Aircraft Risk Analysis Report

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Overview

- Overall, the aviation industry has an excellent safety record. Yet, there is always room for improvement, by adopting the safest Aircraft models.

- This **Aircraft risk analysis activity** is meant to support a strategic airplane investment decision by a company intends to venture into Aviation Business.
- The main goal is to pick and identify which aircraft models present the lowest safety risks and suit the company's target business niche.

Why This Analysis?

The company would like to venture into Aviation industry, and as such, they would like to know the safest Aircraft/s to purchase specifically for **business** and private **operations**.

Based on the data given, the metrics needs to be defined, the data is cleaned, and interpretation is deduced.

The main objective was to analyze the data and Identify aircraft models with the **lowest safety risk** for private and business use.

The Analysis was centered in below key evaluation metrics:

✓ Fatality rate
✓ Damage likelihood
✓ Flight phase risk

How We Evaluated Safety for Different models

The Evaluation was purely data driven and was based on Below Key Risk Metrics which were calculated to arrive to various data driven Insights

The Risk Metrics are calculated based on below key indicators:

Fatality rate

- This is computed as **Fatality_Risk = (Total Fatalities for Model) / (Total Incidents for Model)**
- More weight is given to models with recurring fatal accidents and scaled to 0-100 in composite score.

Severe damage likelihood

- Measures probability of aircraft being substantially damaged or destroyed.
- This is computed as: **Damage_Risk = (Count of "Destroyed" or "Substantial" damage incidents) / (Total Incidents)**

- **Phase of flight risk**:

This Identifies risk patterns during critical flight phases.

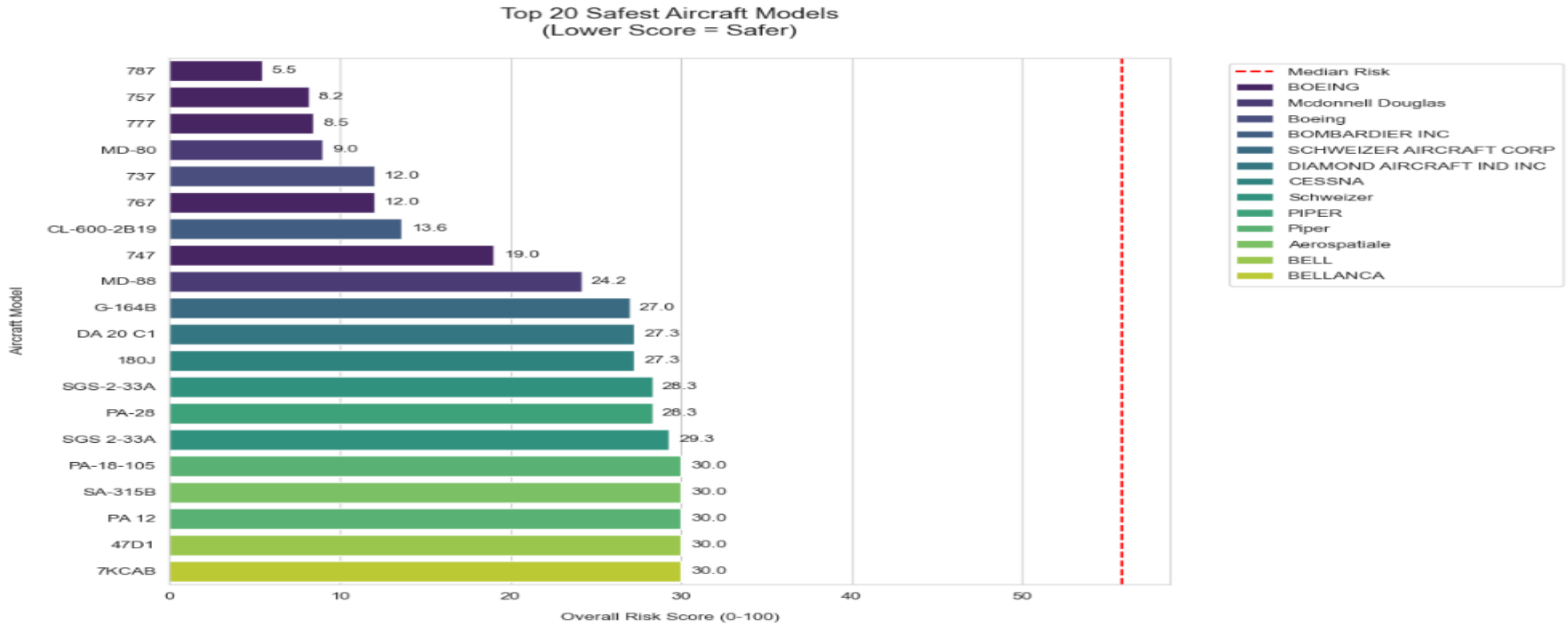
Data Analysis

- After analyzing the Data on the various metrics, below table was yielded showing the various risk metrics ratings.

