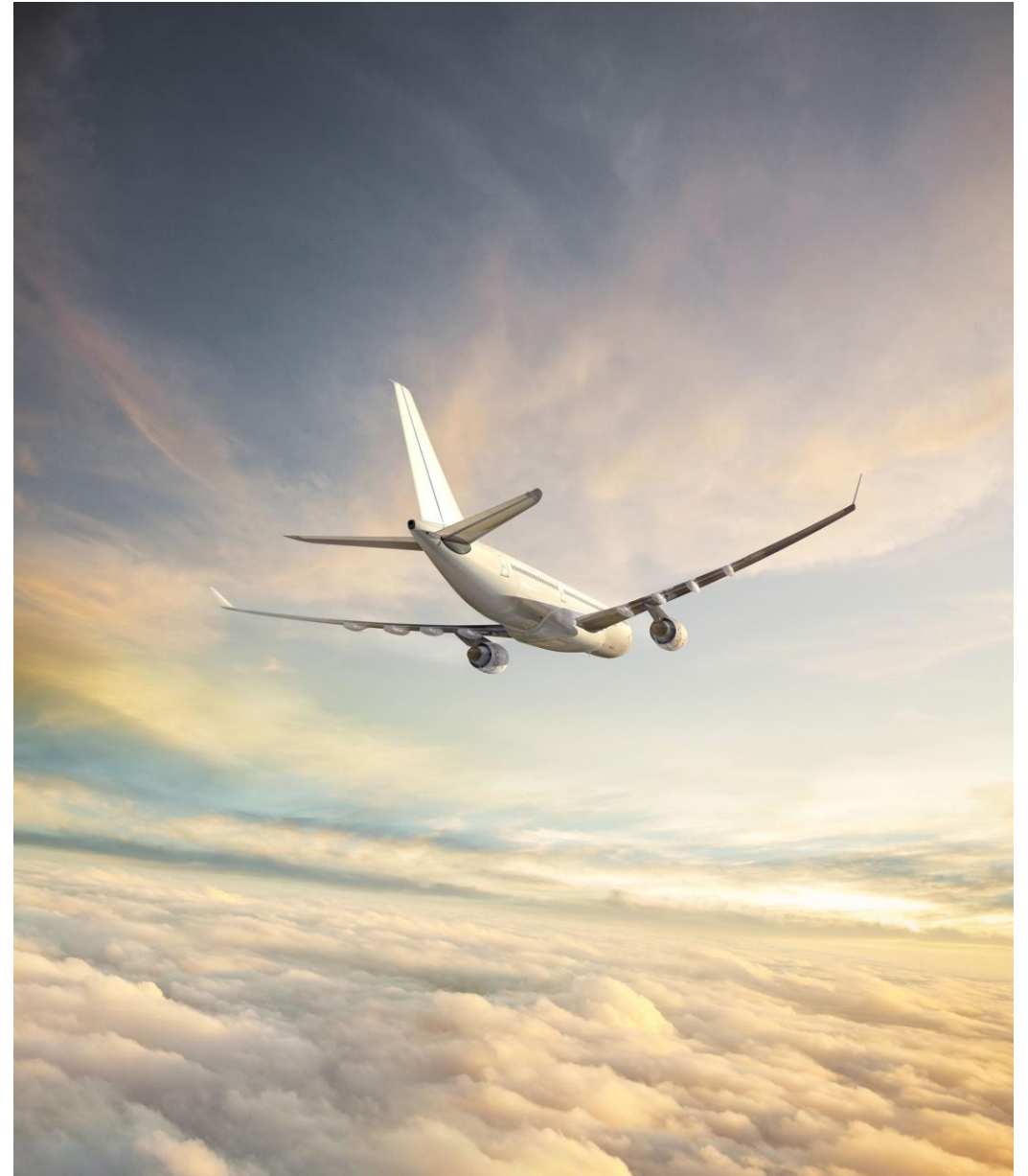


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# Aviation Risk Assessment: Data-Driven Acquisition Strategy

*Analyzing safety trends to improve  
aircraft procurement*





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# Presentation Agenda

- Project Overview and Business Understanding
- Project Approach and Methodology
- Aviation Safety Trends and Industry Insights
- Analysis of Accident Types and Risk Drivers
- Manufacturer and Model Risk Profiles
- Actionable Recommendations for Aircraft Acquisition
- Next Steps for Implementation
- Final Thoughts and Support

