AIRCRAFT ACQUISITION PROJECT

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OVERVIEW

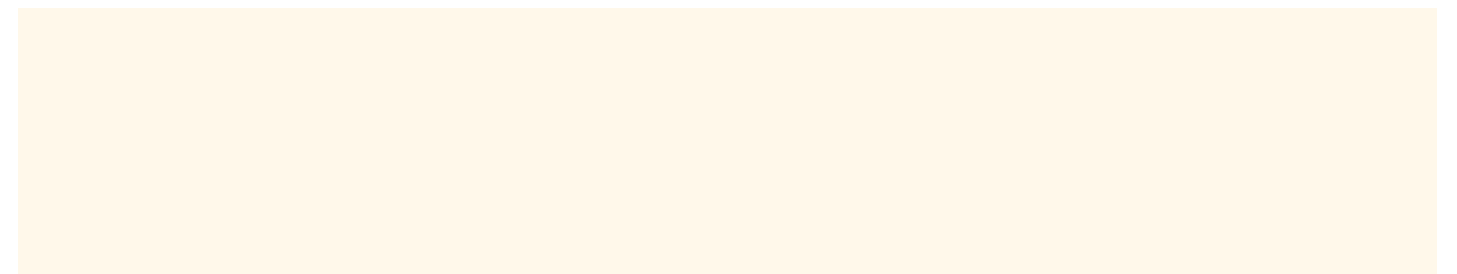- **Data-Driven Analysis:** Leverage NTSB aviation accident data to assess safety and costs of aircraft models.
- **Risk Minimization:** Identify low-risk, reliable aircraft based on historical safety and operational performance.
- **Strategic Investment:** Invest in aircraft that ensure safety, reliability, and cost-effectiveness for our operations.

BUSINESS UNDERSTANDING

1. Safety and Reliability: Identify aircraft with the best safety records and reliability.
2. Cost and Maintenance: Evaluate operational costs and maintenance needs for optimal efficiency.
3. Informed Decisions: Make strategic choices to align with the company's commitment to excellence and sustainability.

OBJECTIVES

* To evaluate and rank various aircraft models based on their safety records and overall reliability.
* To identify the top three aircraft models that present the lowest risk for the company's new aviation venture.
* To provide actionable recommendations and strategies for purchasing and operating the selected aircraft, ensuring optimal performance and safety.

DATA UNDERSTANDING

- **Data Source:** Utilized the NTSB aviation accident database, which provides comprehensive information on civil aviation accidents and incidents from 1962 to 2022.
- **Data Information:** The dataset includes preliminary reports updated with factual information and finalized with probable cause descriptions, aiding in thorough analysis and safety improvements.
- **Data Structure:** The dataset comprises 88,889 rows and 31 columns, offering a robust foundation for data visualization and exploratory data analysi