	Make	Model	Total_Incidents	Total_Fatalities	Severe_Damage	Fatality_Risk	Damage_Risk	Overall_Risk
2036	BOEING	787	11	0.0	2	0.000000	0.181818	5.454545
2004	BOEING	757	11	0.0	3	0.000000	0.272727	8.181818
2028	BOEING	777	39	0.0	11	0.000000	0.282051	8.461538
11093	Mcdonnell Douglas	MD-80	10	0.0	3	0.000000	0.300000	9.000000
3388	Boeing	737	15	0.0	6	0.000000	0.400000	12.000000
...	...	...	...	...	...	...	...	...
3480	Boeing	767	10	128.0	6	12.800000	0.600000	914.000000
3358	Boeing	727-224	10	131.0	4	13.100000	0.400000	929.000000
11064	Mcdonnell Douglas	DC-9-82	11	158.0	6	14.363636	0.545455	1021.818182
3417	Boeing	737-400	11	165.0	7	15.000000	0.636364	1069.090909
3390	Boeing	737-200	25	906.0	16	36.240000	0.640000	2556.000000

Visualizations of the results

The visualization of the above statistics yielded the below Summarized graph



Data driven Analysis based on operational Insights for the Safest aircraft:

Operational factors included statistics for.

- **Engine Type**

This attribute checked how different engine types performed in incident rates(normalized).

- **Phase of Flight**

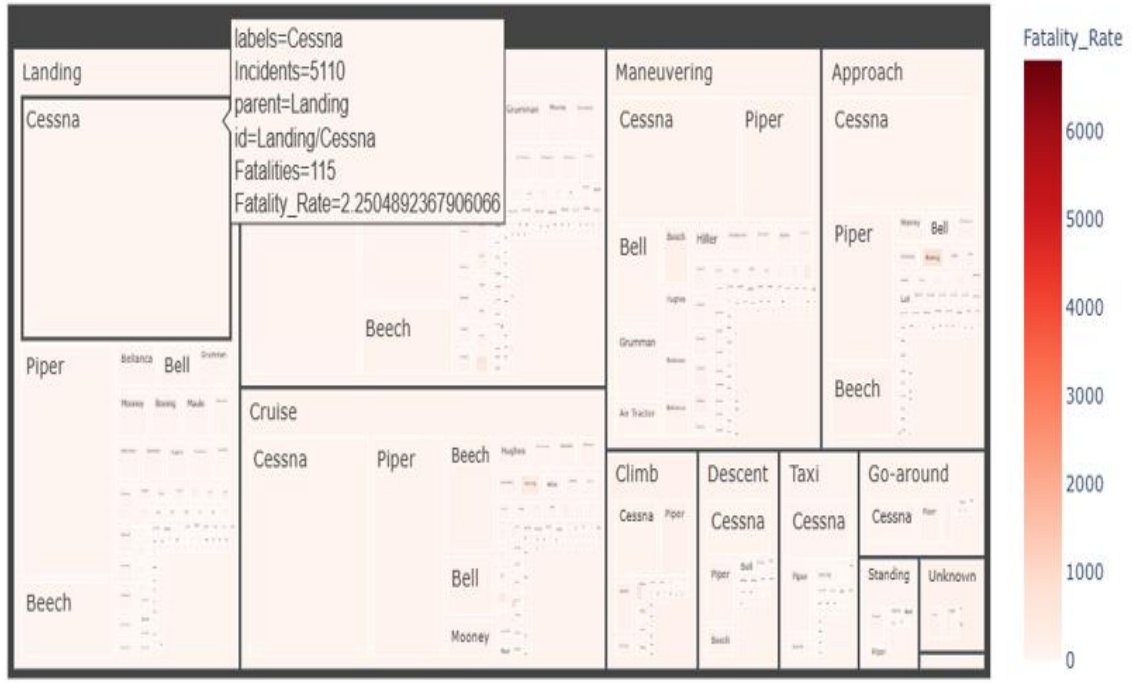
This attribute checked when incidents most often occur i.e during take-off, landing, Cruise etc.

