

Chapter 2: COVID19 crisis - an opportunity for a Manufacturing revolution ?




Not long ago, thanks to five to seven years of in-depth transformation, the aeronautics industry was in ruddy health. New airlines were emerging. Existing airlines were recording medium to high growth. Travellers were receiving special attention. The shift to more eco-friendly behaviour was picking up pace. And passenger numbers were projected to rise steadily over the following ten years. Then came the end of the iconic A380 programme. This was followed by the 737 MAX debacle and its tragic human consequences. And for the last 13 months, the COVID-19 pandemic has put the entire industry under severe strain, and even at risk of collapse.

The COVID-19 pandemic has plunged the airline industry into a unique and unprecedented crisis. In the first part of our White Paper, we discussed how passenger transport ground to a halt due to national and international regulations.

At the same time, companies in the industry have all paid particular attention to protecting the health of their customers (see the many communications and studies published, in particular by airlines, aimed at reassuring passengers). The employees of these

companies have received no less attention. Human capital is the number one priority of businesses and governments alike. This has given rise to a large number of measures to protect workers while meeting (revised) aircraft delivery targets.

Even today, there is still uncertainty surrounding how long the situation will last and whether it will get any worse. Airlines and aircraft manufacturers (and the entire supply chain) have either been offered relief by the public authorities or have set up ad hoc support programmes via mutual assistance mechanisms. More plans of this type are currently either being deployed or drawn up all over the world. Since April 2020, a significant drop in revenues and cash flow has been observed across all industry players, whether airlines and original equipment manufacturers (OEMs), or their suppliers in the aeronautical production ecosystem. The International Air Transport Association estimates that the industry will need a cash injection of up to \$200  billion and loan guarantees to withstand the economic turmoil. In addition, a reduction in commercial aircraft orders (a crisis that is already beginning to take shape is a likely knock-on effect of the global pandemic).

Airbus Business Unit Exposure

	FACTORS	COMMERCIAL AIRCRAFT
Demand	Short-term demand	▲
	Mid/long-term demand	▲
	Customer risks	▲
Supply	Sourcing & Logistics	▲
	Inventory (Raw & WIP)	▲
Production	Labor-intensity	▲
	Working environment	▲
	Manufacturing strategy	▲
	Operations continuity & cost base flexibility	▲
Working Capital	Receivables	▲
	Inventory (finished goods)	▲
	Payables	▲
Overall risk	Short-term	Very negative
	Mid-term	Negative

▲ Very negative ▲ Negative ▲ Slightly negative ▲ Neutral

Tier-1 suppliers such as Safran, Thales, General Electric, Rolls-Royce and MTU have reduced capacity by up to 20-30%, but they are all part of larger, diversified organisations and will likely survive.

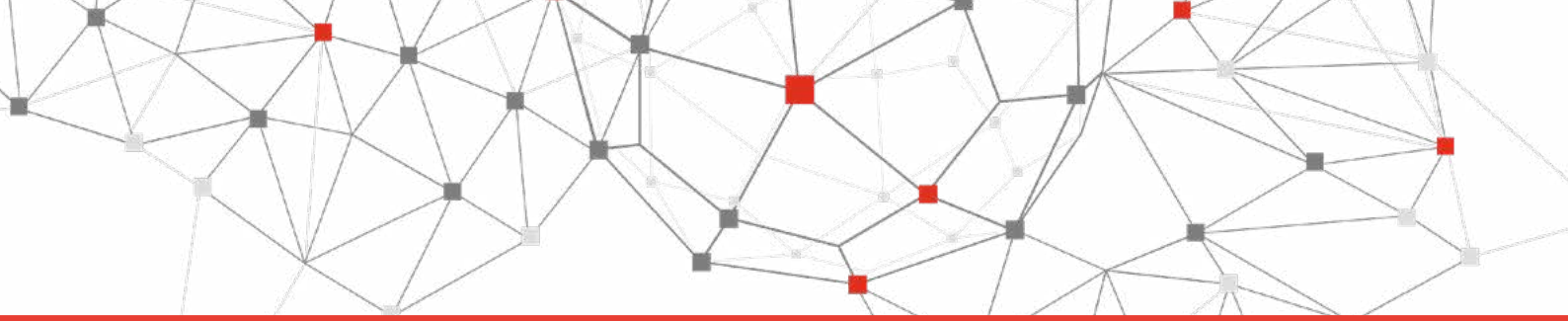
Below them sit thousands of smaller, aerospace-exclusive suppliers that have, in many cases, rewired their organisations to support a single OEM – or even a single airframe. Without significant support, they are likely to go under and trigger risks and vulnerabilities further up the supply chain. The financial struggles of these smaller suppliers may also force long-anticipated and much-needed consolidation within the lower-tier supply base.

