NTSB

De-Risking Market Entry: A Data-Driven Approach to Aircraft Acquisition

A presentation for the Head of the New Aviation Division

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Agenda

The Business Problem & Our Goal

The Business Problem: Our company is expanding into the aviation industry but lacks expertise in assessing the associated risks. We need to make informed, data-driven decisions on which aircraft to purchase.

The Project Goal: To analyze historical aviation accident data to identify aircraft with the lowest risk profile, translating these findings into actionable recommendations for our initial fleet acquisition.

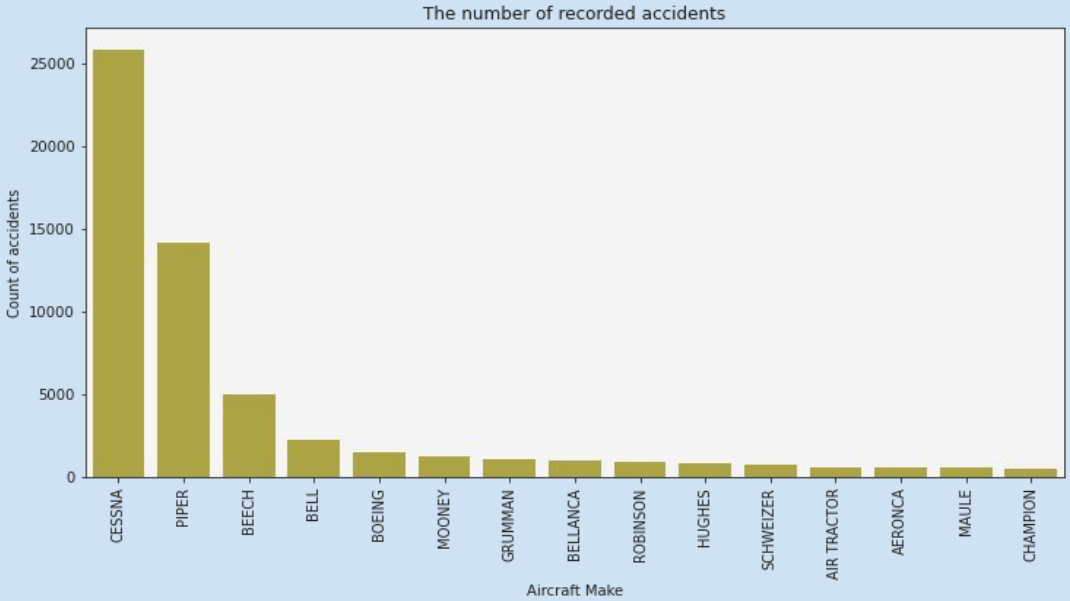
Data Understanding

The Data: We analyzed the NTSB aviation accident dataset, spanning from 1982 to 2022.

Our Process:

1. **Data Cleaning:** We standardized inconsistent data (e.g., manufacturer names), handled missing values, and focused our analysis on relevant incident types within the United States.
2. **Analysis:** We explored relationships between aircraft make, engine type, build category, and incident outcomes (fatal, non-fatal).
3. **Visualization:** We used clear, simple charts to visualize patterns and communicate our findings effectively.

Popularity vs. Actual Risk



The Finding: At first glance, manufacturers like **Cessna and Piper** appear to be the most dangerous, as they are involved in the highest number of incidents.

The Conclusion: This is misleading. These brands are the most popular and widely used in the industry. Their high incident numbers are a reflection of their market dominance, not necessarily a higher risk per aircraft.

Recommendation 1: The company should **prioritize well-established and popular manufacturers.** Their market prevalence ensures a robust ecosystem for maintenance, readily available spare parts, and a larger pool of experienced pilots and mechanics.