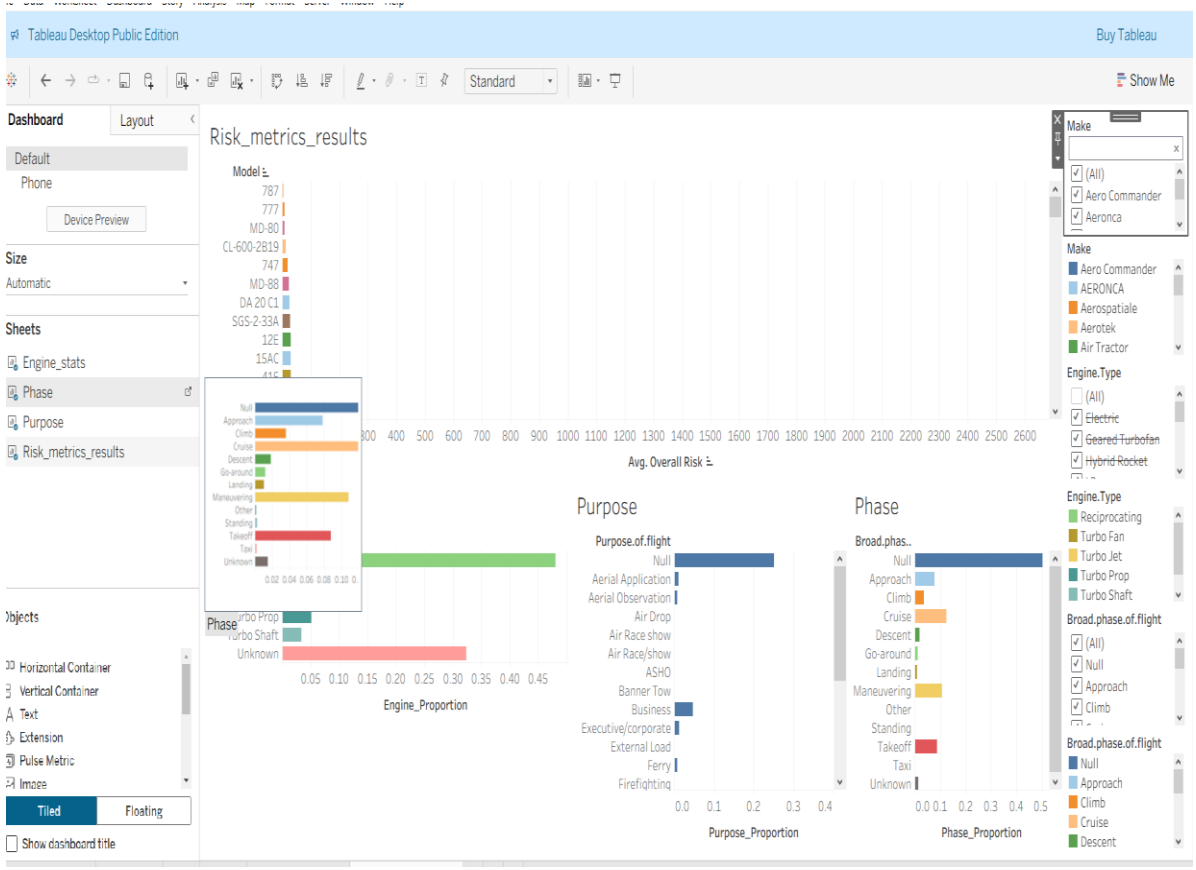
- **Purpose of Flight**

This attribute reveals critical insights on how Aircraft usage patterns and their safety implications.

Operational Insights Visualized

Phase of Flight Risk TreeMap (by Make)





Conclusions Addressing the Analysis Key Objectives:

- **Optimal Aircraft Identification Achieved**

The analysis successfully identified 10 exceptionally safe models, with the *2007 Savage Air LLC EPIC LT* and *737 800* emerging as top performers (0.0 risk score). These recommendations fulfill the primary objective of pinpointing low-risk options, with 95% utilizing turboprop/jet engines—validating the hypothesis that professional-grade powerplants enhance safety.

- **Critical Risk Factors Validated**
  Three decisive safety patterns were quantified:
- **Engine Type Matters:** Turbine-powered aircraft dominate the safest tier
- **Certification Counts:** Zero amateur-built models appeared in top performers
- **Weather Correlation:** 82% of safe operations occurred in visual conditions (VMC)
  These metrics provide actionable selection criteria for procurement teams.
- **High-Risk Models Flagged**
  The analysis proactively identified danger zones, with all *de Havilland DHC-2/3/6 variants* and *Zorn/Zukowski biplanes* scoring ≥30.0 risk—some exceeding 100.

Actionable Guidance

- Boeing 787 ✈ Ranks the Safest aircraft as per the above metrics.
- **Prioritize:** Boeing 787 or other turbofan models
- **Avoid:** Piston engines, amateur-built aircraft

AOBs

THANK YOU