

Point of View

COMMERCIAL AIRCRAFT MARKET:

Why manufacturers can no longer postpone to automate their production lines

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1. The commercial aircraft market

Since the commercial aircraft market saw the light of day around 100 years ago, over 5000 airliners have taken to the skies. Every year the number of air passengers increases substantially. Latest estimations by the International Air Transport Association (IATA) show that by 2036 the number of air passengers will have doubled to 7,8 billion.

As a consequence, commercial aircraft sales are skyrocketing. Currently, some 24.000 commercial aircraft are in service with the need for another 40.000 new planes over the next two decades. About a quarter of all these new orders will be for the replacement of old aircraft and the rest can be attributed to market growth.

World's largest aircraft OEM's, Airbus and Boeing, have reported that demand for their mainstream models A320 and B737 are so high, they are already oversold until in the early 2020s with production lines filled up with work for the next ten years. And meanwhile, the need for new aircraft will only keep increasing.

1.1 Growing manufacturing orders

In response, aircraft manufacturers are ramping up the production of their single aisle aircraft. This is leaving suppliers throughout the supply chain no other choice than to follow suit. A cascade effect that affects every-one in the supply chain sooner or later. For suppliers of advanced composites, the extra challenge is the amount of labour currently still involved when manually producing composites.

Under current production rates, when ordering a B737 or A320 today, customers can expect their aircraft to be ready by 2028

Either keep up and cut costs, or risk being left behind

1.2 Keeping pace with ramp-up demands

As OEM's and suppliers are searching for ways to optimise their current production lines, the time pressure for coming up with a solution leaves manufacturers struggling to keep pace. The manual processes are slowing companies down. On top of that, Airbus and Boeing have pushed their suppliers last couple of years to cut cost, reducing suppliers' profits. Delays have contributed to a production hold-up at Boeing and Airbus. It is estimated that worldwide around 2.500 unfinished aircraft are waiting in storage. Today, OEM's are sending out a clear message to the supply chain: either keep up and cut costs, or risk being left behind.

1.3 Making the first steps towards a new production process

Aircraft (parts) manufacturers are responsible for how they choose to upgrade and modernise their production lines. The purpose of this article is to emphasize the urgency that manufacturers must look at ways to take their production optimisation to the next level. E.g. by implementing new and innovative ways of automated and digital manufacturing. Airborne can help you take these steps and make the right decisions for your business.

Ask yourself: Are you ready for the opportunities and challenges of the next 20 years?

COMMERCIAL AIRCRAFT DEMAND IN NUMBERS

More passengers than ever

- In 2018 commercial aircraft will carry nearly 4 billion passengers
- It is estimated that this number will nearly double to 7.8 billion by 2036

Soaring demand for aircraft

- The total number of aircraft currently in service is approximately 24.000
- Over the next 20 years, there is a need for approximately 40.000 new aircraft
- By 2037, there should be around 64.000 aircraft in de world
- Current worldwide production capacity is maybe good for approx. 1500 new aircraft per year

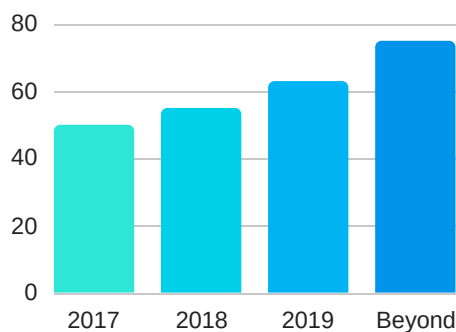
Demand drivers

- The biggest driver of demand will be the Asia-Pacific region, which will be responsible for over half of all new passengers
- Most aircraft orders come from low cost carriers (LCC), seeking flight frequency and fast turnarounds
- Most of the new aircraft are forecasted to be single aisle aircraft, with the Airbus A320-family and the Boeing B737-family as most produced commercial models

2. Supply chain manufacturers: why the stakes are high

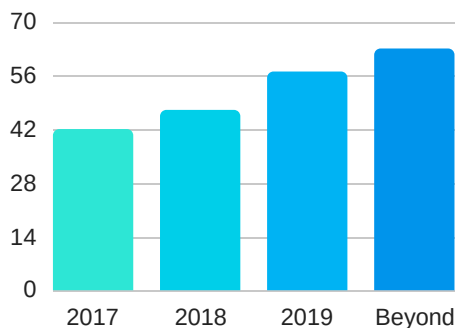
With current production rates, aircraft manufacturers can't meet future demands. Recently both Airbus and Boeing announced another ramp-up of the production of their current cash cows:

Airbus' A320 monthly production rate



Source: Reuters

Boeing's B737 monthly production rate



Source: Reuters

Yes, that's over two aircraft a day. As the big OEM's are spiking production, the whole supply chain needs to deliver their part or risk losing (new) orders. Failing to keep up with the production speed or not cutting costs, could already provide serious competitive disadvantages within the next couple of years.

