

Aviation Risk Analysis

Aircraft Safety Assessment for Business Expansion

Business Objective

- Identify lowest-risk aircraft for company entry into aviation market

Dataset Overview

- Aviation accident dataset
- Filtered to **airplanes category only**

Data Preparation

- Removed duplicates
- Handled missing values
- Standardized airplane identifiers

Injury Metrics

- Calculated total injuries by adding up the different types of injuries: Fatal, Serious and Minor
- Computed average injuries per incident by dividing the total number of injuries with the number of times each incident occurs(frequency)

Risk Score Method

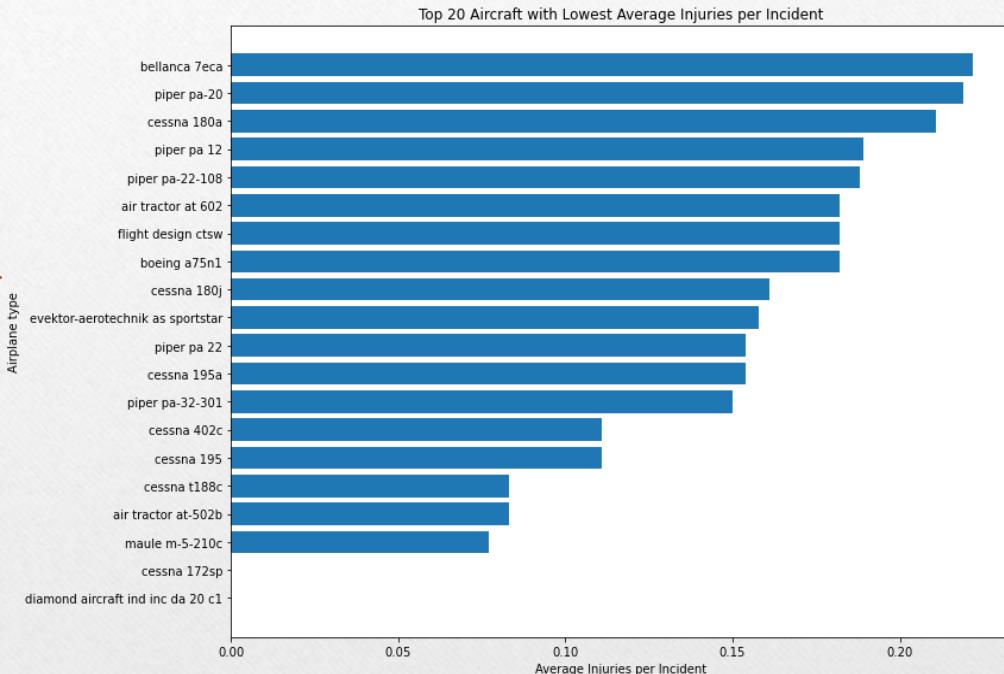
- Fatal = 3
- Serious = 2
- Minor = 1
- Weighted injury scoring – This brings about normalization which helps one come up with better analysis

Safest Airplane (Injuries)

Cessna 172 variants (0.00)

Diamond DA-20 (0.00)

