Identifying Top 5 Best Commercial and Private Planes to Invest In.

Data-Driven Analysis Using Historical Accident ***Data***

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INTRODUCTION

Objective Summary:

This presentation has an objective of identifying top 5 commercial and private planes (Aircrafts) for investment by analyzing accident data.

Dataset Overview Summary:

By analyzing calculations such as accident frequency, injury severity distribution, and damage types, we can identify statistically safer and more reliable aircraft, guiding investment decisions in the aviation sector.

Business Understanding:

The dataset provides detailed records of aviation accidents, capturing specifics such as the date of the event, geographical details, the severity of injuries, the extent of aircraft damage, and the make and model of the aircraft involved.

In aircraft investment, this data is crucial for understanding which aircraft models are associated with fewer accidents or less severe accidents. This insight can be leveraged to market these safer models more effectively to airlines and other buyers, emphasizing reliability and safety records.

Analyzing the data to identify trends in aircraft performance eg aircraft with lower accident rates or showcasing improvements in models over time can be a strong selling point.

Additionally, understanding external factors like weather conditions that frequently contribute to accidents can assist in advising clients on optimal operational practices and safety enhancements, further positioning your offerings as the best choice for safety-conscious buyers.

Data Understanding:

The dataset includes columns like 'Event.Date', 'Location', 'Country', 'Injury.Severity', 'Aircraft.damage', 'Make', 'Model', 'Total.Fatal.Injuries', 'Total.Serious.Injuries', and more.

Missing values were handled by imputing with mode values or group-specific modes to ensure data completeness. Text normalization was performed on 'Make' and 'Model' columns to standardize the data format.

Data transformation involved creating new columns for year, month, day, total injuries, injury severity index, and damage severity index.

Visualizations were generated to analyze trends over time, top aircraft makes by accidents or fatalities, accidents by severity, weather conditions, and more, providing a comprehensive understanding of the dataset.

The data cleaning process involved the following steps:

1. Handling Missing Values:
Filled missing values in columns like 'Make', 'Model', 'Weather.Condition', etc., using the mode or specific group mode.
Dropped rows with remaining null values in critical columns.

2. Normalization:
Normalized text in 'Make' and 'Model' columns by converting to lowercase, removing punctuation, and stripping whitespace.
Normalized text in 'Model' column by converting to uppercase, stripping whitespace, and removing punctuation.

3. Data Transformation:
Extracted fatal injuries from 'Injury.Severity' column and simplified severity descriptions.
Created new columns like 'Year', 'Month', 'Day', 'Total.Injuries', 'Injury.Severity.Index', and 'Damage.Severity.Index'.

Column Name	Description
Event Date	When the accident happened
Location	Where the accident took place
Country	The country where the accident occurred
Injury Severity	How bad the injuries were (fatal, serious, minor, or none)
Aircraft Damage	How much the aircraft was damaged (substantial, destroyed, or minor)
Aircraft Category	The type of aircraft (airplane, helicopter, glider, etc.)
Make	The company that made the aircraft
Model	The specific type of aircraft
Total Fatal Injuries	The number of people who died in the accident
Total Serious Injuries	The number of people who were seriously injured
Total Minor Injuries	The number of people who had minor injuries
Number of Engines	How many engines the aircraft had
Engine Type	The kind of engines the aircraft had (reciprocating, turboprop, turbojet)
Total Uninjured	The number of people who were not injured
Weather Condition	The weather at the time of the accident (clear, cloudy, etc.)
Phase of Flight	What part of the flight the accident happened (takeoff, landing, cruising)
Total Injuries	The total number of injuries (fatal, serious, minor) combined
Injury Severity Index	A score measuring overall severity of injuries
Damage Severity Index	A score measuring overall severity of the aircraft damage

Data Overview
Columns Explanation:

Total Records:

The dataset contains records of approximately 62000 accidents, providing a substantial sample size for robust statistical analysis. Each record includes detailed information about circumstances, outcomes, and characteristics of accidents, allowing comprehensive evaluation of aircraft safety and reliability across different makes and models.

