



FIXING THE VULNERABILITIES IN THE A&D SUPPLY CHAIN

By Greg Mallory, Thomas Peddicord, Lacy Ketzner, and Joshua Brenner

C OVID-19 HAS LED TO an unprecedented crisis in the aerospace and defense (A&D) supply chain, and OEMs need to dramatically scale back their capacity to reflect the new realities of the commercial air travel market. The key challenge is to do this while avoiding long-term damage to the A&D supply chain. Most A&D suppliers are highly specialized, with unique expertise, complex equipment, and deep supply chains of their own. As a result, they cannot simply wind down production now and spool it back up later on demand. If they go under because of challenges in commercial air travel, the industry faces a gap of five to seven years before it will be able to return to pre-COVID-19 capacity. Worse, because many suppliers serve both commercial aerospace and defense segments, spillover consequences from the commercial side could leave defense OEMs unable to source critical parts for their programs and platforms.

We recently prepared a perspective for the Aerospace Industries Association, analyzing the full effects of the pandemic on

A&D suppliers, interviewing dozens of suppliers over a three-month period to identify specific risks for different supplier segments. We also identified measures that OEMs and the Department of Defense (DoD) can take to support suppliers, such as pulling order volumes forward, sending clear demand signals, and offering various forms of financial support. These significant steps are clearly warranted in the current environment. The viability of the US A&D industry hangs in the balance.

Overlapping Crises

The most problematic aspect of COVID-19's effects on the aerospace industry is that the pandemic is compounding with several other crises, each with its own dynamics, to create larger issues for suppliers. Prior to the pandemic, the grounding of Boeing's 737 MAX had posed major challenges to the supply base. Boeing recently restarted production, providing some relief to suppliers involved in the program. But because approximately 400 aircraft are in the production system, significant existing inven-

tory positions need to be worked through. Most suppliers are currently capitalized for up to twice the new required production levels. And even suppliers dealing with clear demand requirements face operational challenges related to the need for social distancing—a constraint that will be in place well into 2021, until either a vaccine is available or herd immunity is achieved.

A longer-term crisis involves the collapse of commercial air travel. Ticket sales are down 90%, and we believe that the industry will require three to four years to return to 2019 levels of revenue passenger kilometers, a key industry metric. (See Exhibit 1.) As a result of the decline in ticket sales, airlines have canceled or delayed orders, and OEMs have drastically scaled back production. Both Boeing and Airbus have reduced their production rates by approximately 40% since the start of 2020.

Thus far, defense spending has remained level, but fiscal pressures—from reduced tax receipts due to the current recession and a potential need to reverse current levels of deficit spending in the future—will likely affect defense budgets going forward.

Segmenting the Supply Base

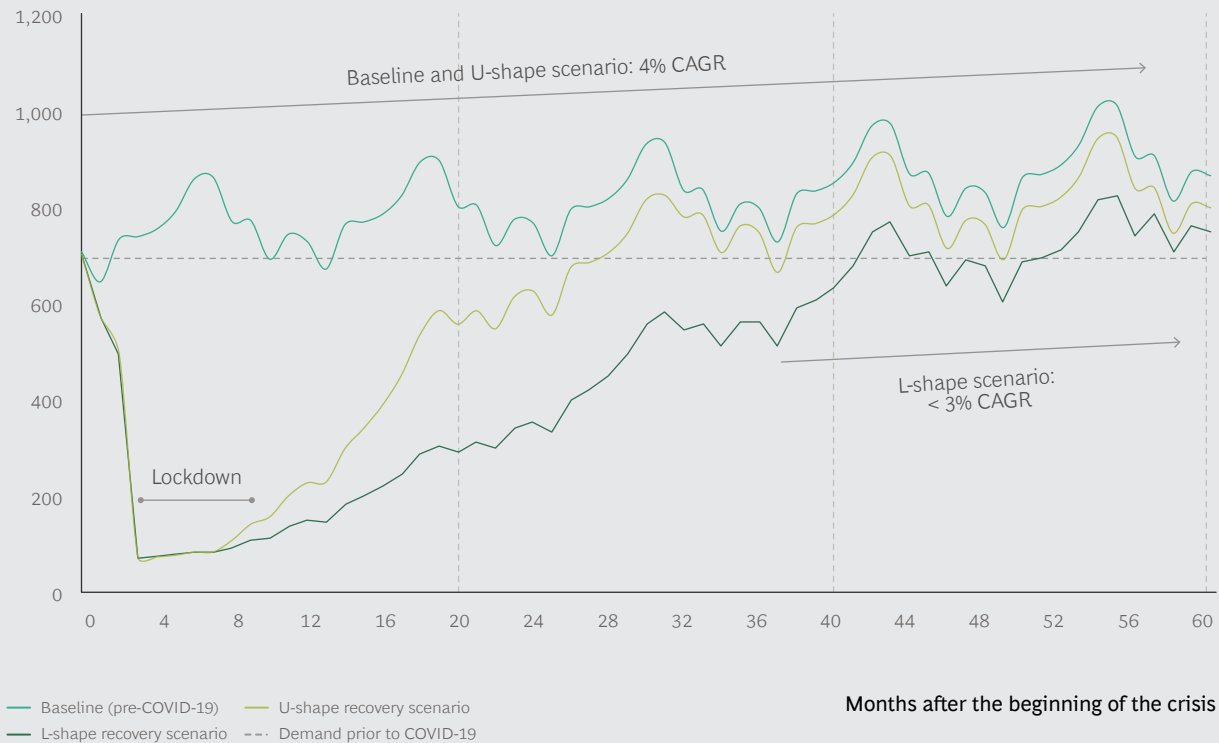
The A&D supply base is not a single homogeneous bloc. Rather, the overlapping crises in the industry will affect suppliers in different ways, depending on whether they primarily focus on defense, commercial aerospace, or the aftermarket. (See Exhibit 2.)

