



Aircraft Risk Assessment for Strategic Investment

Overview: Navigating Aviation Investment

Diversification

Expanding into the aviation sector to broaden our company's portfolio and unlock new growth opportunities.

Significant Investment

Aircraft purchases represent a substantial financial commitment and carry inherent safety considerations.

Mitigating Risks

Poor aircraft selection can lead to high maintenance costs, increased accident risk, and reputational damage.

Goal: Leverage historical aviation accident data to identify lower-risk aircraft options and support data-driven purchasing decisions.

Business Understanding

Business Question:

Which aircraft present the **lowest operational risk** for commercial and private use?

Why This Matters:

- Aircraft safety directly impacts insurance costs, downtime, and passenger/crew safety.
- Data-backed decisions are crucial for reducing uncertainty in a new, high-stakes market.

Success Definition:

Clear, actionable recommendations that guide aircraft acquisition and operations, ensuring optimal safety and financial performance.



Data Foundation: NTSB Historical Records

1

Data Source

National Transportation Safety Board (NTSB) database.

2

Coverage

Civil aviation accidents and incidents in the U.S. and international waters, from **1962 – 2023**.

3

Key Information

Aircraft Category, Manufacturer, Model, Engine Type, Number of Engines, 'Purpose.of.flight', Weather Condition, phase of flight, and accident severity outcomes.

This comprehensive dataset provides long-term trends, revealing consistent safety patterns that are invaluable for strategic decision-making.

Data Preparation & Methods: Ensuring Reliability

1

Data Cleaning

Removed duplicate and incomplete records to maintain data integrity.

2

Missing Values

Addressed missing data points to prevent biased analytical results.

3

Categorization

Grouped accidents by specific aircraft characteristics and environmental conditions for systematic analysis.

4

Severity Calculation

Calculated average accident severity for fair and accurate cross-category comparisons.

Outcome: Employed visual tools like charts and graphs to clearly compare risk across categories, facilitating easy interpretation.

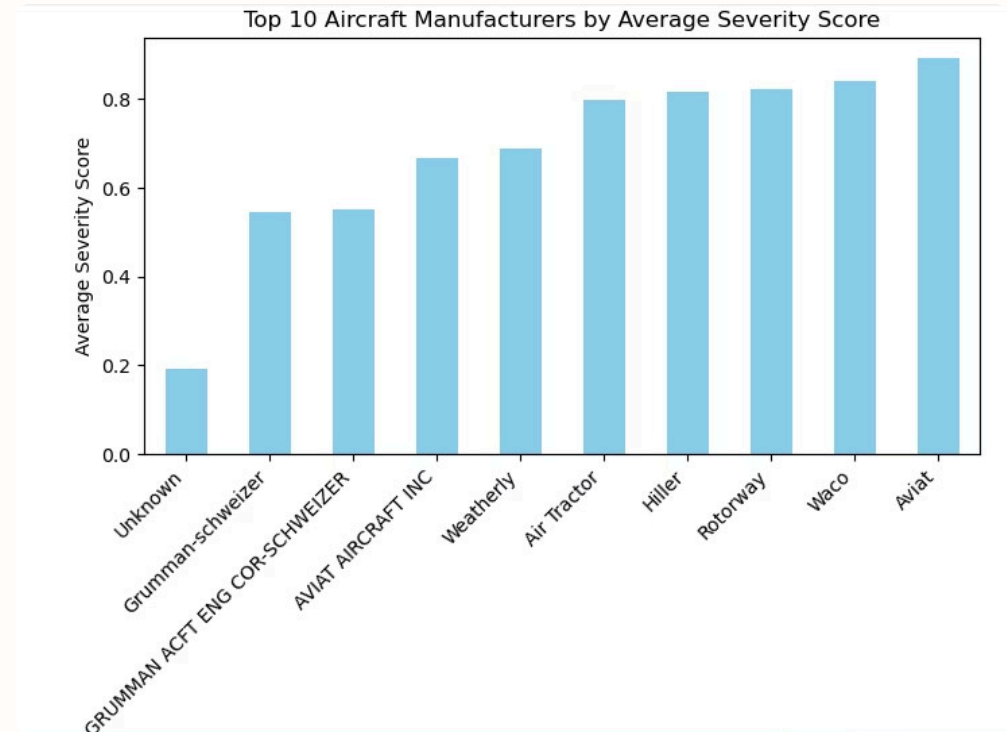
Key Finding 1: Aircraft Make Significantly Impacts Risk

Insight:

- Accident severity varies significantly across aircraft manufacturers.
- Some makes consistently demonstrate **lower severity outcomes**, indicating superior safety performance over time.

