Supplier Risk and Quality Assurance — Addressing Sub-Tier Visibility and Risk in the Aerospace Supply Chain

By Christopher Brumitt

The Covid-19 pandemic exposed the fragility and inadequate depth of many industry supply chains, none more so than in the Aerospace & Defense sector. According to the International Air Transport Association (IATA), the backlog (cumulative number of unfulfilled orders) for new aircraft has reached 17,000 planes, a record high. At present delivery rates, the current backlog would take 14 years to fulfill, double the six-year average backlog for the 2013-2019 period. However, the waiting time is expected to shorten as delivery rates increase according to IATA's document, "Supply Chain Issues Continue to Negatively Impact Airline Performance into 2025."

Furthermore, labor shortages, skillset reductions and material availability (down to the raw material level) issues have reduced visibility of supply, supply quality, predictability of on-time delivery and increased lead times (which have now been reduced, to some degree). The resulting impact on OEMs and top Tier 1 suppliers has been a lack of in-depth understanding of the drivers of supplier challenges, especially at the sub-tier level, and most importantly, very poor visibility of potential critical-part disruption.

As we move further into 2025, the looming threat and reality of tariffs and other economic hardball situations have the potential to create further instability, just as the aerospace supply chain is attempting to stabilize.

Much of the efforts of OEMs and Defense Primes to recognize supply chain weaknesses focus on big Tier 1 suppliers that provide very large, very expensive, complex systems and sub-systems like landing gear, avionics, engines and aerostructures. This is understandable to a degree; however, most of these highly engineered systems are made up of hundreds, if not thousands of sub-assemblies and individual parts that come from huge numbers of smaller companies that do not necessarily have the same robust systems to manage demand and production as effectively as Tier 1s themselves. Limitations arise when OEMs attempt to gain direct, on-site access to sub-tiers; sub-tier relationships are largely directly managed by the Tier 1 suppliers and there can even be specific privity clauses in the contracts between Tier 1 and sub-tier suppliers.

Impacts of Supply Chain Visibility and the Production Readiness Audit Process

While most OEMs and Primes have supplier quality and vendor management systems (and many have highly structured production readiness processes) in place, the problem that often materializes is that there are simply too many suppliers and too many assessments to be done in a given year to keep up with. Coupled with inconsistent training and poor adherence to rigorous process, this tends to lead to assessing through 'pencil whipping' and copy / paste when it comes to vital processes. Often, thoughtful, deeper probing of supplier production readiness is set aside as readiness audits press for speed and conclusion.

In an effort to raise quality and production rates so that they can get their parts, many of the largest Aerospace & Defense OEMs and Primes are known to send dozens of their own engineers and production leads to a Tier 1 supplier for months at a time to correct design, engineering, production and supply chain issues. This is obviously an expensive effort; however, it can be worth the cost IF they can get the critical parts and systems to meet their own demand. It is not uncommon for Tier 1s (especially larger ones) to apply a similar methodology to their sub-tiers to simply keep their own supply chain moving. The problem with this approach is that the cost makes it a short-term fix at best, and even though the supplier's quality and production may go up while they are there, once the OEM or Tier 1 leaves, things quickly go back to what was being done before and sub-tier suppliers are right back where they started. The question is, why?

The reason this approach is both short-lived and limited in effectiveness is that there is not a specific, clear approach to determining the root cause of the issues, aligning on a course of action to correct the issues, and subsequently implementing an operating model change driven by strong KPIs and sustained by intensive training in order to ensure the change sticks in the long term. The other important issue that comes up is that this approach is typically only applied to critical parts, which leaves other sub-tier suppliers untouched by the OEM and mainly left to improve on their own.

Communication and Data Clarity Challenges

The complexity of this supply chain visibility weakness really begins (as in most cases of breakdowns in production maturity) with lack of clear, concise communication and poor data. First, OEMs and Defense Primes can get very frustrated with the lack of communication between their Tier 1s and sub-tiers (and likewise between themselves and the sub-tiers); however, if you were to ask most sub-tier suppliers they will tell you that they are just as frustrated with the lack of a clear demand signal from their customers (both the Tier 1 and OEM). This is an especially difficult situation for smaller Tier 2 and Tier 3 suppliers as frequently they simply do not have the capital to invest in more robust systems and processes, nor capacity to quickly raise production rates, or conversely simply slow their production due to the OEM having a sudden slowdown in their production. This churn in demand creates a rollercoaster of fluctuation that can be very difficult for suppliers to respond to as they plan their own production schedules.

In addition to communication, poor data is the second piece of this puzzle that must be addressed. Often OEMs and Tier 1s may have many different sources of information coming from several disparate ERP systems and even from Excel spreadsheets. This lack of a 'single source of truth' can create confusion when it comes to delivering accurate, reliable, and timely information to sub-tier suppliers they depend on to ensure that they are scheduling the right work at the right time. The same disconnect often happens from the sub-tier to the Tier 1 and OEM, which leads to the OEM not trusting that the supplier will be able to deliver on time and in full, which then, you guessed, starts the cycle all over again.

Moving to a Predictive Supplier Quality Process

The entire process can quickly become a downward spiral of quality and production that gets out of control fast and can have a significant impact on Cost of Poor Quality (CoPQ) for both the supplier and the OEM. But what can be done to turn this around in the near term?

The first thing for the OEM is to create a very robust supplier performance program that includes multiple elements in a process that eliminates visibility issues and gives them confidence that suppliers can deliver on time and in full. Some of the critical criteria include: supplier data consolidation; supplier risk rankings; critical parts analysis; prioritization & stratification criteria to determine highest priority sub-tiers; and a clear supplier production readiness assessment process that goes beyond just 'checking off boxes.'

Moving from a reactive to proactive to predictive supplier quality process requires a rigorous Supplier Risk and Quality Assurance process, which includes:

- Developing a Risk & Capabilities Matrix (integrated with digital enablement)
- Analyzing and enhancing current data to refine prioritization measurements and define risk landscape
- Determining current percentage of Supplier of Concern issues related to sub-tiers
- Determining an effective supplier communication strategy to engage and prepare sub-tiers for assessment
- Consolidating data, supplier risk rankings, critical parts analysis, prioritization & stratification criteria to determine highest priority sub-tiers for the Wave 1 on-site assessment
- Jointly developing a rollout plan that includes specific supplier initiation, analysis timing, logistics, etc.
- Analyzing each supplier for critical production process criteria: quality, capability, capacity, metrics, KPIs.

While it is very easy to see the potential benefits of a robust, comprehensive and cohesive supplier risk and quality assurance approach for the OEMs and Tier 1 suppliers, the upside potential for the sub-tier supply chain could be even more pronounced. Many sub-tier suppliers continually struggle with labor, material and cost impacts just like the OEMs. Aligning sub-tier suppliers with OEMs through increased visibility, open communication, and clear supply and demand signals, and supporting with reliable data to drive confidence in decision making, has the potential to enable OEMs and the supply chain to ensure predictability of supply while reducing cost and improving profitability. AM

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