DATA EXPLORATION: AIRCRAFT DAMAGE

- 72.2% of airplanes encountered substantial damage in accidents.
- Less than 3.2% of airplanes experienced minor damages.
- In terms of damage Severity, most airplanes are damaged beyond repair when accidents occur.
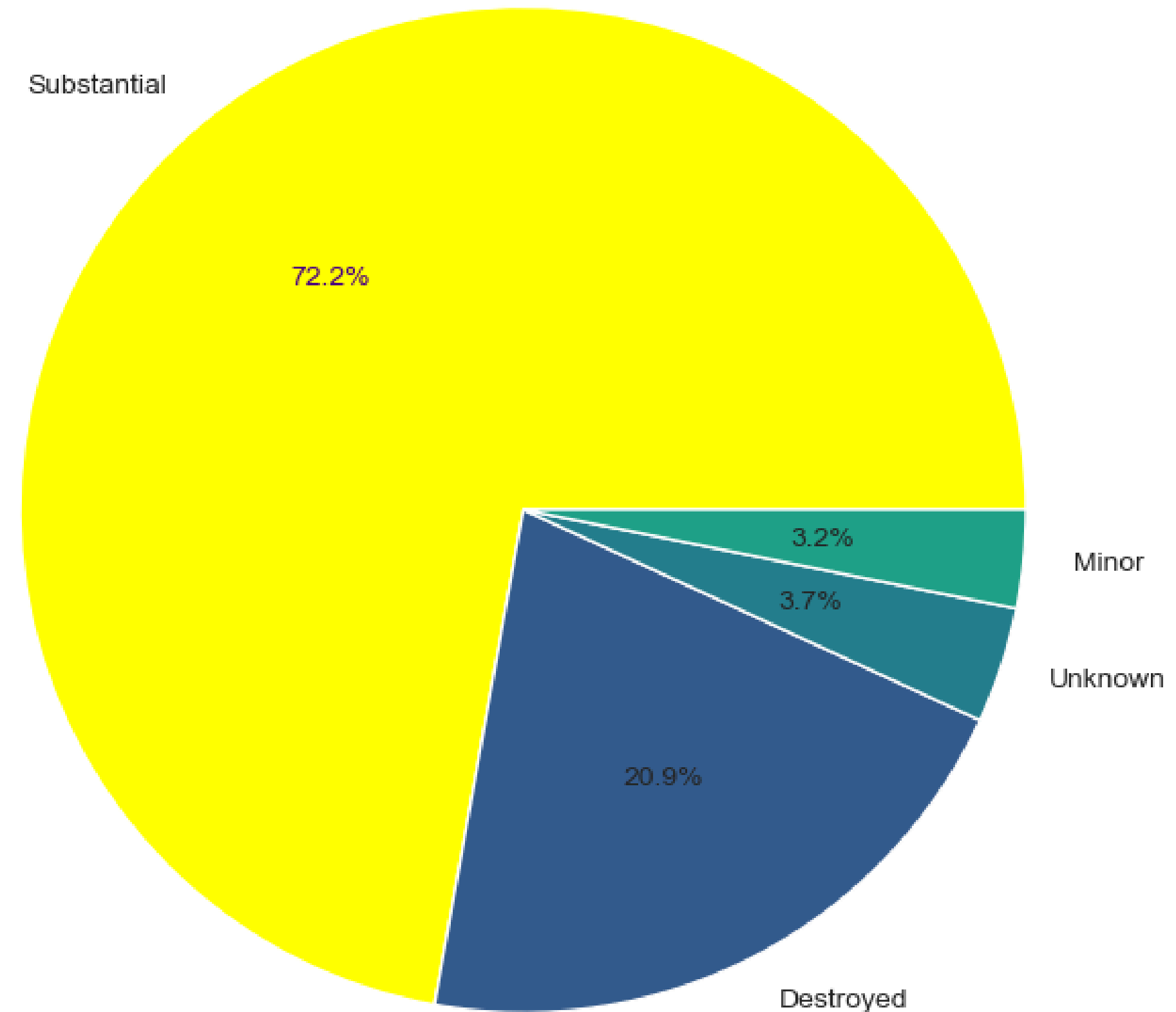
DATA EXPLORATION: ENGINE TYPES

- Reciprocating engines are the most used type in airplanes.
- Less than 10,000 airplanes use turbo shaft, turbo fan, and turbo prop engines.
- The preference for reciprocating engines highlights a significant trend in engine choice among airplanes.


