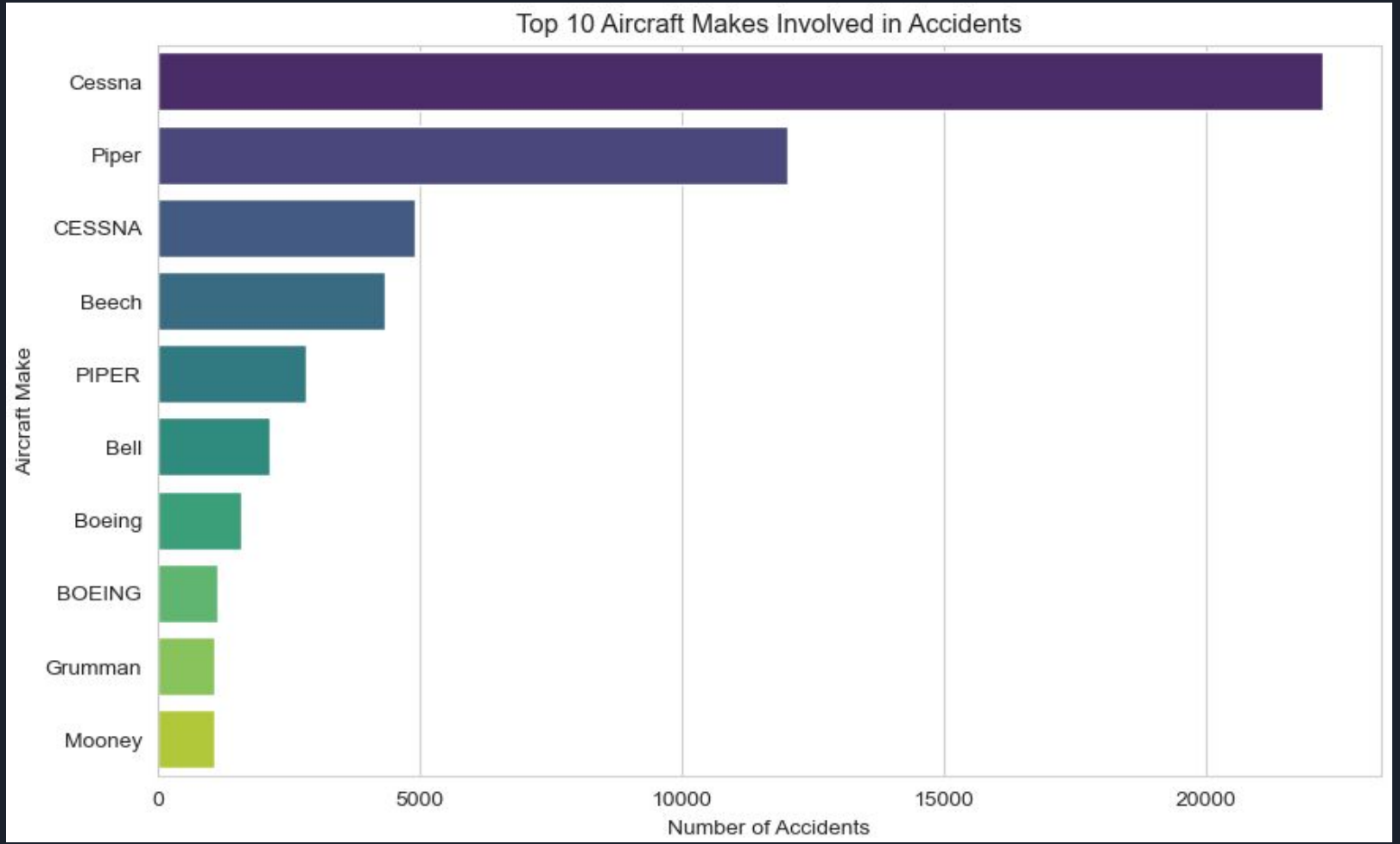
How we analysed the data:

- Identified aircraft models with the most casualties.
- Investigated accident trends by phase of flight.
- Applied statistical analysis to detect high-risk patterns.
- Created visualizations in Tableau to compare accident rates across different models.