For OEMs, the near-term challenge is to support these suppliers to the extent possible, in part by working with governments and industry associations (GIFAS in France, BDLI in Germany, Care Act, etc.). Internally, OEMs and Tier-1 suppliers should conduct a diagnostic of all suppliers for a given airframe or component



This is the worst crisis since 1929. It is having a strong impact on specific business sectors, with winners and losers... with some companies in tech doing better than ever and others at rock bottom."

Philippe Keryer – Executive Vice President Strategy, Research & Technology – Thales



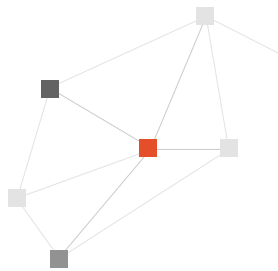
and rank them based on their relative risk. Compiling this information into a dashboard can ensure that everyone has an up-to-date view of each supplier's status, regardless of changes in the environment.

In Europe, OEMs (Dassault Aviation, Safran, Airbus, Thales) have set up a joint investment fund with ACE Capital Market to protect suppliers and support them through the COVID-19 crisis. Strategic assets are being closely monitored, too. Recently, ACE launched a takeover bid for high-performance alloys specialist Aubert & Duval. This Eramet subsidiary has seen a 70% decrease in business because it depends heavily on aerospace. Eramet, already in a tight situation, now finds itself compelled to sell. The purpose of the takeover bid is to secure the OEM's supply chain and guarantee Europe's technological independence.

While most companies already have business continuity plans in place, these may not have factored in the unknown, fast-changing variables of a pandemic such as COVID-19. Typical contingency plans allow for a return to operational effectiveness after natural disasters, cyber incidents and power outages, among other things. But they generally overlook the widespread quarantines, prolonged school closures and additional travel restrictions that may occur in a public-health emergency.

The coronavirus pandemic is a source of concern and economic hardship for consumers, businesses and communities worldwide. The situation is changing rapidly, and the consequences are considerable, both in the short and the medium to long term.

The crisis in the commercial air transport industry is compounding this negative impact on aircraft manufacturers, as new aircraft orders decrease – and existing orders are cancelled.