Top 5 Engine Type Distribution
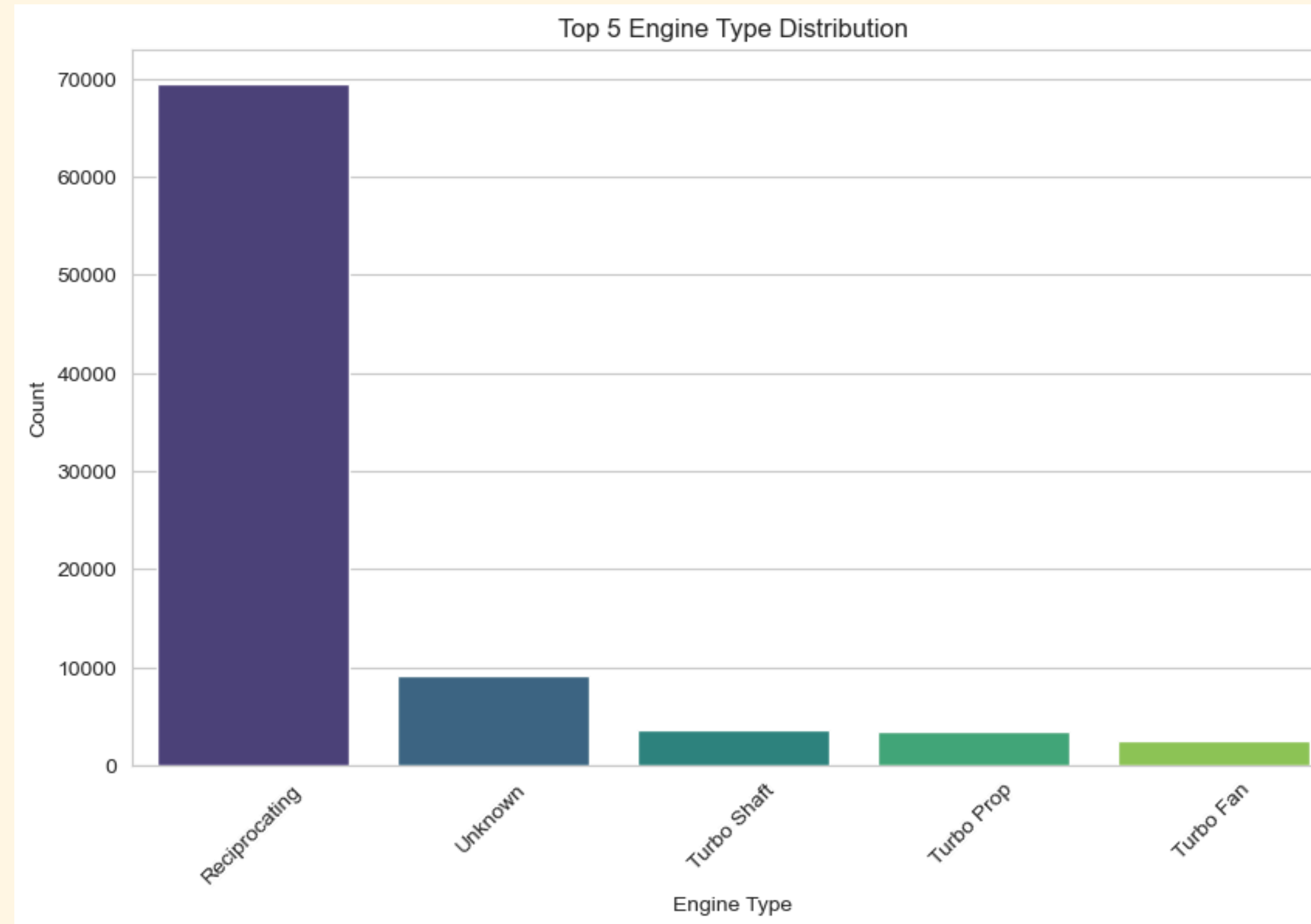
DATA EXPLORATION: WEATHER CONDITION

- Most accidents occurred during VMC (Visual Meteorological Conditions).
- The least number of accidents occurred during IMC (Instrument Meteorological Conditions).
- This indicates that even under generally favorable weather conditions (VMC), accidents are more frequent, possibly due to factors like pilot error or mechanical failure.


