OPTIMIZING END-OF-LIFE FOR BIG ASSETS

WITH MORE HIGH-TECH COMPONENTS and ever more stringent regulations to meet, the costs to own, lease, and maintain transportation assets keep going up. On top of this, the expense of maintaining a plane, ship, or piece of rolling stock in top shape generally increases as an asset ages. End-of-life or end-of-lease can be a particularly fraught time for decision making about when and whether to undertake repairs and overhauls.

Too often, the approach to keeping costs from spiraling as an asset's expiration date nears is a throwback to another time: manually developing an end-of-life maintenance plan for the final 6-12 months of use. This approach narrows down the options available to optimize use versus costs, however, and so can be a recipe for wasting millions of dollars in unused asset uptime, unexpected maintenance, or lease return penalties.

Our research has shown that asset end-of-life planning needs to start much earlier: three to five years in advance of retirement or lease return, to provide maximum flexibility. This planning also must move into the information age – utilizing an integrated, holistic modeling approach and big data tools and techniques to fully account for the complexity of multiple assets with different return or retirement requirements. As an example, an airline might have 200 to 300 aircraft with widely varying lease return dates and terms.

BALANCING COSTS AND USAGE

It's odd that companies which employ some of the most advanced operational research tools in the world often don't apply similar analytical might to their fleets. Yet today's optimization modeling tools and techniques can bring together many variables – such as utilization, asset maintenance history, lease return conditions, and projected used asset availability and market pricing – to extract the most value from each and every asset.

End-of-life optimization works to increase asset availability and minimize costs by considering the most intelligent use of assets across a fleet and how assets should be sequenced: In the case of an aircraft engine, for example, when should the engine go on a wing, when should it move to a lower-mileage service, and when should it become a spare to ensure that it is returned with exactly the amount of lifespan required by the lessor? Ultimately, optimization modeling allows remaining asset uptime to be balanced against the residual value of the asset.

SIMPLIFYING LEASE VERSUS BUY

It is also useful for making "lease versus buy" decisions and contract-length

COMPONENTS OF TOTAL FLEET COST
AVIATION EXAMPLE

AIRCRAFT LEASING AND FINANCING
Aircraft-specific costs of leasing or financing
Opportunity cost of ownership

MAINTENANCE COSTS
Engine costs
Airframe task costs
High-value component costs
Landing gear costs

FUEL COSTS
Fleet-specific fuel cost
Fuel pricing
Engine age and degradation curves

decisions for leased assets, as modeling can factor in the supply and pricing dynamics of the used asset market, the impact of remaining uptime at retirement on value, or provide ideas for better alignment to lessor-stipulated return requirements.

As an example, a delivery surge in the early 1990s means that airlines will likely retire more than 11,200 aircraft over the next decade, nearly twice the number retired over the past ten years. Many of these aircraft are leased, and preparing an aircraft for redelivery to a lessor can be a costly process if not planned properly. Some airlines will face tens of millions of dollars in last-minute maintenance costs, late redelivery penalties, and out-of-service downtime.

By thinking about lease return optimization more holistically over a longer time period, however, an airline has more options. These include more efficient engine swapping, life limited part (LLP) programs that match parts to the remaining life of the leased assets, and more proactive and predictable surplus parts management. In our experience, such planning can help an airline save an average of $2 million per redelivered aircraft in maintenance costs alone.

Similarly, asset maintenance in the rail and maritime industries represent large and complex cost buckets. "Own versus lease" is a common dilemma and asset lifespans are both long and somewhat flexible: Older rolling stock and ships can be cascaded down into secondary services or even rebuilt. These industries also face volatile markets that make sophisticated modeling and scenario evaluation even more necessary, as multiple "what if" choices can be explored to optimize the tradeoff between maintenance/overhaul costs and the likelihood of generating future revenues.

EMBRACING A DATA-DRIVEN FUTURE

We expect that end-of-life optimization modeling will eventually become the norm for transportation industries with life-limited assets that require complex maintenance and operate in highly regulated environments. Evolving such an approach sooner rather than later, however, will make it easier to incorporate anticipated "digital industry" developments, such as an expanding flow of real-time information from smart assets (for example, streaming health monitoring) and more coordinated information sharing between operators and manufacturers. These upgrades will provide even more opportunities to plan ahead, making end-of-life decisions more a matter of choice than chance.

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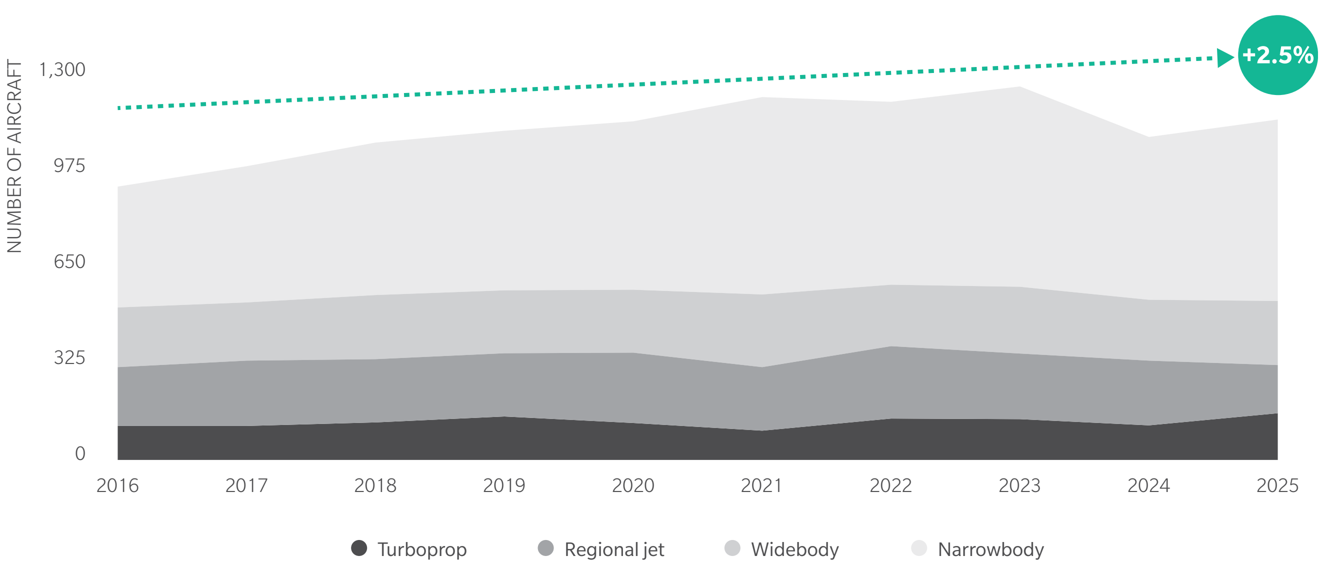
GLOBAL AIRCRAFT RETIREMENT FORECAST
2016-2025



Note Excludes government and military
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