Enabling Ecommerce of Aerospace Aftermarket Services

A neural approach
Abstract

Commercial airlines, air transport, and charter operators depend on original equipment manufacturers (OEMs) and their maintenance partners for maximizing aircraft uptime and continued safe operations. These are high-stake partnerships for all parties to deliver flawless service while meeting expectations on customer experience, profitability, and environment, society, and (corporate) governance (ESG). Furthermore, aircraft maintenance, repair, and overhaul (MRO) services are always complex, often customized based on each aircraft’s unique needs, and frequently subject to work-in-process changes resulting from unforeseen issues. The buying and selling of aftermarket services is a highly manual process, even for routine services. While operators have adopted ecommerce for parts for a long time, they are increasingly interested in buying MRO services through ecommerce. OEMs and MRO service providers are also keen on exploring ecommerce for making their sales service process efficient.

In this paper, we explore the challenges in the trade of aerospace aftermarket services and present an approach to standardize such services into products through the Neural Manufacturing™ lens and drive benefits for the buyers and sellers of such services.

Challenges of aerospace aftermarket services

Aircrafts are certified for operation with an elaborate set of regulations governing their ongoing maintenance to be fit for purpose. Aircraft maintenance includes scheduled maintenance and unscheduled maintenance. In addition, airworthiness directives from regulators and service bulletins by OEMs, as well as addition or modification of features, may require additional services to be performed on an aircraft. At present, the buying and selling of aerospace aftermarket services is a highly manual process between salespersons, maintenance engineers, and other stakeholders including MROs, OEMs, operators, and asset owners. These processes are very slow and time consuming and impact the availability of aircrafts for their mission. To address these challenges, stakeholders across the aerospace value chain want to adopt ecommerce for buying and selling aftermarket services, in addition to parts.

To illustrate the challenges and approaches in aerospace ecommerce, let’s consider aircraft Wi-Fi upgrade as an example. Since Wi-Fi connectivity is a high-demand passenger service and a significant source of add-on revenue, aircraft operators need to keep fleets up to date with the latest technology. Every few years, a new frequency band or satellite constellation comes online with faster speed and bandwidth, and this requires operators to upgrade many hardware components on the aircraft, along with electrical and data wiring infrastructure. Such a project may also have dependencies on aircrafts’ built-in electrical architecture, which can vary significantly between aircraft models, and even between individual airplanes due to prior modifications.
These modification projects need hardware components and materials and engineering services to adapt and apply those components to the aircraft in question. Such processes require skilled labor to design, install, configure, test, and certify these components.

At present, such aftermarket services are bought and sold manually, and ecommerce can speed up the processes.

Sources of friction in aerospace aftermarket services

Any service product is a collection of specific parts and specialized labor activities to meet the needs of a particular outcome. A baseline service design may be intended for re-use across many jobs. However, in the Wi-Fi upgrade project example, a baseline definition will not be an accurate fit for each aircraft. For instance, aircraft model A may share the same external antenna as model B. But these two aircrafts may have different current and voltage constraints, thereby needing slightly different power supply components. Aircrafts of any make and model may be able to use the same internal hotspots, but the number of components and their installed orientation may depend on seating density and layout.

When a fleet manager identifies a need for modification or services upgrade, the customer journey begins with the service company, an MRO provider, or an OEM offering MRO services. The complexity of these projects, and need for customization, become a source of friction in this customer journey. The MRO provider also experiences similar friction while marketing its services, since it is difficult to accurately define them without knowing the constraints of an individual aircraft (see Figure 2).
The traditional method of selling MRO services is to use a salesperson-led process with steps such as prospect, discover, quote, iterate, negotiate, and contract. This traditional sales process may take several iterations to arrive at the final service definition, even for routine and standard services. Because of the information hand off and time delay associated with each iteration, it behaves as a waterfall process.

As illustrated in Figure 3, the waterfall process is perpetuated by treating each customer journey as a complete custom job. Even when starting from a generic baseline service definition, the traditional sales process takes over immediately and relies on extensive manual intervention. This manual intervention is repeated for each customer cycle, leading to loss of efficiency.

Figure 2: Sales process friction between MRO providers and their customers

Figure 3: The traditional waterfall sales process in aerospace ecommerce
A neural approach to ecommerce of aftermarket services

An alternative approach to selling MRO services is to develop configurable service products to cover as many services as possible. This involves starting off with standard service offerings, actively learning from the market, incorporating the resulting intelligence in modifying service product definitions, and using the ecommerce channels. The new approach consists of three elements designed to address the factors as presented in Figure 4 and further expanded below along with the WiFi example. Key to the approach are the neural capabilities of connectedness, cognition, and collaboration, to facilitate the buying and selling of MRO services.

Enterprises may select from commercial off the shelf platforms from Siemens Digital, Dassault, PTC, Salesforce, SAP, Informatica, and more based on their individual needs. However, the systems should be stringed together to create the three elements from Figure 4 that underpin the neural approach to ecommerce for aftermarket services.