ANALYSIS

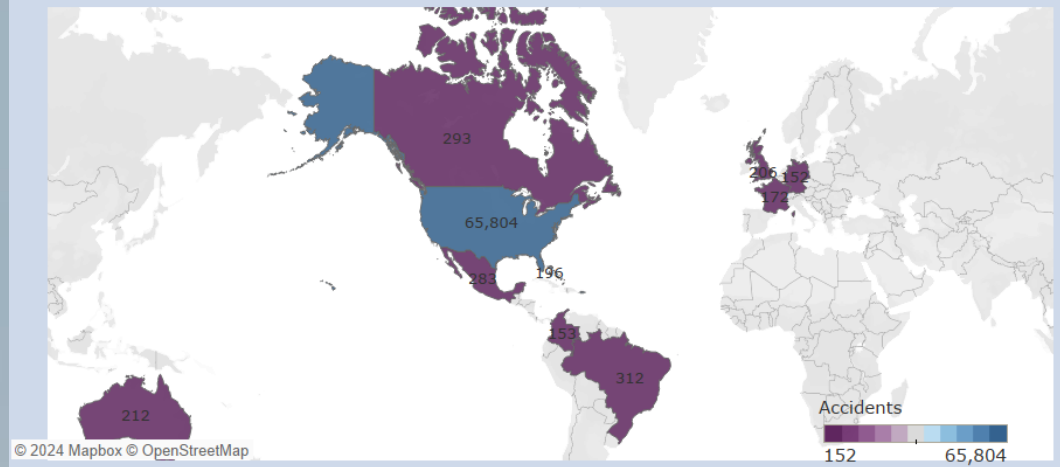
Overview

Aircraft.damage: (All)

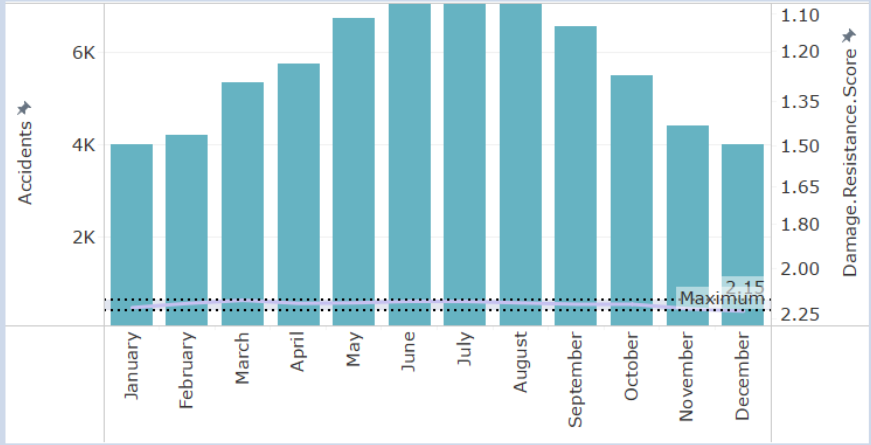
Injury.Severity: (All)

Engine.Type: (All)

Highest Accidents By country



Monthly Accident and Resistance Distribution

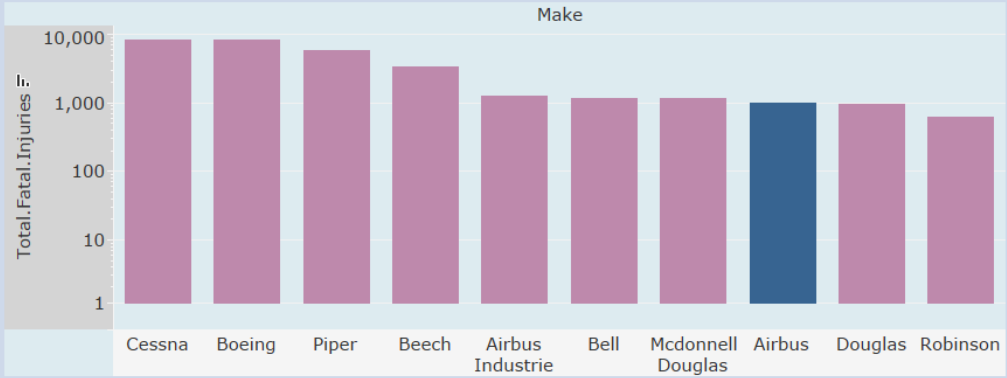


Max. Injury.Severity
- Serious
- Unavailable

Aircraft.Category: (All)

Measure Names
- Accidents
- Damage.Resistance.Score

TOP 10 Airplane Make with Highest Fatality



This overview provides clear and insightful context. The analysis reveals that the United States experiences the most aviation accidents, particularly in June and July, with Cessna, Boeing, and Piper planes having the highest fatality rates. This information helps guide our decision-making for Airplane Investment

Overview Dashboard Explanation

The dashboard displayed above serves as a visual summary of the analysis conducted on aviation accident data. Key insights include:

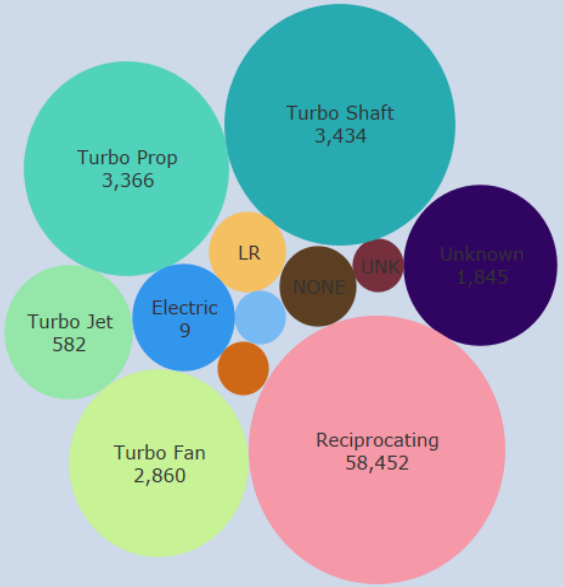
Highest Accidents by Country: This map visualization highlights the geographical distribution of aviation accidents, with the United States showing a significantly higher number of incidents compared to other regions. This insight is crucial for understanding regional safety challenges and resource allocation for aviation safety improvements.