Key Finding #1: High-Risk Aircrafts.

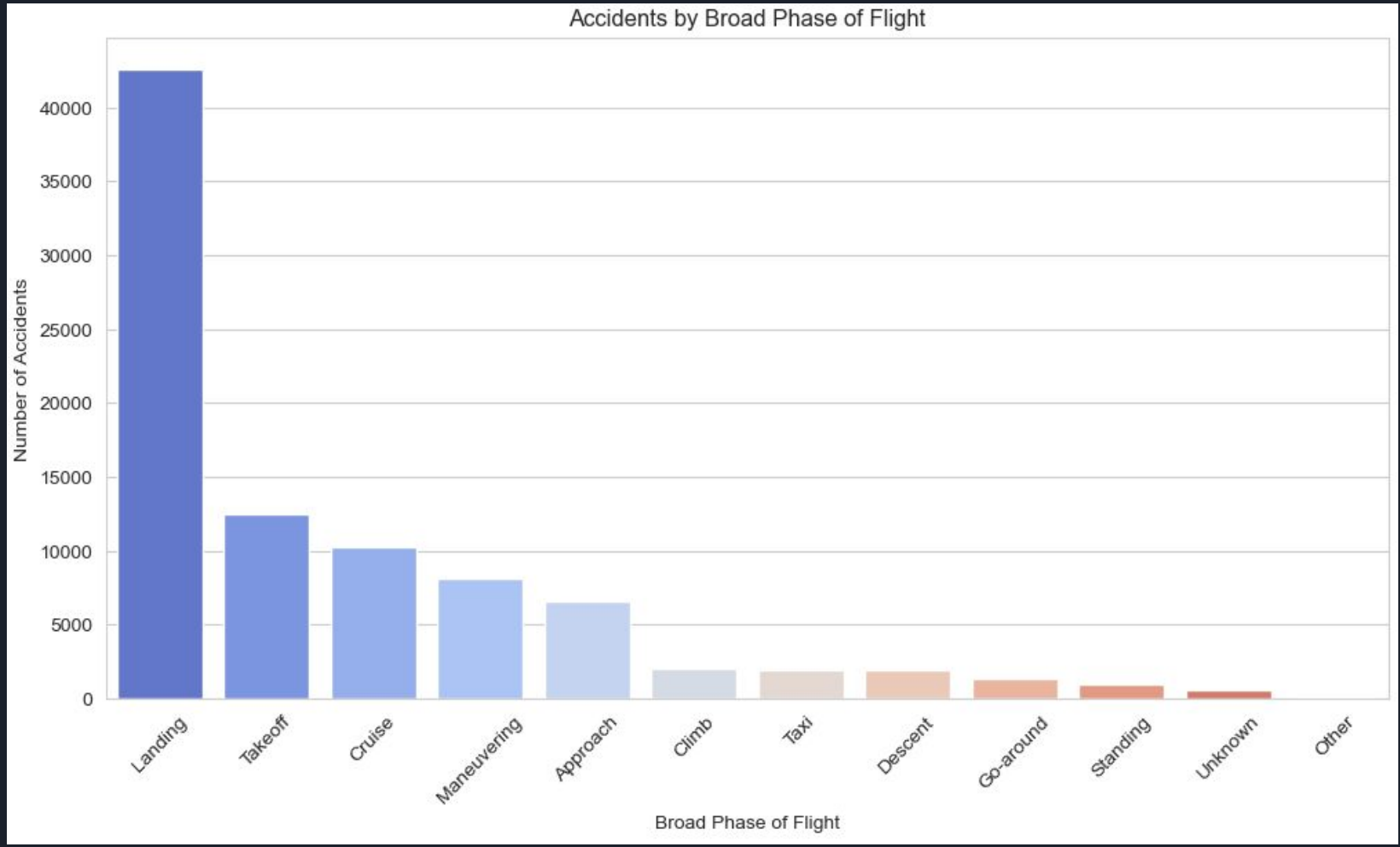
Certain aircraft models have a higher accident frequency and casualty rate.These types of aircraft are exhibiting patterns of higher risk for a variety of reasons, such as design failures, operational issues, or trends of accident incidence. Investing in these high-risk aircraft can mean higher maintenance costs, higher premiums, and increased exposure to safety liabilities. Such of these aircrafts include:

- 737 BOEING 1804 casualties
- 737-200 Boeing 1064 casualties
- 152 Cessna 922 casualties


Top 10 Aircraft Makes Involved in Accidents
Cessna
Piper
CESSNA
Beech
PIPER
Bell
Boeing
BOEING
Grumman
Mooney
Aircraft Make
0
5000
10000
15000
20000
Number of Accidents

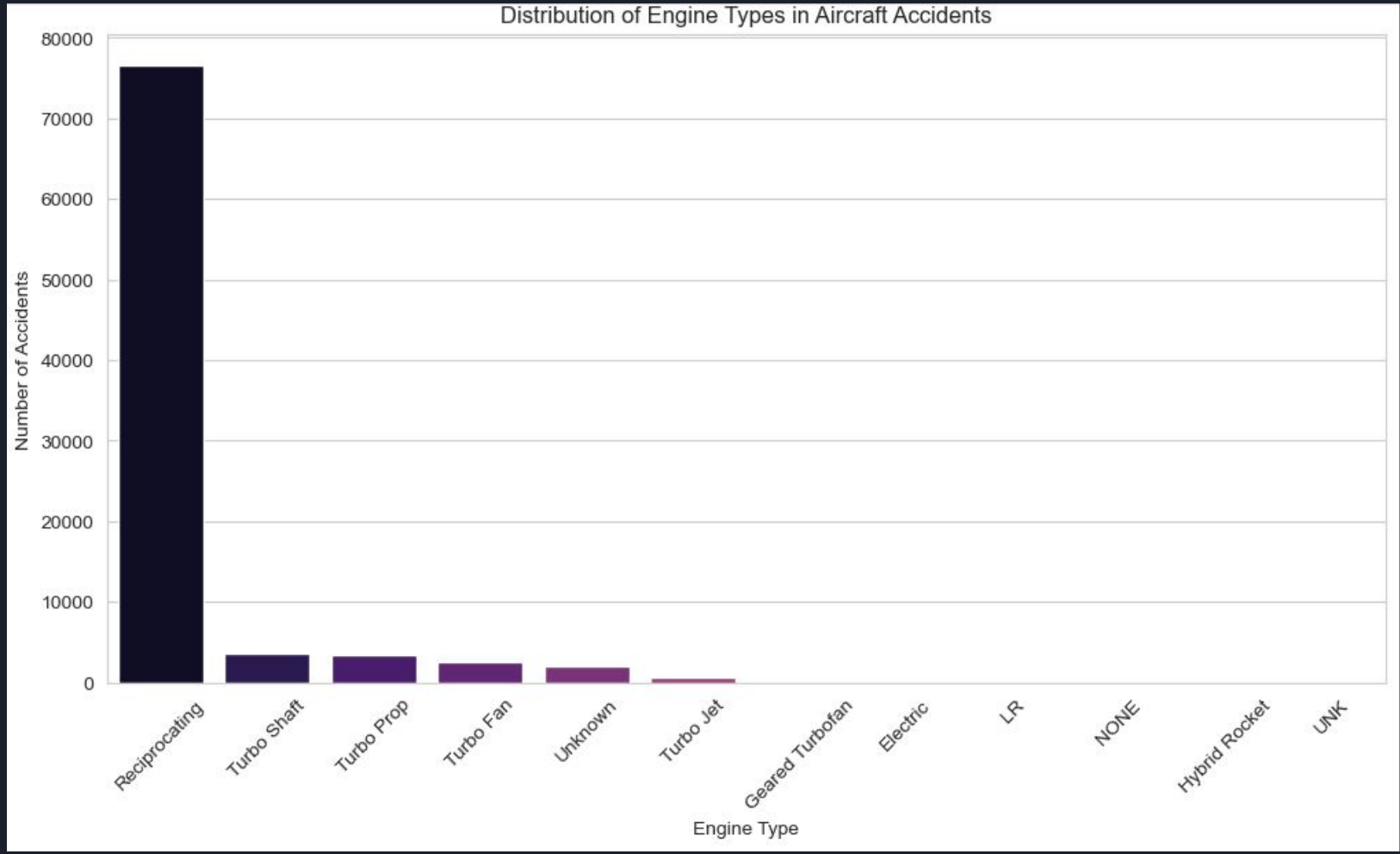
Key Finding #2: Phase of flight matters.

