

Aviation Accident Risk Analysis (1962–2023)

Supporting Safer Investment in Aircraft Operations

RYAN NGIGI

ryangiggz2004@gmail.com

Business Understanding

Problem: Company wants to expand into aviation but lacks expertise on accident risks.

Goal: Identify which aircraft present the lowest operational risk based on accident data.

Key Question: Which aircraft categories, engine types, and makes have historically been safer or riskier?

Project Objectives

Investigate accident and injury trends over time.

Analyze accident outcomes by engine type.

Compare injuries across different aircraft makes.

Provide data-driven recommendations for aircraft acquisition.

Dataset

Source: National Transportation Safety Board (1962–2023)

Records: Civil aviation accidents and selected incidents.

Cleaned dataset: `cleaned_airline_accidents.csv`

Key columns: `Event_Date`, `Make`, `Engine_Type`, `Total_Injuries`

Data Cleaning Process

Selected relevant columns.

Converted and extracted dates.

Standardized categories (Make, Engine Type).

Filled missing values.

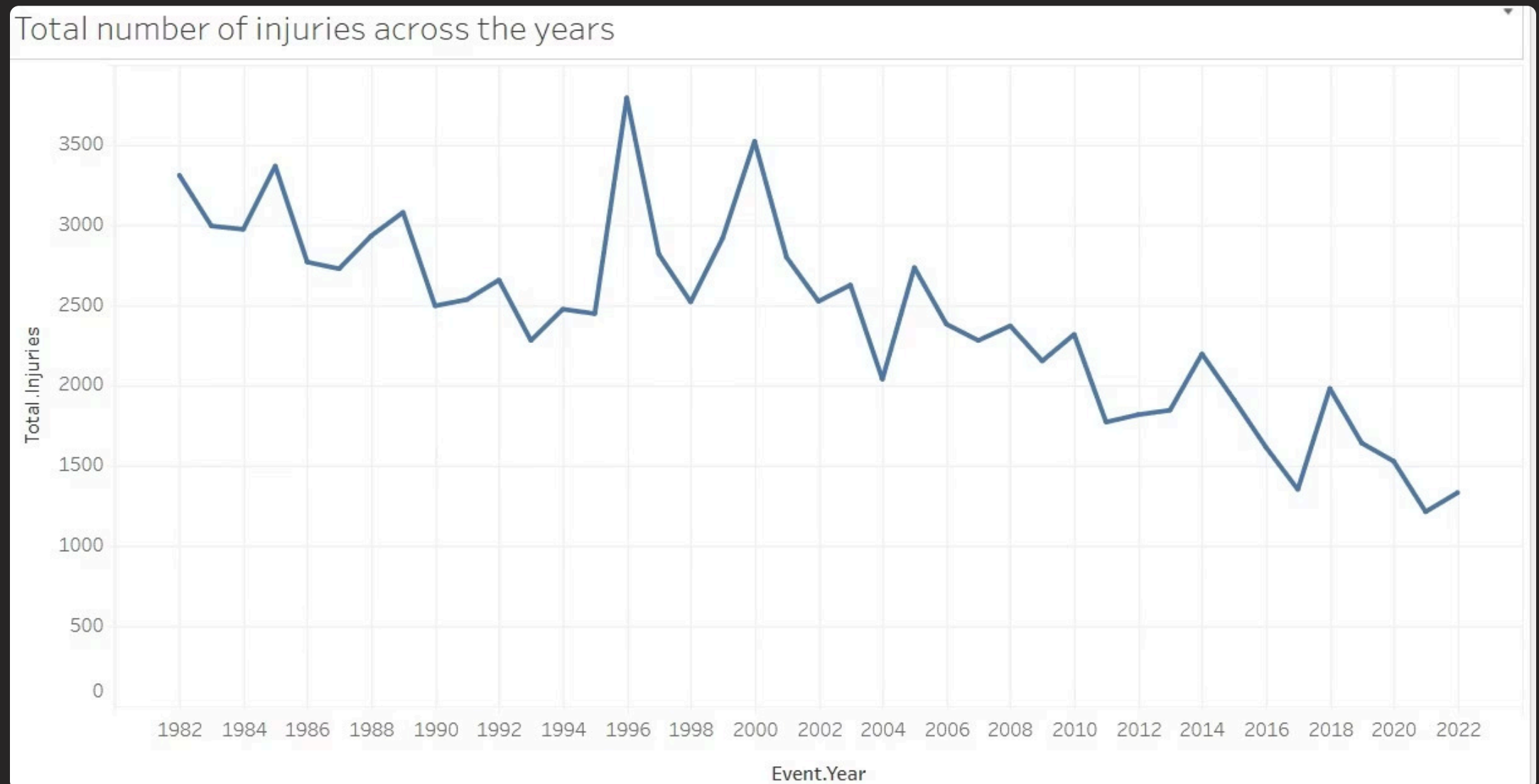
Derived fields: Total Injuries, Severity Index, Fatality Rate.

