



# Aircraft manufacturing: An industrial symphony

By **Addison Schonland**

March 7, 2025, 12:16 (UTC +3)



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*Addison's focus is helping clients and colleagues improve their understanding of the industry through data models.*

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Producing aircraft requires millions of parts from many vendors scattered across the globe. The concept of Toyota's "just-in-time" production is now a standard within aerospace. Parts are expensive because raw materials are expensive. Roll into this cocktail the skills needed to make the parts and government oversight to ensure 100% safety.

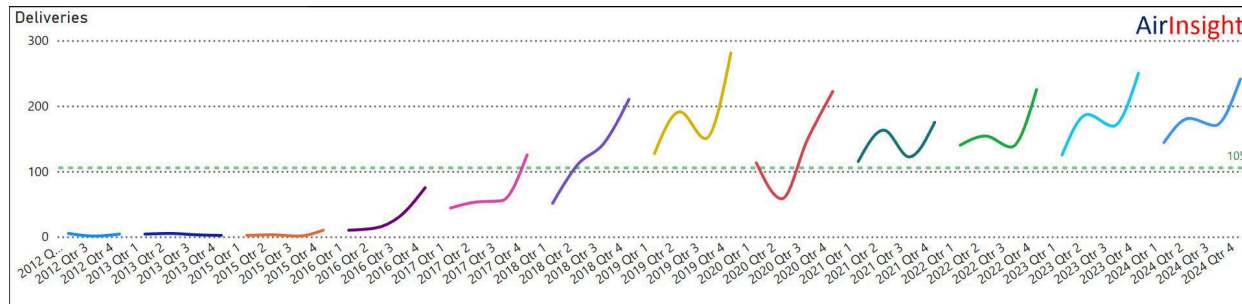


That's the theory, anyway. The practical way this all comes together can be visualized as a grand orchestra with instruments across the globe. The conductor must ensure each instrument keeps the beat. The difference between music and cacophony is immediately apparent.

With this mental image, we want to share something that displays this beat. Producing an aircraft may be one of the most complex industrial activities.

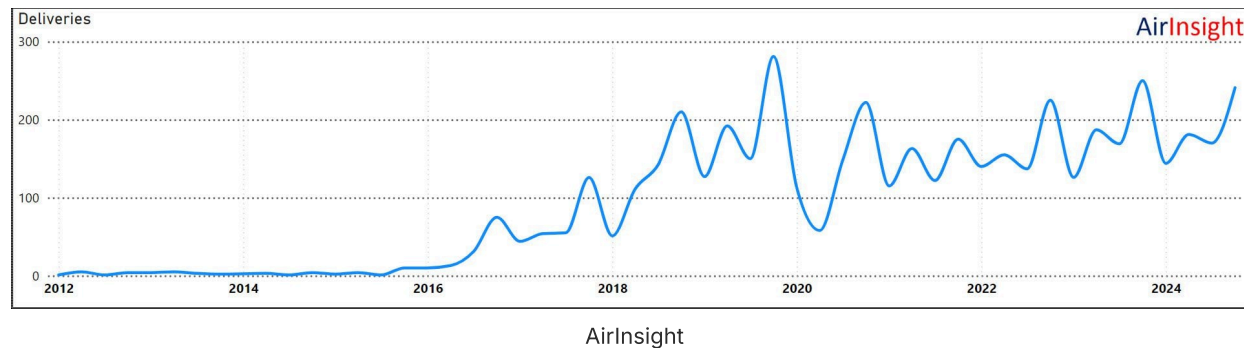
## Airbus

Let's start with Airbus. The chart lists deliveries from current programs. The green dashed line is the quarterly average. That average was pierced in 4Q18 but for the pandemic, Airbus has remained above it.



- Notice that deliveries accelerated as Airbus moved from the CEO to the NEO program. The curves show how Airbus developed a rhythm and did exceptional work going into the pandemic. 2019 was an excellent year.
- The pandemic wreaked havoc on commercial aviation, as we saw in 2020.
- But by 2021, the rhythm was returning. Since then, Airbus has kept at it.

Another view of this work effort can be seen below, tracking deliveries over the period.

