Capgemini

# Transforming Aviation:
*The Power of Lifecycle Analysis* **for Aircraft Parts**

An airplane flies not only with parts but also with paperwork—the countless documents, records, and certifications that ensure its safety and compliance with government regulations.

In today's digital world, the process of tracing aircraft parts remains outdated, anchored in paperwork and countless hours of manual labor to document and track. The aviation industry, often perceived as a leader in digital transformation, faces challenges in digitizing the recorded history of aircraft. New generation aircraft require less paperwork if tracked in one system, but documentation of previous generation aircraft remains stored on paper in boxes. Through digitization and the emergence of mature AI/ML technologies, combined with GenAI, we can now tackle this challenge and optimize the lifecycle of aircraft parts.

That is why Capgemini and Amazon Web Services (AWS) have recently launched the Lifecycle Optimization for Aerospace platform, which aims to address the need for digitized aircraft and parts maintenance history. The platform simplifies inspection and airworthiness review while ensuring complete traceability documentation, aiming to maximize the lifespan of parts and enhance their potential for resale or reuse. Additionally, the platform can structure operations and maintenance history for analytics purposes, focusing on predictive maintenance capabilities.

Lifecycle Optimization for Aerospace exemplifies how digital transformation can benefit the entire value chain. While the immediate result produces a more efficient, data-driven process for information traceability, the long-term benefits translate to enhancing parts reuse and enhancements in maintenance strategy. Utilizing today's technologies is one of the easiest ways to address the many challenges faced by the airline industry, from manufacturing to supply chain to workforce productivity and sustainability.

# Mounting pressures *across* the value chain

Several factors have contributed to the timing and necessity of Lifecycle Optimization for Aerospace. The industry is facing urgent pressures to adapt to remain competitive.

### Legacy systems vs. digital transformation

Full traceability is essential to increasing the rate of reuse for aircraft parts. However, this process remains inefficient due to various systems, both manual and digital, that are not in alignment. When you want to remove a specific part from one aircraft to reuse it in another, the effort to find the documentation is enormous.

Preparing a part for reuse or resale involves gathering all the documentation to ensure that the part is suitable, safe, and compliant with regulatory standards. Time and money need to be allocated to this process whether for large, expensive items like engines or for smaller and less costly parts. Again, thanks to the digital world we live in, there is opportunity for improvement with full transparency of the part history and maintenance.

The dependence on paper records impedes inspections for sales or maintenance of aircraft. Each inspection requires manual labor to process copious amounts of documentation.

Transforming physical paperwork into digitized assets enhances operational efficiency, simplifies tasks, and speeds up the sales process of inspected aircraft while providing more accurate insights.

### Supply chain disruptions

Many companies continue to grapple with a backlog of aircraft orders due to increased demand after the pandemic. Uncertainties like rising inflation, economic uncertainties, and ongoing geopolitical issues have created obstacles to production ramp-up and delivery. In addition, we are seeing innovation and the emergence of a new generation of aircraft technologies that impact supply chain and production.

This heightened demand on supply chain is felt by the entire aerospace and defense ecosystem and demonstrates how intertwined the industry is. Supply chain is woven throughout the fabric of the industry from design to manufacturing to product support and repair. It is essential to view the supply chain process as an interconnected network of suppliers, manufacturers, and distributors that requires the use of advanced technologies and data analytics to address production timelines and demand forecasts. Supply chain is an integral part of an organization's value chain, but it's also the foundation of the value chain across the aerospace ecosystem.

Today's technologies can help connect the many facets of the supply chain allowing for a more efficient, reliable, accessible, and transparent process. In addition, technology enables more accurate insight into aircraft parts that can be recycled and reused to help address the supply chain backlog. A digitized tracking system for the lifecycle of parts can help to first extend, or alternatively, improve the reuse rate of parts. Better use of existing parts will help with supply chain by reducing the global market pressure on creating or identifying new parts and allow for consideration the use of existing parts that still have functionality, determined by effective records-keeping.

## Counterfeit parts concerns

Counterfeit aircraft parts in the supply chain pose a significant risk to aircraft safety and operational integrity. These counterfeit parts, often indistinguishable from genuine ones, can fail to meet safety and performance standards, leading to potential hazards. The problem has become a major concern for the aviation industry leading to the formation of the recently announced Aviation Supply Chain Integrity Coalition. The coalition was formed by executives from leading organizations in the industry in efforts to "maintain the integrity of the aviation supply chain" by preventing unauthorized parts from entering the process. While initial research indicates that the percentage of counterfeit parts circulating in the supply chain is minimal, it still warrants review and action to prevent the problem from escalating. It demonstrates the industry's collaboration and agreement on a trend that threatens the integrity of aircraft production.

