

(expleo)

How cross-fertilisation can facilitate the transformation of the aircraft industry

Could good practices in the automotive industry be a relevant source of inspiration for its aeronautics counterpart, despite their evident differences in cycle times, production volumes or industry structure?



Global airline traffic could double to 8.2 billion passengers by 2037¹. Air travel continues to develop and become more accessible to more people with the growth of low-cost airlines and the emergence of new customer groups, particularly in China and India². From the manufacturing perspective, more than 38,000 new aircraft are expected to be sold over the next 20 years to meet this demand.

At the same time as creating the right conditions for sustainable growth, this wider context also poses a real challenge for the aircraft industry. How is it possible to successfully produce and market an increasing number of airliners faster, while remaining compliant with high safety requirements; and at the same time improve the quality of products and services that are delivered to airlines and, ultimately, passengers at a competitive cost?

Cross-fertilisation to support change

The answer lies partly in expanding production capacity and therefore transforming production resources, partly in redefining aircraft industry supply chain management practices, and, lastly, in developing new generations of products and the range of associated services. Assembly line

configuration, supplier management, team organisation, the introduction of passenger services...: seizing the growth opportunities currently available to the aircraft industry is therefore dependent on engaging in profound and structural transformational change.

The automotive industry has already been confronted by the same imperative under similar circumstances of rising demand and fierce competition between manufacturers. Clearly, production and market constraints are by no means identical in the automotive and aeronautics industries: the world's car manufacturers together produce more than 10,000 cars an hour, whereas some aircraft takes more than a month to assemble.

Although the two experiences are not interchangeable, some automotive industry good practices open up interesting possibilities that aircraft industry stakeholders could use to achieve improvements in performance and efficiency.

Learning from automotive mass production methods to achieve a successful ramp-up

As production rates ramp up, aircraft production is seeing its cycle times contract, which is forcing the industry to rethink its organisational structure and adopt new processes. The automotive industry example, which characterises standardised mass production, reveals three levers for improvement: production chain automation and robotisation, logistics flow optimisation and improved component traceability.

To increase its productivity, the aircraft industry is increasingly turning to automation and robotisation, following in the footsteps of engine manufacturers, which have considerably transformed their assembly lines over the past ten years. Sequenced assembly lines, the use of AGVs (Automatic Guided Vehicles), cobots (collaborative robots), laser alignment systems and camera-based quality control: it's clear that aircraft production systems and processes are evolving. More specifically, these transformations ensure a higher level of reliability by limiting the risk of damage to components or of non-compliance issues during the assembly process, and improve operator workstation ergonomics by eliminating repetitive tasks and refocusing the work of operators on tasks that add greater value.

Nevertheless, the standardisation that results from automation comes with some limitations in the short term. The program organisation that characterises the aircraft industry, and the specific issue of aircraft interior fit-out, both require a high level of customisation. Modular systems that combine standard assembly lines with customised customer production lines are under consideration and offer a 'proto' solution, perhaps in readiness for new technological developments.

The second area for improvement is logistics flow management. In the quest for efficiency and rationalisation of inventories and the storage area footprint, the automotive industry has adopted the synchronous flow methodology that aligns the supply of components with the order in

which they are used in the assembly process. In other words, the supply chain and assembly line are synchronised. This example could be equally relevant to the aircraft production supply chain.

The third lever for improvement to be explored is component traceability at every link in the production chain, and even beyond. Already commonplace in the automotive industry, this process identifies and tracks individual components from their journey along the assembly line through to vehicle sales and after-sales service. Many technologies, and perhaps especially blockchain, offer new possibilities for data management and security. Again, following the example of its automotive counterpart, the aircraft industry is justifiably interested in such solutions to optimise the tracking of the 1.5 million components that are on average used in the manufacturing of an aircraft.



Securing the supply chain

Successful aircraft production ramp-up also depends on the ability of supply chain stakeholders to embrace the dynamic transformation of the industry. However, the aircraft manufacturing supply chain is extremely dense and more fragmented than that of the automotive industry, with most suppliers being midsize, small and very small companies. So the challenge here is therefore not so much to achieve a unilateral transformation of these stakeholders as to implement a new collaborative model for aircraft manufacturers and their suppliers.

The AirSupply platform³, which coordinates the main processes of the European aircraft industry, is one response. The replication of automotive sector good practices, such as bringing suppliers closer to production sites to reduce supply lead times, is another. The world's major aircraft manufacturers are also interested in the APQP (Advanced Product Quality Planning) framework of procedures and techniques used in the automotive industry. From the upstream phase through to series production, and for any component under development with a supplier, this management method ensures compliance with all cost, lead time, quality and process requirements, based on precise expectations (deliverables, documentation, etc.).