Visualization 1: Injuries Over Time

Chart: Line/Bar chart of total injuries per year.

Observation: Injuries decline over time, with peaks in earlier decades.

Insight: Suggests safety has improved across the industry, supporting investment in modern fleets.

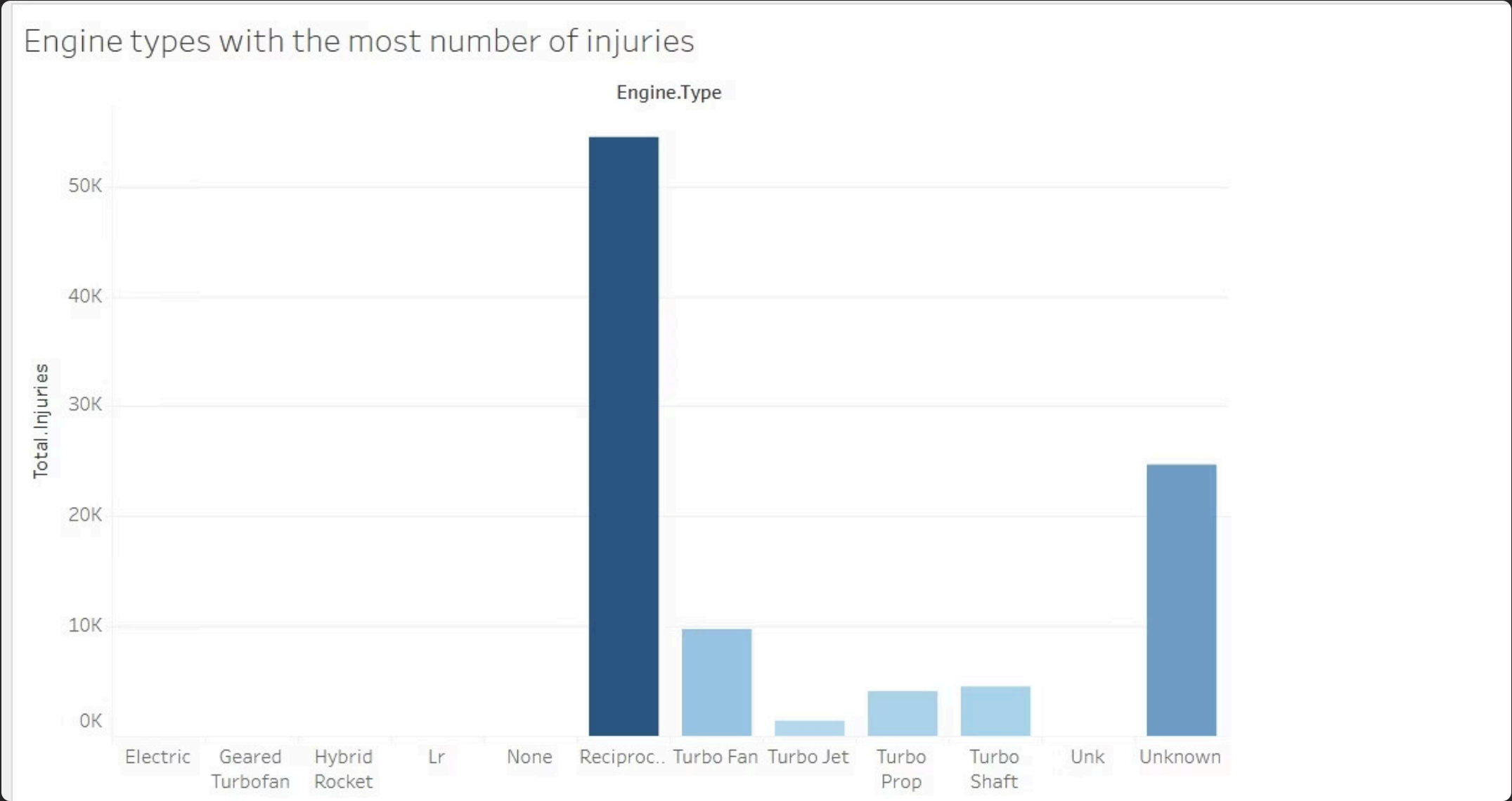


Visualization 2: Injuries by Engine Type

Chart: Bar chart comparing total injuries for piston, turboprop, and jet engines.

Observation: Piston-engine aircraft dominate injury counts, while jets show far fewer.

Insight: Indicates modern jet-powered aircraft are associated with fewer severe outcomes.

