

AVIATION RISK INSIGHTS

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PROJECT OVERVIEW

Goal:

Identify the safest aircraft makes for business investment through data-driven analysis of aviation accidents.

Audience:

Company leadership and the new aviation division team.

Dataset:

National Transportation Safety Board data including event dates, locations, aircraft make, engine types, number of injuries, fatalities, and flight purposes [1962 to 2023]

BUSINESS UNDERSTANDING

Company
expanding into
aviation sector

Needs to assess
aircraft safety
risks

Goal: Identify **low-**
risk aircraft for
investment

Support informed
decisions for **fleet**
acquisition

DATA UNDERSTANDING



Dataset from National
Transportation Safety
Board



Includes:

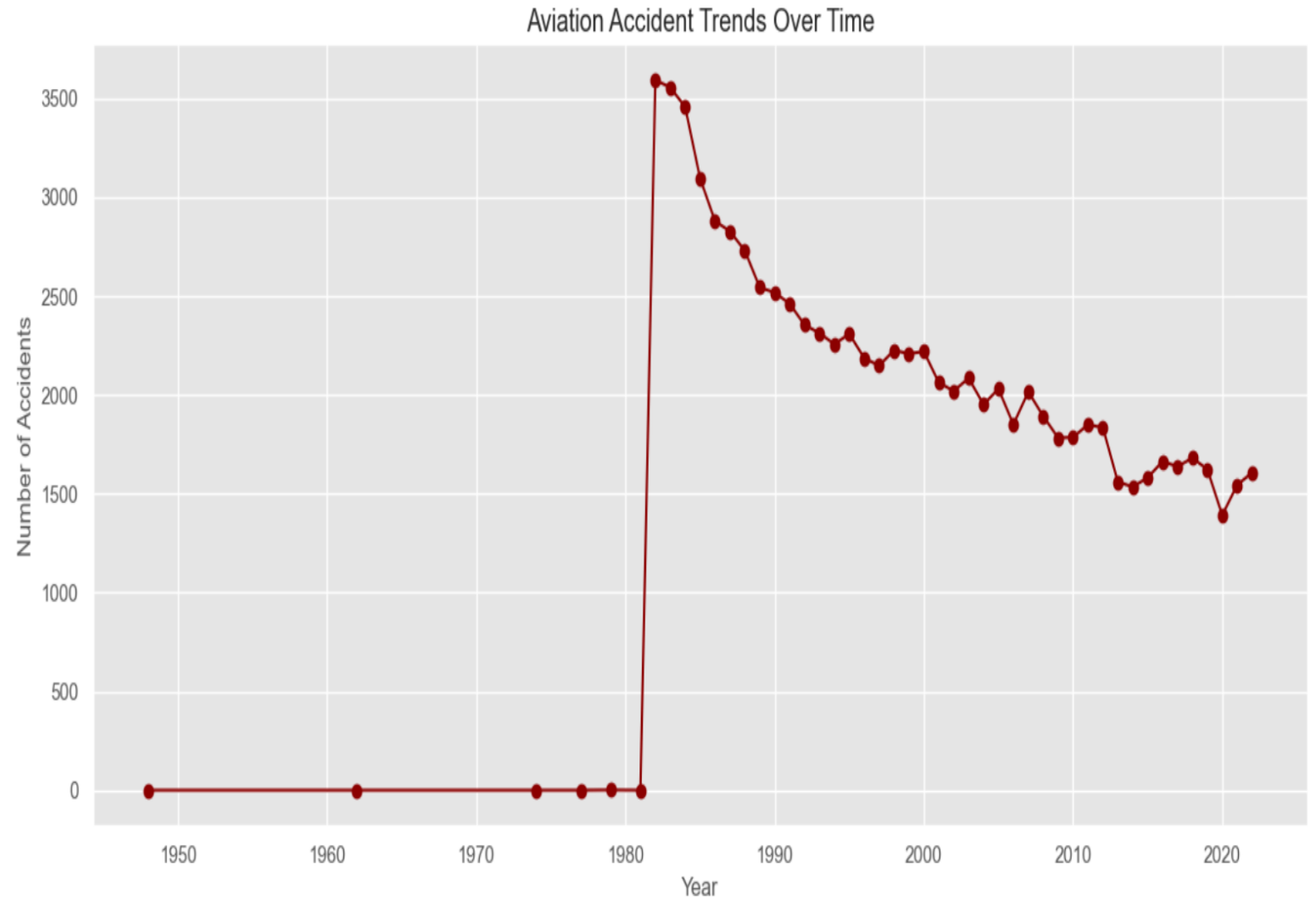
- Aircraft make & model
- Accident date & location
- Injury & fatality counts
- Flight purpose & engine type