This issue is not just about supply chain, but effectively tracking and monitoring parts. Digital records provide a transparent and immutable history of each part, making it easier to verify authenticity and origin. This traceability is crucial for distinguishing genuine parts from counterfeit ones.

# The impact of lifecycle optimization on
## *operations and efficiency*

Behind the platform is the expertise of Capgemini's expansive, World-class engineering team and the technological innovation synonymous with AWS. Together, their collective experience and knowledge underpin the platform, promising an optimally designed tool geared towards meeting the complex demands of the aerospace industry.

The platform addresses the challenges faced by aviation while providing tangible benefits in efficiency, operations, and profitability:

### Efficiency gains:

With the use of AI and Machine Learning, the platform can save operators 50% of the time typically spent analyzing documents. Typically, it takes weeks to do a full history review of an aircraft. The platform cuts that time in half and, on top of that, offers a high-reliability level in classification, information extraction, and reconciliation.

### Responsible resource management:

The platform enables responsible use of materials, focusing on reusing materials linked to parts that are found to be beyond economic repair during aircraft inspections.

### Digital transformation:

As a digital-native and cloud-based platform, it can seamlessly integrate into the existing aerospace ecosystem using API connections, complementing MRO and other operations.

The Lifecycle Optimization for Aerospace platform accurately tracks and analyzes aircraft parts history using advanced technologies such as AI, Machine Learning, OCR, and NLP, promoting efficient reuse and contributing to the development of circular economy practices. The systems have been specifically developed and trained on data models based on ASD standards. We are working with early adopters of the platform, in the airline and OEM sectors, who are contributing to the platform's development through ongoing feedback and data sharing thus providing input on future updates.

# Creating a *positive value chain* across the lifecycle

Lifecycle Optimization for Aerospace is paving the way for digital transformation by enhancing the value chain across four key business areas:

### Reuse:

The solution helps to recover and consolidate the full history of a part which is mandatory for a part to be reused on the same fleet within the same airlines, or for the part to be made available in the market for reinstallation and reuse in eligible aircraft.

### Repair:

The platform's advanced data analysis identifies the repair potential of each part, providing detailed insights that help decision-makers optimize repair operations and procedures.

### Resell:

Innovative tracking and data collection methods provide a clear, observable history of each part, enhancing its resale value. This shift to a positive value chain enhances backend sales, opening new avenues in the resale of parts.

### Recycle:

In instances where parts are beyond economic repair, this platform promotes repurposing valuable materials, thus reducing waste and conserving resources. The objective will be to better provide actionable steps in the future towards eco-friendly recycling, minimizing environmental impact while retaining maximum value.

The Lifecycle Optimization for Aerospace platform makes a circular economy tangible and profitable. It allows users, be it an OEM or an airline, to achieve full traceability of parts, improve maintenance strategy, and boost revenue. Companies can use the data extracted from the platform to track and quantify the impact on the overall bottom line. Sustainability and circular economy become more than just abstract concepts but also concrete business objectives.

# Final thoughts

The launch of the Lifecycle Optimization for Aerospace is a turning point. It shows what digital transformation can do—a concept we've been hearing about for years but now see in action. As we look to the future, we can foresee the ongoing positive impact of digital transformation in other areas beyond the bottom line. The reuse and recycling of parts will enable a circular economy and a long-term sustainability strategy. We are already seeing the next generation of transformation through AI and Gen AI, allowing for even more timely and efficient use of data and analytics. And the impact of Lifecycle Optimization for Aerospace is not limited to the aviation sector. Its capabilities can transform other industries where intensive documentation, traceability, and regulatory compliance are key.

With Lifecycle Optimization for Aerospace, we aim to make the most of digital transformation, getting us one step closer to a sustainable, efficient, and profitable future. And that's the kind of future the industry needs.

# About Capgemini

Capgemini is a global business and technology transformation partner, helping organizations to accelerate their dual transition to a digital and sustainable world, while creating tangible impact for enterprises and society. It is a responsible and diverse group of 340,000 team members in more than 50 countries. With its strong over 55-year heritage, Capgemini is trusted by its clients to unlock the value of technology to address the entire breadth of their business needs. It delivers end-to-end services and solutions leveraging strengths from strategy and design to engineering, all fueled by its market leading capabilities in AI, cloud and data, combined with its deep industry expertise and partner ecosystem. The Group reported 2023 global revenues of €22.5 billion.

**Get the Future You Want | www.capgemini.com**

## For more details, contact:

**Lee Annecchino**
Executive Vice President, Capgemini
Global Aerospace & Defense Industry Leader
*lee.annecchino@capgemini.com*

**Matthieu Ritter**
Vice President, Capgemini Aerospace and Defense
Head of Lifecycle Optimization for Aerospace
*matthieu.ritter@capgemini.com*