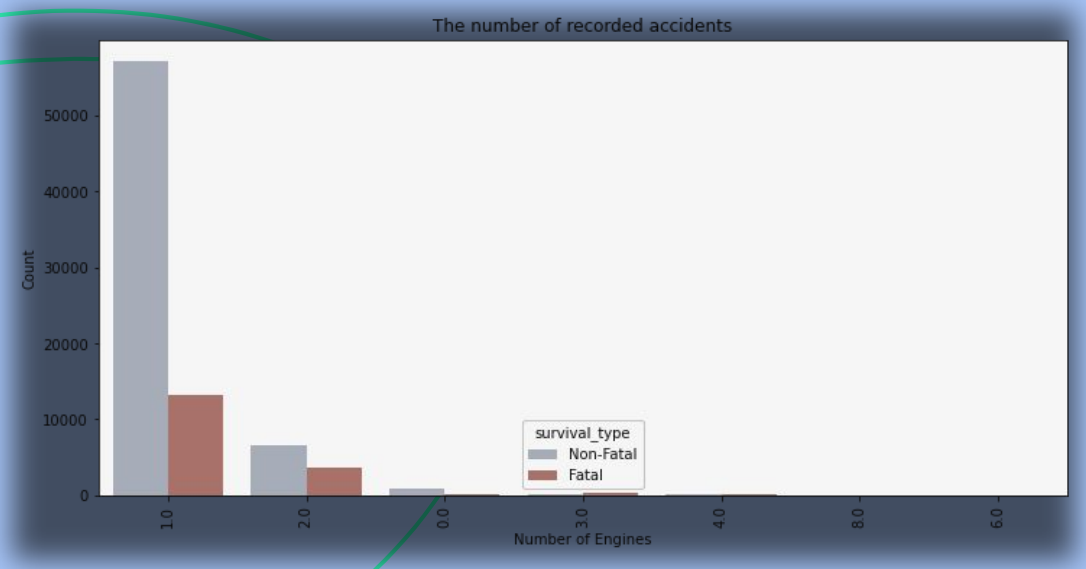
Shifting Focus: Why Rates Matter More Than Totals

To accurately assess risk, we must normalize our data.
Instead of asking *"Who has the most accidents?"*
We should ask:

- *"What is the **fatality rate per incident**?"*
- *"What factors are most correlated with **safe outcomes**?"*

The following recommendations are based on this more nuanced, rate-based approach to risk assessment.

The Power of Redundancy

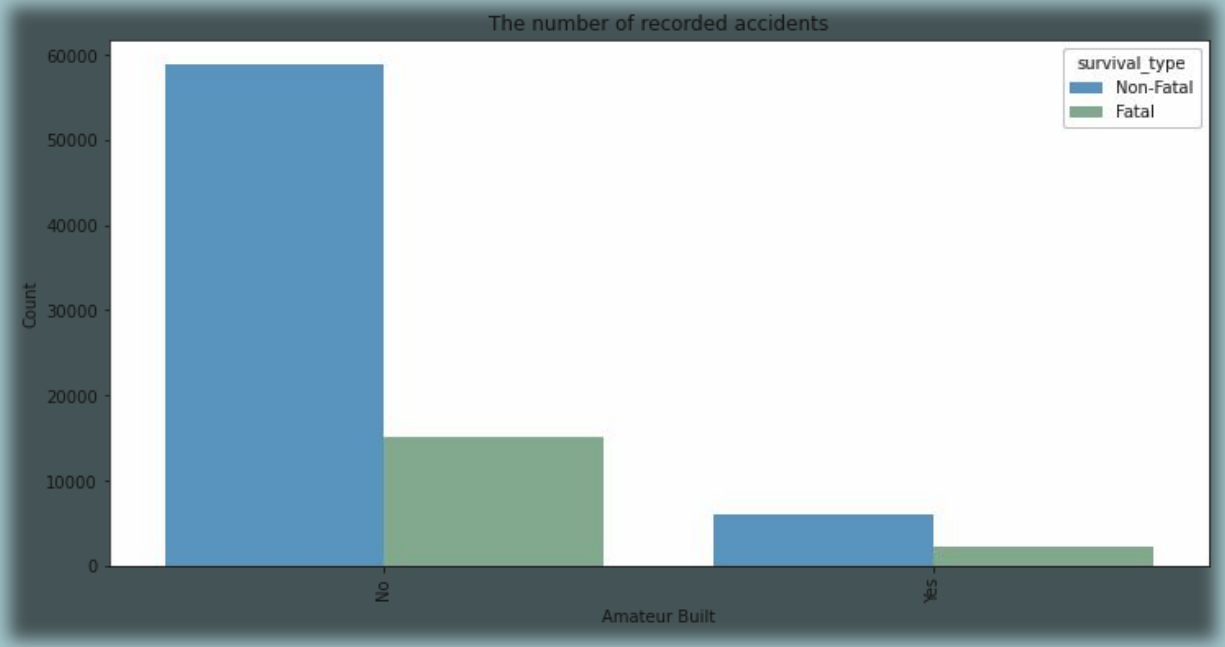


The Finding: Single-engine aircraft are involved in a vastly higher number of both fatal and non-fatal incidents compared to multi-engine aircraft.

The Conclusion: Multi-engine aircraft have a demonstrably better safety profile. The redundancy of having a second engine is a critical safety advantage in the event of an engine failure, significantly increasing the chances of a safe outcome.