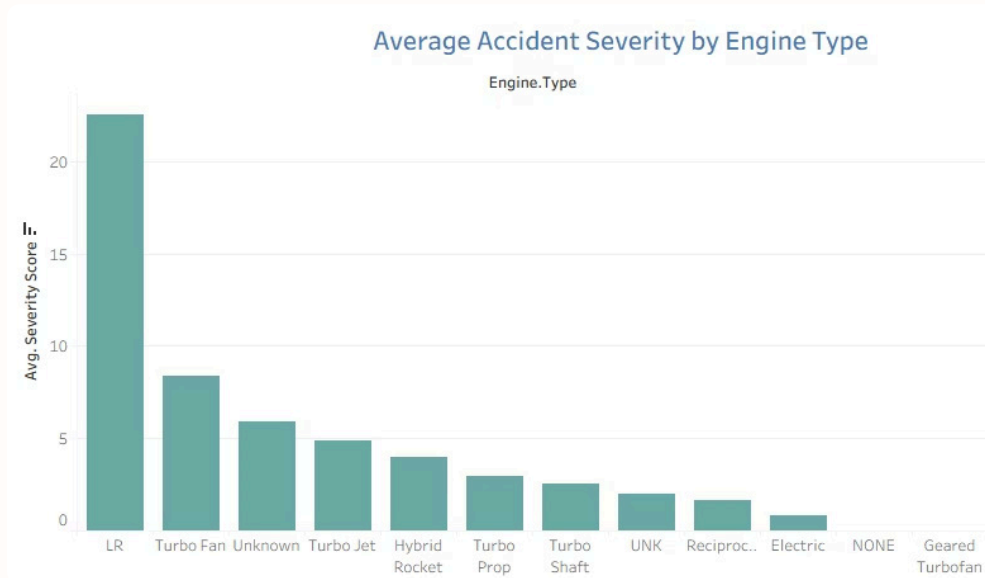
Business Interpretation:

Aircraft brands do not carry equal levels of risk; careful selection based on manufacturer history is critical.



Visualization: Average accident severity by aircraft make.

Key Finding 2: Engine Type & Operational Safety



Visualization: Average accident severity by engine type (simulated impact).

Insight:

- Specific engine configurations are consistently linked to **lower accident severity** and more predictable operational outcomes.
- Conversely, other engine types exhibit higher risk profiles, demanding increased scrutiny.

Business Interpretation:

The choice of engine design and configuration plays a pivotal role in overall operational safety and reliability.

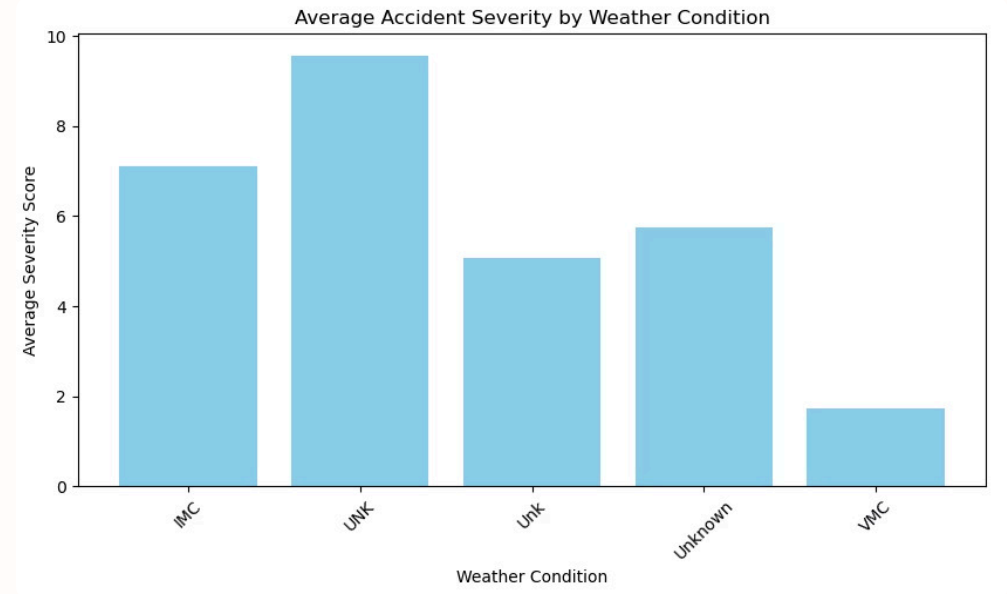
Key Finding 3: Weather's Impact on Operational Risk

Insight:

- Adverse weather conditions significantly elevate the likelihood and severity of aviation accidents.
- Even aircraft with strong safety records face **substantially increased risk** when operating in poor weather.

Business Interpretation:

Effective risk management must extend beyond aircraft selection to include robust operational controls and policies for varying weather conditions.



Visualization: Average accident severity by weather condition.

Strategic Recommendations for Aviation Investment



Prioritize Lower-Risk Aircraft Makes

Focus acquisitions on manufacturers with historically lower accident severity scores, reducing long-term safety and insurance liabilities.



Select Safer Engine Configurations

Favor engine types demonstrably linked to lower average severity, enhancing reliability and decreasing maintenance exposure.



Implement Weather-Based Operating Policies

Enforce strict operational restrictions during high-risk weather conditions, strengthening safety beyond inherent aircraft design.



Next Steps: Refining Our Risk Assessment



Cost-Benefit Analysis

Conduct detailed financial assessments for recommended aircraft models, balancing safety benefits with investment costs.



Integrate Real-time Data

Incorporate live operational and weather data into our risk monitoring systems for dynamic assessment.



Expand Analysis Scope

Include maintenance records, flight hours, and operator type (commercial vs. private) to deepen risk understanding.

These steps will further refine our risk assessment framework, ensuring scalable and informed decision-making as the business grows.