Monthly Accident and Resistance Distribution: The bar chart shows the monthly distribution of accidents, peaking in June and July. This could indicate seasonal factors affecting aviation safety. The accompanying line graph represents the damage resistance score, providing insights into how aircraft damage severity varies throughout the year.

Top 10 Airplane Makes with Highest Fatality: This bar chart ranks aircraft makes by the total fatalities associated with their accidents. Brands like Cessna, Boeing, and Piper are noted for higher fatality figures, which could influence safety assessments and marketing strategies for aircraft sales.

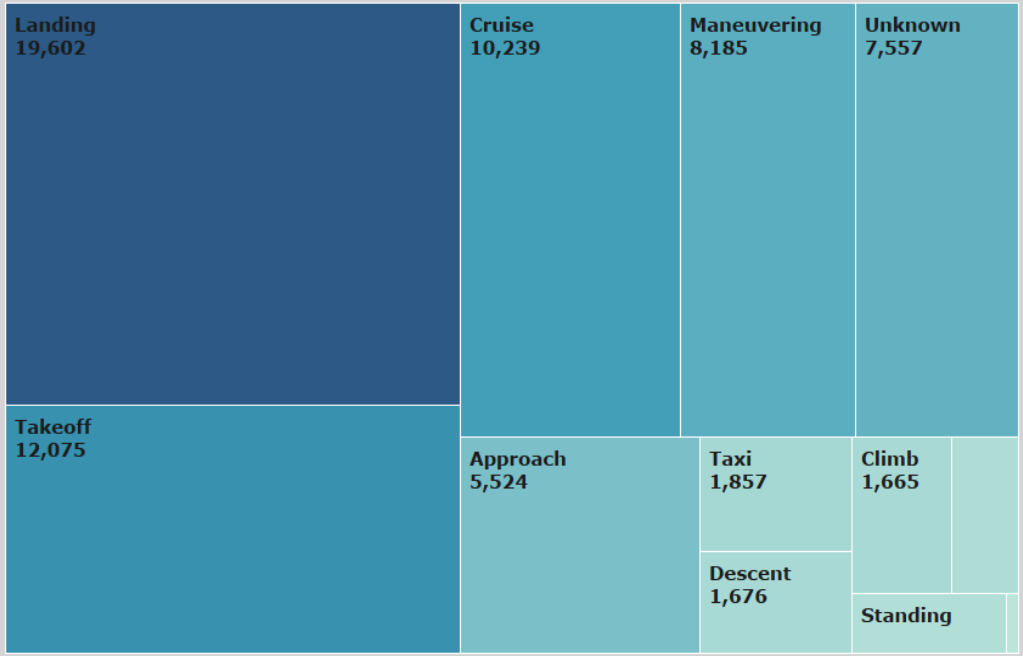
This dashboard is instrumental in providing a clear and immediate understanding of critical factors that affect aviation safety, guiding strategic decisions in the aviation industry, particularly for entities involved in manufacturing, regulating, or selling aircraft.

Engine To Accidents

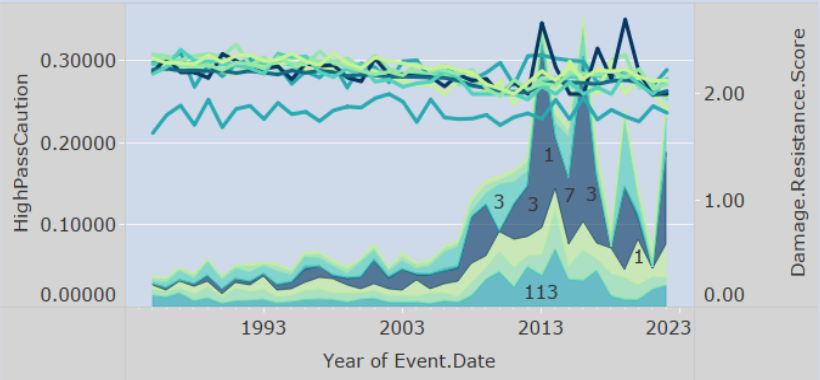


Engine.Type
- Electric
- Geared Turbofan
- Hybrid Rocket
- LR
- NONE
- Reciprocating
- Turbo Fan
- Turbo Jet
- Turbo Prop
- Turbo Shaft
- UNK
- Unknown

Phase To Accidents



(High Passenger Caution and Damage Resistance) Score over years



Make
- Beech
- Bell
- Bellanca
- Boeing
- Cessna
- Grumman
- Hughes
- Mooney
- Piper
- Robinson