Low average injuries



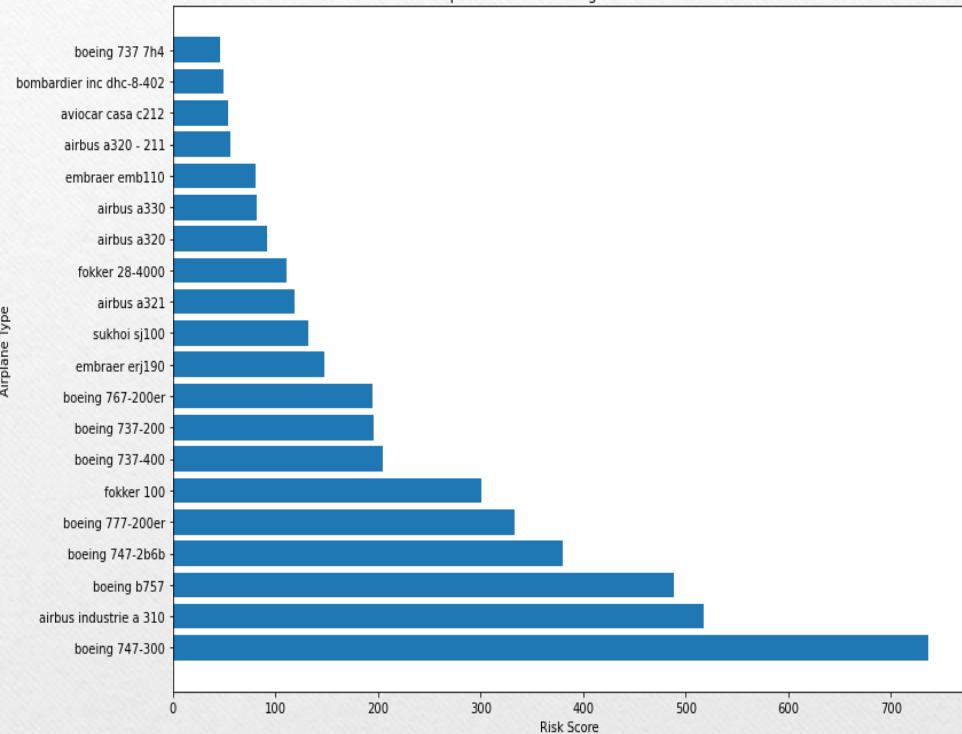
Highest Risk Airplane

Boeing 747 (736)

Airbus A310 (517)

