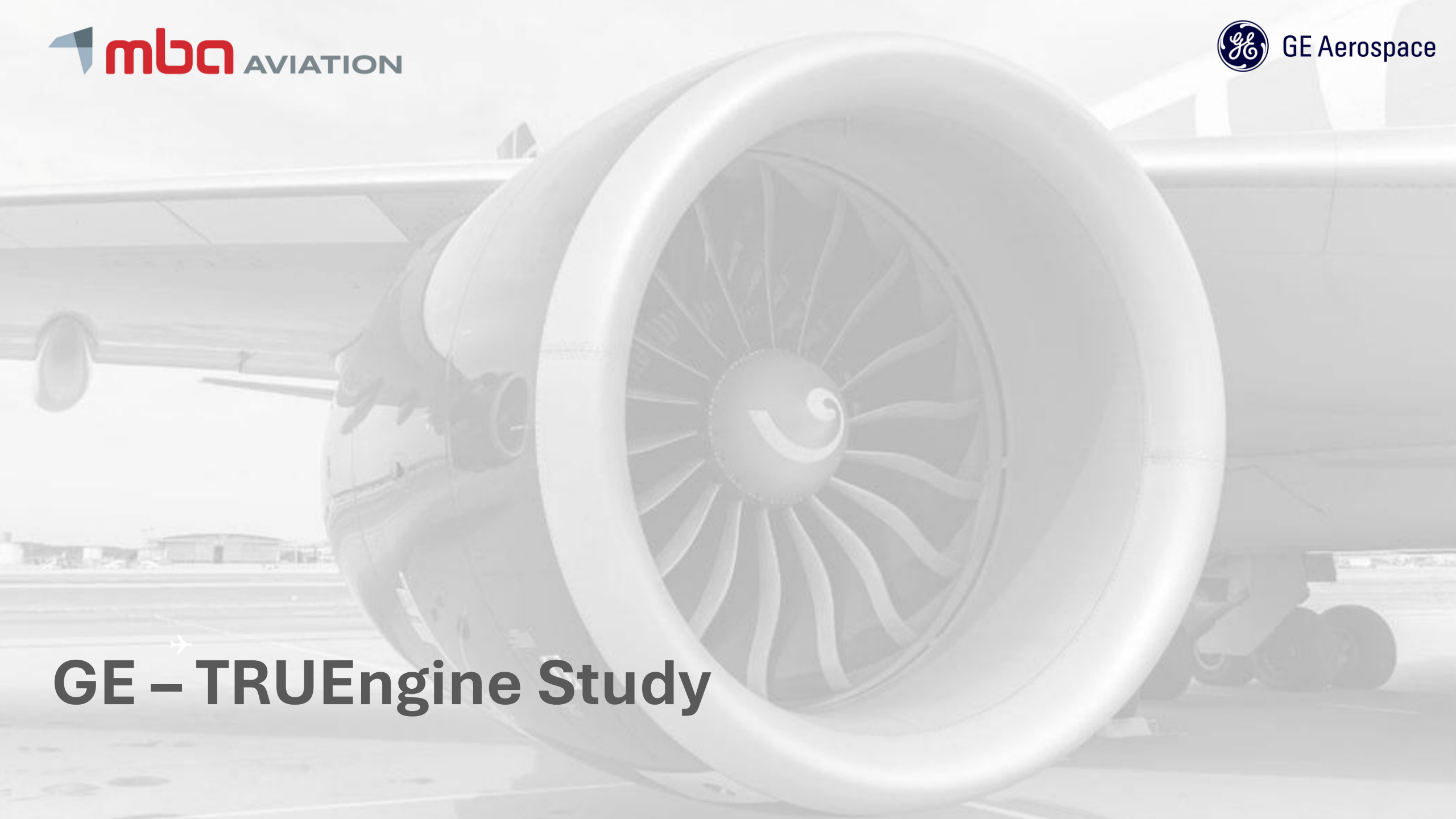




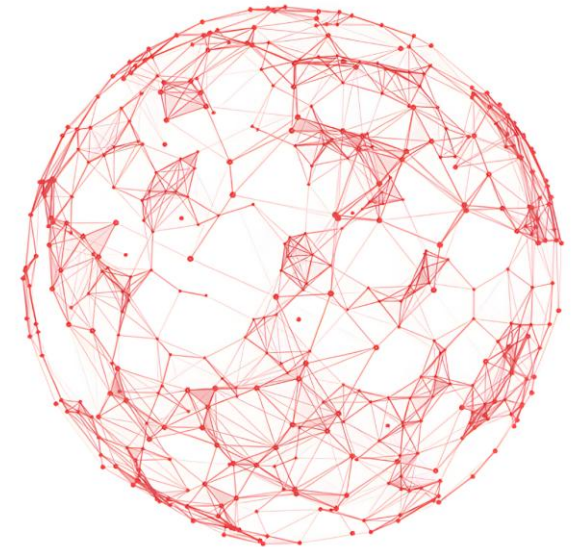
GE – TRUEngine Study

Executive Summary

mba Aviation was commissioned by GE Aerospace to conduct an independent industry study evaluating the financial and operational impact of non-TCH (Type Certificate Holder) material, specifically Parts Manufacturer Approval (PMA) components and Designated Engineering Representative (DER) repairs, on mature/maturing CFM56, CF6, and GE90 engine platforms. To capture an objective view of current industry sentiment, proprietary data and qualitative feedback were gathered from a targeted cross-section of airlines, lessors, teardown entities, and MRO facilities. The primary objective is to quantify the financial impact between exclusively TCH-configuration engines and those containing alternative materials across four key parameters: direct impacts on value retention, variations in asset liquidity and remarketing, financial implications during lease transitions, and the piece-part economics of secondary teardown and trading.

