

Identifying Low-Risk Aircrafts for Business Expansion in Aviation Industry

24th November 2024

Business understanding

- A company is expanding in to new industries to diversify its portfolio
- Their interest is purchasing and operating airplanes for commercial and private enterprises, but do not know anything about the potential risks of aircraft
- To evaluate the potential risks associated with purchasing and operating airplanes, the company considers historical accident trends

OBJECTIVES

General objective

Determine which aircraft are the lowest risk for the company to start this new business endeavor

Specific objectives

- i. Aircraft Make and model: What is the relationship between Accidents and Aircraft Make and model?
- ii. Amateur Built: Is there a correlation between accidents trends of amateur built and professional built aircrafts.
- iii. Number of Engines: Does number of engines determine safety.
- iv. Engine types: Is there a relationship between engine type and number of accidents.

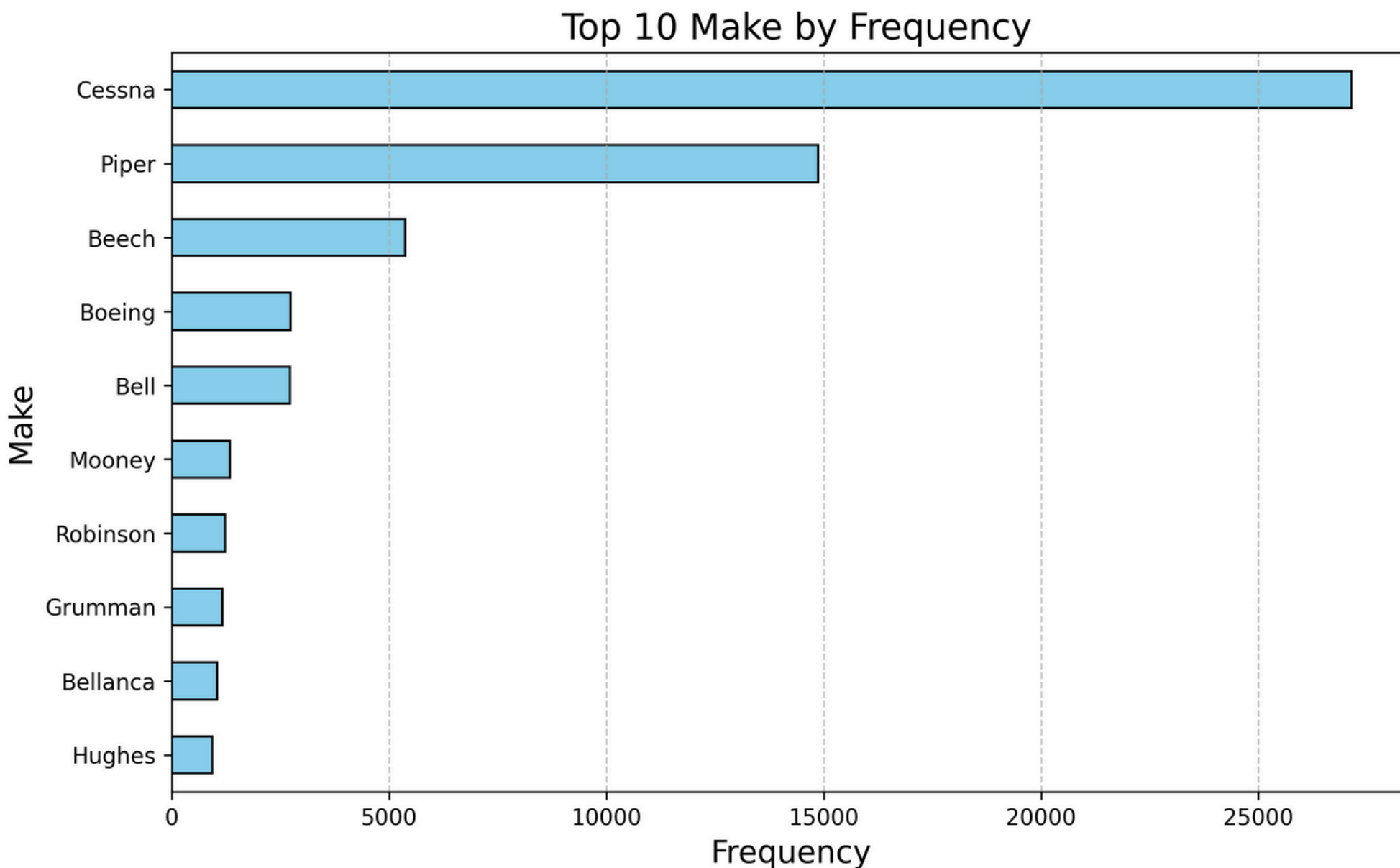
Data understanding

- The data is sourced from the National Transportation Safety Board that includes aviation accident data from 1962 to 2023 about civil aviation accidents
- It has 88889 rows and 31 columns with different types of data
- The key identifier is Event.Id column, that uniquely identifies each event
- The data has some missing values on different columns