# **Project Overview and Business Understanding**

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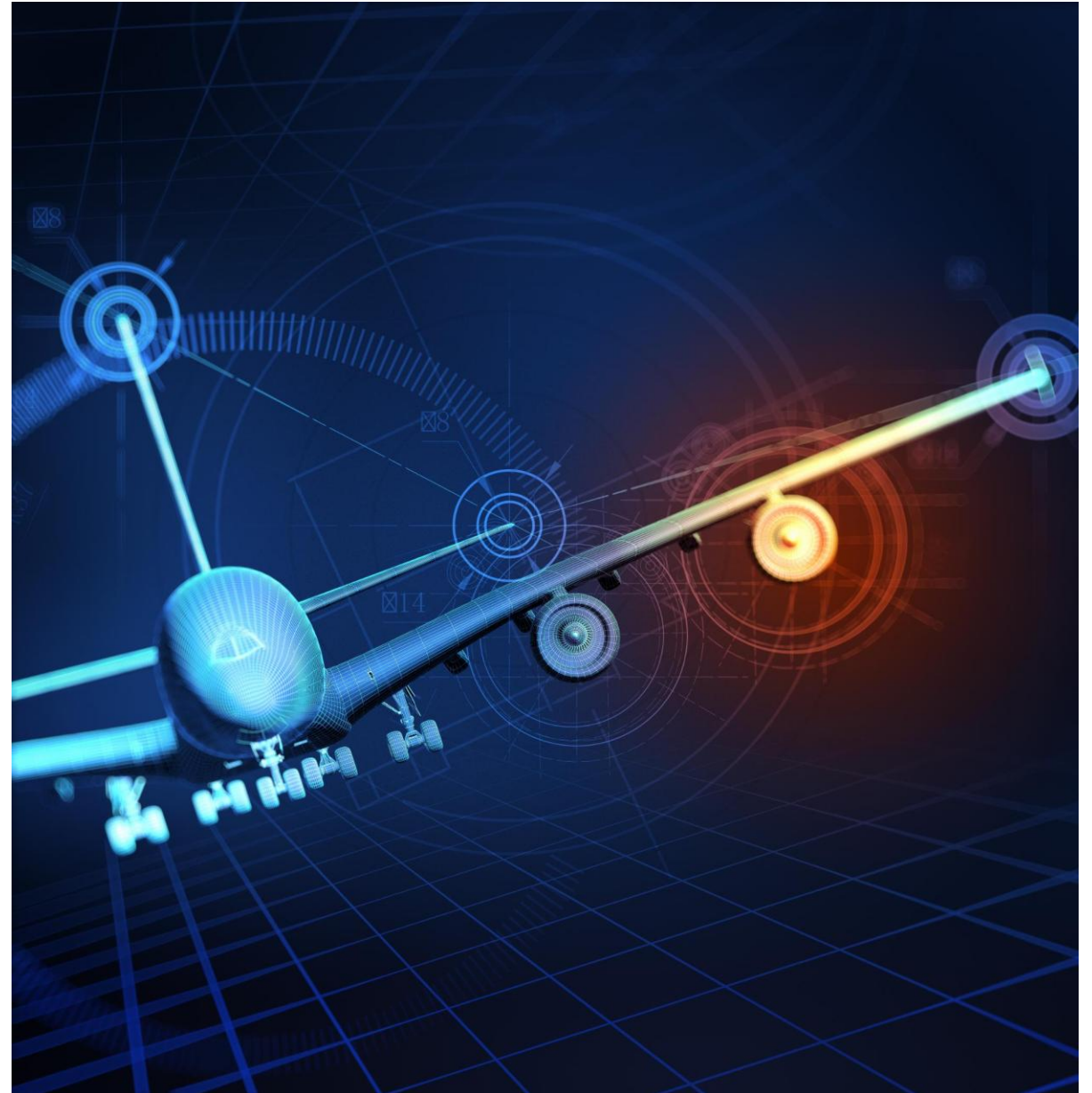
# Minimizing Risk in Aviation: Project Title and Objective

## Project Title

Minimizing risk in aviation through a data-driven acquisition strategy ensures safer aircraft selection.

## Project Objective

Identify the safest aircraft for new ventures to enhance safety and reduce operational risk.