Overview of Results

- **Value Retention:** The presence of non-TCH material fundamentally impairs core asset value.
- **Asset Liquidity:** Non-TCH configuration engines face heavily restricted lessee and buyer pools.
- **Lease Transition:** Returning a "PMA-heavy" engine to strict TCH configuration carries significant financial burdens.
- **Piece-Part Economics:** Buyers and Sellers of Used Serviceable Material (USM) treat alternative materials as largely obsolete once removed from the core asset.



Methodology & Data Collection

Quantitative Survey

Designed and deployed a structured questionnaire.

Ensure varied feedback from active industry participants with relevant experience.

Qualitative Interviews

Conducted direct conversations with key owners and operators (Airlines, lessors, traders, and MROs).

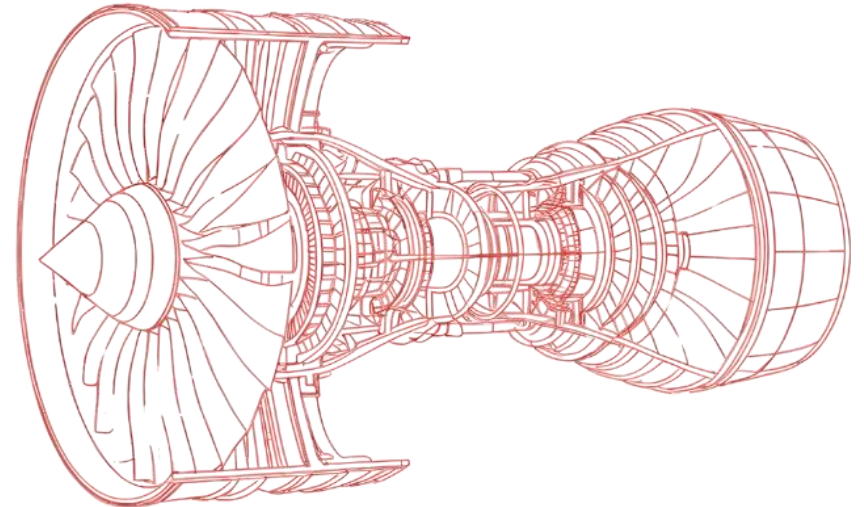
Captured industry sentiment and direct quotations.

Data Integrity

All feedback is strictly anonymised and aggregated.