High-severity outcomes

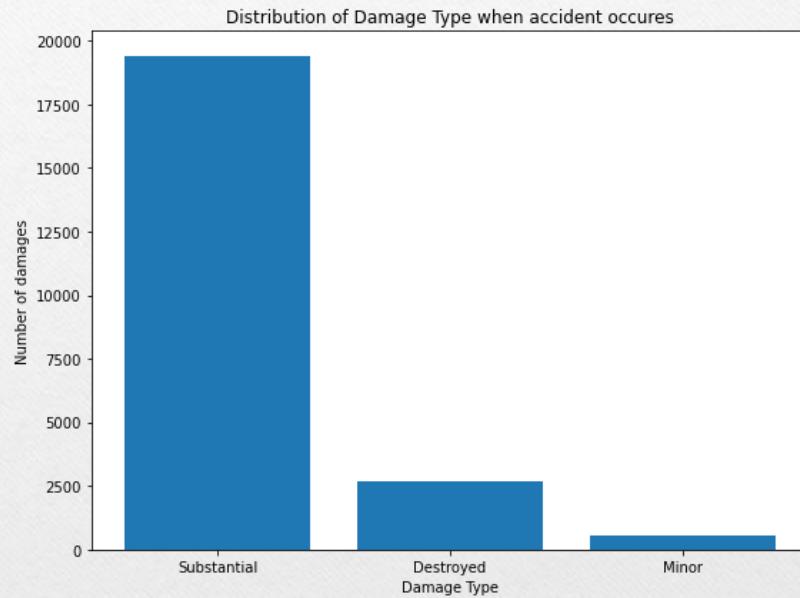
Top 20 Aircraft with Highest Risk Score



Damage Severity Findings

Substantial damage dominates (19414) and exposed to serious repair costs

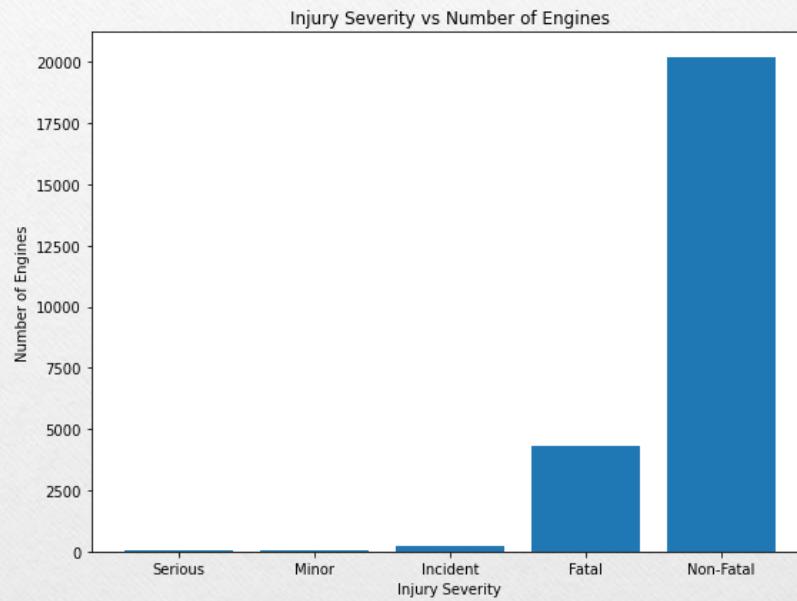
Destroyed incidents(2704) pose high financial and safety risk



Engine Analysis

Higher engine count is linked to severe outcomes

Company should focus on airplane with engine configurations and safety records that limit fatal outcomes, ensuring safer and more reliable operations as it enters the aviation sector.

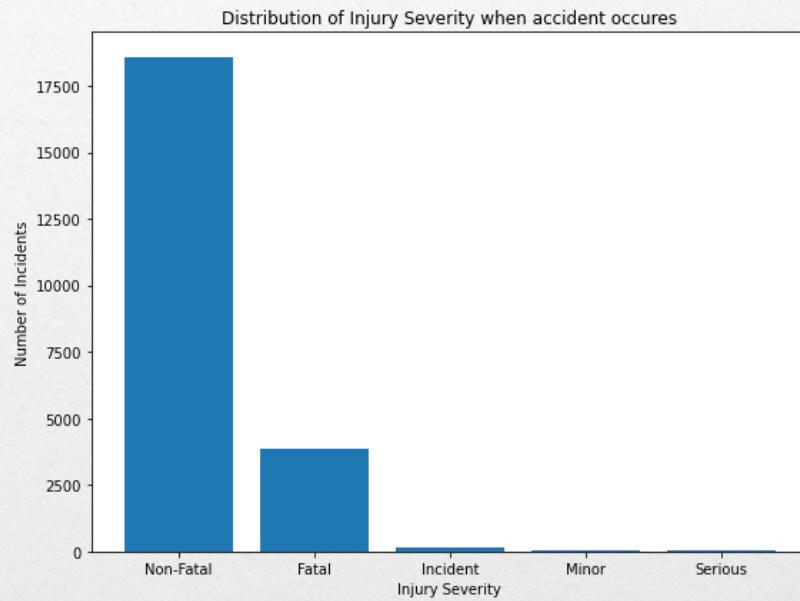


Injury Severity Distribution

Non-fatal (18591) and fatal dominate(3831)

Minor injuries rare(57)

Airplanes with lower fatality and serious injury counts should be prioritized to minimize safety and operational risk



Composite Weighted Risk

- Combines injury, damage, severity, frequency . This composite score reflects how different risk factors compound risk influence overall airplane safety.