Focus: Identify
patterns in
**accidents & risk
factors**

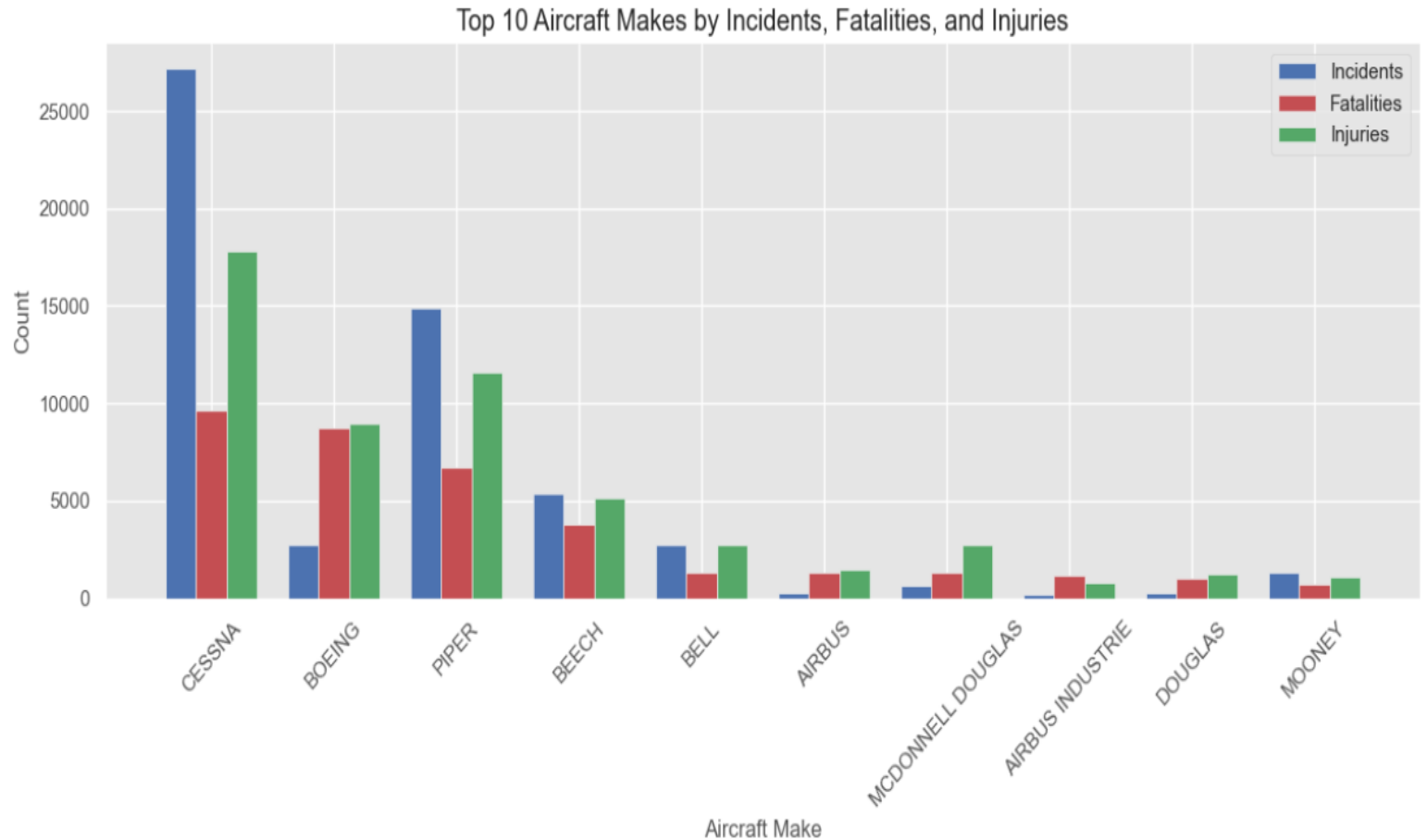
AVIATION ACCIDENT TRENDS OVER TIME

A sharp spike in 1982 likely reflects improved data reporting. Since then, accidents have declined steadily due to stronger regulations, better compliance, and major technological advances. **Modern aviation is far safer** today, but maintaining safety requires ongoing investment in equipment, training, and a strong safety culture.