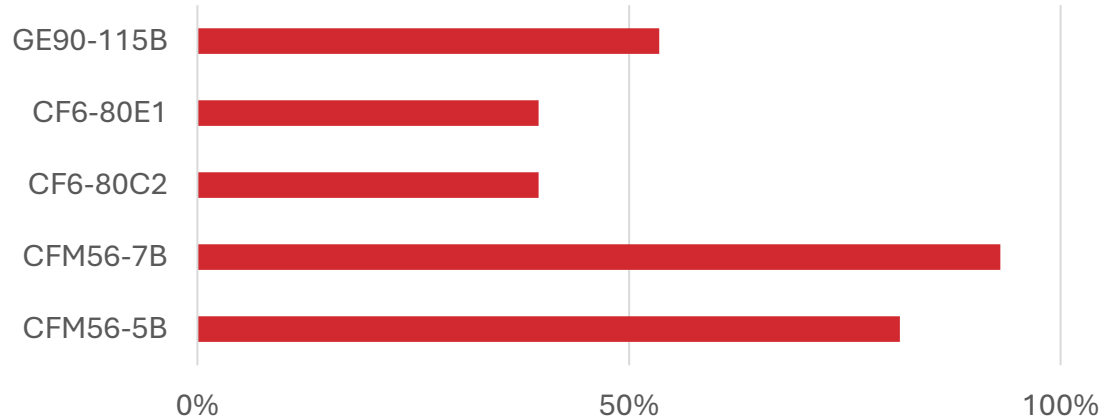
mba Analysis

Combined the data to draw clear, independent conclusions.

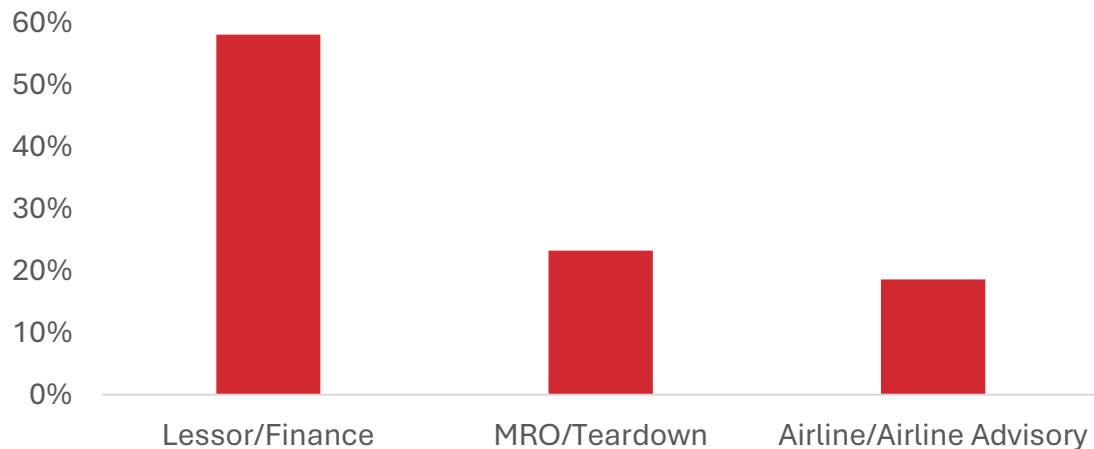


Overview of Responses

Engine Experience



Primary Role



Subject Engines Represent 37% of Global Fleet

Rank	Engine Type	Aircraft In Service	Percentage of Fleet
1	CFM56-7B	5,648	19.39%
2	CFM56-5B	3,279	11.26%
8	GE90	1,015	3.48%
10	CF6-80C	779	2.67%
24	CF6-80E	192	0.66%

