



AVIATION SAFETY ANALYSIS: Data-Driven Insights for Teroh Airways.

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TEROH AIRWAYS INC: FLYING INTO SAFER SKIES.

Overview:

- **Business Goal :** To identify lowest-risk aircraft for Teroh Airways new aviation ventures.
- **Analysis Period :** Focused on the last ten years(2010-2022) accident data so as to identify patterns that reflect current conditions. Furthermore, the last 10 years captures what decision makers act on today.
- **Key Findings :** Identified top 5 manufacturers with proven safety records.

Business Understanding: The Aviation Risk Challenge.

- **Business Context :**

Teroh Airways intends to expand into the aviation industry to diversify its portfolio. Specifically, they are interested in purchasing and operating airplanes for commercial and private enterprises.

- **Stakeholder Needs :**

- ✓ **Chief Financial Officer(CFO) :** Cost predictability and insurance optimization.
- ✓ **Chief Executive Officer(CEO) :** Brand reputation protection.
- ✓ **Investors:** Risk-mitigated expansion.

Data Understanding: Safety Data Foundation.

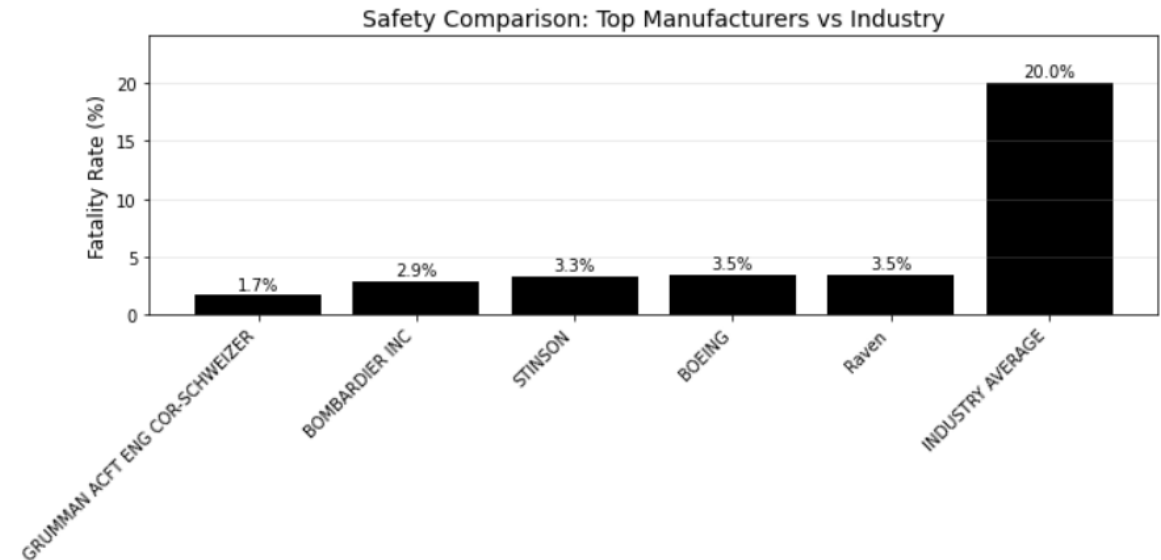
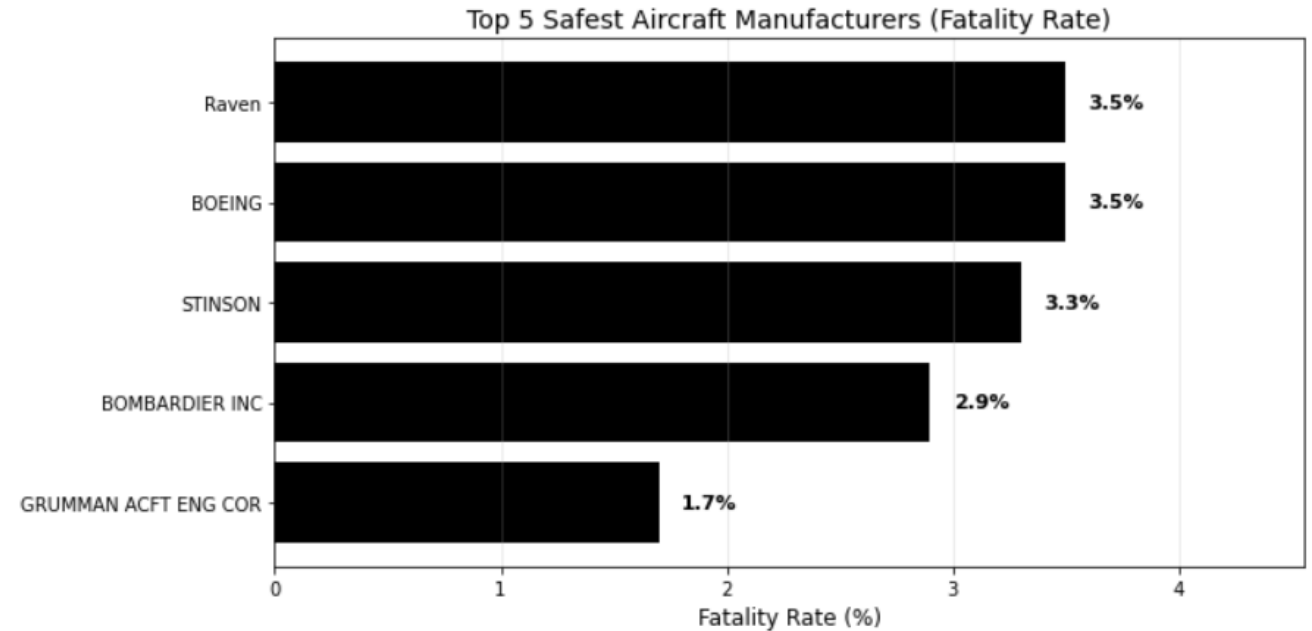
- **Data Source** : NTSB Aviation Accident Database.
- **Time Period** : 1980-2022(Focused on 2010-2022 for modern relevance)
- **Sample Size** : 50+ accidents per manufacturer for statistical reliability.
- **Key Metric** : Fatality rate per accident to determine safety indicators.