Aircraft.damage
(All)

Engine.Type
(All)

Aircraft.Category
(All)

Accidents
79 — 19,602

Injury.Severity
(All)

BACK

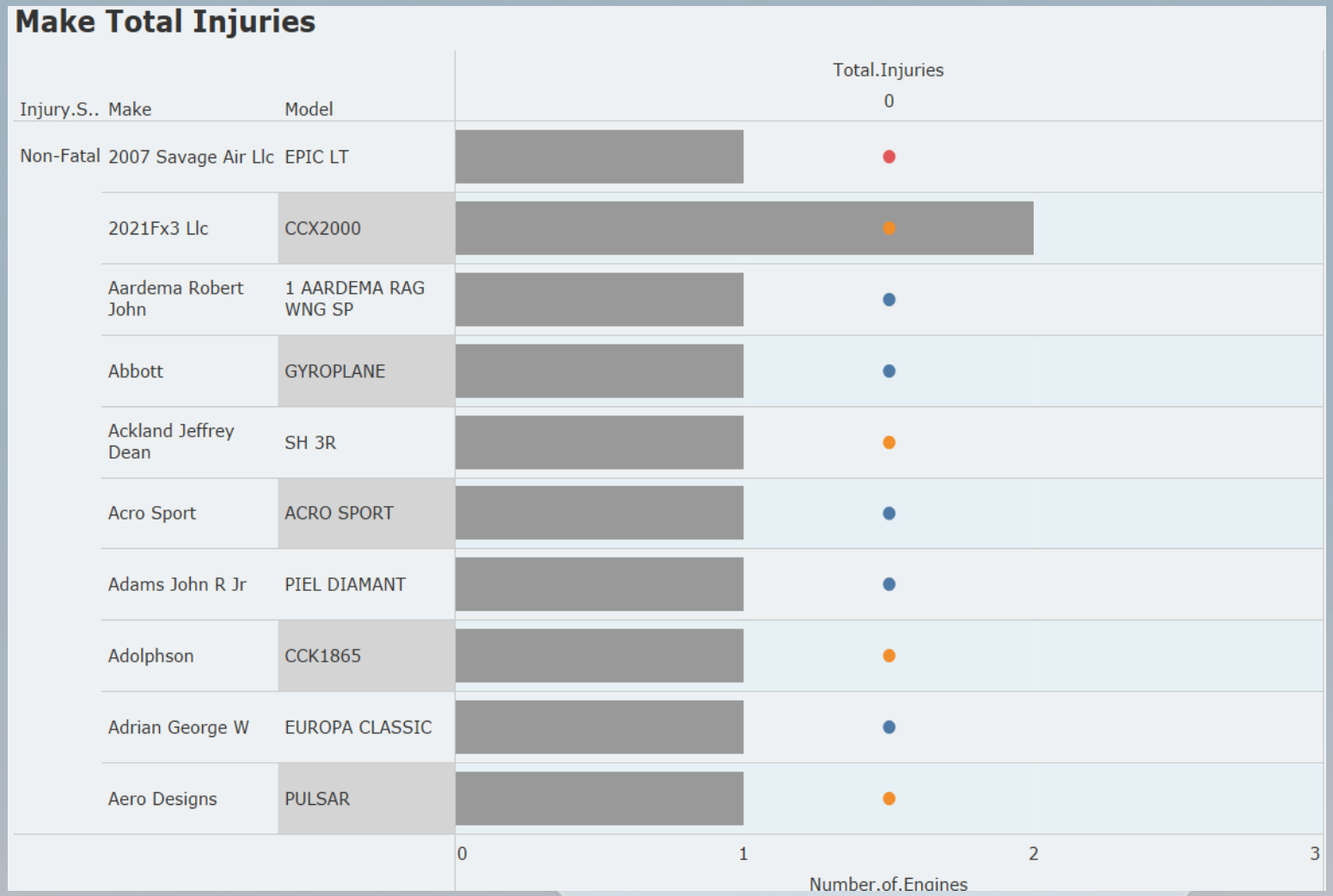
Engine to Accidents: This bubble chart show the number of accidents by engine type, highlighting that reciprocating engines are involved in the majority of incidents. This visualization helps identify which engine types are most associated with accidents, which can guide maintenance and safety training priorities.

Phase to Accidents: The bar chart shows the distribution of accidents across different phases of flight. Landing and takeoff are identified as the phases with the highest number of accidents, suggesting these are critical areas for safety improvements and targeted training.

High Passenger Caution and Damage Resistance Score Over Years: This line graph tracks two metrics over time: the *'High Passenger Caution Score'* and *'Damage Resistance Score'.* The fluctuating trends provide insights into how aircraft safety and resilience have evolved, potentially correlating these trends with technological advancements or changes in aviation regulations.