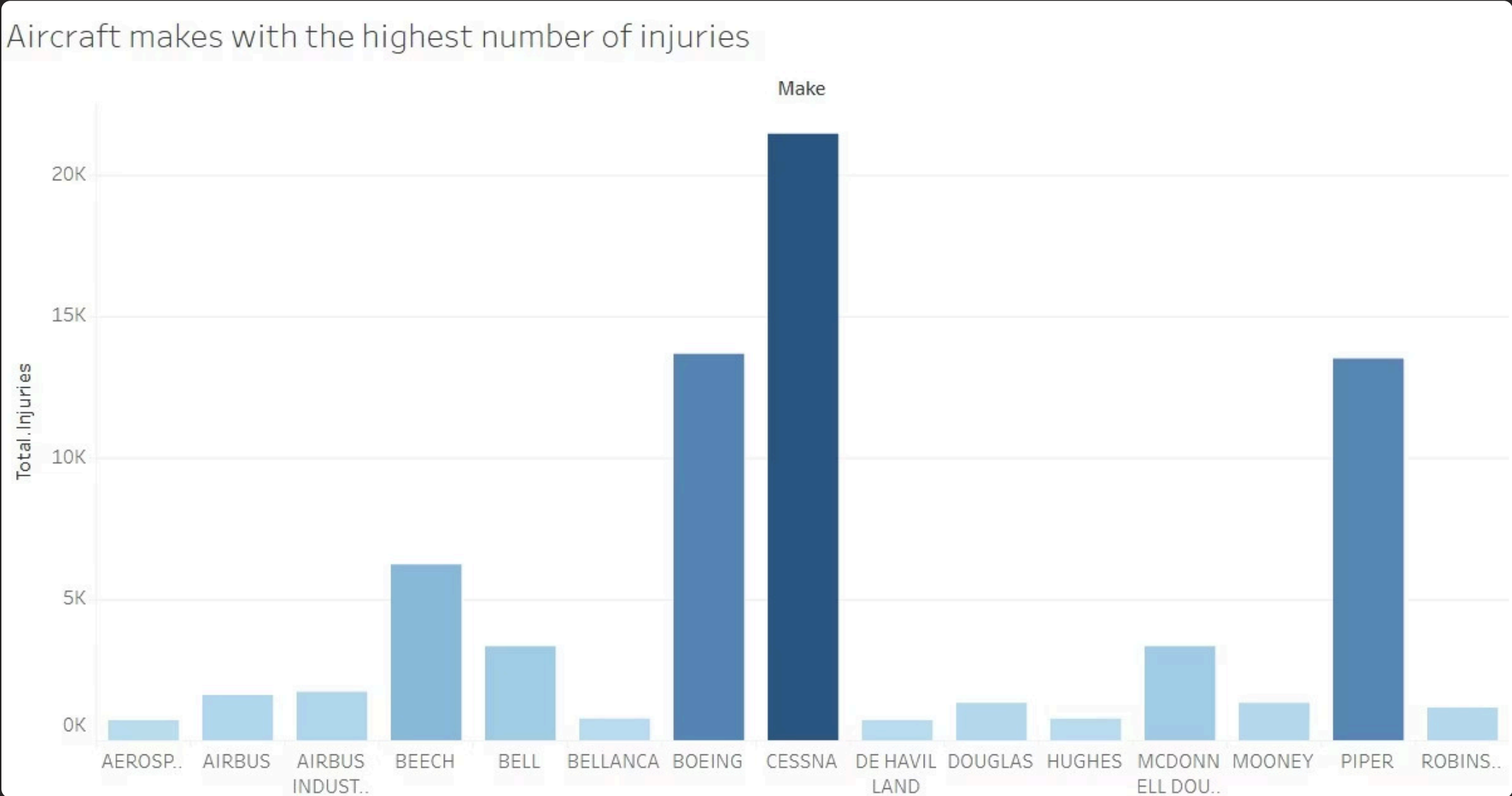


Visualization 3: Injuries by Aircraft Make

Chart: Bar chart of top manufacturers (Cessna, Piper, Beechcraft, Boeing, Airbus).

Observation: General aviation makes (Cessna, Piper) have the highest recorded injuries.

Insight: Risks in the dataset are concentrated in general aviation. Commercial manufacturers (Boeing, Airbus) appear much less frequently, aligning with stricter safety oversight.



Key Insights

Accident injuries have declined over decades → aviation is safer now.

Piston engines dominate accident injuries → avoid small piston aircraft.

General aviation makes dominate injuries → prioritize commercial jets.

Business Recommendations

Prioritize modern commercial jets over small piston-engine planes.

Invest in multi-engine aircraft for redundancy and improved safety.

Adopt newer fleets to leverage technological safety improvements.

Conclusion

Data-driven analysis supports safer business decisions.

Modern jet aircraft = lowest operational risk.

Next step: Use insights to guide fleet acquisition.

Questions

Any questions for me?

Thank you for your time.