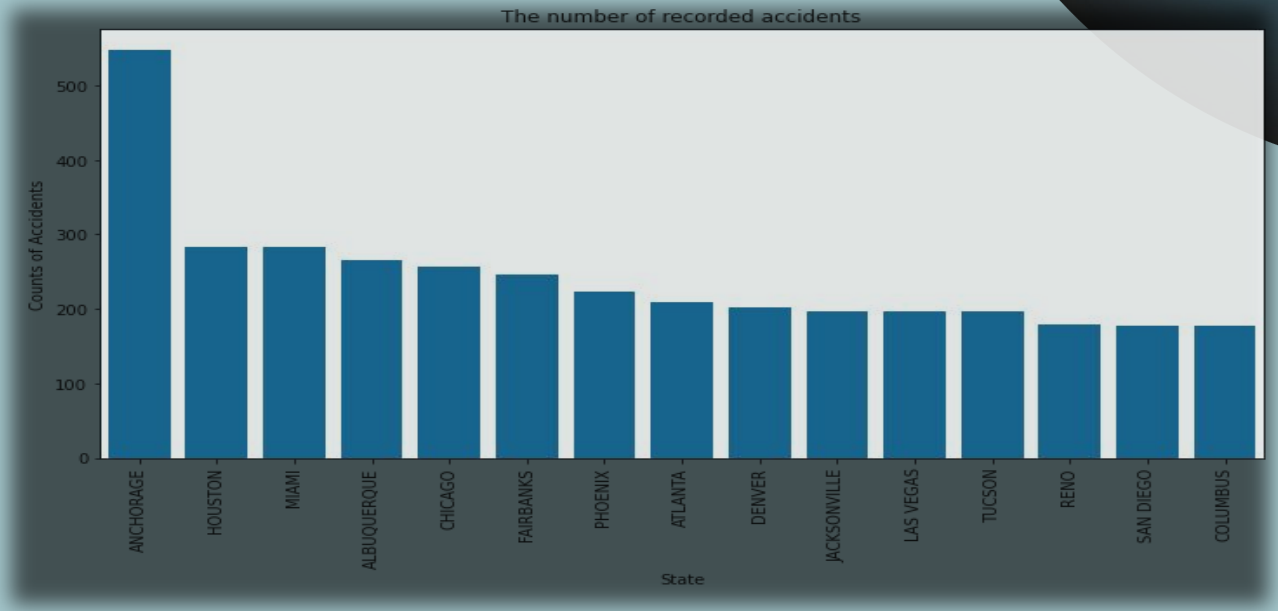
Recommendation : To minimize operational risk, the company should **exclusively focus on acquiring multi-engine aircraft** for its initial fleet. This is the single most effective step to de-risk our entry into the market from an equipment standpoint.

The Importance of Certification



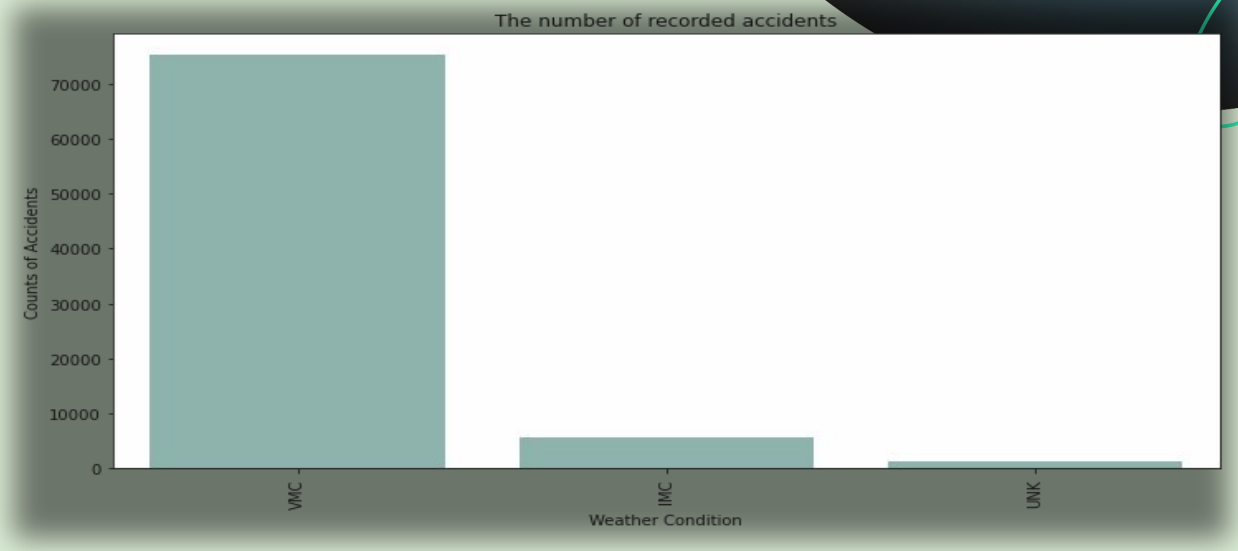
The Finding: Commercially manufactured aircraft are subject to rigorous, standardized certification processes (e.g., FAA standards) that amateur-built planes are not.
The Conclusion: This certification ensures a consistent and high standard of safety, design, and reliability that is not guaranteed with amateur-built or "experimental" aircraft.
Recommendation 3: The company must adopt a strict policy to **exclusively purchase commercially manufactured aircraft.** This avoids unnecessary liability, ensures a baseline of certified safety, and simplifies maintenance and insurance.