These visualizations collectively offer a detailed breakdown of accident data by engine type and flight phase, alongside a longitudinal analysis of safety and damage resistance trends. This information is crucial for stakeholders aiming to invest in aircrafts that enhance aviation safety and reliability.

RECCOMENDATIONS

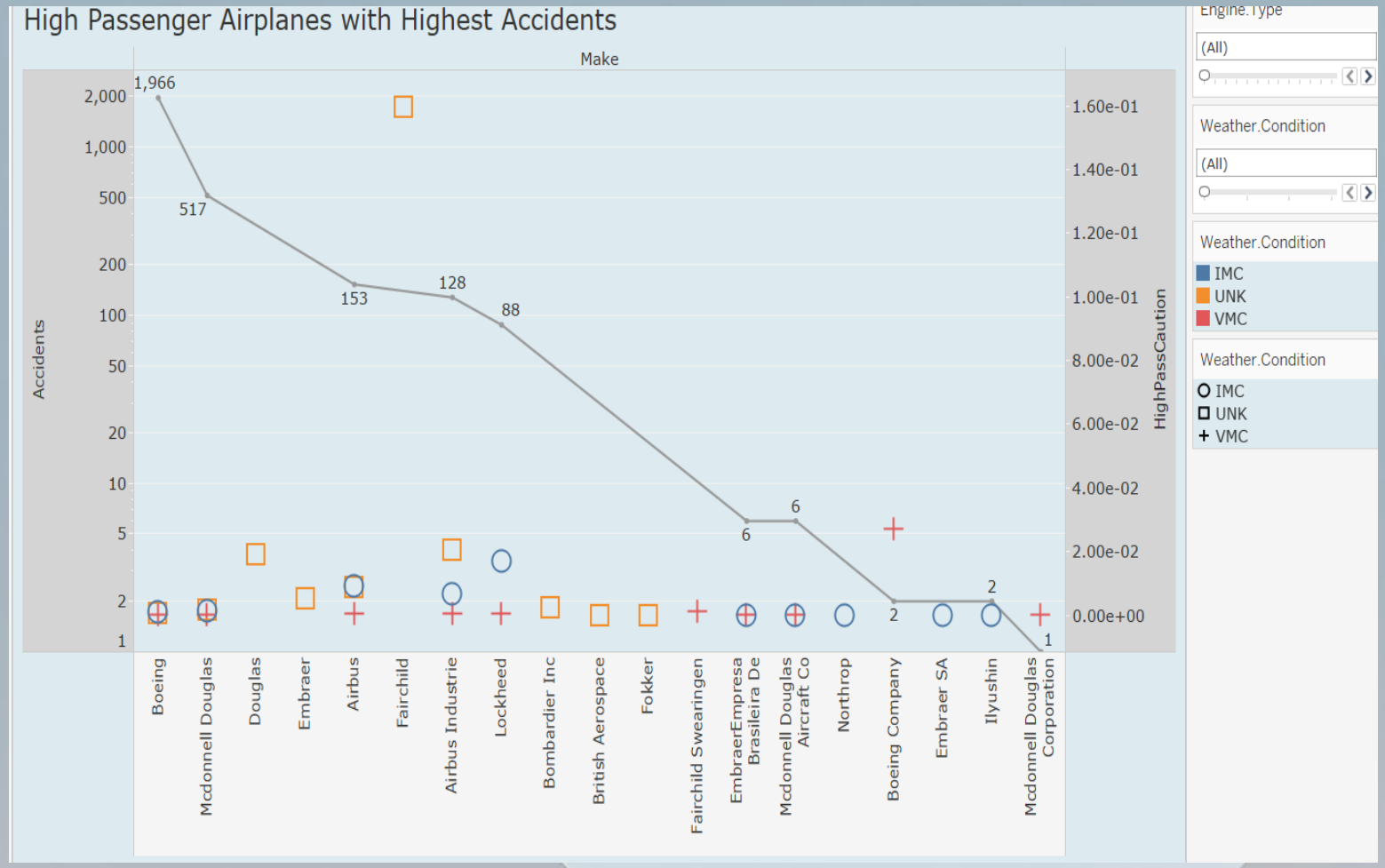


1. Least Injuries

Visualization shows the number of injuries associated with various aircraft makes and models, highlighting the safety records of each. The color-coded dots represent the number of engines, providing additional context on aircraft design and its impact on safety.

Investment Guidance:
Prioritize Safety: Invest in models with lesser recorded injuries, indicating higher safety standards and potentially lower operational risks.

Engine Considerations:
Note the engine count as an additional factor; models with more engines don't necessarily correlate to higher injuries but may impact maintenance and insurance costs.