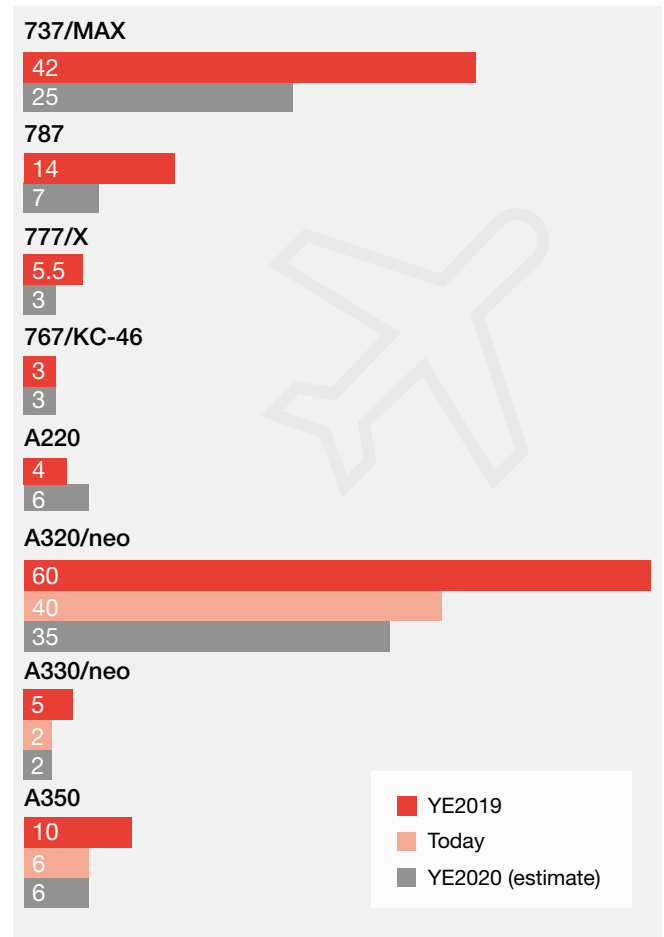


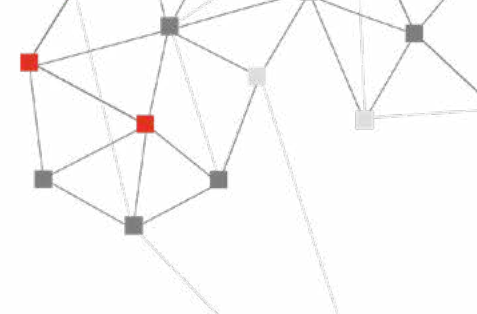
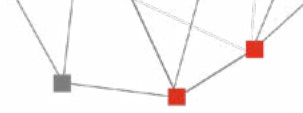
The commercial aircraft business activity has dropped by close to 40% in recent months as the industry faces an unprecedented crisis. Commercial aircraft production rates have been adapted accordingly. Airbus is grateful for the government support that has enabled the Company to limit these necessary adaptation measures. However with air traffic not expected to recover to pre-COVID levels before 2023 and potentially as late as 2025, Airbus now needs to take additional measures to reflect the post COVID-19 industry outlook.”



Guillaume Faury – Chief Executive Officer – Airbus

Oem production rate (announced)
YE2019 v. Today v. YE2020, Monthly Rates





Weaker demand for materials and components is now hitting OEMs, and will affect the entire supply chain in the long term.

Given the unknowns around how the COVID-19 pandemic will play out and when it will end, commercial airlines should expect a period of turbulence and plan ahead for the recovery. Judging by previous crises that the industry has experienced, however, this may not occur until 2023 or even 2024.

The immediate consequence is disruptions to the supply chain, due to the financial impact on partners and suppliers who may have had to scale back or stop production.

The crisis has made it clear that commercial aircraft manufacturers must expect the links in their supply chain to continue weakening. Some vendors and suppliers are already facing operational or financial difficulties. Further supply chain bottlenecks, both nationally and internationally, are likely to come.

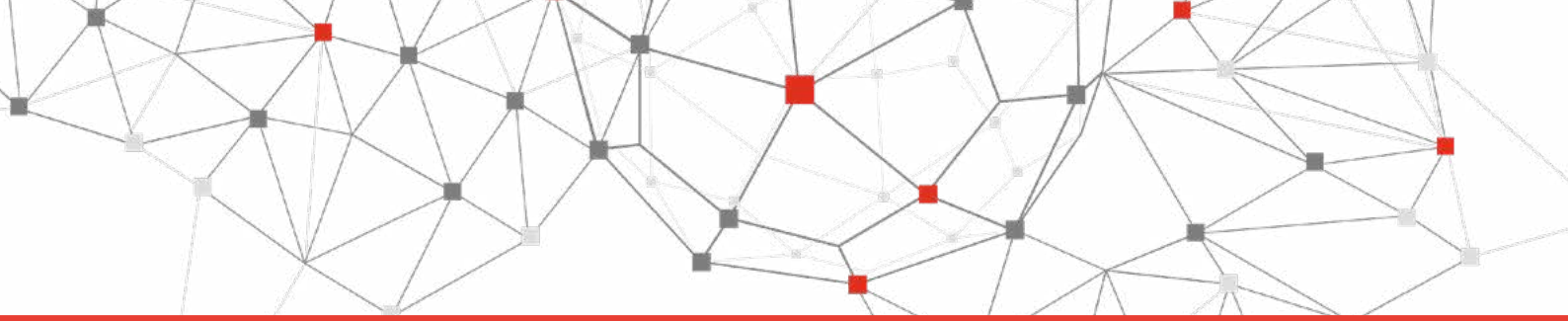
Due to regulations, restrictions and controls, companies in the industry have seen their supply chains become increasingly vulnerable to global disruptions. Pain points include single sourcing and JIS parts from critical COVID-19 regions, labour-intensive production phases, low transparency in Tier-2 to Tier-n suppliers, and Tier-2 to Tier-n material scarcity.

As in previous years (2001 and 2008-2009), the aviation industry has been rapidly reducing discretionary and capital spending to support its operations. Today, it is fair to ask the following questions:

- Are you monitoring government advice and measures being enforced in countries which form your supply chain, to assess how supply chain disruption could accelerate in coming weeks as the virus continues to spread?
- What mechanisms do you have in place to keep up to date on local country developments and changes?