Weather Condition During Accidents
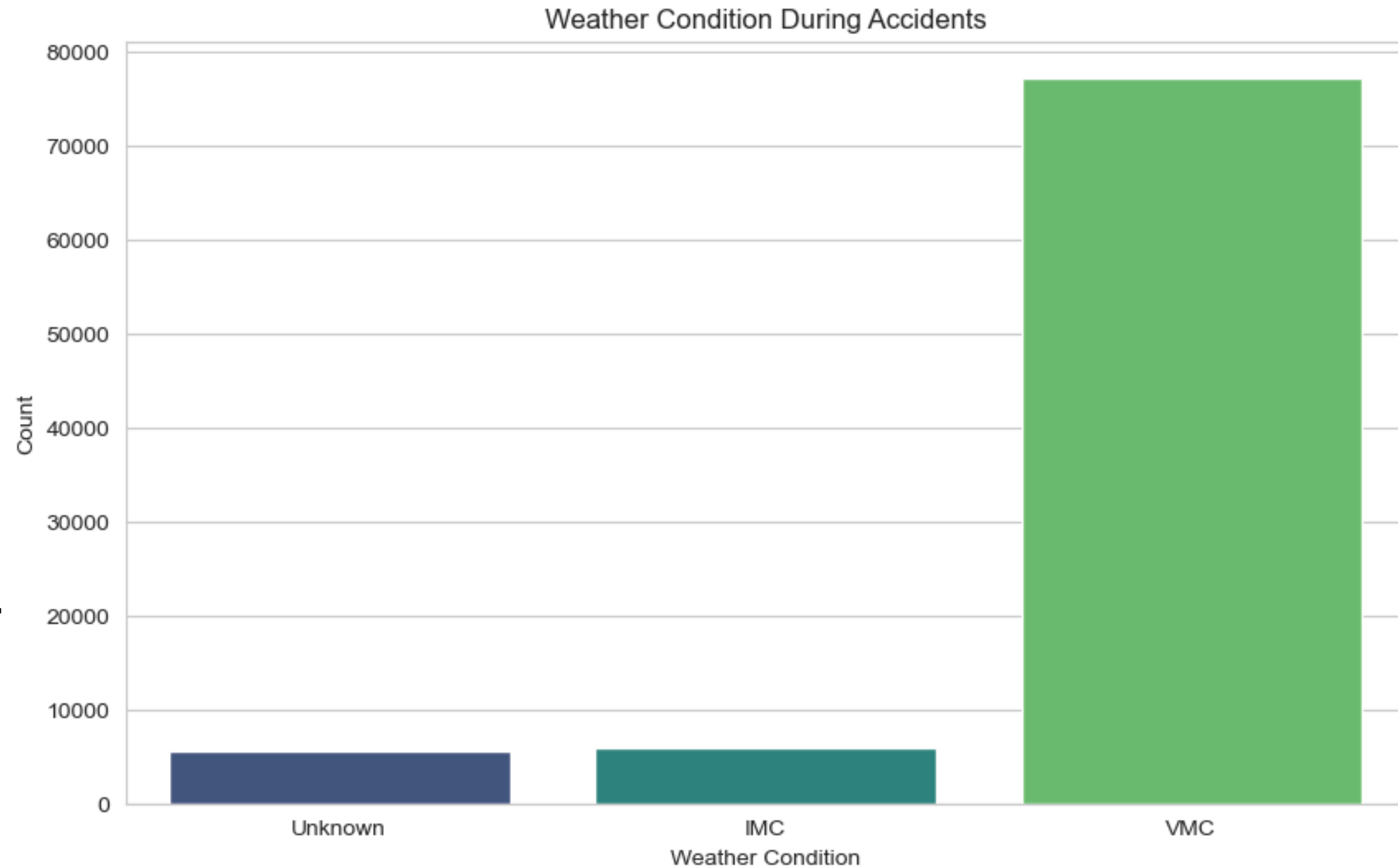
DATA EXPLORATION: AIRPLANE MAKE

- Cessna had the highest number of airplane models used.
- Piper, Beech, Boeing and Bell also were among used models used after Cessna.
- The prominence of Cessna indicates its dominant role in aircraft usage compared to other smaller variety of models.