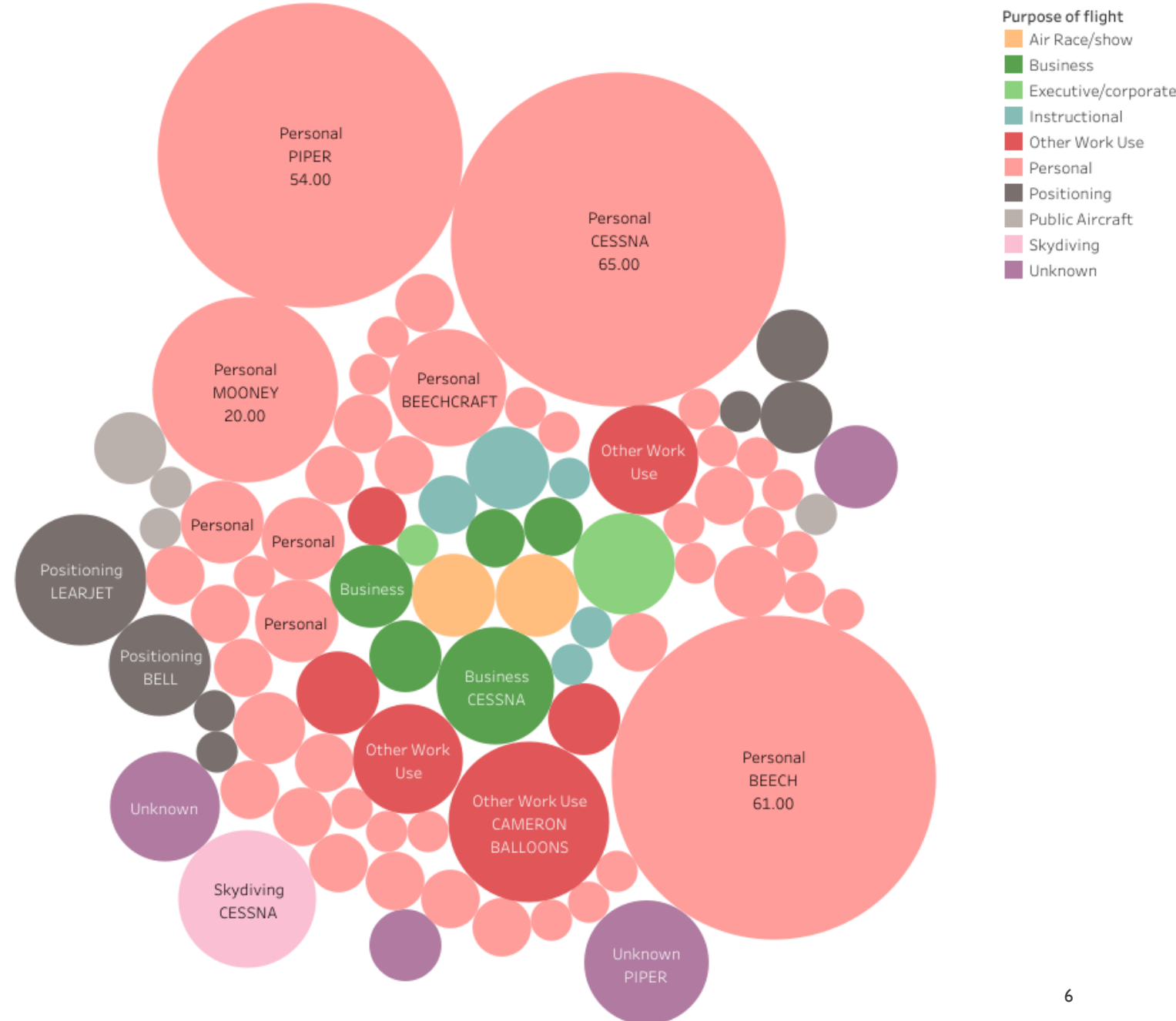


TOP 10 AIRCRAFT MAKES WITH HIGHEST INJURIES

Cessna leads in all three categories, followed by Piper and Boeing. This suggests that while these makes are commonly used, they may also carry higher operational risk due to their incident history.