Data preparation

- Columns with more than 30% missing values and columns that were not necessary to the project were dropped
- Rows with duplicates were dropped
- The Make column was converted to a header by capitalizing the first letter to avoid same Make with different styles like cessna and CESSNA
- Missing values were filled with unknown to avoid bias except for the numeric columns where median was used because they were skewed
- The Amateur.Built column was converted into a boolean type
- The Event.Date column was converted to a date type
- Renamed all the columns for easier reference

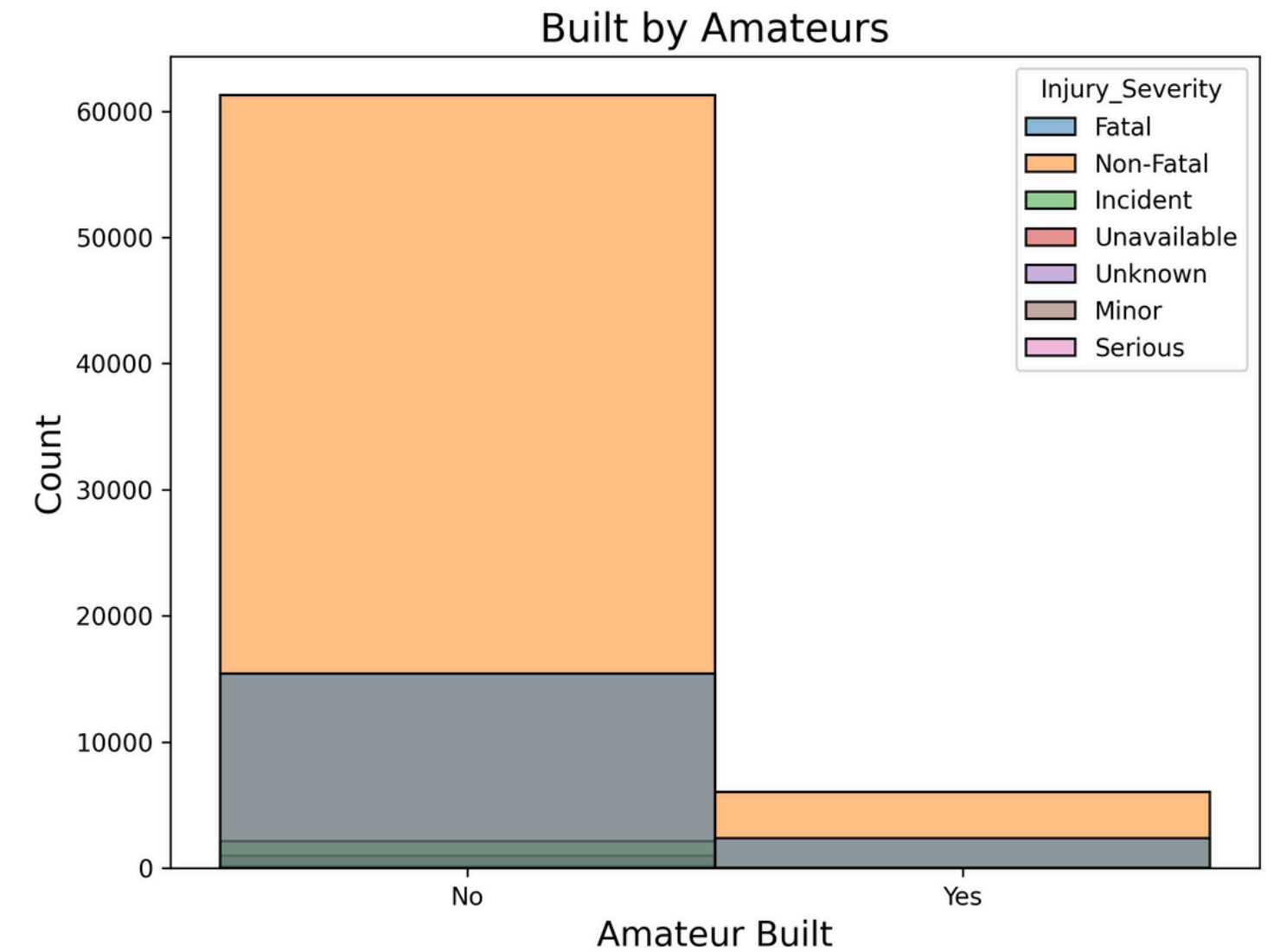
Accidents by Make



The Cessna aircraft make tops with the number of accidents.