2.1 A much needed focus switch to long-term solutions

Over the past decade manufacturers have been focusing on short term solutions: hiring additional workers, cutting cost, outsourcing production to low-cost countries or by making small investments to upgrade current equipment. But optimising existing production lines has its limits and many companies are reaching the end, having fully 'squeezed out' the capacity of the current set-up. In order to meet the OEM's ramp-up demands for next couple of years and to build a solid future-proof business case, aircraft and part manufacturers must look into new and innovative ways to prepare their production lines for the long term.

The effect

Suppliers are so pre-occupied with current orders, that there are no resources to look ahead of the game

2.2 Suppliers' bottlenecks

One might assume manufacturers are fully aware of the challenges faced and are putting in the work to modernise. But in the field, we often encounter this is not the case. So what is holding manufacturers back in fully modernising their production lines?

1. Cost

Investment costs are putting many manufacturers off from modernising. This especially goes for suppliers in a brown field situation, who are already producing parts on existing production lines. Without the certainty of a short-term ROI, they cannot get the business case to go, straight away, for a (partly) automated and fully efficient production line. Hence more low-cost investment solutions are being sought, despite them proving to be insufficient for the long term.

2. Contracts are keeping suppliers busy

Many manufacturers are currently executing ongoing contracts. With business cases based on pre-agreed terms and production rates. But with

monthly demands now growing and contracts no longer being sufficient, many suppliers are afraid that opening up the contract will showcase their production deficiencies and might result in losing the contract. Suppliers are so focused and pre-occupied on executing current orders, that there are simply no resources to look ahead of the game.

3. Lack of new skills, high-tech workforce

Already in The Netherlands, the number of open vacancies in the high-tech, engineering and manufacturing field is high and keeps on increasing. Yet, those are the workforce now needed to make the change to different organisational structures and digital automated manufacturing.

3. The future is automation

Production lines need to be much more efficient. But what is the best solution or approach? At Airborne, we strongly believe the future is automation. Already new competitors that enter the aircraft manufacturing market are investing in (partially) automated and digital manufacturing lines and are successfully competing with low-cost countries.

3.1 Why automate?

Automating the production process does not only help speeding up production and meeting ramp-up targets, it will also help you in preparing to overcome other future challenges. One can think of:

- Increasing your competitive advantage through:
 - drastically lowering the cost of manufacturing
 - reaching higher production rates
 - improving time-to-market
- Optimising the use of your workforce, by looking for automated manufacturing solutions for repeatable tasks that can easily be automated and so assigning more flexible tasks to your skilled workers
- Shifting to a 24/7 production capability, which will be easier and more cost-effective with automated manufacturing lines than with a human workforce due to e.g. stringent labour laws, high night and weekend tariffs and reduced quality
- Guaranteeing a good and repeatable quality of your product, as an automated production line will always carry out its tasks the same way and there will be no room for human error
- Drastically reducing material waste and enhancing Buy to Fly ratios
- Paving the road to a fully digitalised production line, holding many advantages such as e.g.
 - simplifying administration
 - easify sharing knowledge and communicating with clients
 - analysing data
 - spotting deficiencies to further optimise the process
- Lengthening the digital design and manufacturing thread, for digital design is now often translated to analog manufacturing instructions. With automated manufacturing the digital design is continued in digital manufacturing. This will enhance efficiency, limit paperwork, improve quality and reduce conversion risks

3.2 The right solution for the right situation

Most manufacturers operating on the current commercial aircraft are stuck in a brown field situation, where they are already producing with an existing production line. When already involved in a program, options are to either further 'squeeze out' current production or gradually upgrade with off-the-shelf automated manufacturing solutions. Once new aircraft are being designed and will enter production, it will become easier to invest and install new, innovative and highly efficient automated production lines. Therefore, it's highly recommended to gradually start implementing new and innovative ways of automated and digital manufacturing. Since, adopting to the changes isn't an overnight drill. It takes training people, creating new organisational structures, a new mind-set, infrastructure and so forth. Not starting today will mean you become obsolete tomorrow - and someone else will do the job for you.