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# Business Opportunity, Challenges, and Data-Driven Solution

## **Business Diversification Opportunity**

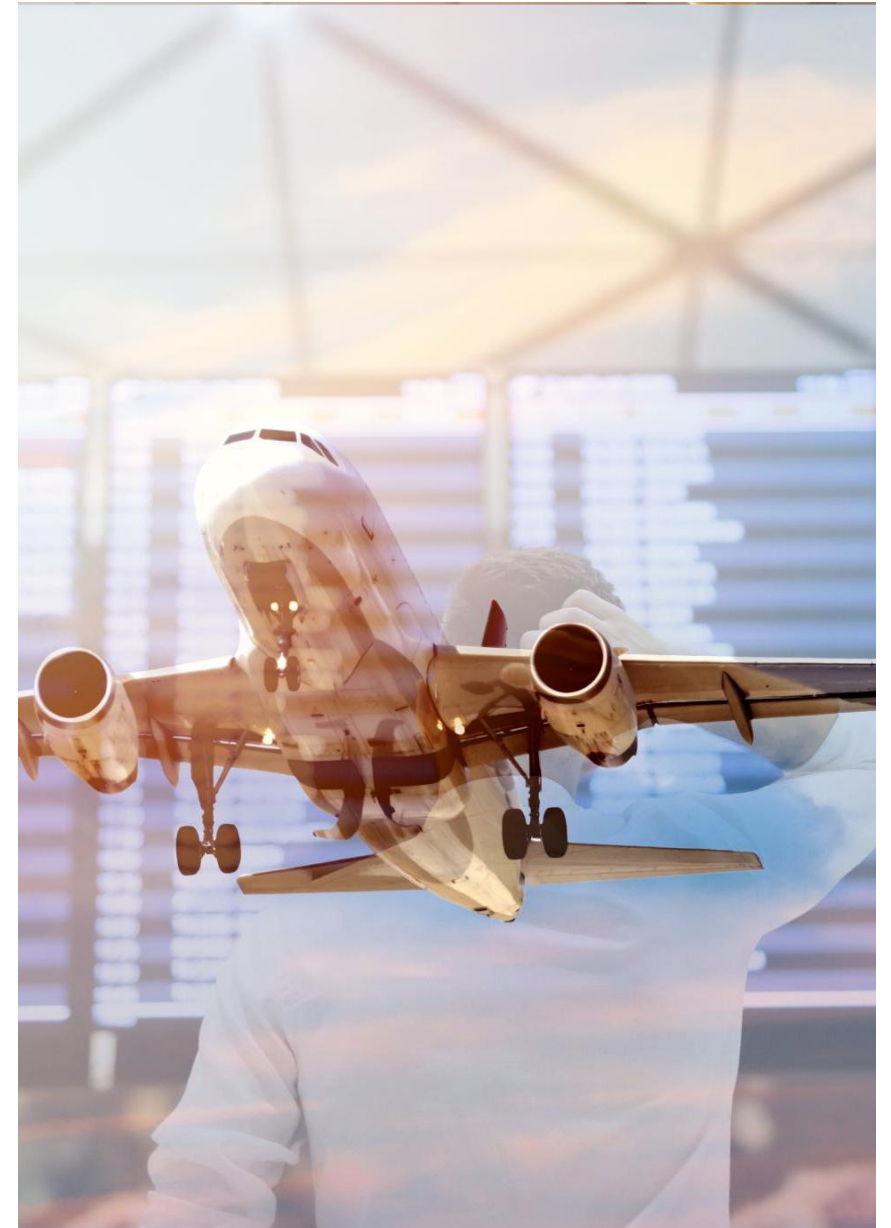
The company is expanding into commercial and private aviation to diversify its portfolio and open new revenue streams.

## **Knowledge and Risk Challenge**

Internal expertise on aircraft risks is limited, making informed, low-risk decisions crucial for success.

## **Data-Driven Decision Making**

Using historical accident data to identify and select the lowest-risk aircraft for safe market entry.



# **Project Approach and Methodology**

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# Data Sources, Timeframe, and Analytical Tools



## Data Source

Data was sourced from the National Transportation Safety Board's accident and incident records.



## Timeframe

The analysis covers over 60 years of data, from 1962 through 2023.



## Analytical Tools

Python and the pandas library were used for efficient handling and summarizing of large datasets.



# Key Metric: Defining Aircraft Risk with Fatal Accident Rate

## Fatal Accident Rate Definition

Fatal Accident Rate measures fatal accidents as a percentage of total aircraft accidents to assess risk.

## Quantifying Aircraft Risk

The rate quantifies aircraft risk by highlighting the proportion of fatal outcomes among all accidents.

## Importance in Safety Analysis

Fatal Accident Rate is a key metric used in aviation safety to improve preventive measures and policies.