Top 5 Airplane Makes
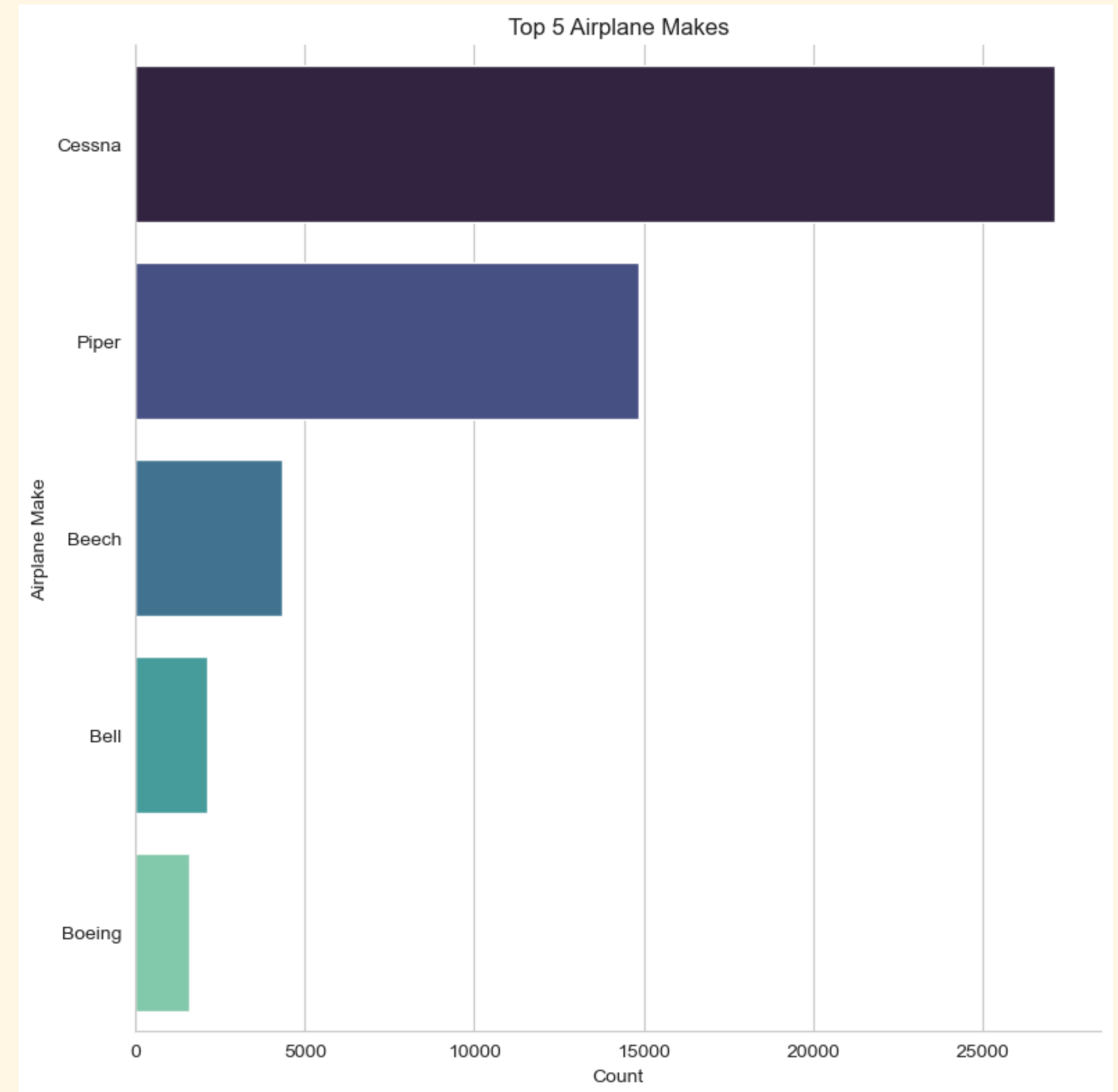
DATA EXPLORATION: AEROPLANE MAKE SURVIVAL RATE

- Ilyushin, 737 and LTV aircraft models recorded excellent survivability.
- Prominent Aircraft Models also like Boeing, Airbus, and McDonnell Douglas demonstrate high survivability in accidents.
- Prioritize acquiring aircraft from these manufacturers to ensure superior safety and reliability in our fleet operations.