AVIATION RISK INSIGHTS



NUMBER OF ACCIDENTS BY ENGINE TYPES

Reciprocating (1 engine): 8,631 injuries – highest risk in single-engine aircraft.

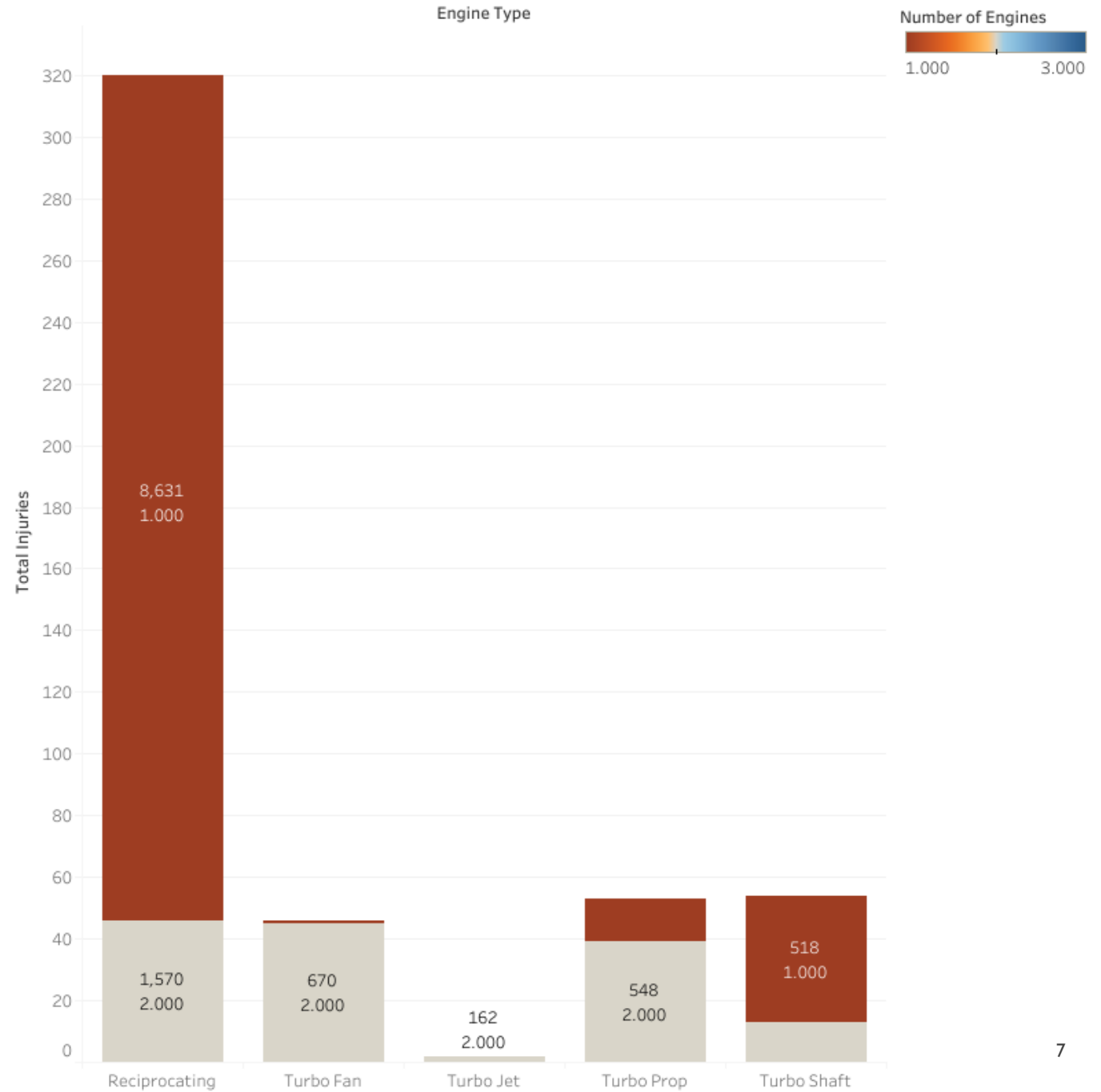
Reciprocating (2 engines): 1,570 injuries – still high but significantly lower than single-engine.