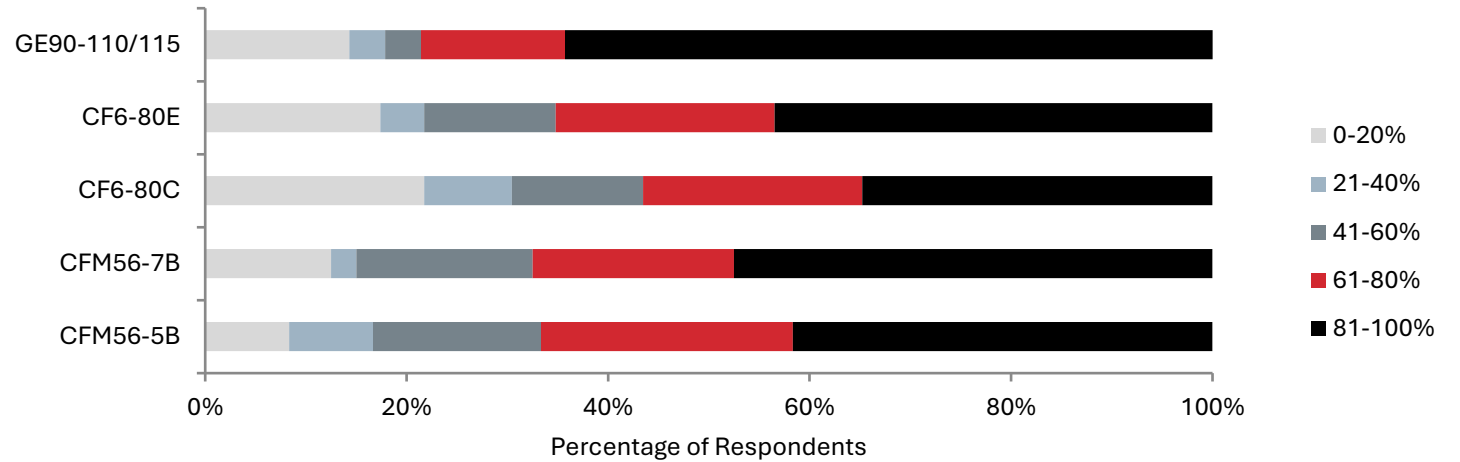
Source: REDBOOK Fleet+ as of April 2026

- 55% Lessors, with roughly 80% of all respondents focused on leasing, teardown, and end-of-life residual values.
- CFM56-5B and CFM56-7B experience from over 81% and 93% of respondents, respectively.
- Widebody engine experience is more limited, but still with 40-50% of respondents.

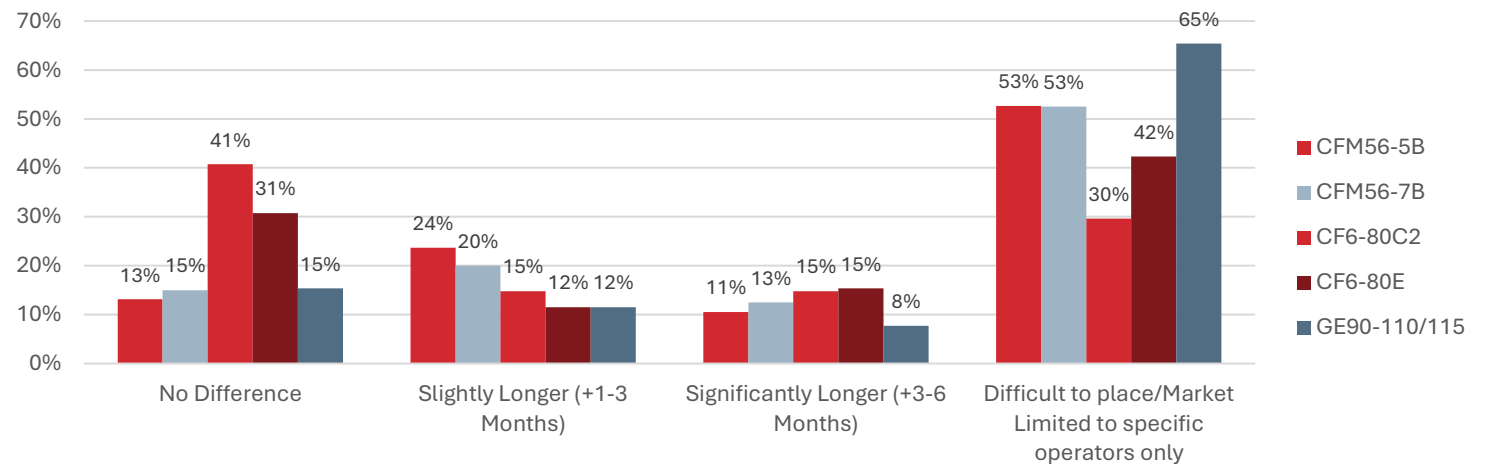
Liquidity Impact

- Majority of the industry require TCH material configuration.
- Outside of the mature CF6, **only 13% to 15% of respondents report "No Difference" in remarketing timelines.**
- Over 65% of the industry views a GE90 containing non-TCH materials as exceptionally difficult to remarket, with 64% of respondents noting their client base almost entirely restricts it.
- Strict lessor covenants and **overwhelming industry resistance** fundamentally limit the liquidity of non-TCH configuration engines, creating a risk of stranded inventory.