2. Low High Passenger Caution Score

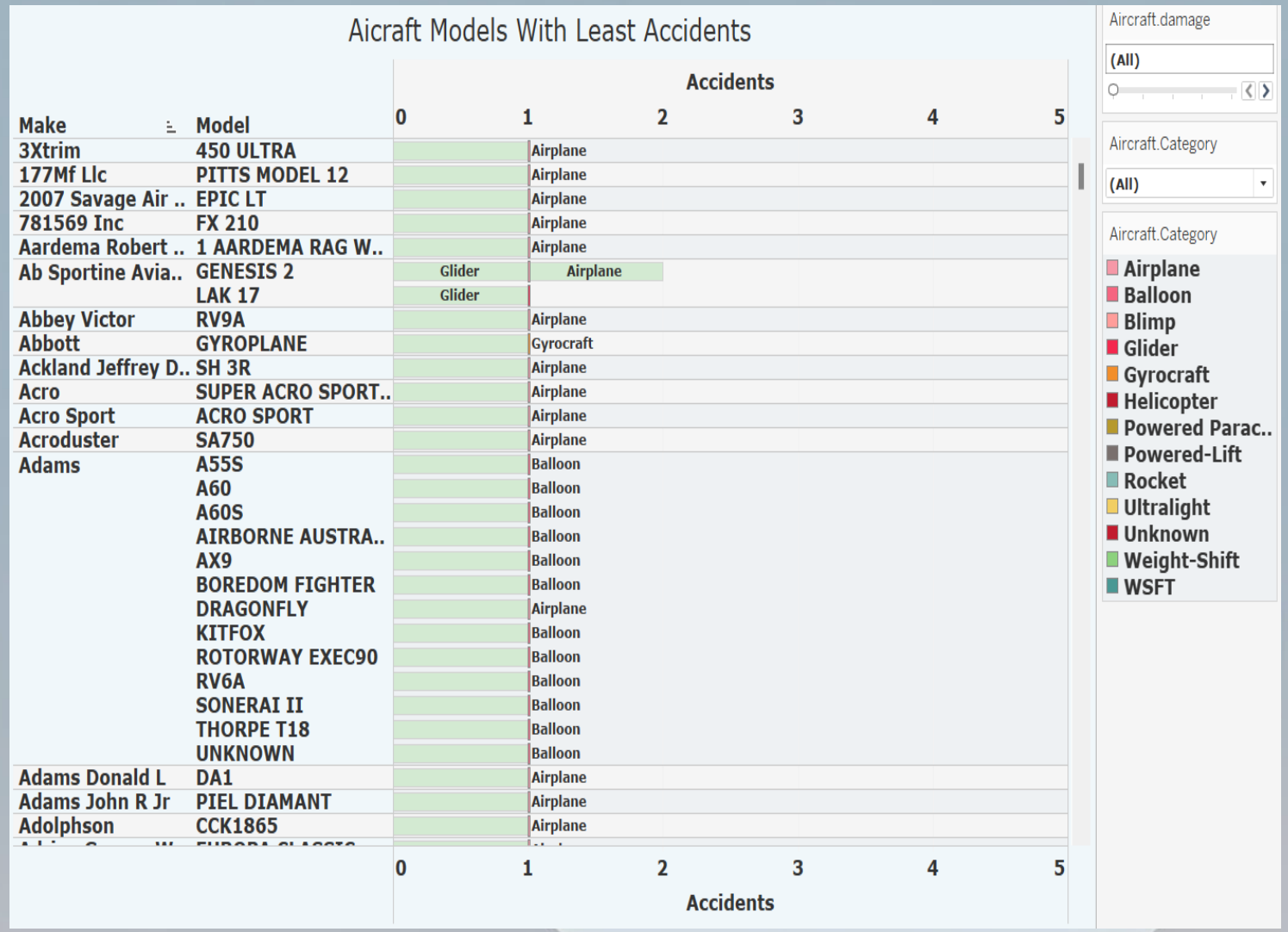
HighPassCaution:
(avg([Total.Fatal.Injuries]+[Total.Serious.Injuries])/[Total Passengers])/[Accidents]

This graph helps in *evaluating risk in high passenger Airplanes* . The 'High Passenger Caution' metric, calculated as the average of fatal and serious injuries per total passengers divided by the number of accidents shows accident severity per passenger.

Investment Considerations:

Risk Management: Aircraft makes with higher 'High Passenger Caution' scores indicate greater severity per accident, suggesting higher risk. Prioritizing investments in aircraft with lower scores can reduce risk exposure.

Safety Enhancements: For aircraft makes with high caution scores, consider advocating for or investing in advanced safety features and rigorous training programs to mitigate risks.