3.3 Automation examples

Looking at our own playfield in the composites industry, we identified a few common bottlenecks and provide 'off-the-shelf' solutions that (usually) only require some minor customization for both brown and greenfield situations. These quick plug-and-play

wins are mere examples of the kind of production steps that you can automate:

- **Ply cutting, picking and sorting**

When thinking about thermoset composite production processes, prepreg plies are being cut and operators are picking the plies manually from the cutting table to start sorting them on another table in order to create a fully sorted stack of plies that can be used for the lay-up process. How about robotized ply cutting, picking and automated sorting?

- **Honeycomb potting or core filling**

Many honeycomb blanks for aircraft interiors, fan cowlings or structural components are being manually filled with core fillers or potting compounds in order to create local reinforcements. Why not automating this production step and use your workforce elsewhere in the production process for manufacturing processes that aren't straight forward to automate?

- **Laminating**

Small to medium sized parts are usually still being produced by cutting prepreg plies and putting them manually through a lay-up process in moulds. Imagine what automated tape laying, cutting & pick & place can do for you.

4. Make your move: how to get started

To become a future-proof company, one must automate and digitalise production. Often we hear from manufacturers they don't know where to start. What is the best first step to take?

Many manufacturers act paralysed out of fear of making a wrong decision and bad investment. Or they are waiting for competitors to make a first move and search for success stories on how to go about. But we are standing on the brink of a technological revolution, the fourth industrial revolution, the era of automation and digitalisation where technologies are being fused. It is pioneering!

4.1 Becoming a change maker

As we have seen in other market segments, waiting too long might result in competitive disadvantages compared to (new) suppliers who are in a green field situation and go straight away for the newest technologies, often making them the cheaper, more flexible and faster partner.

The first change maker is the winner that takes it all, as we have learned from Uber, Airbnb and Booking. The other risk is watching the OEM's start producing the parts they now outsource themselves, out of discontent with production speeds, cost levels and flexibility.

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Get started: 3 crucial steps that will help you find the right automated solution

4.2 Production line optimisation in 3 steps

Airborne has over 20 years of experience in advising and helping clients with advanced composites and automated composite manufacturing solutions. To help manufacturers get started we have defined 3 crucial steps you should make before jumping straight into all automated manufacturing solutions the market has to offer:

Step 1

Analyse your (future) production line, ramp-up targets and contractual obligations

Step 2

Determine your bottlenecks and weak spots and what it takes to overcome them

Step 3

Orientate which possible solutions could work for you

4.3 Questions to ask yourself before calling us

Only when clearly having your targets, contractual obligations and bottlenecks in mind, you will find an automated solution that might work best for you. Some of the questions to ask yourself are:

- What is the production volume?
- What is the available time for that production volume?
- What is the allowed conversion cost for the part?
- What is the material cost and waste percentage?
- How scalable should the output be?
- How scalable is my organization?
- How can I connect manufacturing to my engineering and design?
- How flexible should the line be: dedicated to one type/model or multiple?

5. How can we help?

Manufacturers that are looking into modernising their manual production lines need to make difficult choices. Needs may contradict with available company resources and regulations and certifications need to be streamlined. The service of an experienced and trusted advisor such as Airborne can help you make the right business decisions. We can support composite parts manufacturers in both greenfield and brownfield situations by offering advice in any stage or with off-the-shelf automated composite manufacturing solutions, such as:

- **Automated Laminating Cell**
- **Automated Pick & Place**
- **Automated Kitting & Sorting**
- **Automated Honeycomb Potting**

5.1 Shape your own future

Ultimately, we hope to have succeeded in emphasizing the urgency that commercial aircraft (parts) manufacturers must look at ways to take their production optimisation to the next level. Looking at current market demands and trends, it is key to start focussing on the long term and organise your production line accordingly. Simply to ensure that in the near future you are shaping the market, instead of fighting it.

About Airborne

As a preferred supplier we design, develop, qualify and manufacture composite products for the most demanding applications. We develop and build machines with the capability to automate manufacturing of composites structures at competitive price levels for a number of industries worldwide. Our ambition is to build a leading physical and digital platform in composite automated manufacturing technologies for small to mid-size composite components. Airborne employs more than 100 highly skilled people. Customers include directly and indirectly companies such as Airbus, Dassault, GKN-Fokker, Gulfstream, Thales Alenia Space.

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