Perceived Requirement of TCH Configuration

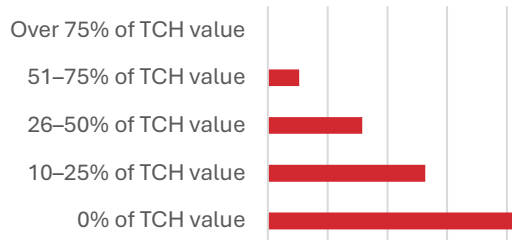


Remarketing Impact of PMA/DER

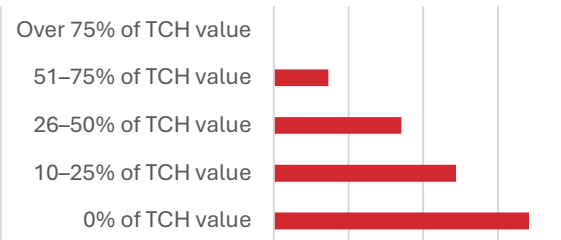


PMA Parts Value Retention

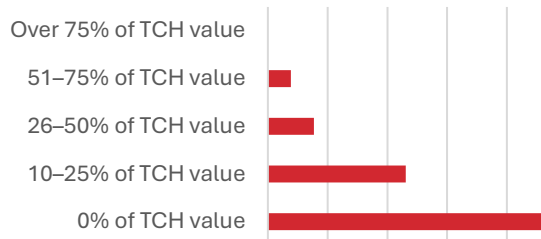
CFM56-5B



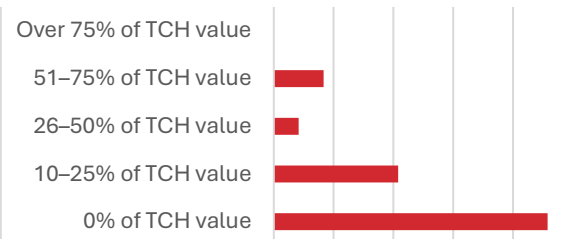
CFM56-7B



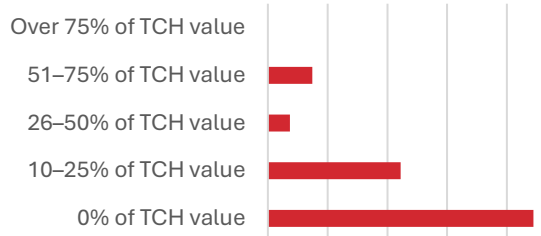
CF6-80C



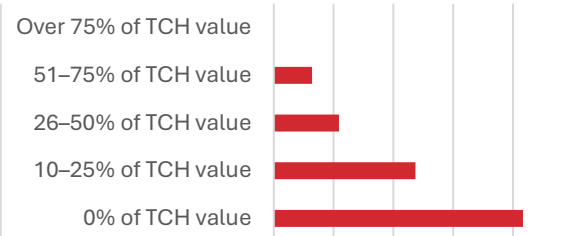
CF6-80E



GE90-110/115



TOTAL



Question: When parting out an engine, how do you value a serviceable PMA part compared to the equivalent TCH part?