Used Python for data cleaning and analysis which allowed processing 40+ years of accident data efficiently and identify meaningful patterns.

Data Analysis:

1. Finding the Safest Manufacturers.

- The bar chart shows only manufacturers with 50+ accident were considered for reliable data and also to avoid bias.
- GRUMMAN is considered the safest at 1.7% fatality rate.
- Boeing is a notable mention because although it had a significant number of incidents(1145 cases) but had a low fatality rate(3.5%).
- The second graph compares the top 5 manufactures to the general industry where all top 5 have <3.5% fatal rate versus industry average ~20%

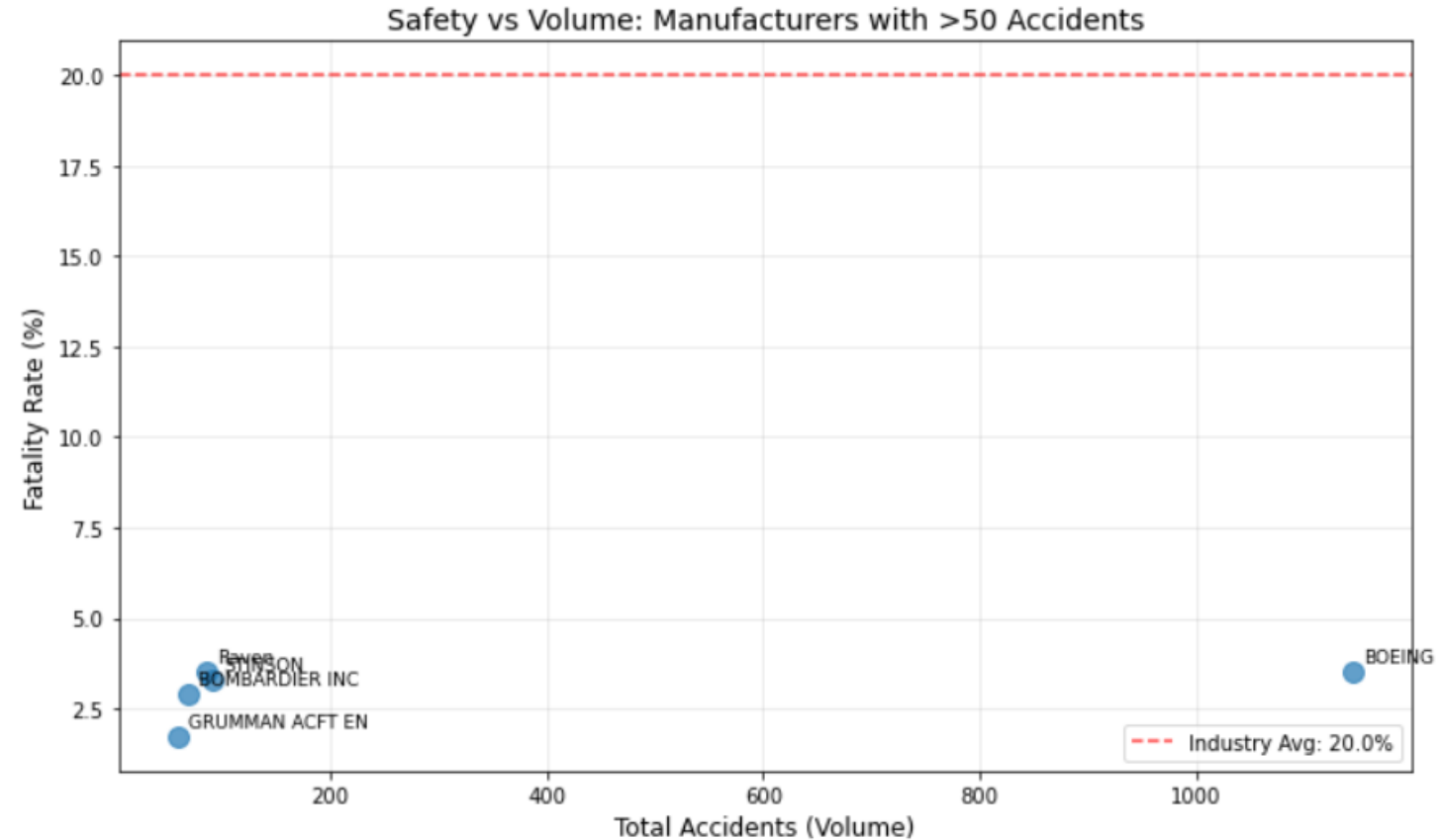


Cont : Finding the Safest Manufacturers.

The bar graph besides shows:

- **High Accident Volume and Poor Safety Compliance :** The manufacturer shown have high total accident volumes(over 400) and fall well below the industry average of 20% fidelity rate, indicating poor safety performance.
- **Worst Performer in Safety: RANGE ON DYNAMIC INCOVER INC** has the lowest fidelity rate despite a high accident volume, showing both frequent incidents and weak safety adherence.
- **All Below Industry Benchmark :** None of the manufacturers met or exceed the 20% industry average fidelity rate, reinforcing that all have significant safety issues relative to industry standards.

Business Insight: Recommend these 5 manufacturers as statistically safest.