SUPPLIERS THAT FOCUS ON DEFENSE

The safest A&D suppliers, representing about 15% of the US industry, are those that generate the majority of their revenue from defense contracts. Overall, suppliers

EXHIBIT 1 | Projections Call for a Slow Recovery in Commercial Aviation

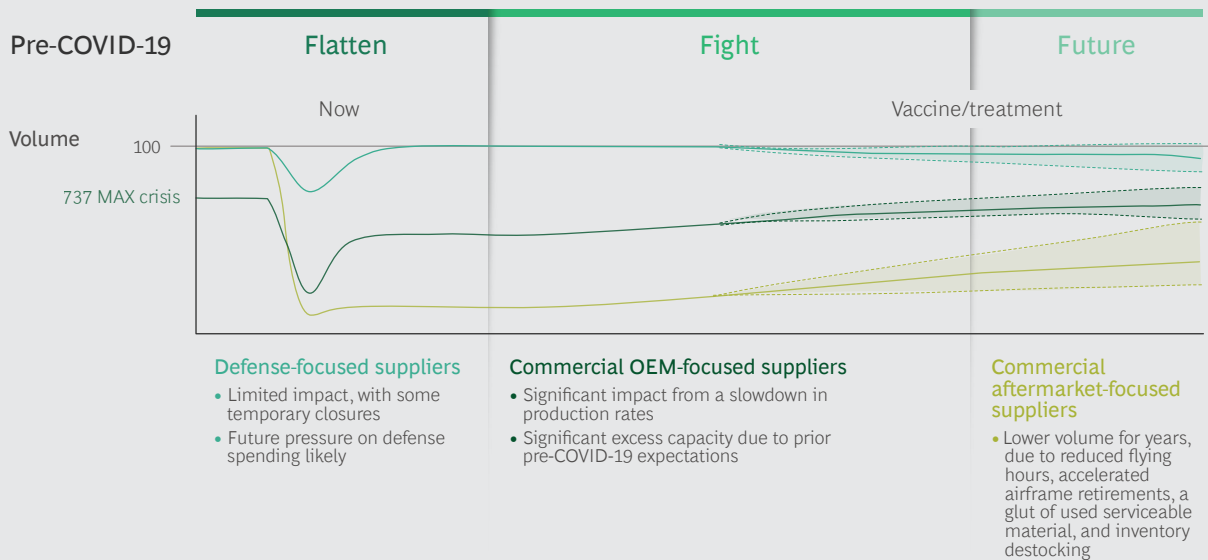
Global monthly air travel (billions of RPK)



Sources: IATA; BCG analysis.

Note: Analysis as of April 30, 2020, using January 1, 2020, as the crisis start date. RPK = revenue passenger kilometers.

EXHIBIT 2 | COVID-19 Will Have Different Impacts on Three Supply Chain Segments



Source: BCG analysis.

Note: The dotted lines above and below each solid line plot in the graph represent probability bounds for that plot.

in this group face limited liquidity threats, though they will likely feel some pressure in terms of productivity and profitability.

Because defense order volumes have so far remained relatively consistent, the biggest challenge for these suppliers has been to manage the near-term impact of COVID-19 on operations.