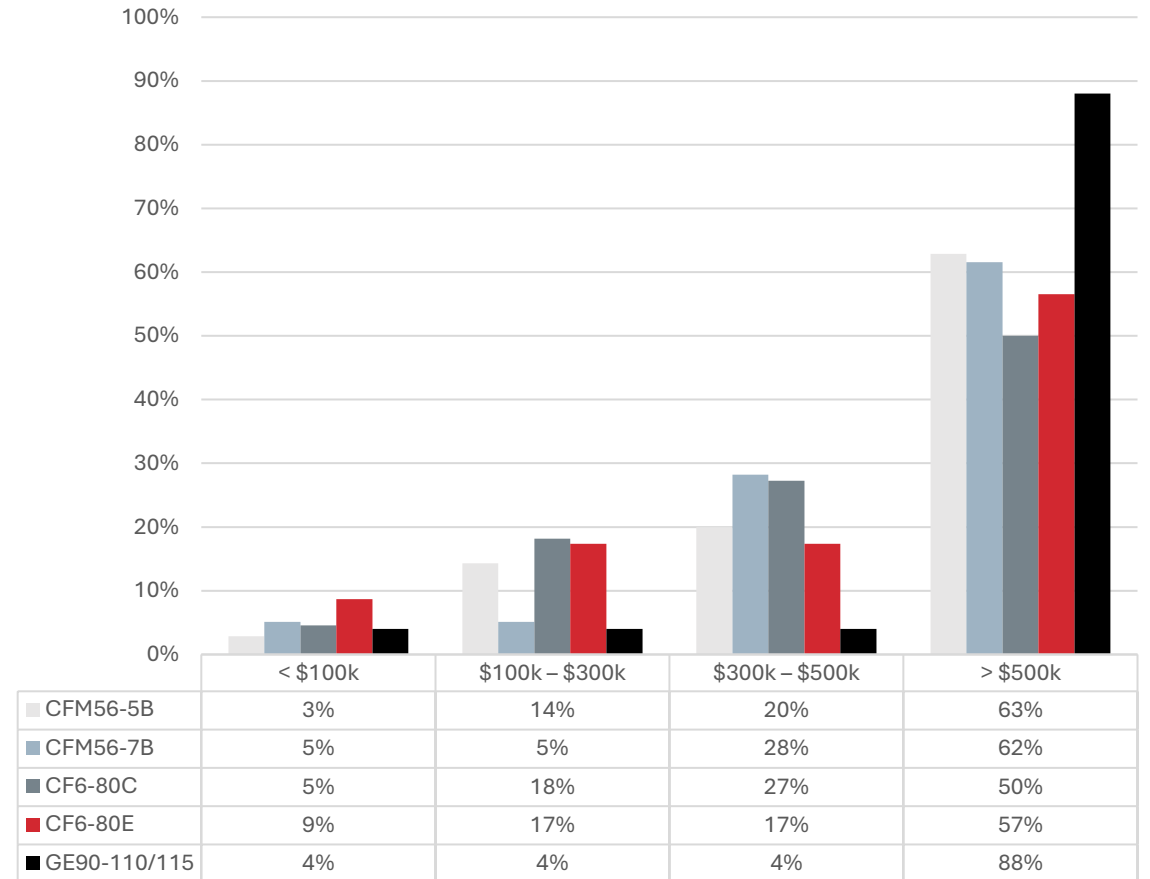
- 42% of the survey respondents value serviceable PMA parts purely as scrap (0% of TCH equivalent) upon teardown.
- 60-70% of the industry assigns a residual value of just 25% or less to alternative materials, regardless of the engine platform.
- The CF6 and GE90 platforms experience the harshest costs, with nearly half of all respondents erasing all piece-part value during part-out.
- Meaningful residual retention is limited, with just 6.4% of the survey respondents willing to value PMA at more than half of its TCH equivalent.

Cost to Rectify

Question: In a restoration scenario, what is the estimated cost premium to return a "PMA-heavy" engine to TCH Configuration status compared to a standard shop visit?