**Service offerings:** Service providers need to offer a standard service product package to customers. This requires a combination of base line service definition, service definition modifiers based on options already installed on the aircraft, and content such as images, descriptions, and simulations.

A baseline service product consists of a default list of components, a work-breakdown structure of the service, and resource requirements. This can be efficiently created based on the following:

- Automated discovery from maintenance procedures that are defined during the product development process as well as installation instructions specified in PLM / MES for building new aircraft / sub-systems and in service life cycle management (SLM) software.
- Learning from historical service projects and orders using machine learning. This is the cognitive step on defining service offerings.
- Collaboration with subject matter experts (SME) for validation and addition of service products.

PIM software is used to manage the service offerings, determine which options and variants are appropriate and compatible, manage media content on service products, and provide pricing data based on these variables. Then, based on the target aircraft model and installed options, that service...
product would be configured in the configure price and quote (CPQ) software as needed in real time.

These steps will reduce time-to-market for defining and offering services over ecommerce.

**Market demand:** Based on how the services are browsed, requested, priced, and negotiated, service providers can capture key insights about market demand.

The ecommerce suite of tools allows the customer to interact directly with the service offerings. These interactions are an invaluable opportunity to gather insights about customer needs for which machine learning can be leveraged. For example, as fleet managers shop for available services, their inputs and behaviors on the site can reveal their interest in specific services, details about their fleet, and their sensitivity to price, schedule, and volume of services. These customer interactions can be used to learn customer preferences and refine service offerings.

**Fleet intelligence:** As services are customized, ordered, and executed, service providers can capture additional details about the status and needs of their customers’ fleet. This will allow them to create a digital twin of their customers’ fleet with the fine details necessary for improved service offerings.

The key to creating a digital twin is to capture all information of an aircraft known to the enterprise, starting from its manufacturing in case of the OEM or suppliers, to servicing. Service records, configuration details observed during servicing, operational history, and aircraft maintenance manual (AMM) data are useful sources to compile updated knowledge of airplanes in the field. This can also be a collaborative exercise with asset owners.

Figure 5 depicts the entirety of the buying and selling process of MRO services, including the neural capabilities.
Conclusion

Aerospace MRO services are complex and subject to customizations and in-process changes. This results in customer journeys that are long, inefficient, and subject to repeated work. OEMs and MROs can reimagine the design and delivery of these services by adopting neural ecommerce, with each customer interaction providing new insights to be captured and used for refining the business further. OEMs and MRO providers can share service catalogs directly with their customers, allowing them to observe market interest. They can aggregate detailed information of aircrafts under service, which offers them a more detailed view of their customer needs. A continual flow of product refinements will return additional value back to the customers, ensuring long-term relationships between airplane operators and their trusted MRO service providers. The adoption of neural ecommerce has great potential to drive efficiency of sales and fulfillment processes for aircraft MRO services, minimize time on ground for the aircraft for customers, and fuel revenue growth for OEM and MRO service providers.
About the authors

Ramesh Srinivasan
Ramesh Srinivasan is the Managing Partner for the Aerospace Growth and Transformation Group at TCS. In this role, he advises leading aerospace and defense (A&D) customers on digital transformation. He has over 30 years of experience in manufacturing and the aerospace value chain from product development, manufacturing, supply chain, product costing, marketing, digital products and aftermarket services. Ramesh holds a bachelor’s degree in mechanical engineering from the University of Madras, Tamil Nadu, India; a master’s degree in systems design from the University of Houston, Texas, United States; and a master’s degree in business administration from the University of Pittsburgh, Pennsylvania, United States.

Sanjay Bhattacharjee
Wing Commander Sanjay Bhattacharjee (Veteran) is a Consultant in the Aerospace Growth and Transformation Group at TCS. He provides deep insights and actionable forecasts related to emerging trends in the aerospace industry for both defense and commercial stakeholders. With his varied experience of aircraft maintenance, overhaul, and repair of over two decades as an aeronautical engineer in service to the Indian Air Force, he is now adding value to TCS and its customers.

Sanjay holds a bachelor’s degree in electronics and telecommunication from the National Institute of Technology, Hamirpur, Himachal Pradesh, India; a post-graduate degree in aeronautical engineering from Air Force Technical College, Bengaluru, Karnataka, India; a post-graduate diploma in business administration from Symbiosis Institute of Business Management, Pune, Maharashtra, India; and a post-graduate diploma in clinical psychology from The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, India.
Awards and accolades

Contact
Visit the Manufacturing page on https://www.tcs.com
Email: manufacturing.solutions@tcs.com

About Tata Consultancy Services Ltd (TCS)
Tata Consultancy Services is a purpose-led transformation partner to many of the world’s largest businesses. For more than 50 years, it has been collaborating with clients and communities to build a greater future through innovation and collective knowledge. TCS offers an integrated portfolio of cognitive powered business, technology, and engineering services and solutions. The company’s 500,000 consultants in 46 countries help empower individuals, enterprises, and societies to build on belief.

Visit www.tcs.com and follow TCS news @TCS.