SUPPLIERS THAT FOCUS ON COMMERCIAL AEROSPACE PRODUCTION

The second major segment of suppliers—comprising about 25% of the A&D supply base—consists of those that sell primarily to commercial OEMs for the production of new planes. Most of the companies that fall into this segment are diversified and also sell to the defense market, with product offerings such as composites, casing, and forgings. But they have been acutely impacted by the COVID-19-related production declines and shutdowns at Boeing and Airbus.

Complicating that impact is the fact that pre-COVID-19 production levels were extremely high, with forecasts for strong future demand, and many suppliers had

made substantial investments to increase their capacity in order to win contracts on large airframe programs.

For that reason, many have excess capacity today and will need to scale down to align with reduced future demand. But they must do this while retaining the capabilities they will need in order to capitalize on the ramp-up once production resumes—a difficult balance to strike.

Currently these suppliers are tracking their cash very closely, and many of them have begun reducing the size of their workforce. As the general manager of a 300-person structural component manufacturer told us, “We laid off 27% of our employee base, and we had already eliminated overtime in February because of the 737 MAX challenges. I’ve shut down buildings not being used, cut off heating and A/C to reduce costs, and I’m currently in negotiations with my utility to get a discount. As a next step, we’re considering shifting to a three-day workweek, and we’re reviewing which jobs can be completed by multiple people. You have to act immediately if you want to survive.”

SUPPLIERS THAT FOCUS ON THE COMMERCIAL AFTERMARKET FOR THEIR PROFITS

The third group of suppliers, accounting for about 60% of the A&D supply base, comprises companies that depend disproportionately on the commercial aftermarket for their profits. Many also supply parts for new production in both commercial and defense platforms. However, the main source of profitability in their business model comes from supplying parts—such as engines, auxiliary power units, avionics, and actuation systems—to service these platforms.

This group faces the most acute threat from the downturn, for several reasons. First, as noted above, airline flying hours—which are the primary driver of demand for aftermarket parts—have collapsed, with a highly uncertain recovery that will occur over the course of three to four years. In the meantime, cash-strapped airlines will manage their fleet costs, in part, by deferring maintenance, which will further delay aftermarket spending. “You’ll see airlines using planes that need less service and maintenance,” one executive at an A&D supplier told us. “You’ll also see them pulling parts from planes that are parked to defer spending.”

In addition, airframe retirements and a glut of used components and material will be available in the aftermarket, reducing demand for new parts. The installed base and existing inventory levels will absorb almost all of the demand for some time.

For these reasons, analysts forecast a 50% decline in revenue for the maintenance, repair, and overhaul (MRO) sector, which is a key customer base for aftermarket parts in 2020. The long-term forecast is nearly as grim: a 40% reduction in MRO demand over the next five years. “Aftermarket is in a world of hurt,” one supplier told us. Another echoed that sentiment: “Like a switch being flipped, my aftermarket demand is at zero, with no indication of a recovery.”

In response, aftermarket-focused suppliers are tracking cash very closely and have

reduced staff levels by 50% or more. Those steps were likely unavoidable in the current environment, but it is unclear whether companies can retain critical capabilities when forced to operate with the remaining half (or less) of their workforce.

Common Challenges—and a Threat of Irreversible Damage

Although each supplier segment faces threats of varying severity, all are struggling to adjust to uneven demand signals. As one supplier described it to us, “Change orders are coming in nonstop. We closed our facility for a week and a half to take a pause. Customers had no idea what they wanted or needed.”

Moreover, almost all suppliers face working capital issues, primarily due to delayed payments from OEMs and prime contractors. Suppliers aren’t in a position to extend payment terms to their own supply base (such as raw materials providers), because they lack the required scale and leverage. As a result, they are squeezed in the middle, resulting in severe liquidity challenges. Our analysis of the free cash flow at suppliers found that with a 30-day delay in accounts receivable—very common in the current environment—archetype suppliers across all three supplier segments would be cash-flow negative, and the aftermarket segment would lose cash at a precipitous rate.

Unfortunately, attracting capital is simply too expensive for many suppliers, as debt availability has dried up. For instance, the spread between the publicly traded bonds of high-yield A&D companies and US Treasury bonds is approximately 1,100 basis points as of June 2020, a significant increase over the historical spread of about 300 basis points.

It’s difficult to overstate the potential damage from these factors. Some capacity will disappear as the supply base contracts to meet reduced demand—a normal response to correction. But the scope of the COVID-19-related threats means that the A&D supply base is at risk of irreversible losses in several areas.

