Aircraft Risk & Safety Analysis

Using Data to Make Aircraft Safer and Improve Buying Decisions

Presented By: Abishang Mueni

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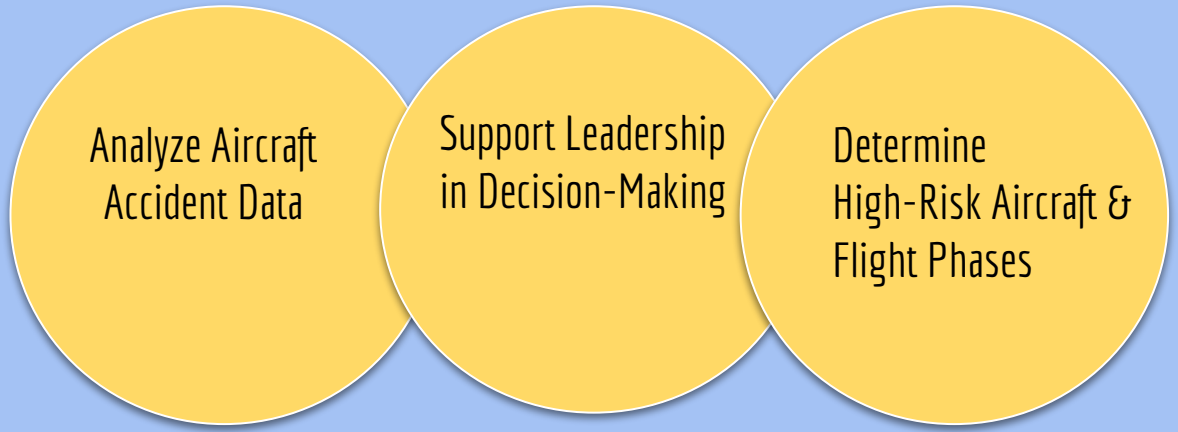
Overview



Key Business Metrics

- Number of accidents per aircraft make and models
- Phases of flight with the highest accident occurrences
- Weather conditions affecting safety
- Passenger injury and aircraft damage statistics

Data & Methodology

Data Source: *NTSB Aviation Accident Database (1962-2023)*

- 88,889 accident records
- 31 key columns
- Includes weather conditions, flight phase, and passenger impact

Data Cleaning Steps

✔ Checked for duplicates (none found)
✔ Handled missing values:

- Numerical: Filled with median/mean

-Categorical: Filled with most frequent value

✔ Converted date columns

✔ Identified & removed outliers

✔ Standardized text values

Key Findings - Aircraft Accident Risk

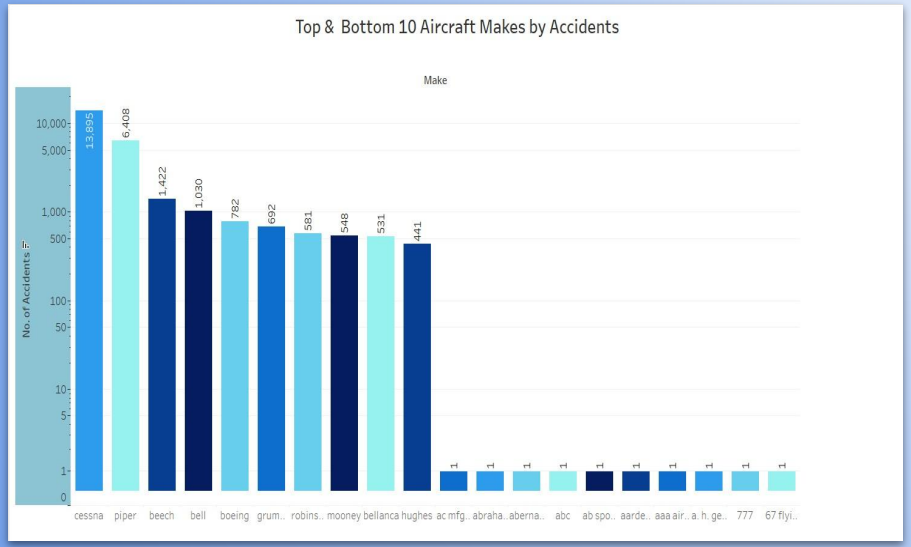
High-Risk Aircraft Models:

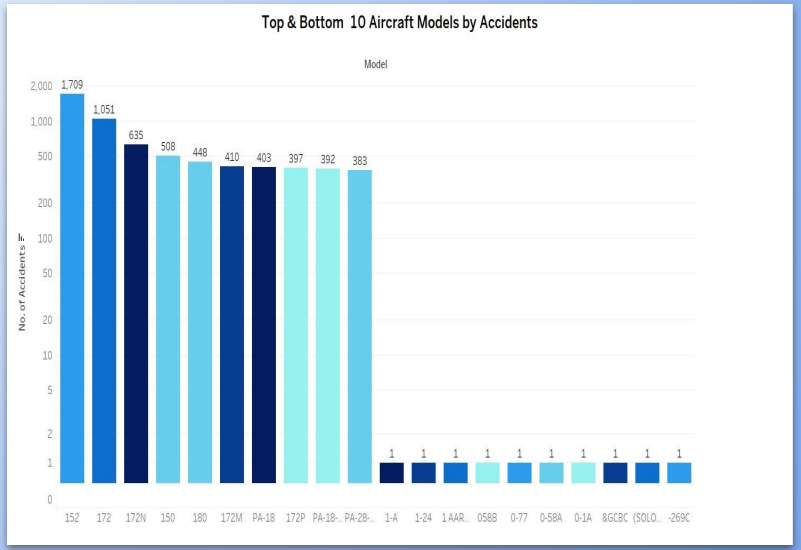
✔ Cessna 152, 172, 172N

✔Piper and Beech aircraft have the highest accident numbers

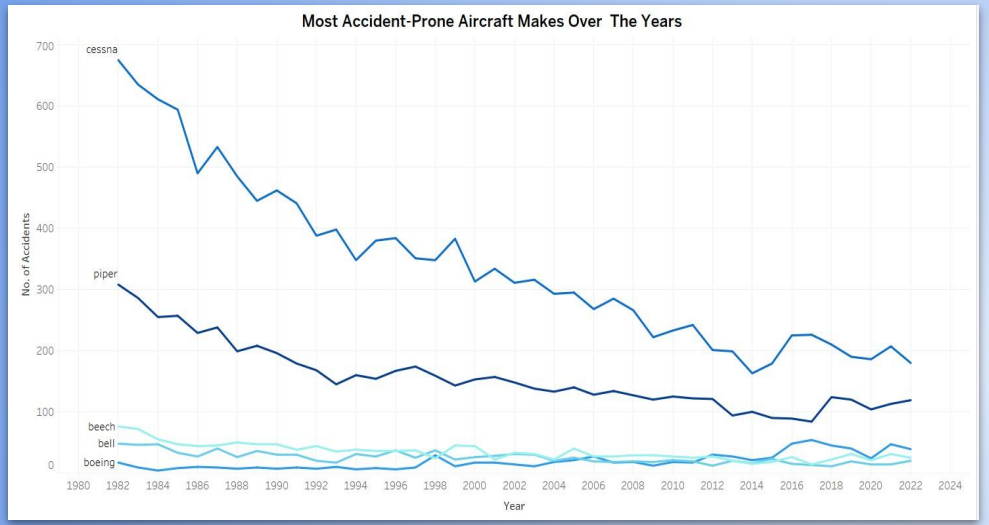
Low-Risk Aircraft Models:

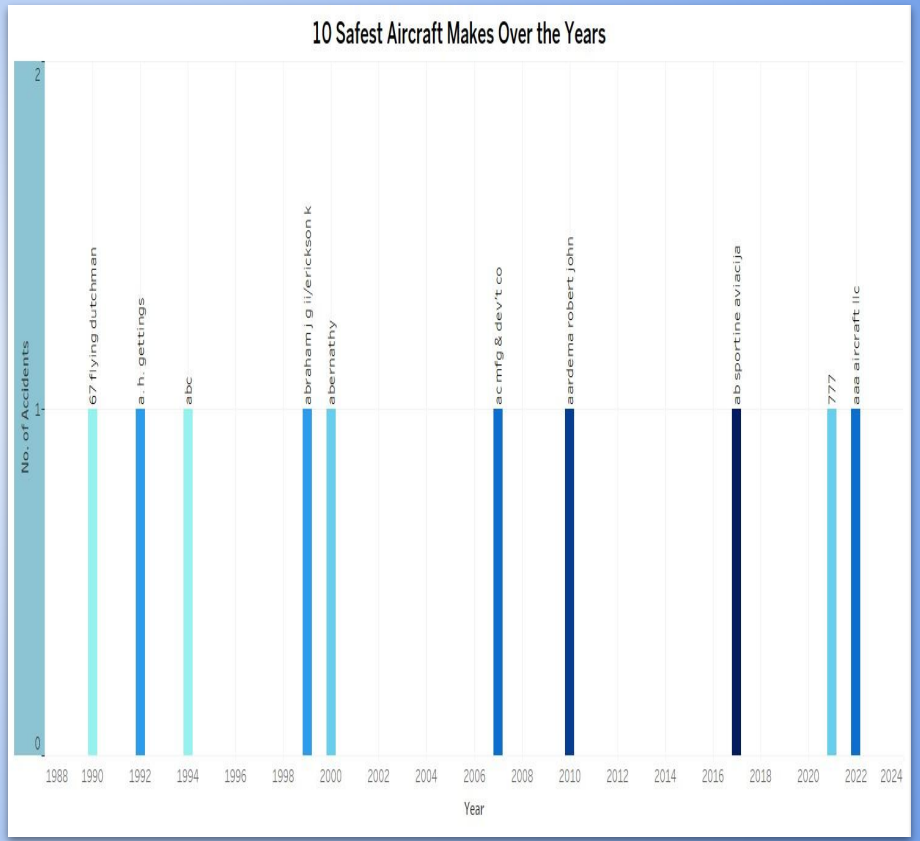
✔ Abernathy, 777, Robert John had fewer accidents over time





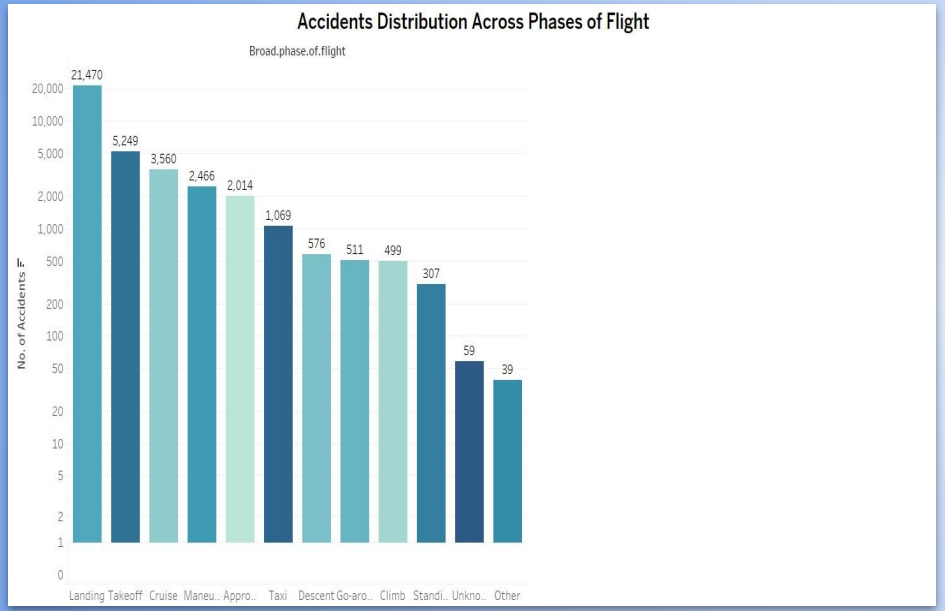
Accident Trends Over Time





- Overall decline in aviation accidents
- Cessna and Piper aircraft have had consistently high accident rates
- Some models have remained the safest over the years