# **Aviation Safety Trends and Industry Insights**

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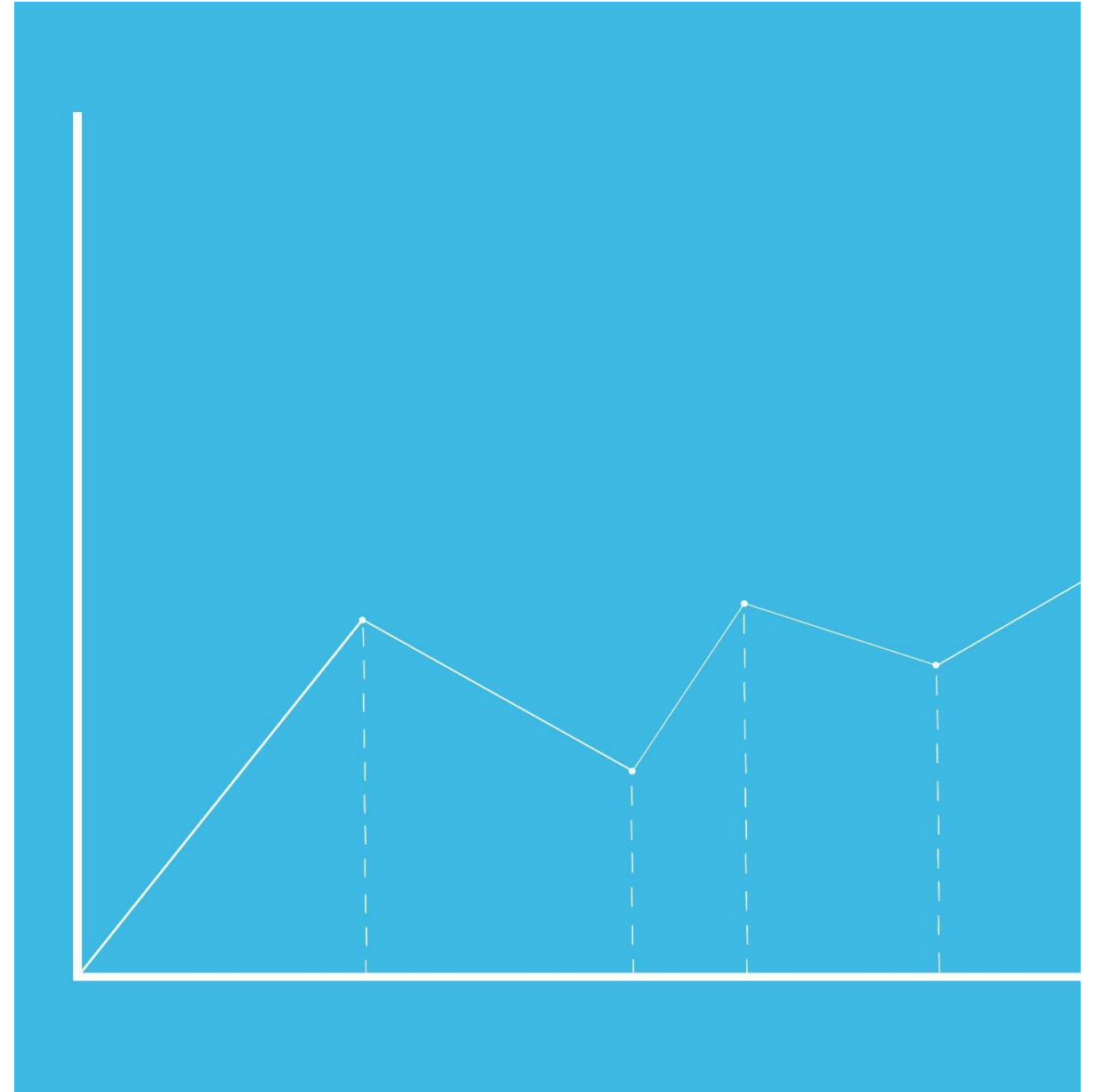
# Long-Term Decline in Accidents and Fatal Accident Rate

## Declining Accident Numbers

Data analysis shows a long-term decrease in total aviation accidents, indicating improved safety measures.

## Reduced Fatal Accident Rate

The fatal accident rate has trended downward over decades, reflecting advances in aviation technology and safety.





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# Business Implications of Improved Aviation Safety

## Aviation Safety Improvements

The aviation industry is showing continuous improvement in safety standards over time.

## Business Success Factors

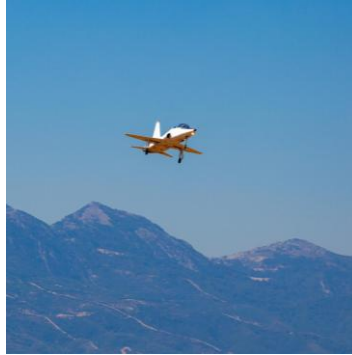
Companies committed to best aviation safety practices can operate successfully and build trust.