Our analysis of accidents by flight phases indicates that certain flight phases are associated with a higher number of casualties. These flight phases are particularly dangerous due to factors such as human error, mechanical malfunction, and poor weather conditions. Hazards in these risky flight phases can be significantly reduced by investing in airplanes with more advanced levels of automation, stability control systems, and better pilot-assist technologies.


Accidents by Broad Phase of Flight
Number of Accidents
40000
35000
30000
25000
20000
15000
10000
5000
0
Landing
Takeoff
Cruise
Maneuvering
Approach
Climb
Taxi
Descent
Go-around
Standing
Unknown
Other
Broad Phase of Flight

Key Finding #3: Consider the engine type of the aircraft.

Our analysis reveals that aircraft engine type plays a significant role in accident frequency and severity. Certain engine types such as reciprocating engines have a higher rate of failures, leading to an increased number of accidents and casualties. By understanding which engines are associated with higher risk, we can make more informed decisions when selecting aircraft for our fleet.


Distribution of Engine Types in Aircraft Accidents
Number of Accidents
80000
70000
60000
50000
40000
30000
20000
10000
0
Reciprocating
Turbo Shaft
Turbo Prop
Turbo Fan
Unknown
Turbo Jet
Geared Turbofan
Electric
LR
NONE
Hybrid Rocket
UNK
Engine Type

Business Recommendation #1: Avoid High-Risk Aircraft makes.

- Do not invest in models with a history of frequent and severe accidents.
- Focus on aircraft that have proven safety records and regulatory approvals.
- Use data insights to negotiate better insurance premiums based on risk assessment.

Business Recommendation #2: Consider Phase of flight when choosing Aircrafts.

- Aircraft that perform well in takeoff and landing phases should be prioritized.

- Select models with advanced safety features, such as enhanced landing gear and automation.

- Train pilots extensively for critical flight phases to minimize operational risk.

Business Recommendation #2: Consider Phase of flight when choosing Aircrafts.

- Aircraft that perform well in takeoff and landing phases should be prioritized.

- Select models with advanced safety features, such as enhanced landing gear and automation.

- Train pilots extensively for critical flight phases to minimize operational risk.

Business Recommendation #3: Choose reliable aircraft engine types.

- Avoid high-risk reciprocating-engine aircraft when choosing aircraft.
- Prioritize turbojet,turbofan and turboprop engines for better safety and reliability.
- Consider manufacturer reputation and maintenance history when selecting aircraft.

Tableau Dashboard & Interactive Insights.

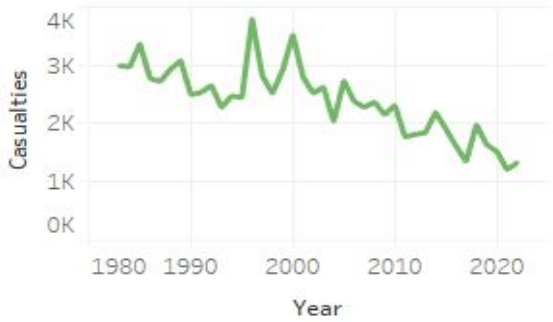
We developed an interactive Tableau dashboard for further analysis.