- Have you investigated options for sourcing parts from onshore suppliers?
- Have you reviewed the possibility of sourcing from an alternative supplier that meets the industry's safety, quality and regulatory compliance requirements?
- Have you modelled the cash flow implications of having to hold increased buffer stocks to avoid shortages?
- Have you reviewed investment plans to consider which ones can or should be deferred to preserve cash flow in uncertain market conditions?
- Have you considered the potential tax implications of changes to your supply chain network or the indirect tax implications of transaction flow changes (e.g. VAT, tariffs)?



On the supply chain side, for at-risk suppliers, companies can step in with mitigation measures such as redesigning operations, offering financial or legal support, or assisting with government stimulus programmes. In the longer term, OEMs and Tier-1 suppliers must build a more resilient supply chain to support production when it ramps up again. The central objective should be to increase transparency, agility and resilience to large external shocks.

During the first weeks and months of the crisis, subcontractors concentrated on managing their resources, both financial (liquidity, stocks, renegotiation with partners, customers and suppliers) and human (working time arrangements, negotiations with trade unions, site layout, etc.).

At the same time, while continuing to keep an eye on their cash flow, subcontractors paid particular attention to demand signals (such as air traffic and order confirmations, postponements or cancellations) to optimise their timetables and supply chain. While one of the very short-term objectives was to keep all Tier-n suppliers afloat, Tier-1s quickly initiated steps to secure and rethink their subcontracting strategy.

All companies have put in place more or less sophisticated tools to capture the slightest signals from the ranks of their subcontractors. These control towers are designed to track weak signals virtually in real time. As a result, partners' capacity to deliver a particular part, piece of equipment or system is now only analysed based on vague and uncertain forecasts.

For this reason, after an initial period of ultra-aggressive "ramp-down" suffered by all companies in the value chain, subcontractors have had to quickly adjust their production efforts to customer expectations and requirements.

Digitalisation and Industry 4.0 concepts, already widely initiated in the industry, have returned to the fore. Whereas previously industry players had launched PoCs or PoVs in large numbers, without always correlating them to "top-line" or "bottom-line" issues, we are now seeing that the need for data recovery and analysis has accelerated to better manage risks throughout the chain of command.



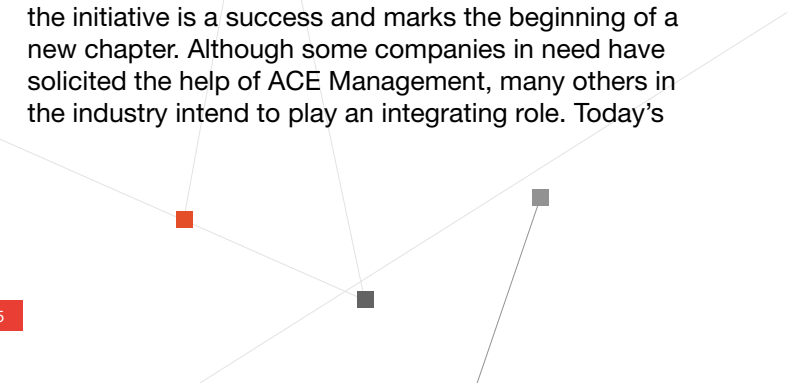
Players across the industry are starting to help each other out talking at the company's quarterly results presentation on Tuesday, 28 April 2020. "Purchaser like Airbus, Thales and other big equipment makers, as well as the public authorities, have understood that it's their responsibility and in their best interest to make sure that the entire supply chain can ramp back up when required."

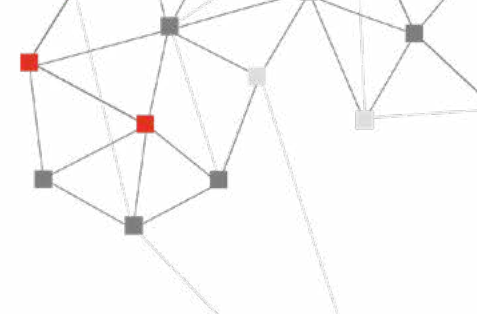
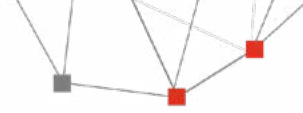
Patrice Caine – Chairman and CEO – Thales

At the same time, a need for improved performance and higher productivity has been confirmed. To achieve this, companies that had found themselves obliged to adapt working time arrangements or stop (or reduce) the use of temporary workers have now had to speed up their thinking, strategy and investments in innovation.