Environmental Factor - States



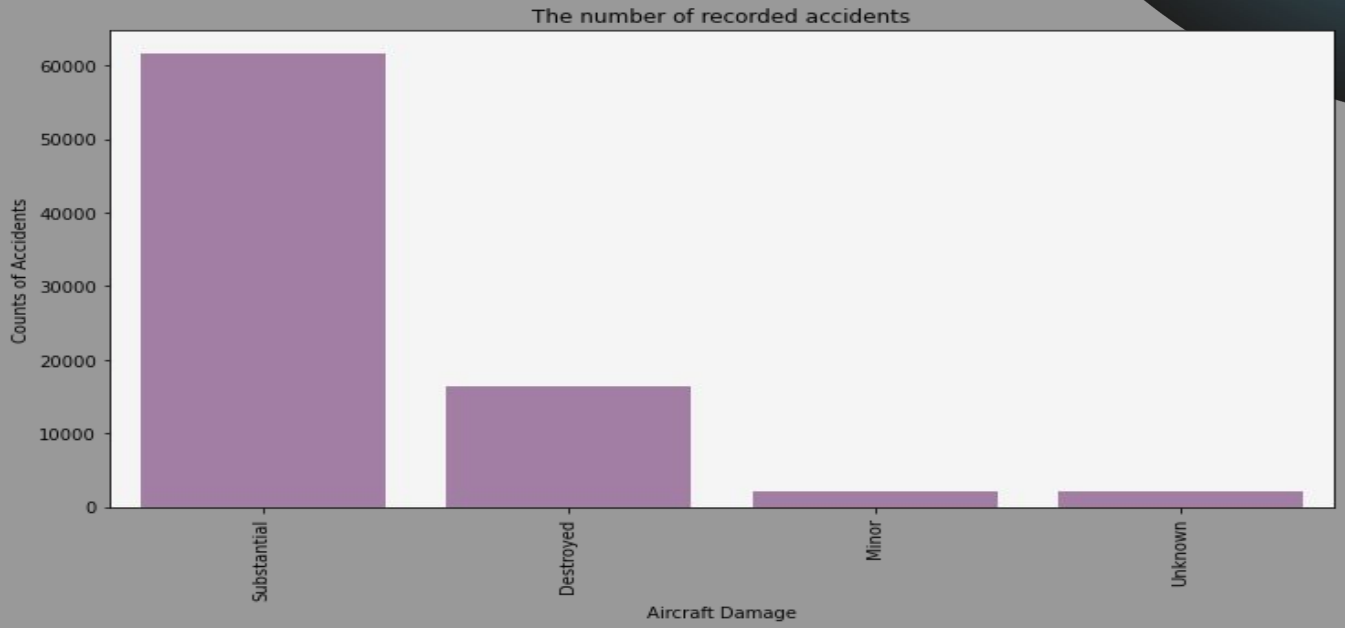
Finding: Incidents are concentrated in high-traffic regions like Miami and Houston, and areas with challenging terrain or weather, such as Anchorage.
Conclusion: The operating environment is a major contributing factor to risk.
Recommendation: For its initial phase, the company should **establish bases in locations with less congested airspace and more favorable flying conditions** to minimize environmental risk.