# **Analysis of Accident Types and Risk Drivers**

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# General Aviation vs. Commercial: Accident Distribution and Risk



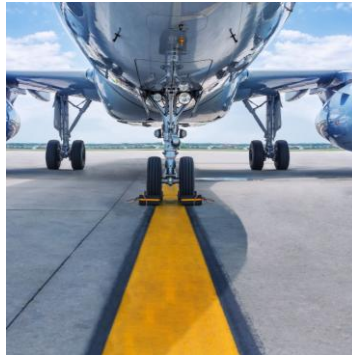
## General Aviation Accident Prevalence

General aviation involving smaller aircraft accounts for most historical accidents, highlighting higher risk levels than commercial aviation.



## Flight Purpose and Accident Risk

Personal and training flights are most accident-prone due to less strict regulatory oversight compared to commercial operations.



## Commercial Aviation Safety

Commercial airlines and cargo operations have the lowest fatal accident rates thanks to strict regulations and mandatory maintenance programs.





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# Impact of Flight Purpose and Segment on Risk Profile

## **General Aviation Risk**

Risk profile is largely influenced by general aviation activities outside major commercial routes.

## **Major Commercial Routes**

Focusing solely on major commercial routes changes the risk profile, generally reducing risk exposure.

# **Manufacturer and Model Risk Profiles**

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# Manufacturer Risk: High-Volume vs. Low Fatal Rate Makers

## High-Volume Manufacturers

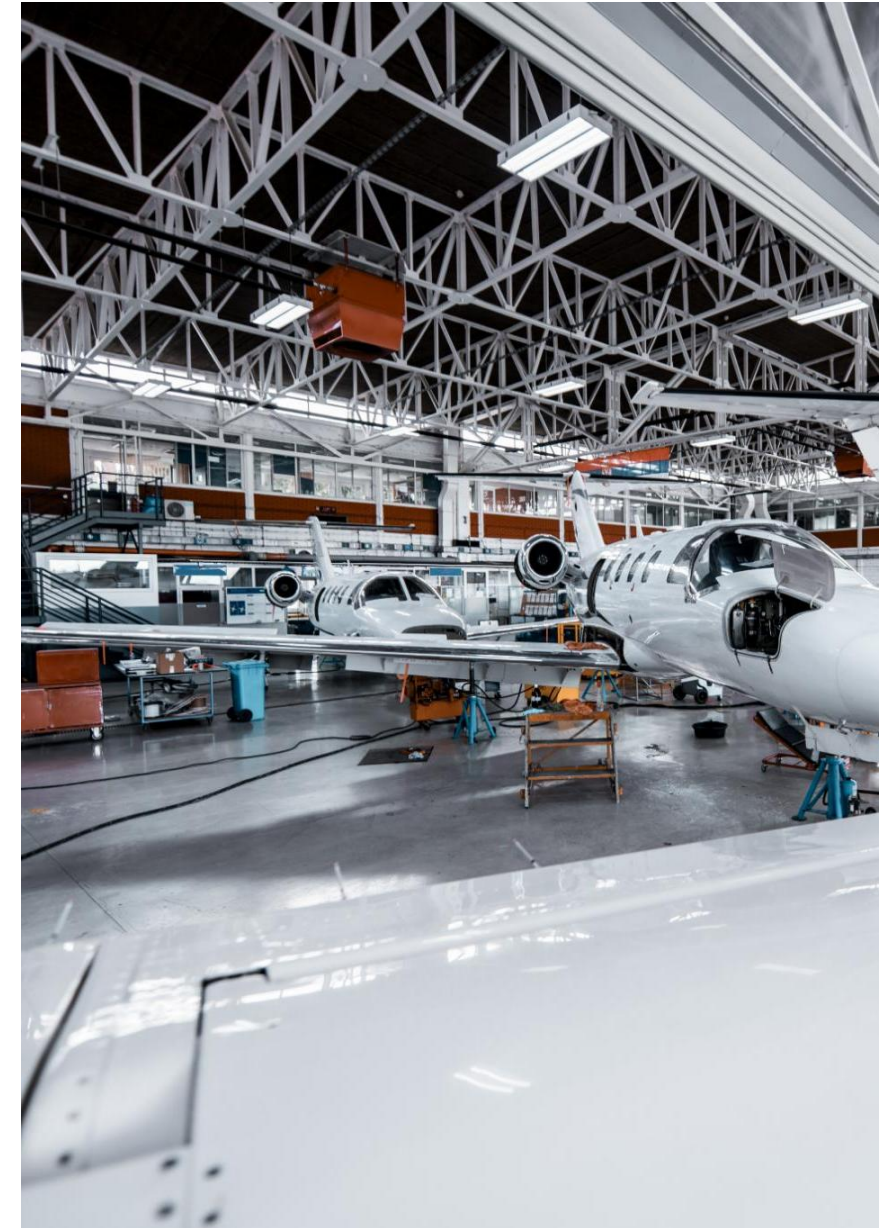
High-volume manufacturers produce the most aircraft and have the highest total number of accidents due to sheer volume.