What You Can Explore:

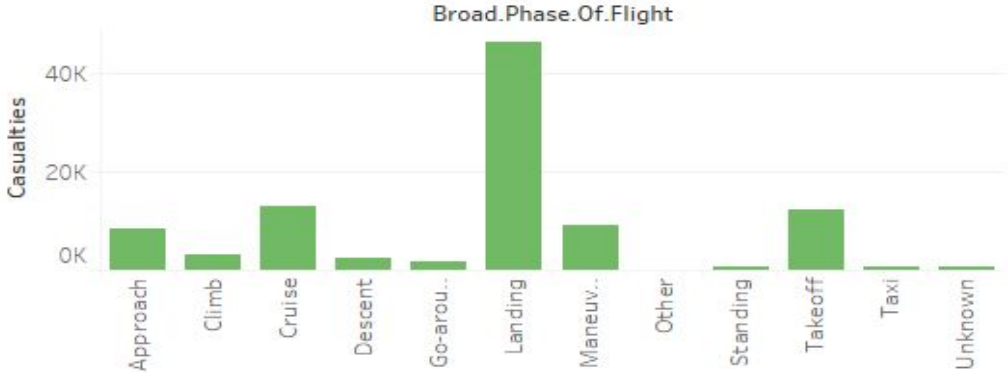
- Accident trends per aircraft model.
- Breakdown of casualties by flight phase.
- Direct comparisons between manufacturers.

Aircraft Risk Analysis

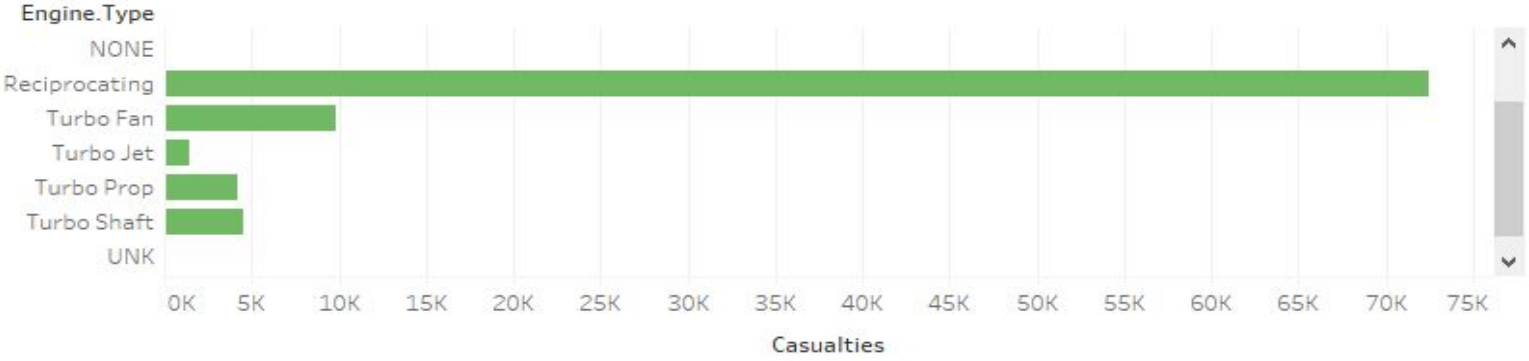
Casualties in accidents over time



Casualties vs The Phase of the flight



Casualties vs the engine type



Conclusion & Next Steps.

Our data-driven approach helps the company avoid high-risk aircraft.

Implementing these recommendations reduces financial and operational risks.

Next Steps:

- Conduct additional safety reviews with aviation experts.
- Use the Tableau dashboard to monitor and update risk assessments.
- Begin negotiations with aircraft manufacturers based on safety insights.

Thank you very much for your time and concentration through this presentation!

Q&A

Let’s discuss any questions or insights you’d like to explore further!