Survival Rates by Airplane Make
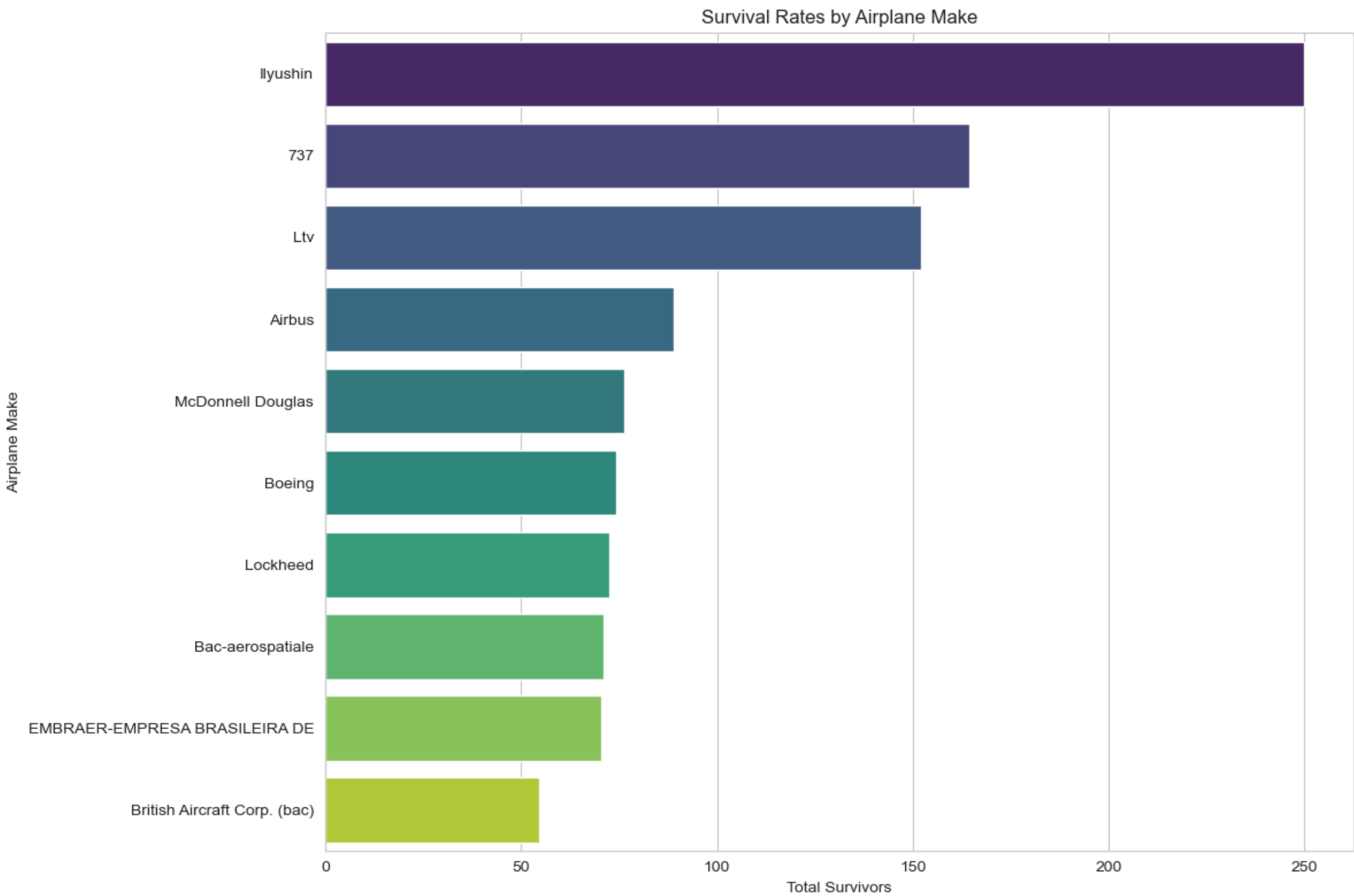
CONCLUSION

- 72.2% of airplanes suffer substantial damage in accidents, with less than 3.2% experiencing minor damage, often resulting in irreparable damage.
- Reciprocating engines dominate airplane usage, followed by use of turbo shaft, turbo fan, and turbo prop engines.
- Most accidents occur during VMC, suggesting higher risks despite favorable weather, with fewer incidents during IMC.
- Turbo fan engines show the highest survivability rates in accidents, followed closely by reciprocating engines, influencing preferences in aircraft engine installations.
- Also models like Ilyushin, Airbus, Ltv, Boeing among others shows higher survivorship during accidents.

RECOMMENDATION

- Prioritize Safety with Tested Models: Focus on aircraft models with high survival rates to mitigate operational risks and ensure passenger safety like Ilyushin, Ltv, 737 and Airbus among others.
- Engine Type Consideration: Given higher survivability rates, prioritize aircraft equipped with turbofan engines to enhance safety during accidents and emergencies.
- Favor Visual Meteorological Conditions (VMC) for flight operations whenever possible, as they generally pose lower risks compared to Instrument Meteorological Conditions (IMC).

NEXT STEP

- Establish comprehensive safety protocols based on data insights to minimize risks and ensure safe operations.
- Conduct regular training sessions for pilots and crew members to enhance their skills in handling emergencies and optimizing safety measures.
- Implement a system for ongoing monitoring and evaluation of aircraft performance and safety records to reduce accident rates.

THANK YOU