## Low Fatal Rate Commercial Makers

Large commercial manufacturers maintain very low fatal accident rates but face high costs and certification complexity.

## General Aviation Safety Records

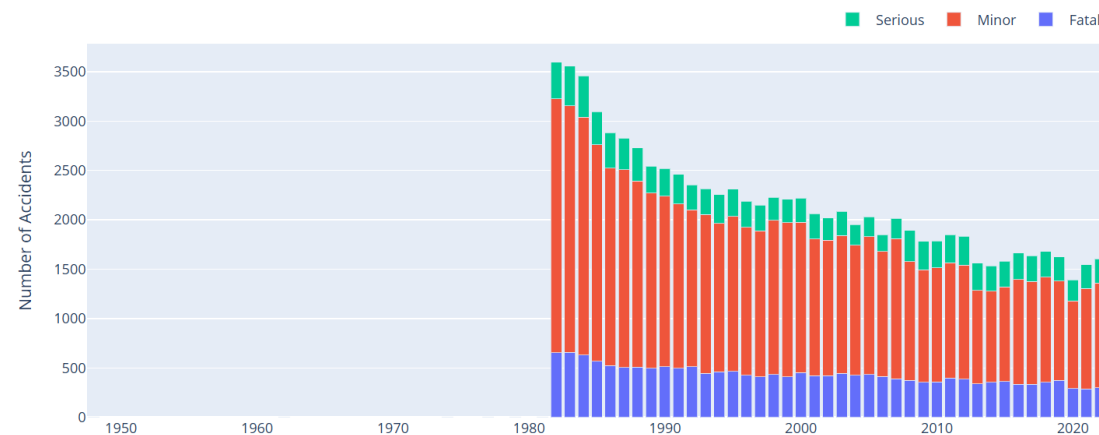
In the smaller aircraft market, safety depends on selecting models with the best safety records within their class.