First, critical talent will depart, leaving suppliers without the capabilities they will need to respond to a future uptick in demand. This is particularly true for suppliers' most valuable talent, such as engineers and machinists. "If I have to get rid of more engineers, it's a separation rather than a temporary layoff, and all their knowledge and expertise leaves with them," one supplier told us. "Those people can find work in other industries. But I can't just hire anyone." In addition, suppliers may need to liquidate tooling and machines simply to stay afloat. And they won't be able to fund necessary investments in R&D to stay abreast of emerging technologies.

As a result, the supply base could suffer irreversible damage, requiring a rebuilding period of five to seven years to restore lost capacity once demand resumes. In the interim, OEMs and defense prime contractors would have to deal with a smaller base of suppliers and likely pay more to access their capacity.

Short-Term Measures to Reinforce the Supply Base

Given this potential outcome, we believe that the situation presents both the government and OEMs with a critical opportunity to take concerted measures to reinforce the A&D supply base.

STEPS FOR THE US DEPARTMENT OF DEFENSE

First, the DoD can continue to authorize predelivery payments for some programs and platforms—for example, making partial, prorated payments against ongoing contracts as they reach production milestones. This initiative has been one of the government's most successful responses to COVID-19-related cashflow challenges in the industry, injecting nearly \$4 billion into all levels of the A&D supply chain.

In addition, the DoD can use its ongoing procurement budget to support suppliers through the contraction in commercial aerospace demand. Specifically, the DoD can accelerate future demand through such measures as providing upfront funding for

long-lead-time parts or ordering spare parts ahead of projected demand. (In some cases these measures might require changes in traditional budgeting processes, which authorize defense spending only for the current year.)

The government can also fund R&D at smaller suppliers, particularly for dual-use technology that will be useful in defense and civilian applications. Investing in this area would help suppliers retain engineers, rather than losing them to other industries.

STEPS FOR OEMS AND PRIME CONTRACTORS

For private-sector players, perhaps the biggest way to support suppliers is to send demand signals that are as clear and stable as possible. Transparency about future demand is particularly critical in A&D, where programs run for years, the production time for subcomponents can take months, and supply-chain lead times are also months long. Clear, reliable information about upcoming demand gives suppliers more transparency and increases their ability to make arrangements for material orders, labor, and other factors. In extreme cases, increased visibility about future demand may prevent suppliers from exiting a program entirely.

Another way to assist manufacturers is to offer balance-sheet support. For example, OEMs and prime contractors should avoid delaying payments or pushing back delivery receipts of finished goods. Cash-tight suppliers have almost no margin for error, and in many cases delayed payments could push them to the brink of insolvency.

In critical situations where production capacity is at risk, OEMs and prime contractors might do well to take ownership of some supplier inventory, such as by buying finished goods ahead of need or purchasing suppliers' raw materials or other inputs.

Longer-Term Strategic Measures

In addition to offering structured, short-term support, the DoD and OEMs should consider several longer-term measures to

ensure the health of the industry as capacity settles at a temporarily lower level.

Measures that the government might take include the following:

- Assess consolidation among suppliers and the level of spending directed to supplier segments to ensure that consolidation doesn't create critical gaps in the supply chain or business continuity disruptions.
- Help retain key talent and develop future talent by funding R&D programs and STEM education initiatives.
- Shorten the supply chain to increase resilience amid growing disruptions—for example, by offering incentives for customers to use domestic suppliers rather than international competitors.

Measures for commercial OEMs and prime contractors to consider include the following:

- Increase the resilience of the supply base by developing secondary sources, onshoring (where appropriate), and integrating vertically.
- Monitor performance and increase transparency by using tools such as supply chain control towers.

A more comprehensive measure—with correspondingly large potential benefits—is to develop an industry standard for communication among suppliers and OEMs. Even setting the pandemic aside, the supply chain suffers from a lack of transparency and visibility, primarily because each OEM and prime contractor communicates to its suppliers in different ways. The lack of uniformity and consistency leads to huge inefficiencies and redundant work for all parties.

A standardized platform would integrate common elements across the industry—including such aspects as supplier reporting, certifications, and first-article inspections; demand signals; and sales, inventory, and operations planning—while still protecting proprietary information. Stream-

lining information flows in this way would reduce a significant administrative burden on suppliers, allowing them to focus their resources instead on core operations. A blockchain-enabled platform is one possible way to standardize and streamline these customer/supplier interactions, but other potential solutions exist as well.

C OVID-19 IS THREATENING the viability of the A&D industry, and smaller suppliers—particularly those with heavy exposure to commercial aerospace and to the aftermarket business—are at existential risk. Market forces will play a role in the outcome, but smart actions and support from government, OEMs, and prime contractors can ensure the viability of suppliers. The situation is challenging, but the future of the industry still lies within our control.

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