Turbo Fan & Turbo Jet (2 engines): Low injuries – 670 and 162 respectively; commercial use is safer.

Turbo Prop (2 engines): 548 injuries – moderate incidents in twin-engine propeller planes.

Turbo Shaft (1 engine): 518 injuries – mostly helicopters, moderate injury count.

Engine Type, Number of Engines & Total Injuries



GEOGRAPHIC ACCIDENT DISTRIBUTION

Most fatal aviation accidents occur in the United States.

Hotspots: California, Florida, Texas, New York, Arizona.

Larger circles = more fatalities (up to 25).

Other regions show fewer incidents due to lower traffic or limited data

ations



TOP 10 AIRCRAFT WITH FEW INCIDENTS

These aircraft models show **incident occurrences without serious consequences**, suggesting effective safety features, crew response, or favorable incident conditions. It highlights that not all incidents lead to harm, especially with robust aviation safety systems in place.

| | Total_Incidents | Total_Fatalities | Total_Injuries |
|---------------------------|-----------------|------------------|----------------|
| Aircraft | | | |
| AGUSTAWESTLAND AW139 | 5 | 0.0 | 0.0 |
| AIRBUS A220 | 5 | 0.0 | 0.0 |
| AIRBUS INDUSTRIE A319-111 | 5 | 0.0 | 0.0 |
| BEECH 99A | 5 | 0.0 | 0.0 |
| BOEING 727-233 | 5 | 0.0 | 0.0 |
| BOEING B737 | 5 | 0.0 | 0.0 |
| BOEING B75-N1 | 5 | 0.0 | 0.0 |
| BOMBARDIER CL-600 | 5 | 0.0 | 0.0 |
| BOMBARDIER CL600 2D24 | 5 | 0.0 | 0.0 |
| DASSAULT DA-20 | 5 | 0.0 | 0.0 |
| DIAMOND DA 40 | 5 | 0.0 | 0.0 |
| DOUGLAS DC-8-71 | 5 | 0.0 | 0.0 |
| HELIO H-395 | 5 | 0.0 | 0.0 |
| HUGHES 300C | 5 | 0.0 | 0.0 |
| MAULE M-4-210 | 5 | 0.0 | 0.0 |
| MAULE M-6 | 5 | 0.0 | 0.0 |
| MAULE M-7-260C | 5 | 0.0 | 0.0 |
| NORTH AMERICAN NA-265-40 | 5 | 0.0 | 0.0 |
| PIPER PA 28R | 5 | 0.0 | 0.0 |
| PIPER PA 34 | 5 | 0.0 | 0.0 |

CONCLUSION

- The aviation industry has made significant strides in safety due to stringent regulations and technological improvements, resulting in a steady decline in accidents over the years. However, risk varies considerably across aircraft types, engine configurations, and operational purposes.
- **Single-engine reciprocating aircraft (e.g., Cessna, Piper)** pose the highest risk due to their accident and injury history, particularly in personal and recreational flights.
- **Twin-engine and jet-powered aircraft** have significantly lower incident rates, making them more reliable for commercial and executive purposes.
- Geographic hotspots in the U.S. such as California, Florida, and Texas highlight where additional operational vigilance and localized safety measures may be required.

RECOMMENDATIONS

1

Prioritize Twin-Engine Turboprops or Jets

Focus on acquiring **twin-engine turbojets or turboprops**, which have a low accident record and are ideal for commercial and business travel.

2

Avoid Single-Engine Reciprocating Aircraft:

Minimize or avoid investment in single-engine aircraft like Cessna and Piper for commercial operations due to their higher injury rates.

3

Implement a Strong Safety Culture:

Invest in **advanced pilot training, maintenance protocols, and safety management systems (SMS)** to mitigate operational risks.

4

Leverage Aircraft with Strong Safety Records:

Target models highlighted in the "Top 10 Aircraft with Few Incidents" category as initial fleet choices.

NEXT STEPS



THANK YOU

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Website

1. [git@github.com:godfreyosundwa254/Phase-1-Project.git](https://github.com/godfreyosundwa254/Phase-1-Project.git)
2. https://public.tableau.com/shared/Y6PPJ97PN?:display_count=n&:origin=viz_share_link