# Interactive events by year and severity



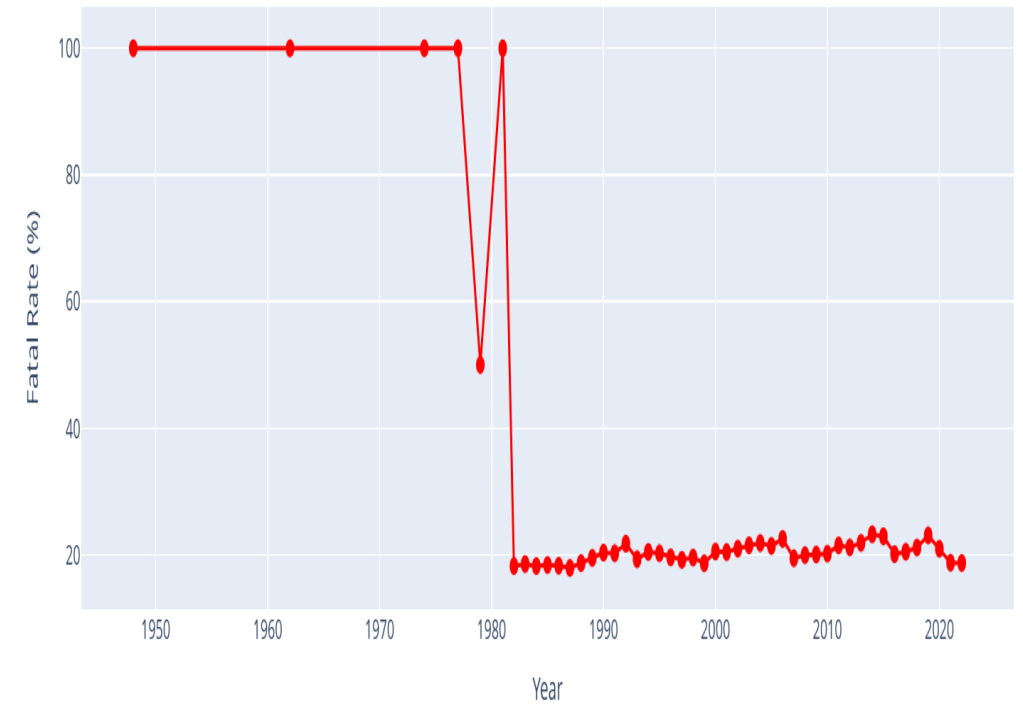
Interactive Events by Year and Severity



# Fatal accident rate (%) over time



Fatal Accident Rate (%) Over Time

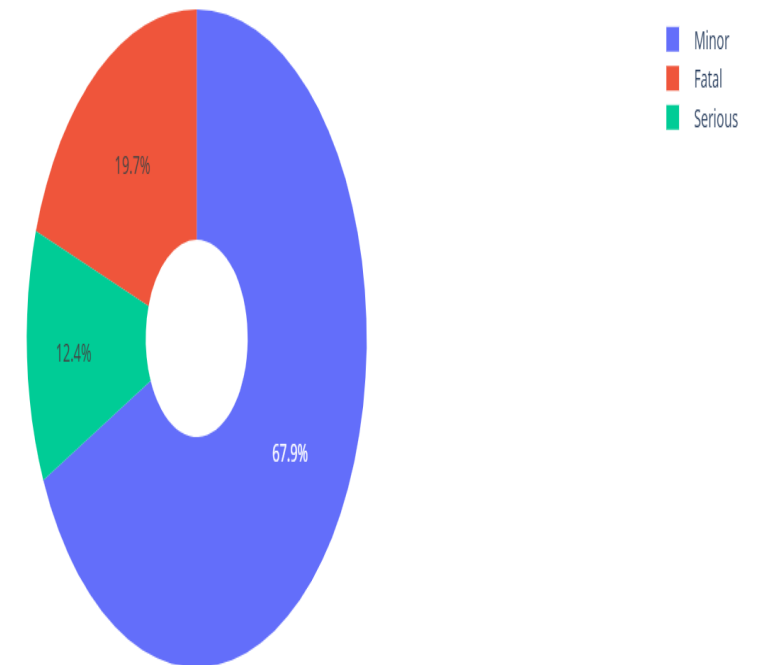




# Accident severity distribution



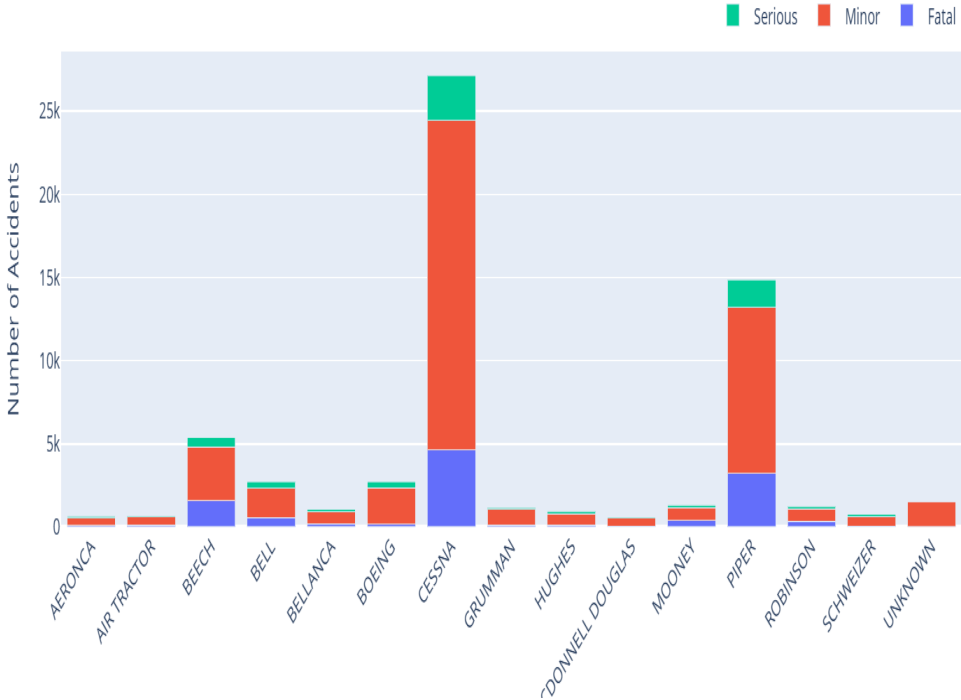
Accident Severity Distribution



# Manufacturers by accident count and severity



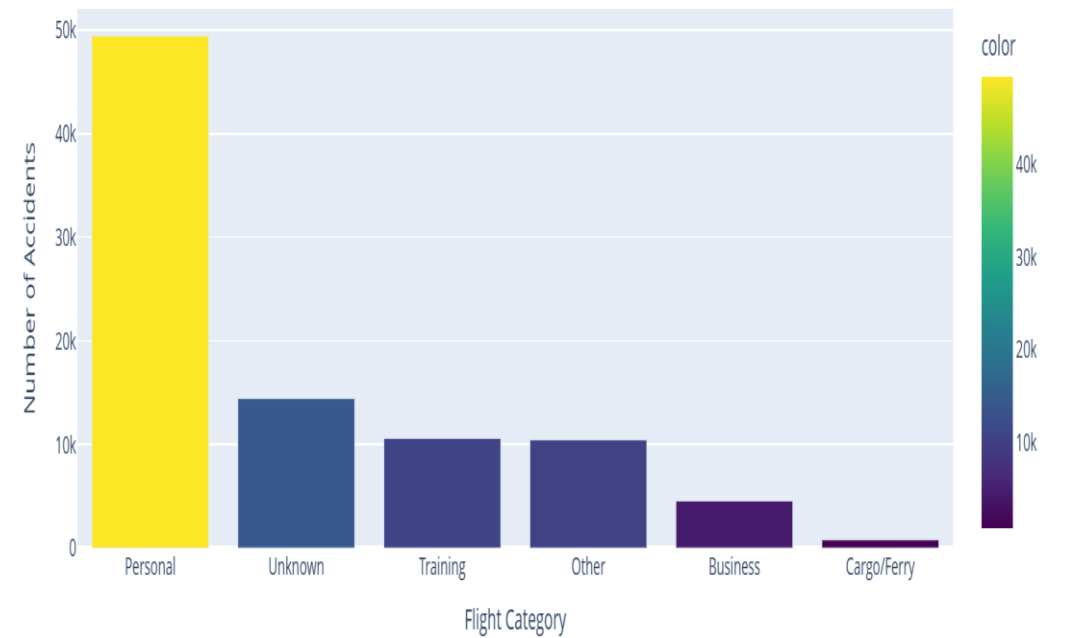
Top 15 Manufacturers by Accident Count and Severity



# Accident by flight category



Accidents by Flight Category



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# Safest Aircraft Models: Cessna 172 and Piper PA-28 Series



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## Accident Rate Filtering

Filtering aircraft models with over 20 accidents helps identify reliable safety leaders in aviation.

### Cessna 172 Safety Record

The Cessna 172 series shows low fatal accident rates between 4.8% and 6.6%, indicating strong safety performance.

### Piper PA-28 Safety Record

Piper PA-28 family maintains low fatal accident rates around 5-7%, making it a safe choice for training and private use.

### Business Insight on Fleet Choice

These aircraft offer a balance of low cost, operational flexibility, and proven low-risk safety for initial fleet selection.

# Actionable Recommendations for Aircraft Acquisition

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# Three Key Recommendations for Minimizing Risk

## **Implement Comprehensive Safety Protocols**

Establish thorough safety procedures to reduce operational hazards and enhance risk awareness in the aviation division.

## **Enhance Training Programs**

Develop advanced training modules for staff and pilots to improve response to emergency situations and risk management.

## **Utilize Risk Assessment Tools**

Incorporate data-driven risk assessment tools to identify and mitigate potential risks proactively in aviation operations.

# Summary Table: Recommendations, Data Support, and Benefits

RECOMMENDATION	DATA VISUALIZATION SUPPORT	KEY BENEFIT