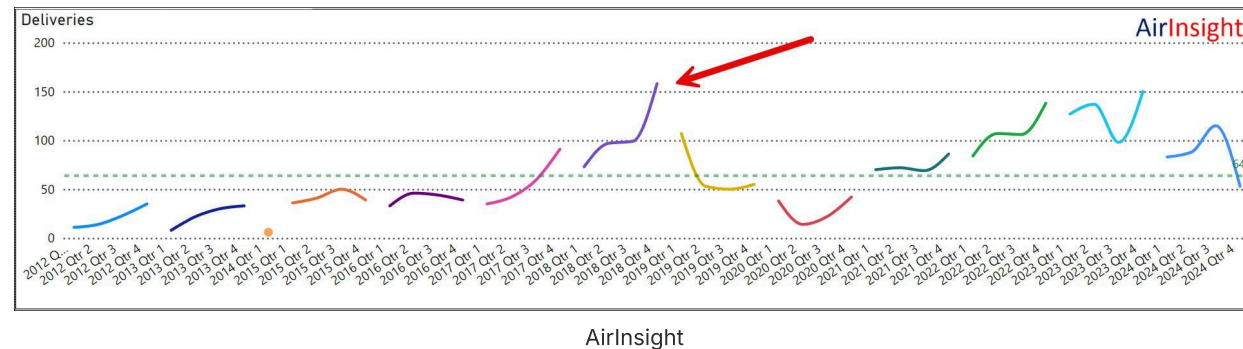


The chart shows acceleration, disruption, and recovery but also indicates delivery growth. To understand how impressive this performance is, consider Airbus ships parts

across the Atlantic to Mobile from Europe. It also has Final Assembly Lines (FALs) in China and Canada. Considering all this, recovering “the beat” after the pandemic is remarkable. This is industrial music.

## Boeing

Now, let’s look at Boeing. Boeing follows a similar path, accelerating its MAX deliveries. The red arrow highlights what we now recognize as the same symbol Airbus has above – “the beat.”

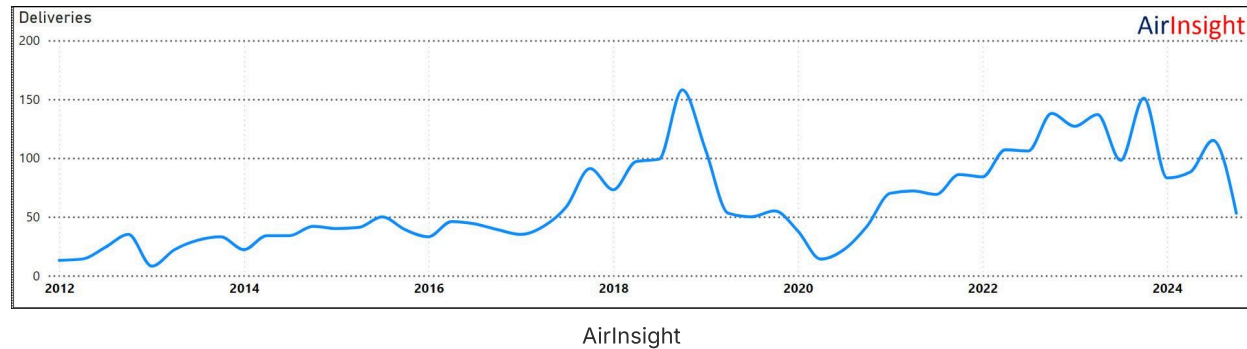


- Even with the 787 and MAX challenges, Boeing moved quickly. However, its average is 54, compared to 105 for Airbus.
- Boeing’s “music” hit its stride in 2018 compared to 2019 for Airbus. We guess we are not alone when we first saw it here.
- Then came the perfect storm: a pandemic plus a grounding.
- Boeing recovered fast. In 2022, we have “the beat” symbol again.



- But 2023 went out of time, and 2024 has been cacophony.

Here's the same chart for Boeing as we have for Airbus above.



It is crucial to consider that Boeing has one FAL for its MAX program, which delivers most of its aircraft, as the NEO program does for Airbus. This should simplify Boeing's processes and mean a more easily managed supply chain. However, that supply chain has been stressed far more than the one at Airbus.

Since these two OEMs are a duopoly, Boeing's disruption impacts the entire supply chain. Indeed, some Boeing supply chain firms are now implementing layoffs to compensate for the company's recent strike. Although the strike may be over, and Boeing may be making deliveries again, supply chain firms are still experiencing whiplash.

## Supply chain stress

The supply chain's sensitivity—the far-flung instruments that must keep the beat—is trying to recover. However, earlier production disruptions from the MAX grounding and 787 delivery pauses hamper this recovery. Supply chain firms don't have the margins to



absorb shocks as they might have without a pandemic. This is the outcome of the perfect storm.

Having made this point, Airbus' impressive recovery becomes clearer. Airbus likely benefited from a supply chain pivot away from Boeing. But that does not explain all of it. Airbus has made an impressive recovery from the pandemic. The supply chain needs Boeing to recover quickly because parts are not interchangeable.