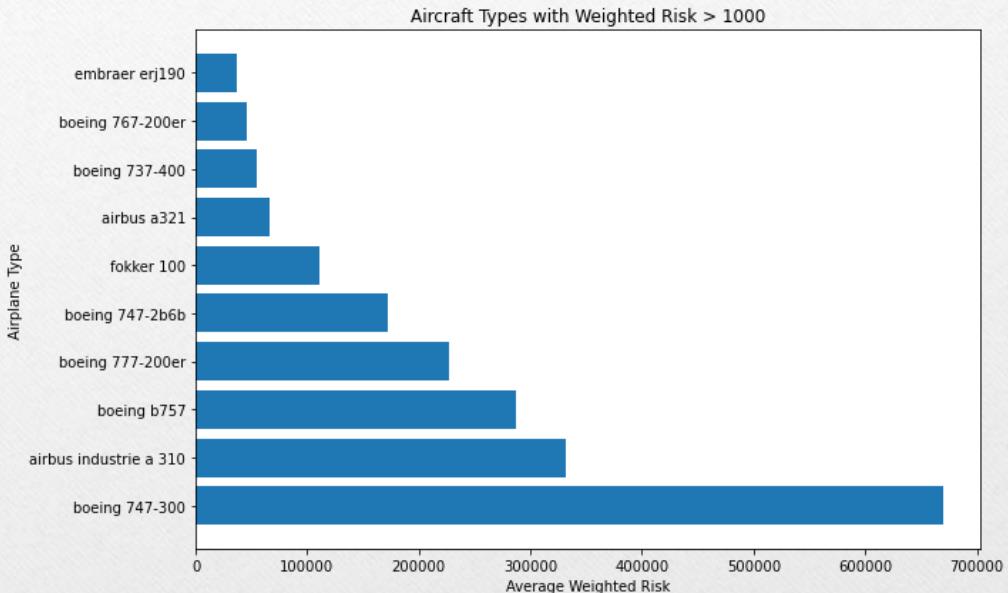
Lowest Weighted Risk Airplane

Embraer erj190

Boeing 767-200er

Airbus a321

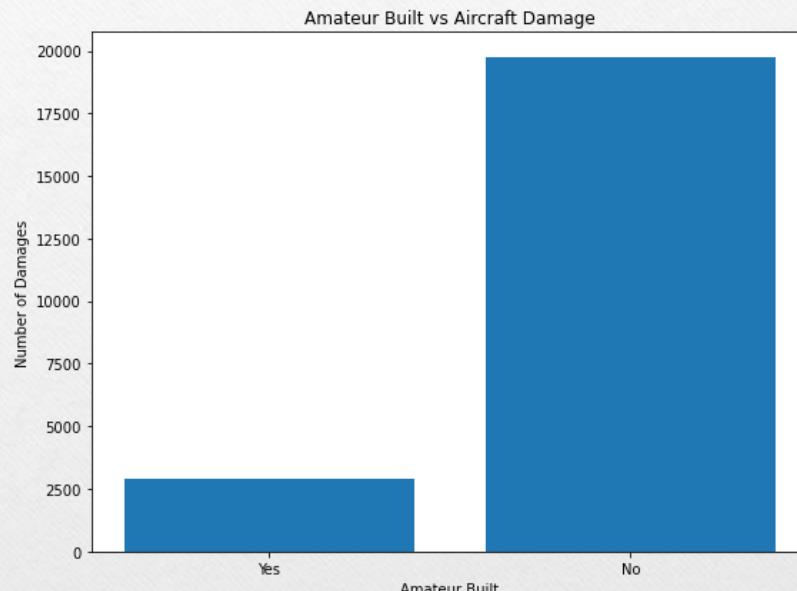
Are typically smaller, lower-speed, and lower-capacity, resulting in fewer severe injuries and less catastrophic damage.



Amateur-Built Analysis

The higher number of damage cases among non amateur built aircraft does not automatically imply they are less safe; rather, it indicates greater usage intensity and exposure to risk.

Lower damage frequency
Reduces exposure



Strategic Implications

- Start with general aviation
- Scale up cautiously

Final Recommendation

- Purchase low-risk GA airplanes
- Avoid large jets initially

Limitations

- No exposure normalization
- Historical bias

Next Steps

- Add cost metrics
- Normalize risk
- Expand model