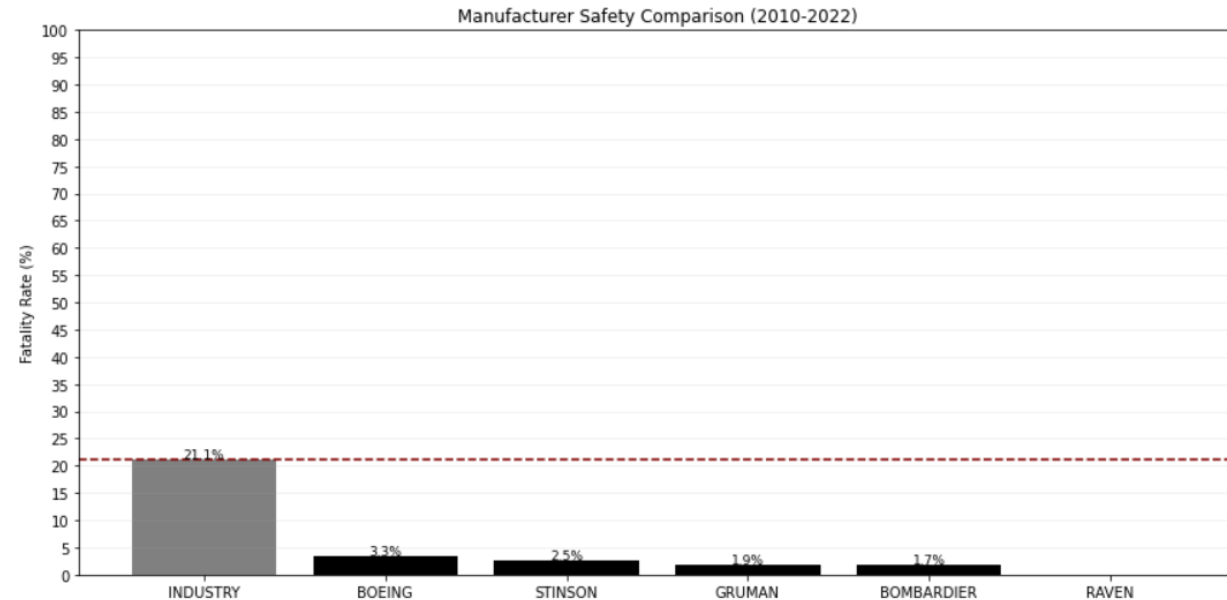
2. Safety Trends Over Time.

The Line graph represents Industry Fatality Rates between 2010 and 2022. It shows;

- Aviation safety improving(23.0%-18.7% fatal)
- A consistent downward trend thus the general industry is moving the right direction.

The bar graph compares the safety trends between industry and the top 5 manufacturers. It shows;

- Wide Industry Disparity: The Industry average(21.1%) significantly exceeds te fidelity rates of all listed manufacturers, indicating a major performance gap.
- Boeing as Top Performer: Boeing has the highest fidelity rate among the listed manufacturers, yet still falls well below the industry benchmark.
- Universal Performance: Every manufacturer sown falls short of the industry average, highlighting a consistent sector-wide safety performance issue.