It therefore draws the supplier into a clear commitment, which is particularly relevant in the current context of rising aircraft production levels, to guarantee lead times and final product quality. However, its success depends on the ability to specify the requirement clearly and in advance, as well as on identifying the key inspection points to be checked at the end of the manufacturing process. This is undoubtedly a challenge for the aircraft industry, given the technological complexity of an aircraft and the number of components to be assembled.

Improving the user experience with new entertainment and mobility services

User experience is another area that presents challenges to both the aircraft and automotive industries. At first glance, they appear to face different issues. Despite recent developments, the car is a personal mode of transportation and an object that is owned, which offers extensive scope for customisation and high levels of comfort (seat ergonomics, noise reduction, storage space, etc.). Within the vehicle, the driver and passengers sit in a space of relative 'equality'. The aircraft, on the other hand, is a mode of public transportation that is used but not owned, and in which attention has traditionally focused on pilot comfort rather than the range of services offered to passengers.

However, there are clear opportunities for cross-fertilisation. Some services that are already available in car interiors could be duplicated in aircraft. For example, mirroring technology already allows smartphone content and features to be accessible on the in-car multifunction display. This can be used for many purposes, including navigation. Adapted for use in aircraft, the same principle would offer a new level of diversity in terms of in-flight entertainment by allowing passengers to view their own content (films, games, etc.) on their seat-back screen in a way that delivers greater visual comfort and a more personalised experience.

There is no technological barrier to the near-term and widespread use of this type of solution, nor to the joint deployment in aircraft and cars of new mobility services that allow drivers and/or passengers to receive local information about their destination (accommodation, leisure activities, parking space availability, etc.) in real time from the cabin or passenger compartment and to interact accordingly.

Although digital services like these occur more naturally in the automotive experience, aircraft manufacturers have fully integrated this challenge into their priorities as they prepare to face competition from aircraft manufacturers based in China and emerging countries.



Envisioning tomorrow's mobility

The level of user expectations and requirements will soon rise even higher: it should be possible to begin watching a film on the aircraft screen and continue watching it on a smartphone in the airport, in the car, or anywhere else. This will be the world of digital continuity, which will facilitate further development of the range of services offered, but will require high-level infrastructures capable of recognising individual users and offering them personally profiled services regardless of their physical location. In this smart city environment, the automotive and aircraft industries will converge around the same user experience challenges: whether in the air or on the road, travel will be a shared experience, but drivers and/or passengers will nevertheless need to be able to access all their own personalised settings.

The construction of this smart ecosystem will use technological building blocks including connectivity and 'data to transformation'. It will also require reaching out for specialist expertise in order to conceive and design the service platforms at the heart of these new cities. Companies like Expleo will leverage their crossover knowledge of the automotive and aircraft industries, their awareness of shifts in mobility and their digital expertise to support manufacturers through this societal revolution.

Working alongside organisations to succeed in the transformation process

The cross-fertilisation of practices and solutions from the automotive industry to the aircraft industry would therefore seem to be a

relevant response to today's productivity and competitiveness challenges, but the process could easily become a two-way street. Just as the revolution in the automotive production chain offers lessons for the aeronautics industry, so airplane manufacturers' recent experience of regulatory compliance could prove useful to car makers as they prepare for the introduction of the much stricter Worldwide Harmonised Light Vehicle Test Procedure (WLTP) environmental regulations in 2021.

Regardless of the initial challenge, the success of cross-fertilisation depends on the ability of those involved to grasp change in all its aspects – technological certainly, but also organisational and cultural – and understand that they must not neglect the need to support their operational teams through this transition. A period of training (in new tools and new procedures) and awareness-raising ('Why are we making this change?') is required for overall success. What's more, cross-fertilisation is not about 'copying and pasting' technologies or methods from one industry to another. It is the specific knowledge of each industry (its products, environment, specialist skills, stakeholders and challenges) that gives meaning and direction to this approach and on which its success is built.

In the longer term, the cross-fertilisation of best practices between the automotive and aeronautics industries heralds a profound transition in mobility that will include new hybrid modes of transportation and decisive technological breakthroughs (flying taxis, smart infrastructures, clean mobility, etc.). There is no doubt that capitalising on knowledge and good practices across industries will play a major part in shaping this bold vision and then making it a reality.

¹ <https://www.iata.org/pressroom/pr/Pages/2018-10-24-02.aspx>

² <https://www.icao.int/Newsroom/Pages/Solid-passenger-traffic-growth-and-moderate-air-cargo-demand-in-2018.aspx>

³ <https://www.supplyon.com/fr/industries/aerospace/>

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