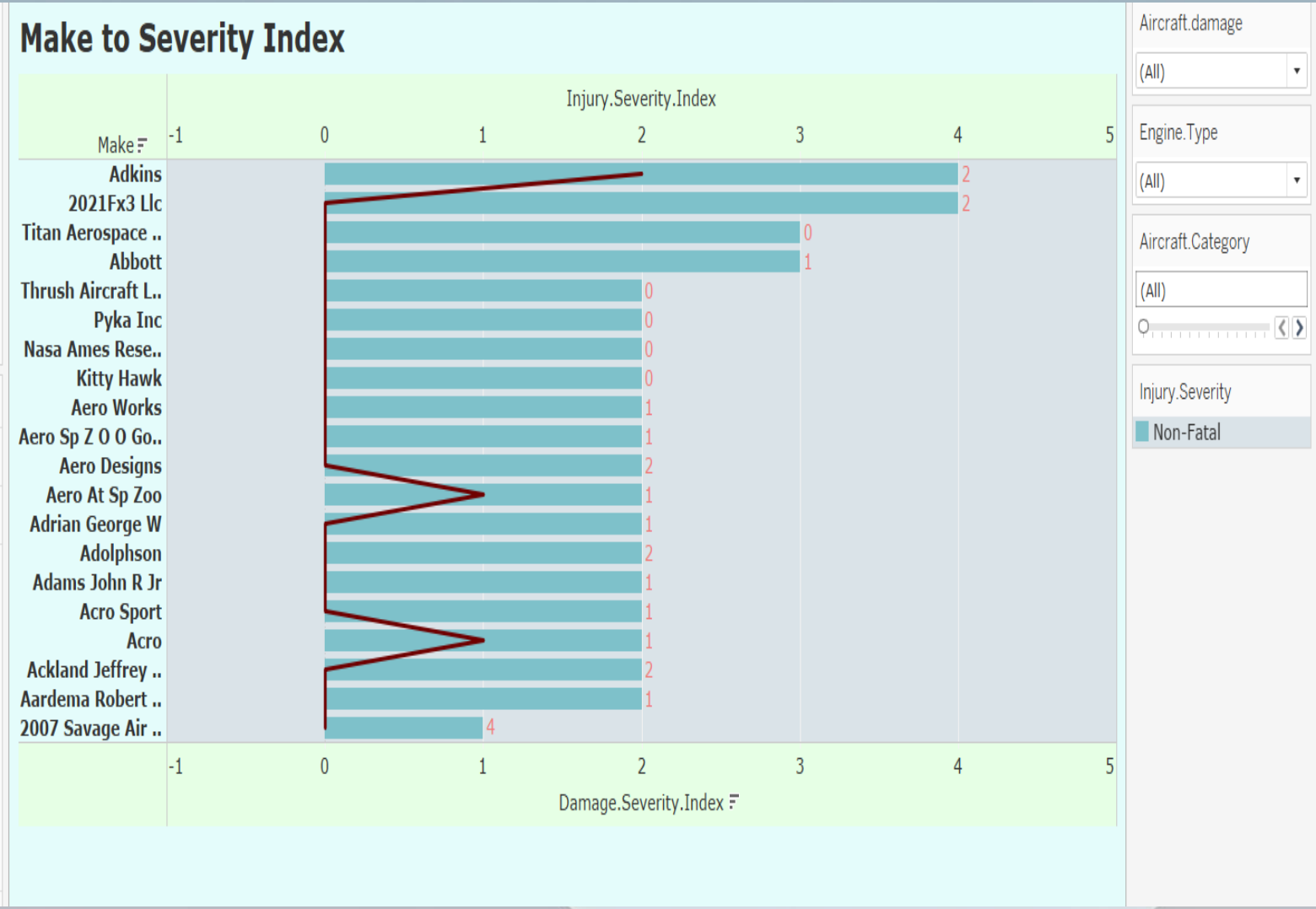
3. Least Accidents.

The graph titled provides a clear visual representation of the safety records of various aircraft models, highlighting those with the fewest recorded accidents.

It's a straightforward measure of the number of accidents per aircraft model, allowing for an easy comparison across different types.

Investment Considerations:

Low-Risk Profile: Models with fewer accidents, as shown on the graph, suggest a more reliable safety record, which could be appealing for investors seeking lower-risk assets.