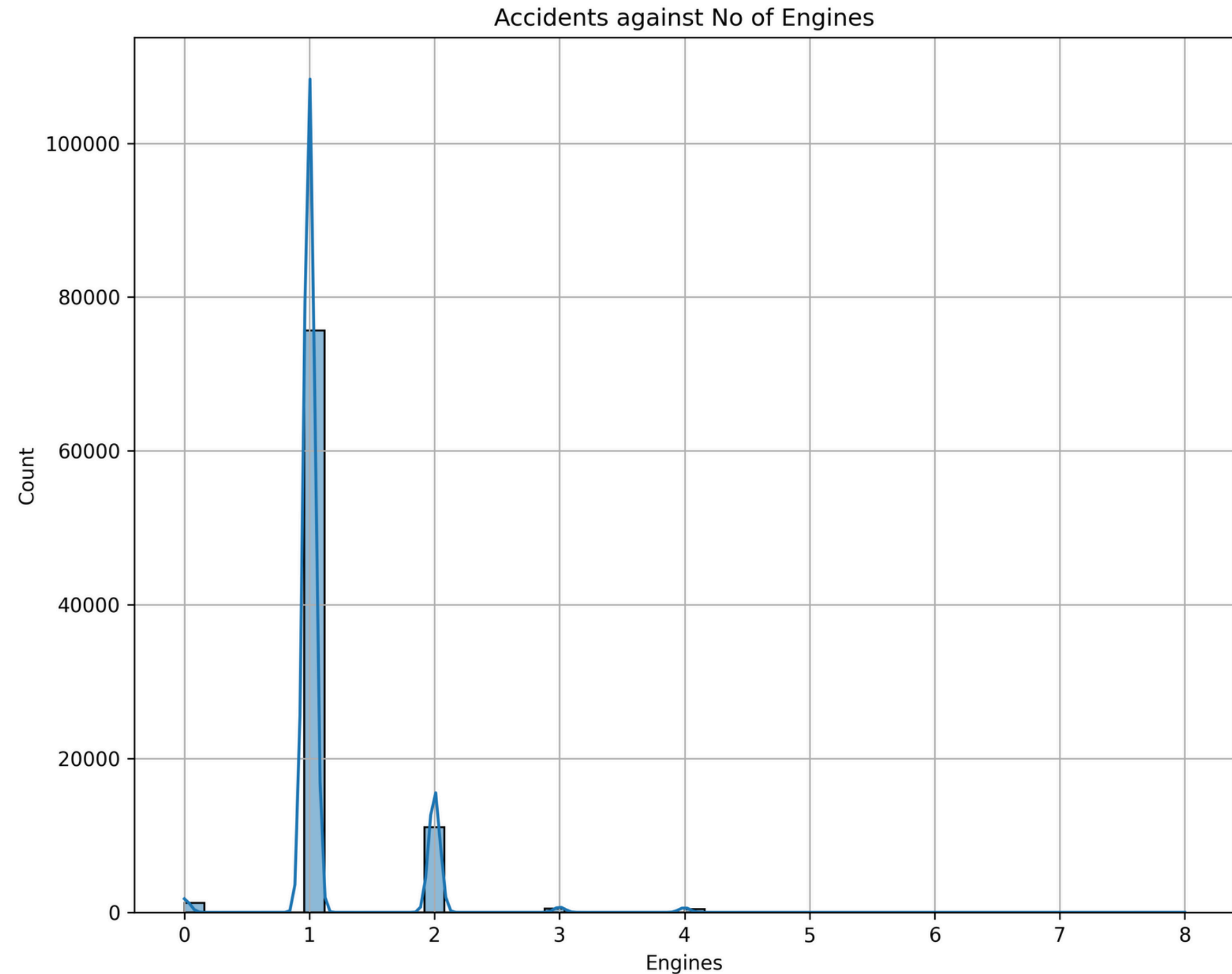
Amateur built

Aircraft that were professionally built and not Amateur built were involved in more accidents