After taking a closer look at the health of their suppliers and their suppliers' suppliers, companies in the industry have been confronted by a stark reality. With almost all suppliers in a critical situation, the entire industry is at risk. It has therefore become imperative to put in place mechanisms to reduce the pressure and the level of criticality.

One way to shore up the industry is to involve investment funds, which could either acquire minority or majority shares in companies or take part in the consolidation efforts called for by many industry players. The initiative launched by ACE Management, Airbus, Thales, Safran and Dassault is very representative of this approach, as it aims to help companies contributing to aircraft production. The amount in excess of €600 million collected shows that the initiative is a success and marks the beginning of a new chapter. Although some companies in need have solicited the help of ACE Management, many others in the industry intend to play an integrating role. Today's





prey can quickly become tomorrow's consolidator. As proof, the number of VDDs has dramatically increased over the last few months. This is the sine qua non to ensuring that the company taken over meets expectations or increases its exposure to customers.



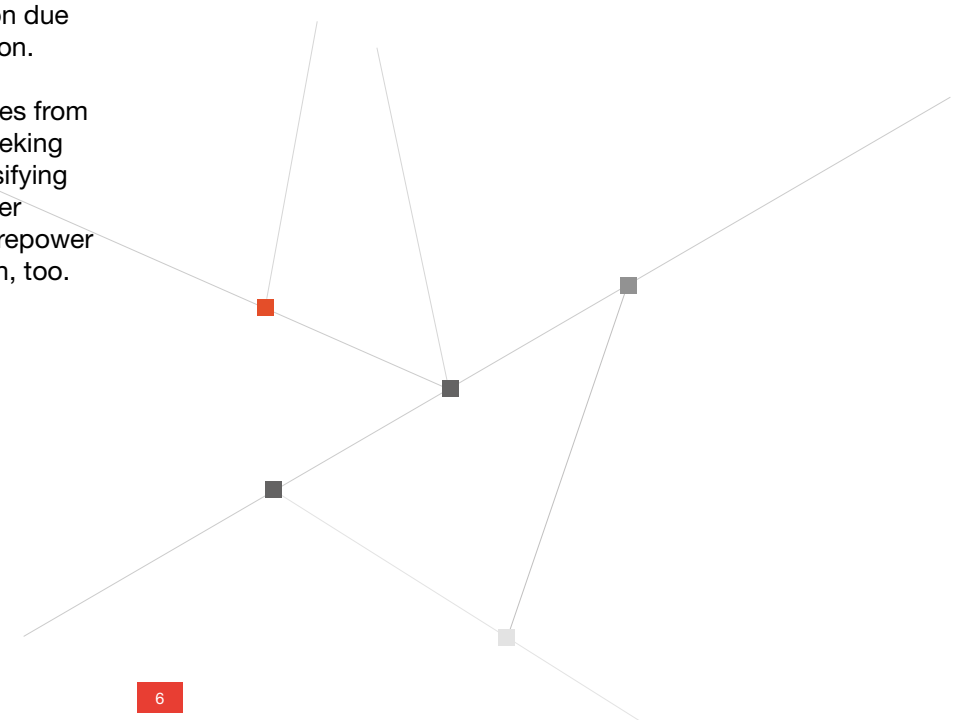
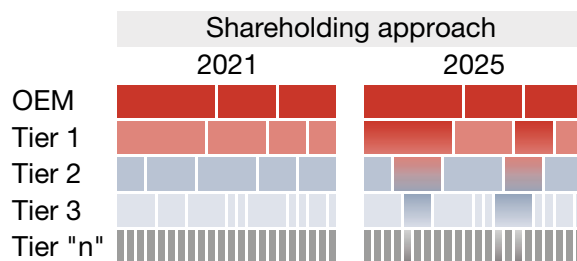
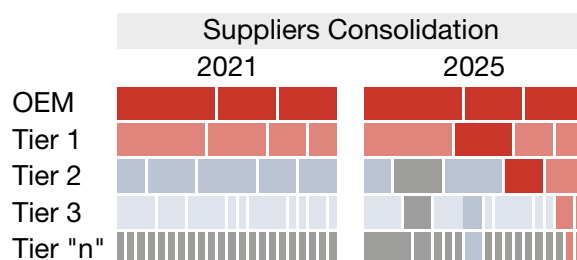
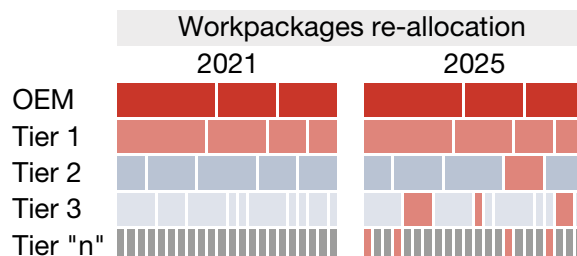
The whole industry is on life support, and the risk of failure could be significant. As a result, the necessary consolidation will have to be accelerated."