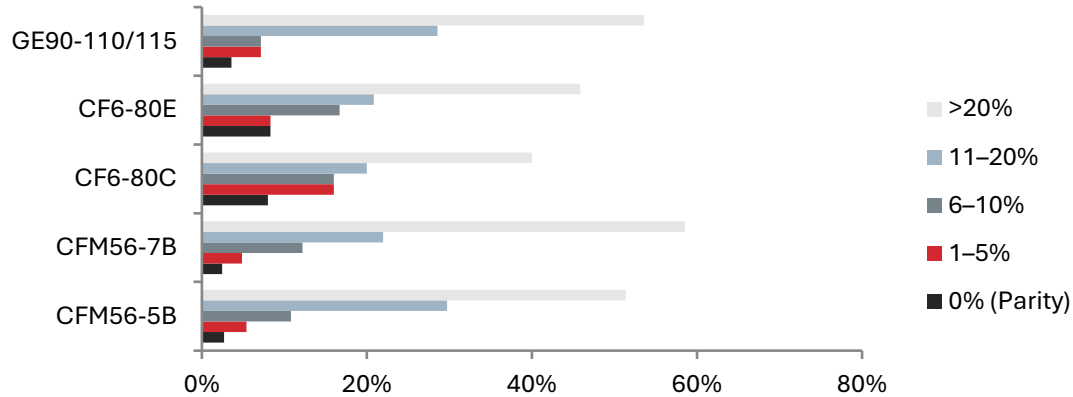
- Across all surveyed platforms, the most common expectation to purge non-TCH material and restore strict compliance **exceeds \$500,000**.
- The GE90 presents a severe financial hurdle, with 88% of respondents indicating **additional cost greater than half a million dollars**.
- Even for the highly liquid CFM56 family, over **82% of the industry anticipates restoration costs to surpass \$300,000**.
- While the older CF6 fleet exhibits a slightly softer cost curve, **over 73% of the survey respondents still place expected transition costs well above the \$300,000 mark**.

Estimated Cost to Return to TCH Configuration

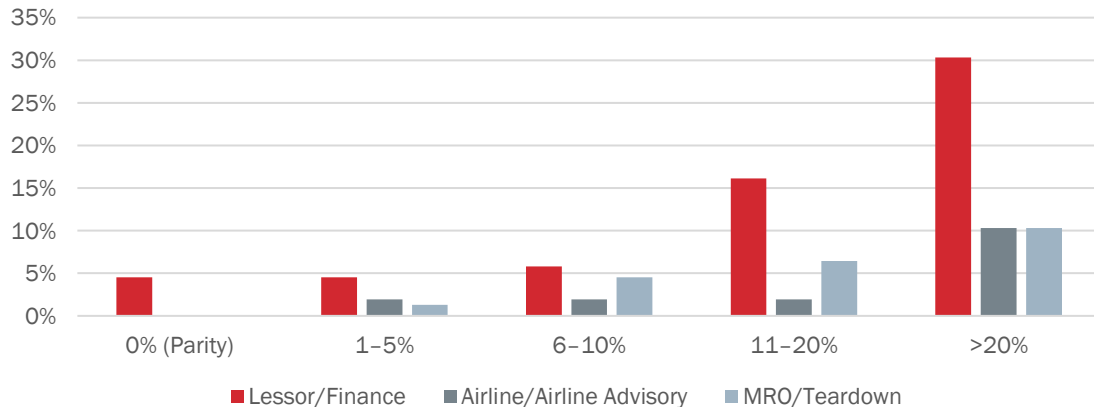


Engine Value Impact

PMA/DER Engine Value Discount



Variation By Role



Question: If two engines have identical LLP stacks and performance restoration status, what % discount would you apply to the Market Value of the engine with PMA parts in the High-Pressure Turbine (HPT)?

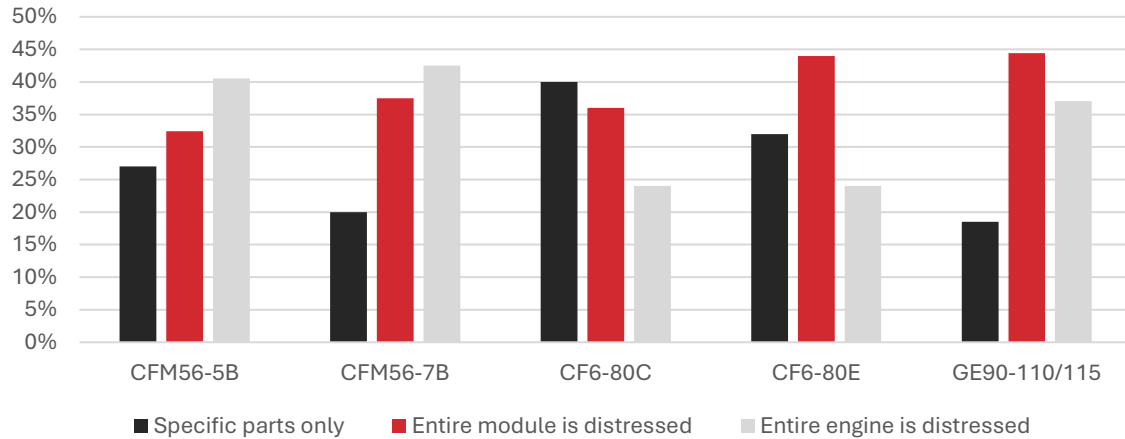
- **Over 95% of the survey respondents would apply discounts to the engine as a whole.**
- A **value deduction of 20% or more** remains the dominant response for core asset impairment across all platforms, peaking at nearly 59% for the CFM56-7B.
- **81%** of respondents further confirmed this engine-level penalty directly degrades the total aircraft valuation.