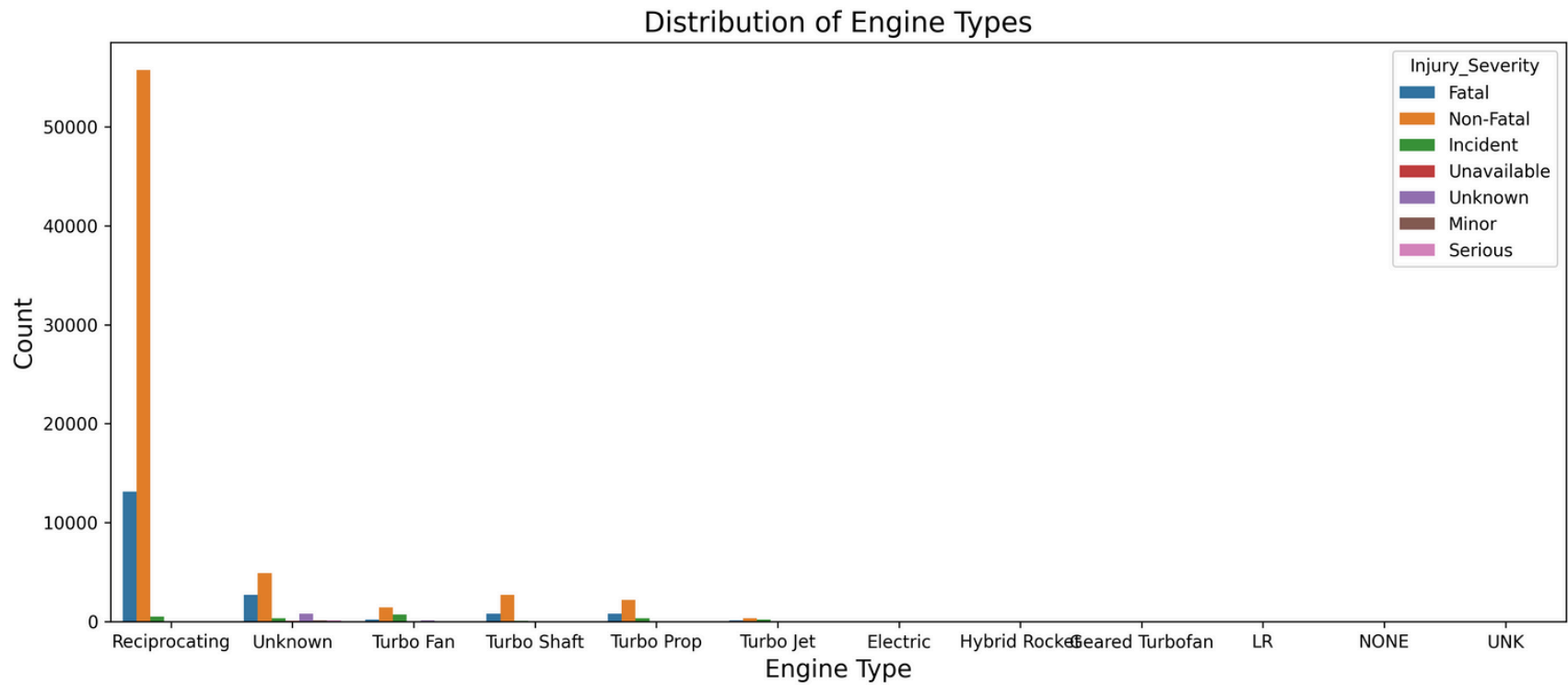
Number of engines

Aircrafts with one engine were involved in majority of the accidents



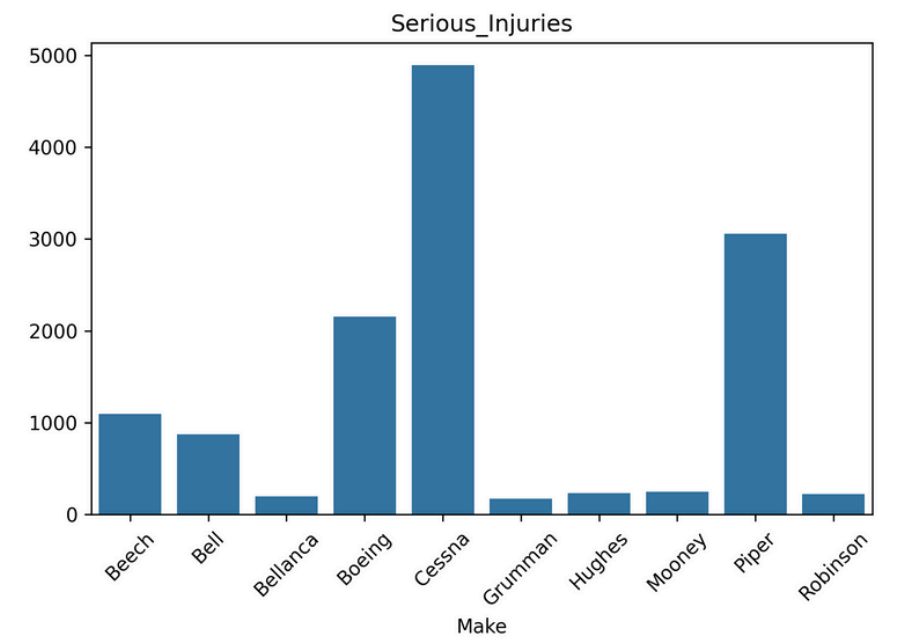