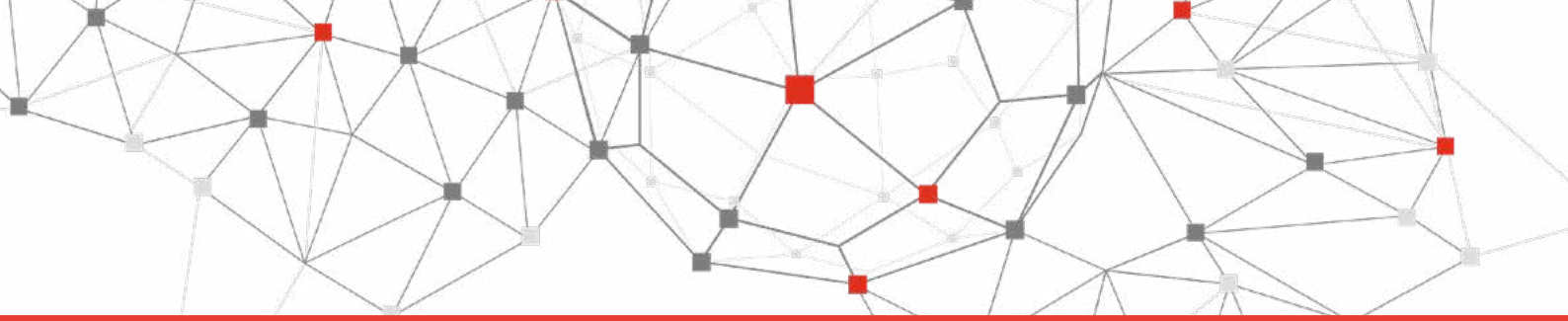
Didier Kayat – Daher

These companies have undertaken to screen the market and be as proactive as possible. Some will seek to consolidate their positions and thus increase their presence on work-package programmes, while others will look to diversify their product portfolio or even expand into the military sector .

While objectives may differ from one company to another, we risk seeing a race towards consolidation in the long term that could lead to negative effects such as an artificial increase in companies' value, dilution or even dispersion due to overly broad or opportunistic diversification.

It should also be remembered that companies from other industries, such as automotive, are seeking to invest in aeronautics with a view to diversifying their own operations. Many US, UK and other investment funds with significant financial firepower are aiming to play a role in this consolidation, too.





On the manufacturing side, aircraft deliveries amounted to 723 units in 2020, almost 40% less than in 2019 (and 55% less than in 2018). This significant decline concerns all hull types. Widebodies had a challenging year, with a drop of more than 50% in deliveries compared to 2019. Deliveries of single-aisle aircraft fell by 35%, a dramatic plunge due to a combination of the difficulties encountered by the 737 and the pandemic.

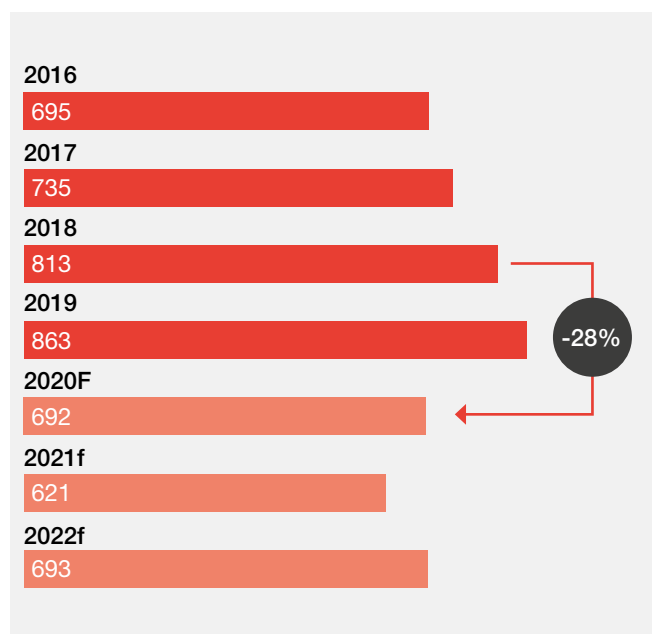
Aircraft orders are following the same trend. Only 500 new orders were recorded in the year, down 60% compared to 2019 (versus a 50% increase in January 2020, before the pandemic’s effects began to be felt). The impact on widebodies is even more significant, with orders tumbling 80% in 2019 due to the uncertainty created by the pandemic and reduced demand for long-haul travel (travel bans, border closures, new local regulations, etc.).