Engine	mba HT CMV	Potential Value Impact (>20%)
CFM56-5B4/3	\$ 8.02m	>\$ 1.60m
CFM56-7B26/3	\$ 8.59m	>\$ 1.72m
CF6-80C2B6F	\$ 5.02m	>\$ 1.00m
CF6-80E1A4	\$ 10.74m	>\$ 2.15m
GE90-115B	\$ 20.18m	>\$ 4.04m

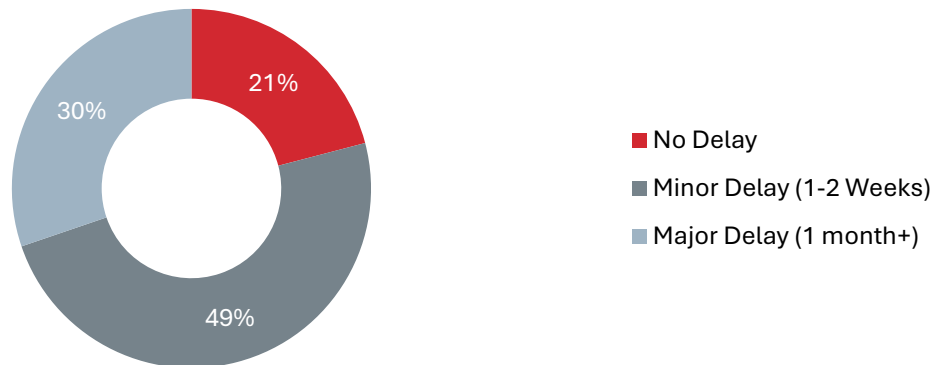
Source: mba Aviation, Engine Values as of 2Q26.
 20% assumed value impact based on survey responses
 HT CMV – Half Time Current Market Value

Additional Effects

Risk of PMA Presence



PMA/DER Technical Records Review Delays



- Across all engine platforms, the vast majority of respondents (between 60% and 81%) indicate that **devaluation spreads beyond the specific non-TCH parts**, distressing either the entire module or the entire engine.
- The highly liquid CFM56-5B and -7B platforms experience the most loss in value. For both engines, the most common response (41% to 43%) is that **the presence of mixed parts distresses the entire engine**.
- Nearly 80% of survey respondents report that the presence of non-TCH material causes technical records review delays during lease redelivery.
- **One in three lease returns (30%) involving alternative materials suffers a major delay.**
- Only a small minority (21%) report zero delays, demonstrating that standard, on-time technical acceptance is highly unlikely when non-TCH parts are present in the build.

Conclusion

Key Insights

- **Value Reduced:** 60%–81% of the survey respondents apply distress discounts to the entire surrounding module or engine. At teardown, up to **46% treat serviceable PMA purely as scrap (0% value)**.
- **Transition Friction Erasing Savings:** Operational savings are rapidly erased at transition. **79% face technical records delays** (30% exceeding a month). **Reversing a "PMA-heavy" build to TCH configuration routinely demands a >\$500,000 restoration cost**, this peaks with 88% for the GE90.
- **Contractual Forces:** Strict lessor covenants govern liquidity. With **64% of client bases actively rejecting non-TCH parts on complex assets** like the GE90, non-TCH configuration engines face severe remarketing drag and stranded asset risk.
- **Module Sensitivity:** Inserting **non-TCH material into the High-Pressure Turbine (HPT) guarantees fundamental impairment**. Over 50% apply a >20% discount to core Market Value regardless of LLP utility, while value parity is practically non-existent (under 4% for key platforms).



Thank You —



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