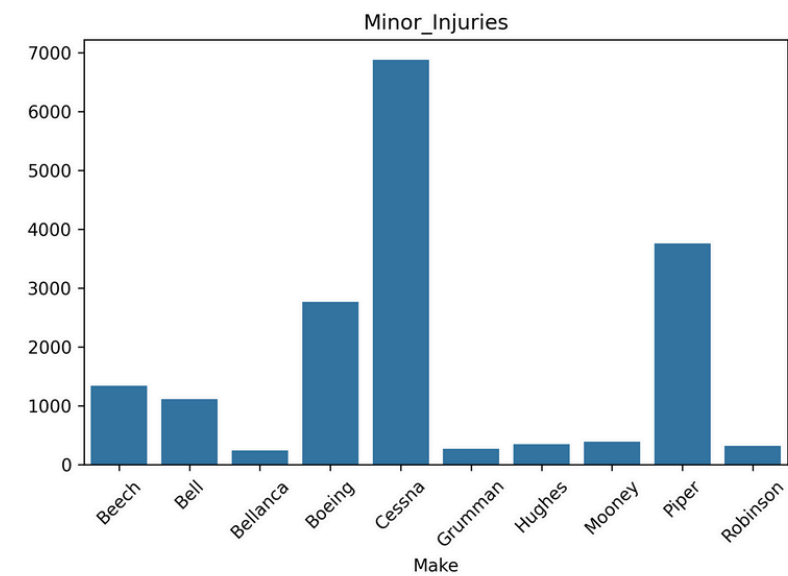
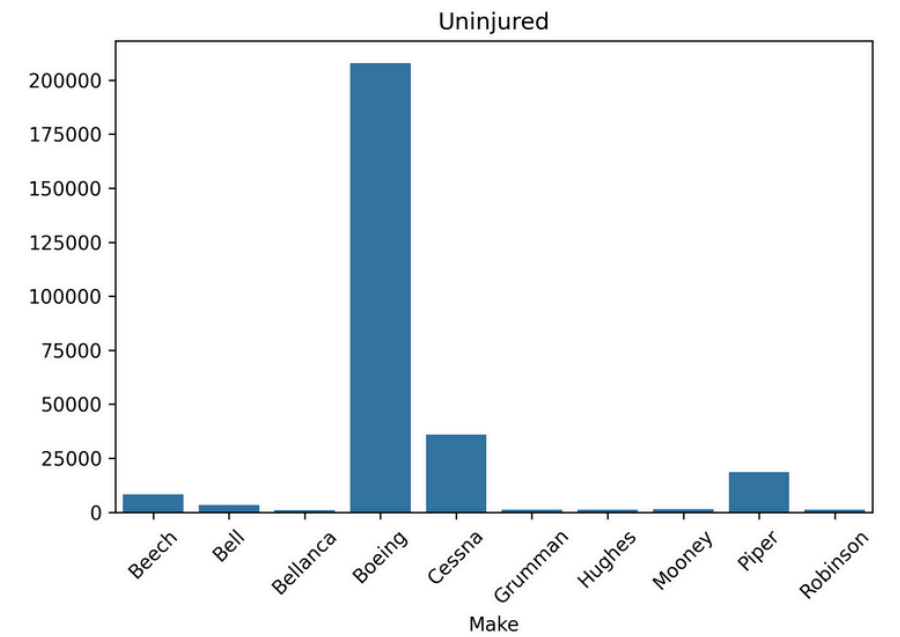
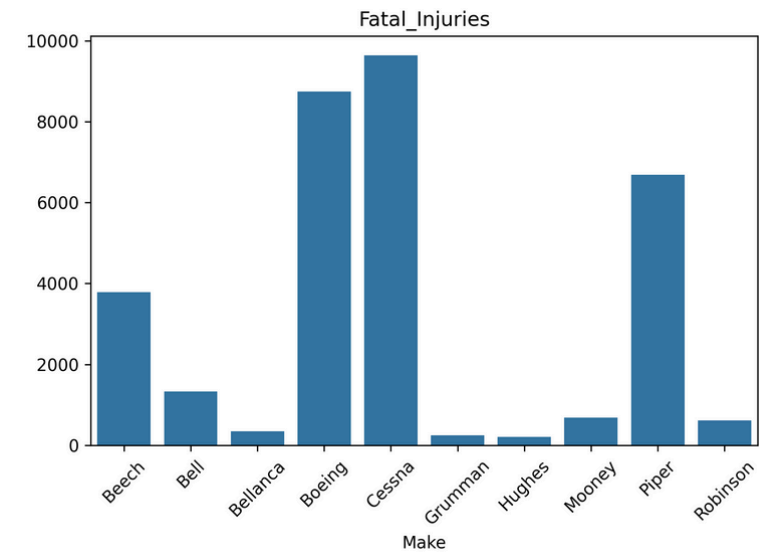
Engine Type