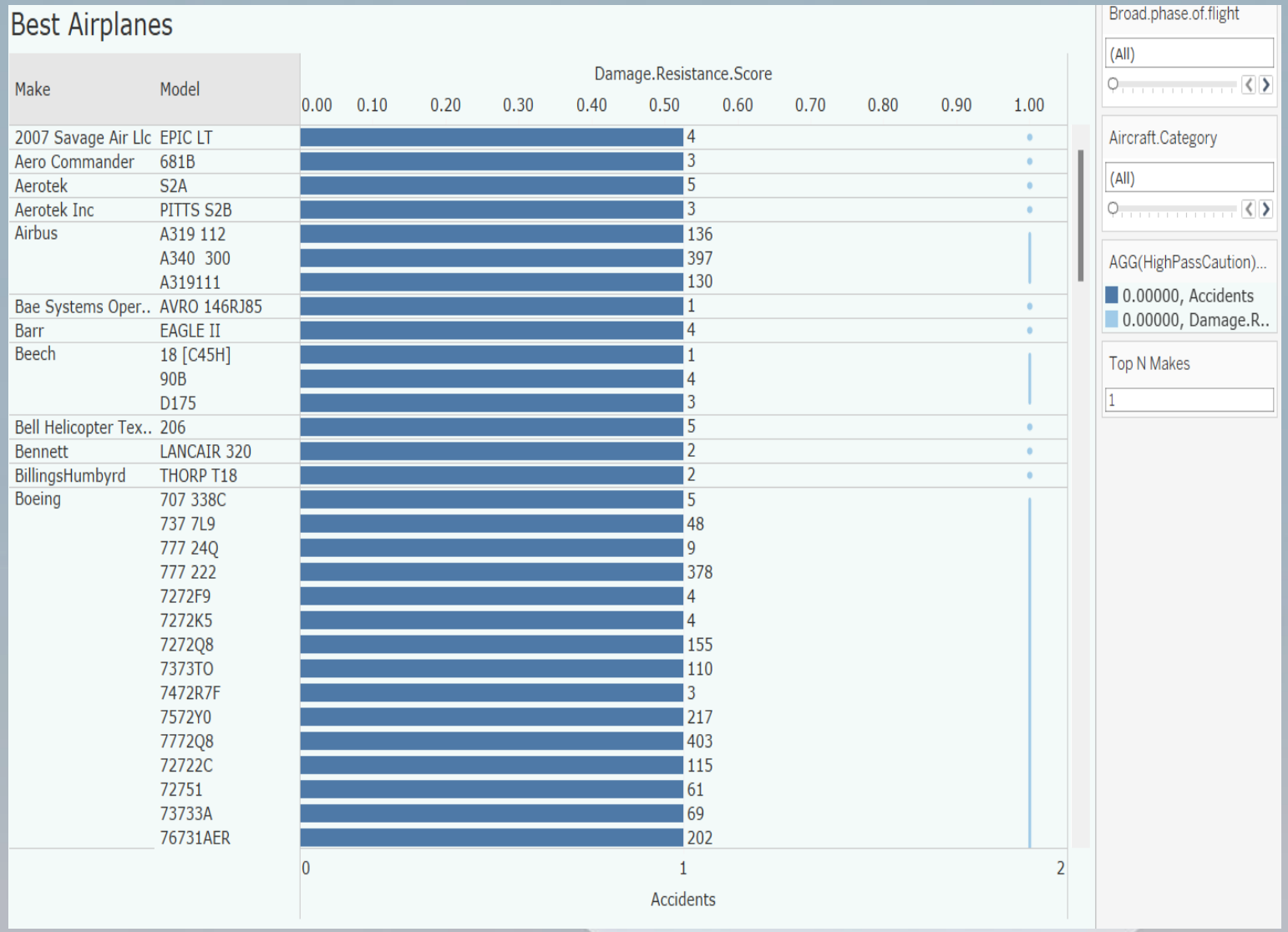
4. Lower Severity Indices

The graph compares the average injury severity and damage severity of different aircraft makes. The 'Injury Severity Index' is plotted as red line, and the 'Damage Severity Index' is represented by horizontal bars, both on a scale from 0 to 4.

Investment Considerations:

Risk Analysis: Aircraft makes with higher values on both indices suggest a correlation between the extent of damage and the severity of injuries, indicating higher risk.
Safety Investment: Investing in aircraft makes with lower severity indices could be a safer option, potentially leading to lower insurance/repair costs and better safety records.

Maintenance and Upgrades: Aircraft makes with higher severity scores might require more frequent maintenance and safety feature upgrades.



5. Low Damage Resistance Score

sum([Damage.Severity.Index])/[Accidents]

The bar chart compares various airplane makes and models based on their 'Damage Resistance Score' and Accident. The 'Damage Resistance Score' reflects an aircraft's ability to withstand accidents with minimal damage (higher values showing less resistance thus higher risk).

Investment Considerations:
Damage Resistance: Airplanes with lower 'Damage Resistance Scores' may incur lower repair costs and downtime, suggesting a more robust design.
Safety Enhancements:
Fleet Composition: Choosing airplanes with a balance of low damage resistance and low accidents can optimize fleet safety and operational efficiency.

Safety Investments: For models with higher accidents, investing in safety improvements or selecting newer models with advanced safety features could be beneficial.

MY TOP RECCOMENDATIONS		
BY LEAST INJURIES AND ACCIDENTS	AIRPLANE	2007 Savage Air LLC ----- EPIC LT
	CHOPPER	BELL Helicopter Textron Canada ----- 206
BY LOW SEVERITY INDICES	AIRPLANE	2007 Savage Air LLC ----- EPIC LT
	CHOPPER	BELL Helicopter Textron Canada ----- 206
BY MOST PASSENGERS AND BEST INDICES	AIRPLANE	Boeing ----- 7772Q8
	CHOPPER	Sikorsky ----- 92
BEST HIGHPASS SCORE	AIRPLANE	Airbus ----- A340 400
	CHOPPER	Sikorsky ----- 92

THANKYOU FOR YOUR TIME ,COOPERATION AND ATTENTION.

ALL THE BEST IN YOUR NEW INVESTMENT