Environmental Factor - Weather



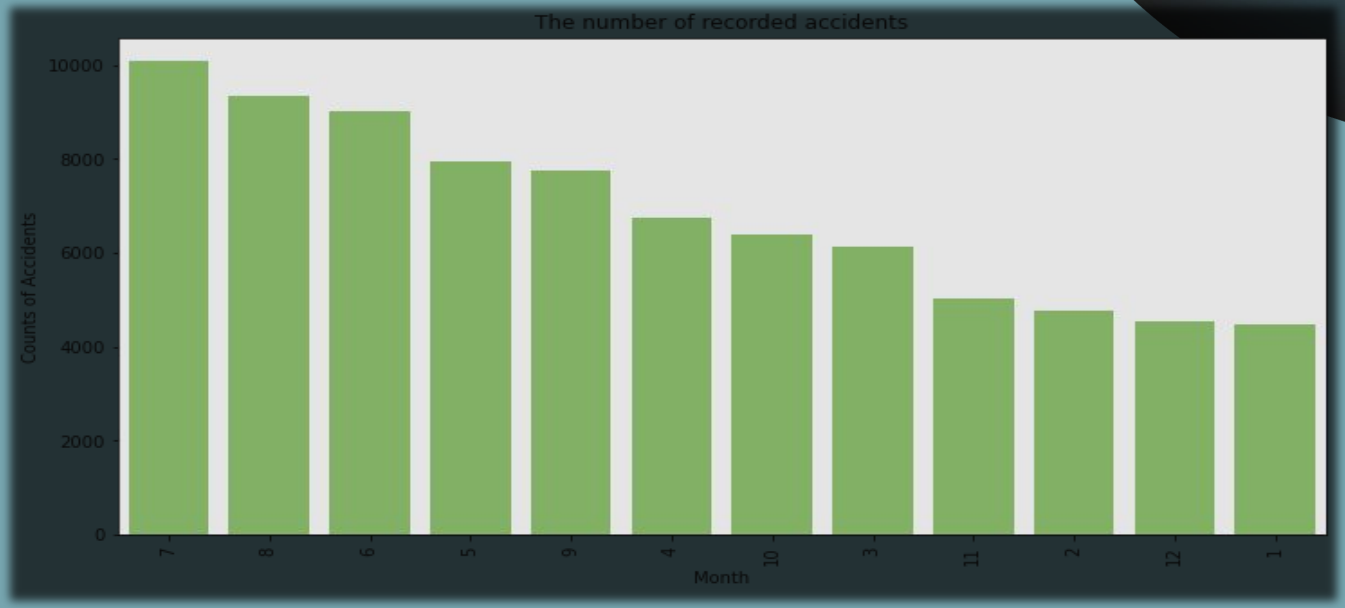
Finding: The vast majority of accidents occur in VMC (Visual/Clear Conditions).
Conclusion: This is because most flights happen in good weather. However, flying in IMC (Instrument/Poor Conditions) is inherently riskier.
Recommendation: Invest heavily in **advanced avionics and rigorous instrument flight training** for all pilots to ensure the highest level of proficiency and safety when operating in challenging weather.

Asset Risk - Damage Severity



Finding: A high proportion of incidents result in "Substantial" or "Destroyed" damage to the aircraft.
Conclusion: Even non-fatal incidents can lead to major financial loss and asset write-offs.
Recommendation: When evaluating specific models, prioritize those with a documented history of sustaining only **"Minor" damage** in incidents. This indicates a more robust and resilient airframe.

Temporal Trends - Accidents by Month



Finding: Accidents peak during the summer months (June, July, August).
Conclusion: This corresponds with the peak general aviation flying season in North America, with more aircraft in the sky.
Recommendation: The company should implement **heightened safety briefings and awareness campaigns** during the peak flying season to mitigate risks associated with increased air traffic.

Summary of Recommendations

Focus on Established Brands

Build the initial fleet with aircraft from popular and reputable manufacturers like Cessna and Piper to leverage their extensive support networks.

Prioritize Multi-Engine Aircraft

Mitigate the leading cause of catastrophic failure by investing exclusively in aircraft with engine redundancy.

Purchase Certified Aircraft Only

Ensure the highest standard of safety and mitigate liability by acquiring only commercially manufactured and certified planes.

Next steps

Deeper Model-Specific Analysis

Conduct a follow-up analysis focusing on *rates* of incidents (e.g., fatalities per 100,000 flight hours) for specific multi-engine models from our recommended manufacturers

Cost-Benefit Analysis

Integrate our safety findings with market data on acquisition costs, operational expenses, and resale value to identify the optimal low-risk, high-value models.

Develop Pilot Training Protocols

Use these insights to create targeted training scenarios for our pilots that focus on the most common phases of flight where incidents occur (e.g., landing, takeoff).


Questions??

Thank you!

Contact me

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