1. Target Cessna 172/Piper PA-28 <sup>24</sup>	Safest Models Chart (Slide 7)	Purchase aircraft with a proven 4-7% fatal accident rate, minimizing entry-level risk.
2. Enforce Strict IMC Protocols <sup>25</sup>	Accidents by Weather Chart (Hidden Visual)	Focus operational training and policy on mitigating risk in poor weather conditions, a major accident cause <sup>26</sup> .
3. Adopt a "Better-Than-Minimum" Maintenance Standard <sup>27</sup>	Fatal Rate Over Time Chart (Slide 4)	Capitalize on the industry's improving safety trend by exceeding regulatory minimums to further reduce mechanical risk.

# Next Steps for Implementation

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# Cost Integration, Insurance Review, and Dashboard Exploration

## Cost Integration

Cross-reference low-risk aircraft models with acquisition and operating costs to finalize budgets accurately.

## Insurance Review

Leverage fatal accident rate data to negotiate optimal insurance rates for operational safety and savings.

## Dashboard Exploration

Utilize interactive dashboards to explore variables like phase of flight and injury breakdown for risk planning.



# Final Thoughts and Support

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# Commitment to Data-Driven Success and Contact Information

## Support for Aviation Success

Committed to driving the new aviation division's success through informed, data-driven decisions.

## Contact and Engagement

Encouraging questions and providing contact details for further collaboration and communication.

# Conclusion

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## **Data-Driven Risk Assessment**

Utilizing data analytics enables precise identification and mitigation of aviation risks for improved safety outcomes.

## **Actionable Insights**

Insights derived from data guide effective decisions to minimize risks in aviation operations.

## **Optimized Acquisition Strategies**

Optimizing acquisition plans ensures cost-effective and safer procurement in aviation.