The effect of the collapse in demand, delivery difficulties and cancellations reduced order books by 6.5% (or 13,000 aircraft), representing more than seven years of “backlog” and as many hours of production industry-wide.

At the start of the crisis in early 2020, Airbus announced a four-day shutdown of production and assembly in a press release dated 17 March 2020. Other big names in the industry followed suit. In fact, companies across all sectors of the economy, whether because they were unprepared or simply ill-equipped to handle a situation of this nature and magnitude, responded in the same manner by closing sites – by choice or necessity.

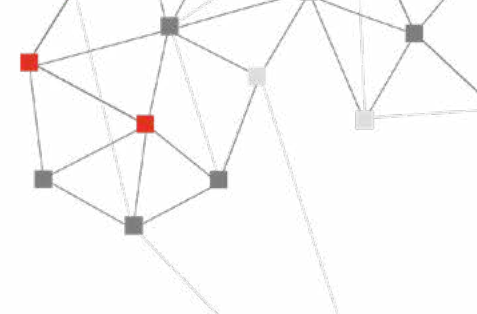
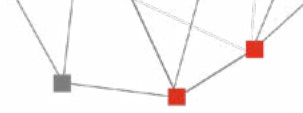
The first priority at this time was to protect workers by ensuring that working conditions allowed social distancing recommendations to be respected. In coordination with employee representative organisations, many return-to-work measures were defined and then deployed with some degree of success. All companies were thus able to restart their production lines, albeit with restrictions, to meet their order-book and other commitments.

Forecast production outlook
Airbus, Yearly rates, estimate



In March, we began looking for a way to work “normally” in a constrained environment. The Executive Committee took decisions in March based on the information that Thales had about COVID-19. Difficult negotiations then took place with the trade unions – consistent with the situation and the unknowns. Thales stopped its non-defence operations for three to four weeks. When employees returned to the workplace, very satisfied with the way Thales had managed the crisis under duress, the trade unions reviewed their approach.)”

Philippe Keryer – Executive Vice President
Strategy, Research & Technology – Thales



Decisions such as these are never taken lightly. Yet they are inevitable because they are the result of failed or incomplete business continuity plans. Although crises of this nature (pandemic) and magnitude (worldwide) have undoubtedly been discussed and debated many times, few companies actually had suitable contingency procedures and plans in place to maintain or restart business. The fact that the risk had been considered low by some points to their ability (or lack thereof) to return to existing business levels, or at least project a reliable target.

Stopping a factory or a production line is, in itself, a complicated technical and organisational operation. There are a number of factors to be taken into consideration, including impacts on the workforce, facilities, inventories and supplier relations, as well as many other critical issues.



There are countless uncertainties. Companies need to stay attentive to the new lockdowns that could be imposed. Until now, they have been able to manage the constraints and maintain production. But if further, tighter lockdowns are introduced, how will they manage? Look at the outbreak at Airbus in Hamburg – the same thing could happen elsewhere. The impact would be immediate – and uncontrollable.”