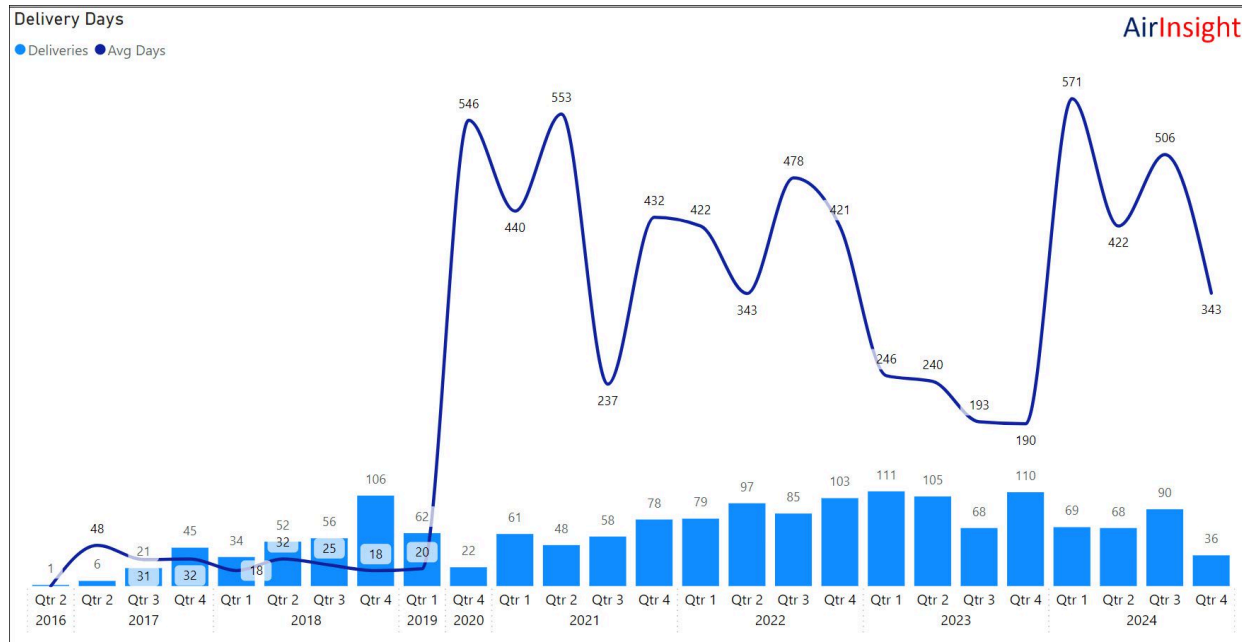
## Boeing's resilience

This is where we need to reinforce the powerhouse Boeing's Renton, Washington FAL represents. As we saw in 2018, Renton is capable of high production rates. Provided labor strife and the supply chain settle, Renton can churn out MAXs again. Currently, the FAA limit is 38/month, but a helpful inventory is almost ready to go.

Here's a chart to illustrate that point. The chart reflects MAX deliveries. The columns are the count of deliveries, and the curve is the days between the first flight and delivery.







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Note that deliveries were made within a month of the first flight in the early days of the MAX program. Airbus's performance was roughly the same. Then came the grounding and complications from the pandemic—the days' metric shows how Boeing managed to move the aging inventory. Indian customers took delivery of aircraft ordered by Chinese airlines as Boeing pivoted its sales efforts.

As we close 4Q24, note Boeing has managed to drive down this metric again. The simplicity of one FAL helps Boeing recover. As it works through the various issues to get the MAX program back on track, another MAX FAL is coming on stream at Everett, Washington. Once the MAX 10 and MAX 7 are certified, we expect to see the days' metric drop below 35 days. The beat will return to the appreciation of the entire aerospace silo.



Airbus

Boeing





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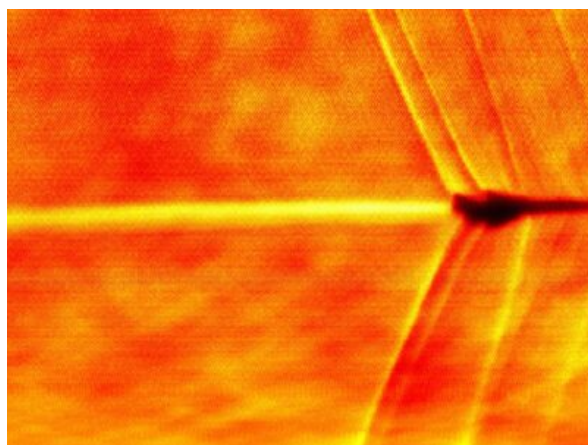
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