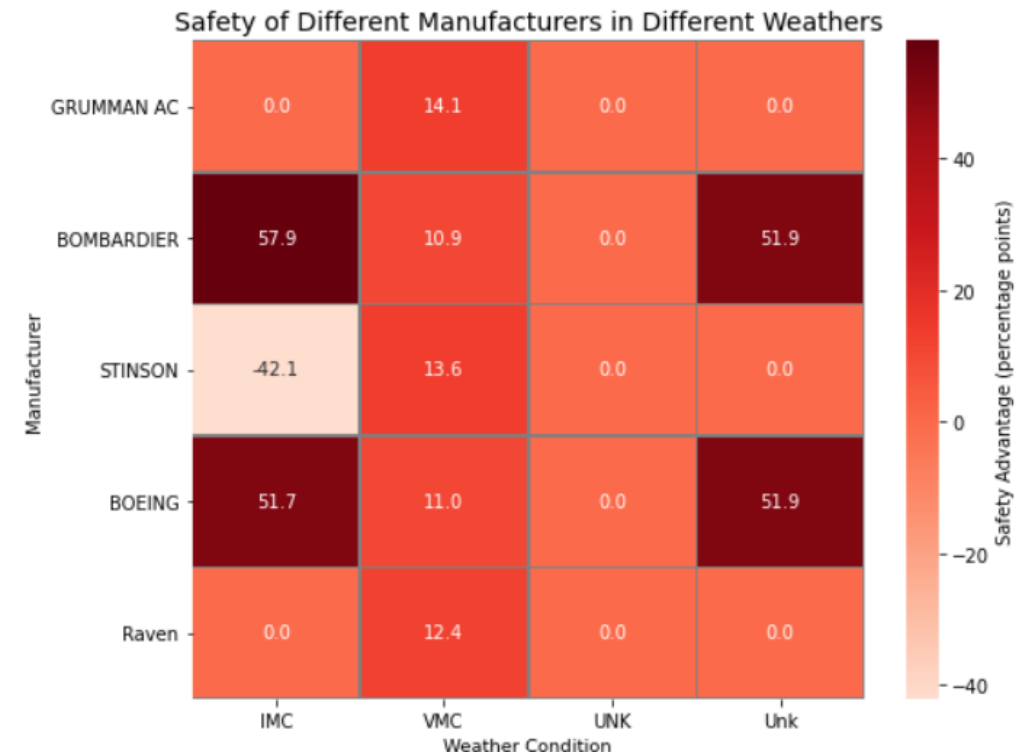
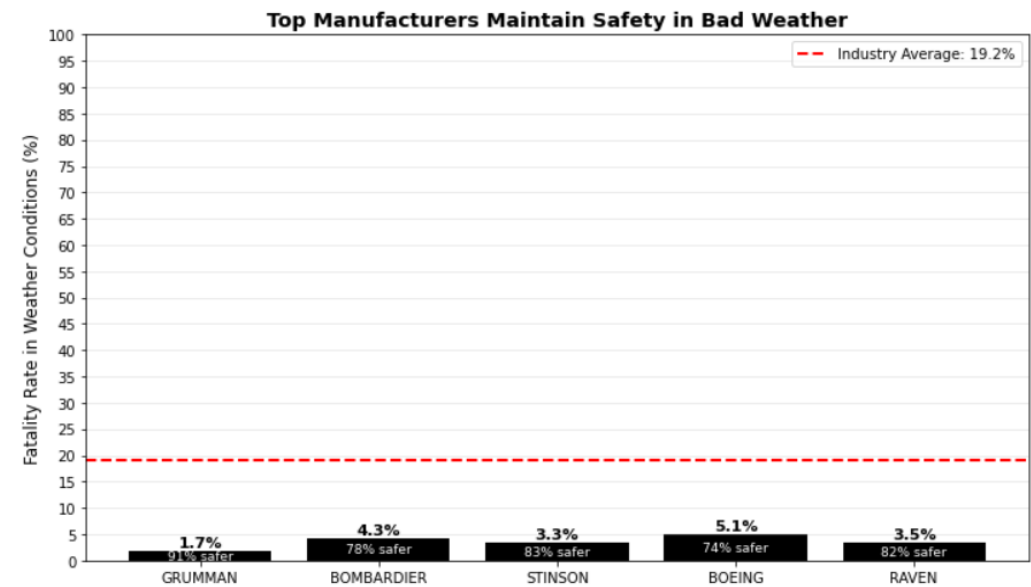
3. Performance in Different Weather Conditions.

The first bar graph shows how the top 5 manufacturers behave in Different Weather Conditions. It shows;

- Exceptional Safety in Bad Weather: All listed manufacturers far exceed the industry average(19.2%), demonstrating strong safety performance in adverse conditions.
- Grumman Leads: Grumman has the best safety rate(only 1.7% incidents), performing nearly 91% safer than the industry average.
- High Uniform Performance: The percentage and “x% safer” labels show all manufacturers maintain a similar, high standard of safety in bad weather compared to the industry norm.

The heatmap shows:

- All manufactures perform significantly better in VMC than in IMC.
- Boeing and Bombardier show high fatality rates in poor weather(IMC) indicating their safety systems may be less effective when visibility is limited.
- GRUMMAN and Raven aircraft have no fatal accidents in poor weather, indicating superior design or stricter operational limits during challenging conditions.
- All manufacturers perform significantly better in clear weather(VMC) confirming that visual, flight conditions remain the safest operational environment across all aircraft types.



Recommendations:

Based on the Data Analysis and Visualizations, I would recommend the following:

- **To the CFO:** Prioritize manufacturers like Grumman, Raven, and Boeing. Grumman and Raven excel in clear conditions, while Boeing maintains strong safety in adverse weather. This combined approach minimizes risk and maximizes cost savings across all operations.
- **To the CEO:** Position the airline as uniquely safe in all conditions. Highlight that our fleet, featuring top performers like Grumman (best in bad weather) and Boeing (consistently strong), uses aircraft proven to be 74-91% safer than the industry average, creating a comprehensive safety story.
- **To Underwriters:** Implement a tiered premium model that rewards fleets using top-tier manufacturers. Offer the best rates to airlines, like Teroh, that select from the proven safest group, including Grumman, Raven, and Boeing, based on their documented performance data.

TEROH AIRWAYS: Flying into Safer Skies.

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