Phases of Flight Risk Analysis



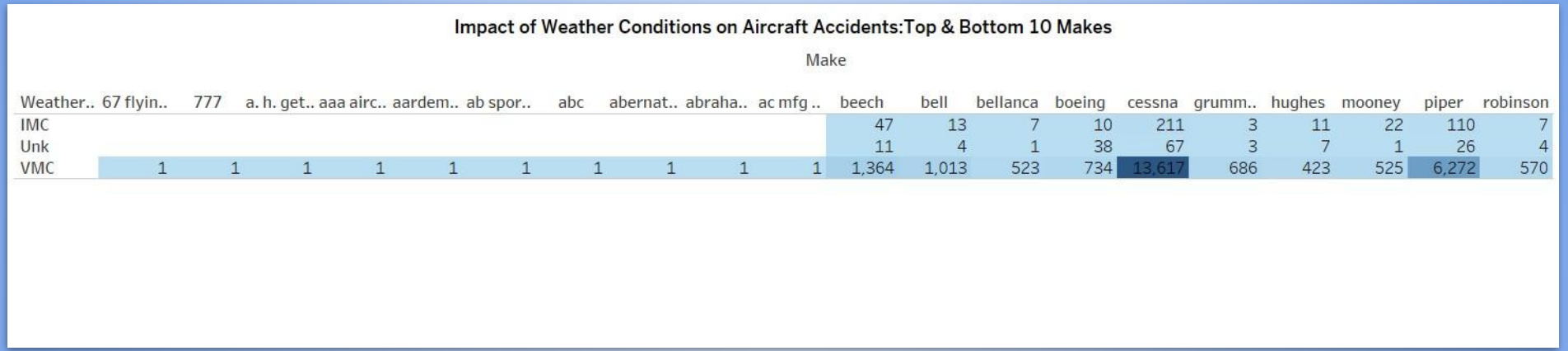
Most Dangerous Flight Phases:

- **Landing:** 21,470 accidents
- **Takeoff:** 5,259 accidents

Least Risky Phases:

- Cruise
- Other/Unknown Phases

Impact of Weather on Safety



Impact of Weather Conditions on Aircraft Accidents:Top & Bottom 10 Makes

Make

Weather..	67 flyin..	777	a. h. get..	aaa airc..	aardem..	ab spor..	abc	abernat..	abraha..	ac mfg ..	beech	bell	bellanca	boeing	cessna	grumm..	hughes	mooney	piper	robinson
IMC											47	13	7	10	211	3	11	22	110	7
Unk											11	4	1	38	67	3	7	1	26	4
VMC	1	1	1	1	1	1	1	1	1	1	1,364	1,013	523	734	13,617	686	423	525	6,272	570

Accidents & Weather Conditions

- Most accidents occur in VMC (Visual Meteorological Conditions)
- Bad weather increases accident rates, especially for Cessna, Piper, Bell, and Beech aircraft.