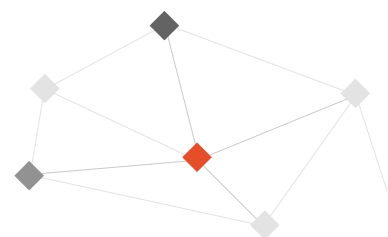
Didier Kayat – Daher

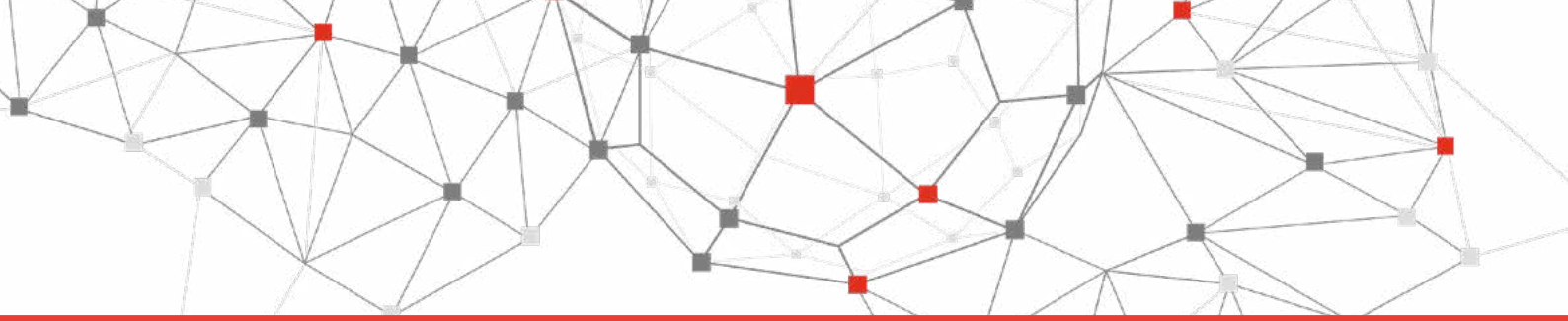
Redeploying or relaunching a production line, however, is completely different, and potentially more complicated. It requires additional measures to return business to the levels observed before the crisis. Despite the fact that civilian and military sites remained closed for only a few days or weeks, the industry has had to reinvent itself by figuring out how to relaunch production lines in compliance with new and constantly changing health protocols.

Some manufacturers have set up team rotation plans. Others have equipped their employees with masks and gloves, installed plexiglass panels and taken other protective measures to restart their sites. Very often, however, they remain unsure and uninformed about the number of parts, components and products to be manufactured, delivered or assembled.

By deciding to close a site (or a production line), an aircraft manufacturer (or an OEM, Tier-1, etc.) disrupts its entire supply chain, with critical consequences for the industry as a whole.

To mitigate this dramatic situation, many have sought to put in place stopgaps, as previously seen. Others have begun to rethink how they work as part of their medium- to long-term strategy. Thales, for example, quickly moved to analyse what benefits the crisis had brought in terms of manufacturing and validation processes, to see if some could be duplicated and deployed at scale. Others, such as Airbus and Daher, confirmed their appetite for digitalisation and Industry 4.0 approaches.





We have made numerous investments in digitisation, such as the launch of the Innovation Lab in Toulouse (Tech Center) focused on logistics. This facility will also serve as a training centre for our teams. The same approach has been applied in Nantes to materials and production processes, and in Tarbes to aircraft processes and production. An SWP agreement allows us to anticipate the need for skills each year to help employees grow in line with team needs and requirements.”

Didier Kayat – Daher

Others still have initiated comprehensive, collaborative strategies to integrate their suppliers even further upstream of their products (MBSE-type approach, digital continuity, data centricity, etc.).

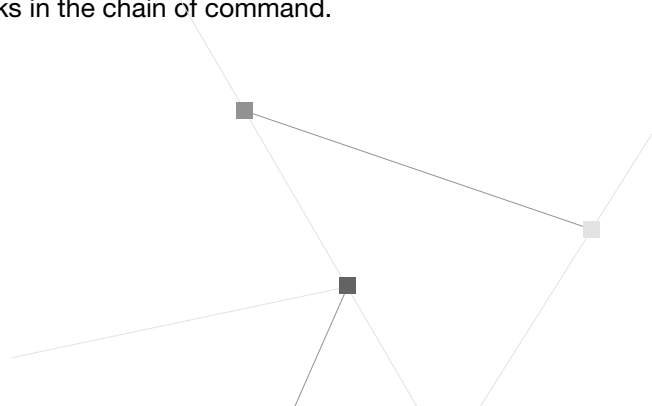
The question today is whether technology should be seen as the answer to the pandemic, and whether robotisation and automation are the only solutions to maintain business. While technology is now a well-known “enabler”, we need to undertake in-depth.

The answer will probably be a hybrid solution, as technology and innovation are fuelled by people.

For this reason, it is essential to rethink the very way in which an aircraft is manufactured and assembled. From upstream to downstream, the entire value chain must be reconsidered. Airbus, through its

DDMS initiative, had already initiated this process before COVID-19 emerged. Integrating production lines from upstream down seems obvious today. But silos resulting from complex organisations, a lack of standardised methodologies in-house, and disparate and sometimes obsolete tools, are all hurdles to the success of any transformation project.

Airbus, Boeing, Thales, Safran and Collins have started to adjust their mindsets and refocus their strategy accordingly. The next step is to reimagine tomorrow’s production and assembly processes by integrating third parties “n” and “n-x” into the overall system, thus avoiding any breaks in the chain of command.



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