Aircrafts with Reciprocating engines were involved in many accidents where the injury severity was mainly non fatal and quite a number being fatal

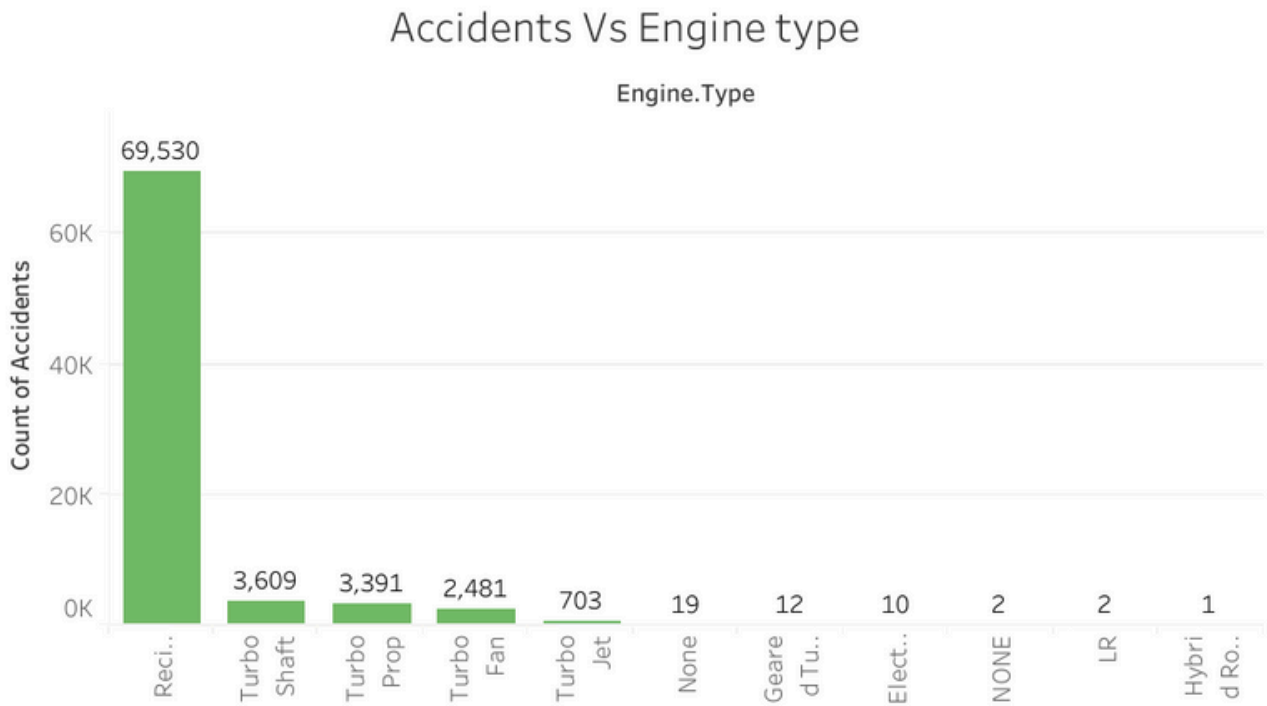
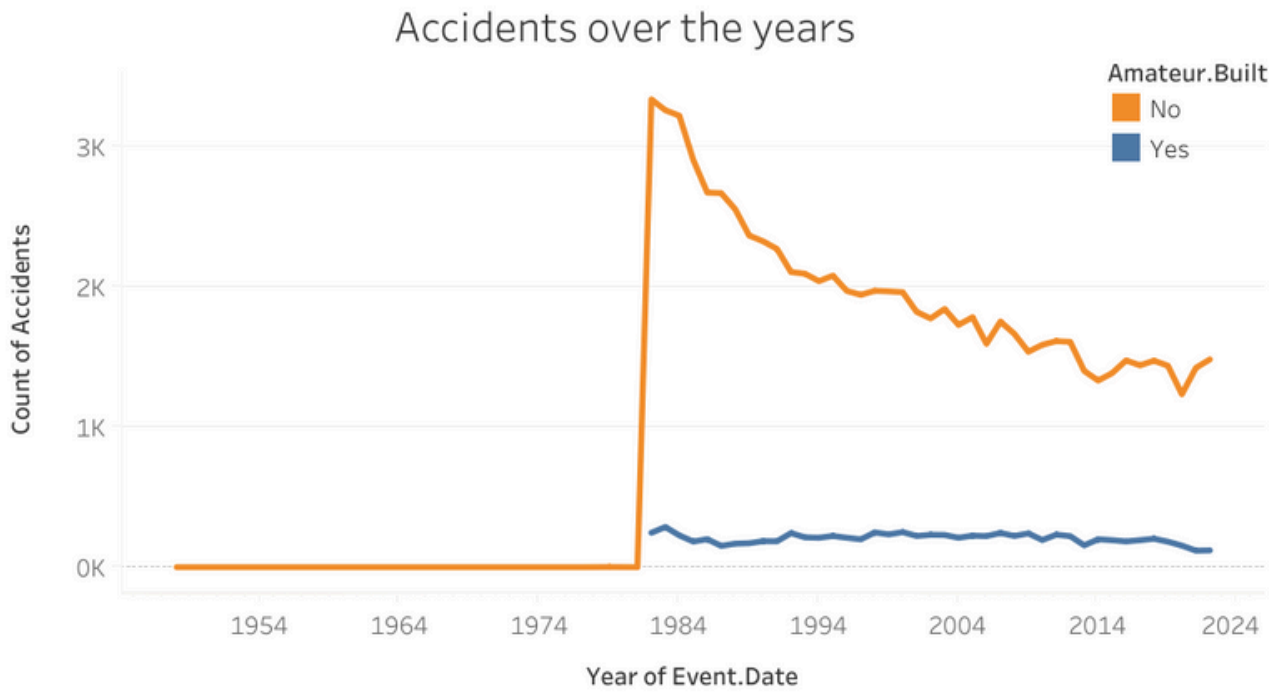
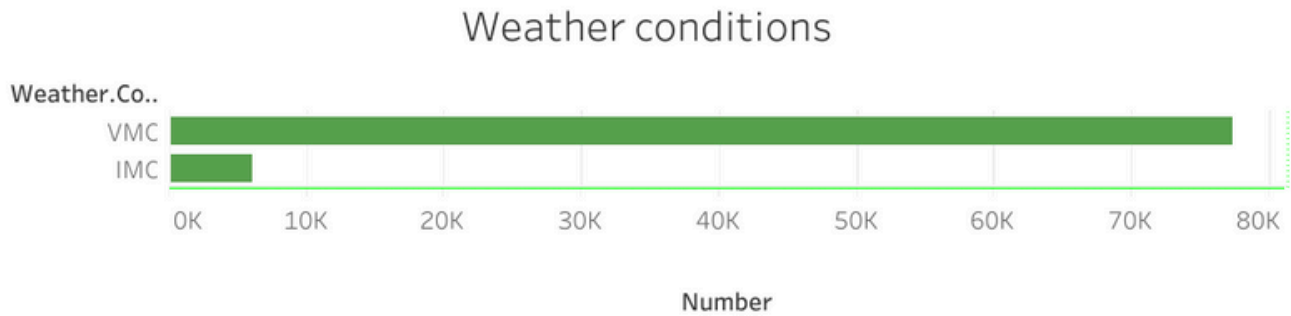
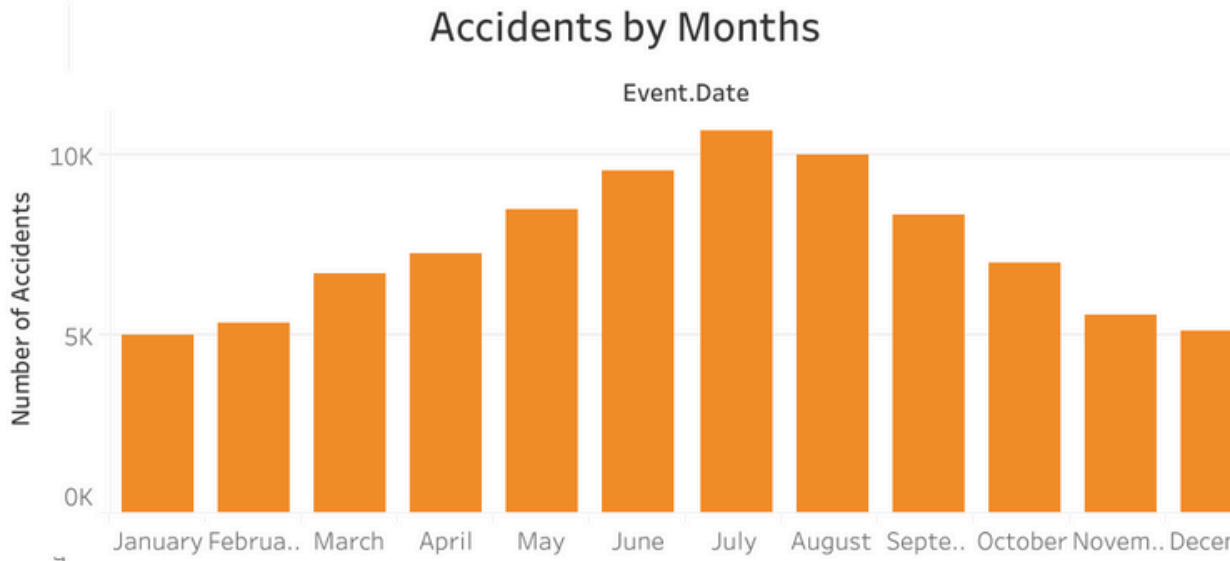
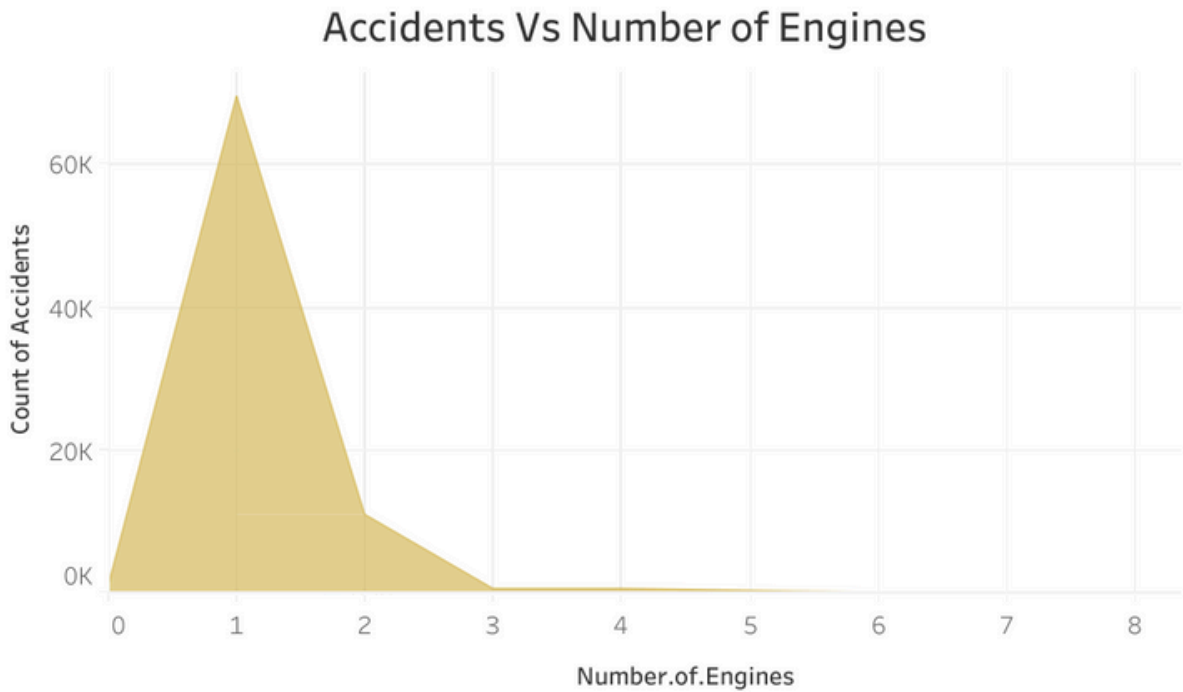
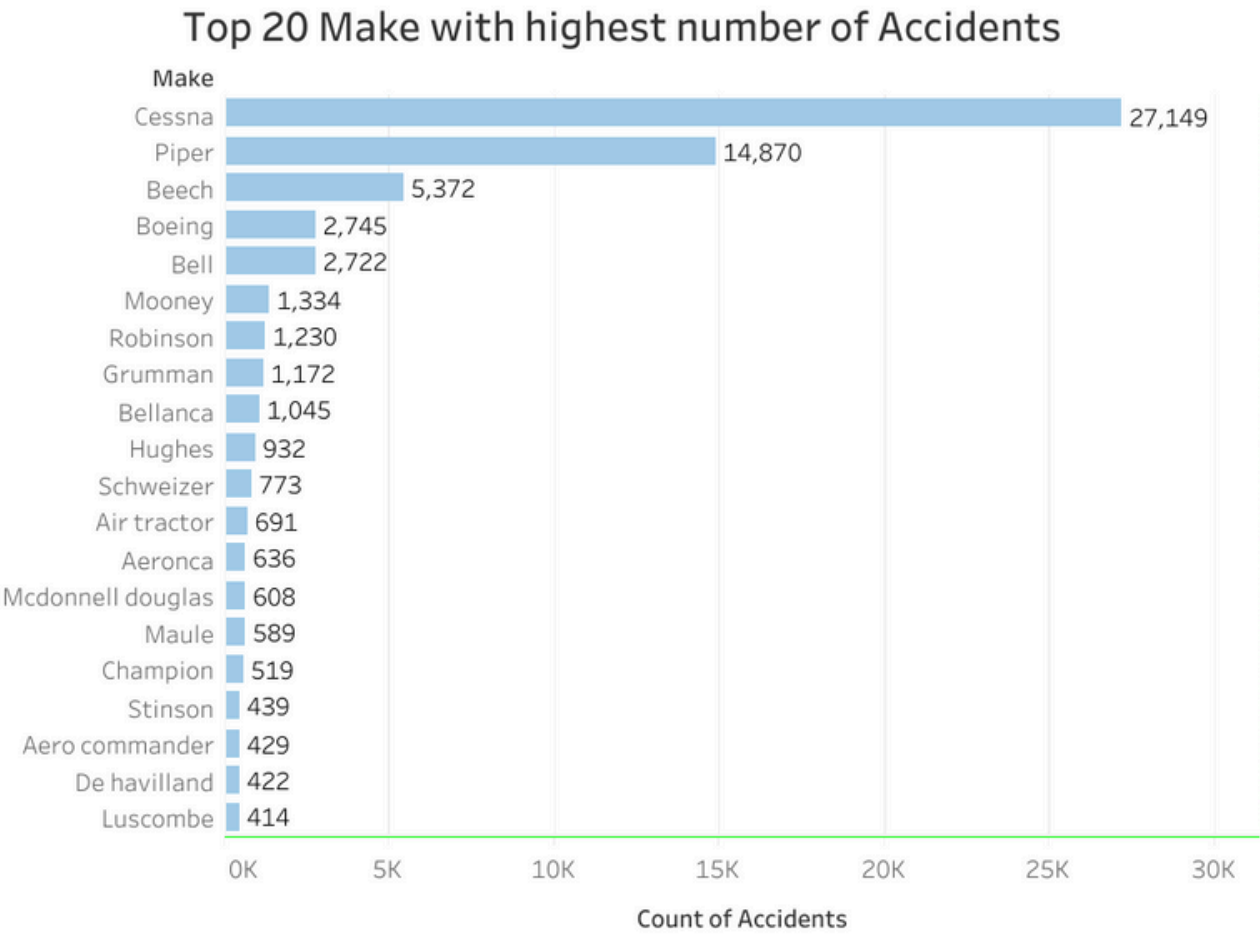


Injuries by Make

1. There were higher incidence of injuries in Cessna aircraft accidents.
2. Passengers aboard Boeing aircraft experienced a significantly higher likelihood of survival from the Uninjured plot.



Low-Risk Aircraft Analysis



Conclusions

1. Cessna aircraft were involved in the highest number of accidents. This could be due to Cessna's large market share and therefore, warrants a closer inspection of specific models and their safety records.
2. Aircrafts with one engine were disproportionately involved in fatal accidents. it is implied that lack of engine redundancy increases risk during engine failure.
3. Amateur-built aircraft were involved in fewer accidents compared to professionally built ones. While fewer accidents may suggest better outcomes, the data may reflect the lower overall usage or different operational patterns of amateur-built aircraft.
4. Aircraft with reciprocating engines were involved in the most accidents. Reciprocating engines are usually used in general aviation aircraft, which may contribute to higher accident rates due to operational factors like outdated runways.

Recommendations

The company to focus on professionally built, more than one engine and avoid reciprocating engine aircrafts

Conduct detailed assessments of manufacturers like Cessna to identify models with strong safety records

This strategy will minimize risk and align with the company's goal of safe and sustainable growth in the aviation industry

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Thank you!

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