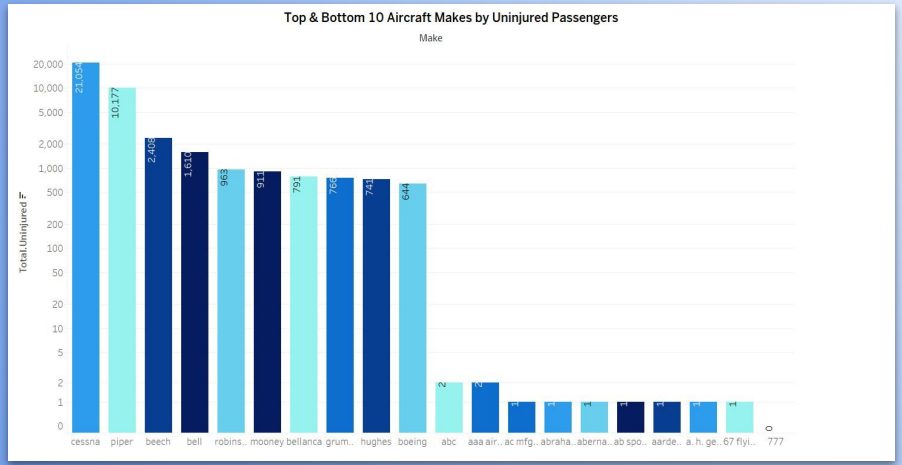
Passenger & Aircraft Damage Analysis

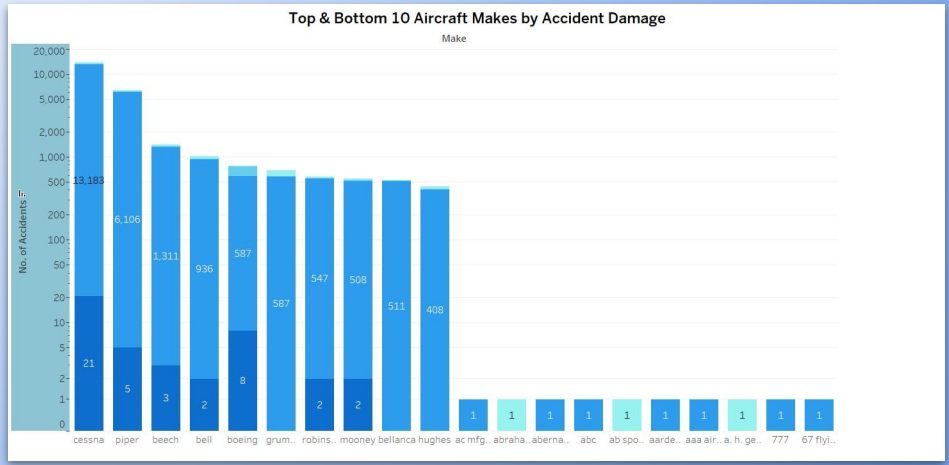
Passenger Safety:

- **Cessna & Piper:** Most passengers survive crashes with little to no injuries, proving their strong safety record.
- Boeing has fewer accidents but **high survival rates**

Aircraft Damage:

- **Most damage:** Piper & Bell aircraft
- Cessna has a high accident rate but a strong safety record due to high survival rates





Recommendations

Key Issues	Areas of Improvement	Counter Actions	Responsible
Pilot errors in bad weather	Improve pilot training and preparedness	Use flight simulators to help pilots practice in different weather conditions	Training Dept.
High-risk flights	Use safer aircraft for critical operations	Choose aircraft with fewer accidents, like Abernathy and Robert John for high-risk flights	Operations Team
Poor aircraft safety records	Invest in safer aircraft models	Purchase aircraft with better safety records from the bottom 10 accident list	Procurement
Low crash survivability	Improve passenger safety in case of accidents	Use planes with strong safety features to protect passengers	Safety Team
Frequent landing accidents	Enhance landing training and technology	Improve landing technology and provide more training for pilots	Training & Tech Team
Takeoff-related accidents	Upgrade systems and improve pilot readiness	Upgrade aircraft systems and train pilots to handle takeoff challenges	Engineering & Training

Conclusion & Next Steps

Summary of Insights

- Certain aircraft models are significantly safer than others
- Most accidents occur due to pilot error and weather conditions
- Aviation safety has improved over time

Next Steps for the Leadership Team:

- Use findings to guide aircraft purchasing decisions
- Invest in safety training & technology

Q&A

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