

Five Strategies for Improving Aerospace Supply Chain Quality Management and Performance

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ABSTRACT

Aerospace suppliers face the daunting task of constantly improving time-to-market, reducing cost of quality and turning compliance into a competitive advantage. Managing to these constraints while staying profitable is a challenge faced by the entire aerospace supply chain face today.

The intent of this presentation is to share five lessons learned on how aerospace suppliers can optimize for these three constraints while growing their businesses. The first is electronically enabling traceability both within a multi-tier supply chains and throughout suppliers. Automating traceability at the shop floor improves quality management and accelerates compliance. Specific methodologies and metrics used to accomplish this will be provided. Second, lessons learned from implementing Manufacturing Execution Systems (MES) showing how shop floor visibility has a direct effect on supplier performance is illustrated with case studies and metrics. Third, lessons learned in making compliance pay by benchmarking performance to AS9100C, ISO9001, and ITAR standards is provided. Fourth, integrating engineering, program management, project management office, accounting and finance workflows together provides exceptional insight into the value of a project in real-time. Examples and metrics of performance will be provided illustrating this point as well. The final lesson learned is that having a single, unified system of record across a diverse aerospace supply chain leads to greater gains in collaboration and communication, leading to proven profitability gains.

COMPETING IN AEROSPACE AND DEFENSE SUPPLY CHAINS

Suppliers serving both the aerospace and defense industries face challenges and obstacles to continually growing their businesses that are unlike any other industry. To illustrate just how complex the challenges are, the aerospace and defense

industry is compared to the automotive or motor vehicles industry (MVI) for purposes of comparison.

Compliance and Quality Management

Aerospace and defense suppliers face compliance and quality management requirements that surpass those of many other industries including automotive. Lot traceability, document control and audit trails are essential for compliance to the International Traffic in Arms Regulations (ITAR). AS 9100 Rev. C requires traceability, audit trails, advanced document controls and record storage, which are all system-level tasks Plex is delivering to customers today. Defense Contract Audit Agency (DCAA) compliance requires fully auditable, traceable accounting procedures linked to operational and manufacturing systems.

Product Lifecycles

An average automobile will last between seven to ten years if routine maintenance takes place. It is common to find commercial jets lasting forty to fifty years. Focused, active Maintenance, Repair and Overhaul (MRO) programs are essential for commercial and defense aircraft service providers to extend the life of aircraft. What CFOs are looking for is a strategy to drive up the Return on Invested Capital (ROIC) ensuring the long-term value of the jet or aircraft is maximized and delivers as much profit contribution as possible.

Production Volumes

The automotive industry excels on this dimension, delivering millions of cars a year in a myriad of configurations and customized bills of material to match specific national and regional market requirements. Commercial and defense-related suppliers often invest an inordinately high percentage of their time in customizing a significantly smaller number of orders to very exact, specific requirements. Producing thousands to tens of thousands of units per year is

commonplace in this industry. Regardless of this wide variation in the quantity of products produced, both industries rely on a consistent system of record for ensuring compliance, cost of quality and time-to-market objectives are met and exceeded.

Percentage of Products Customized to Unique Customer Requirements

The extent of customization possible on vehicles is constrained by the nature of their mechanical design. In aerospace and defense-related products, it's common to see the majority of a given product's being defined by prime and subcontractors, and often by the customers orchestrating complex sourcing projects. Supporting assemble-to-order, build-to-order, configure-to-order and engineer-to-order manufacturing strategies are commonplace in aerospace and defense suppliers.

Project, Program and Product Complexity

A typical automotive has at least 10,000 or more unique parts and a typical commercial aircraft can have well over 1.5 million or more. A typical car has a 400 HP engine while the Boeing 737 class of airlines have engines that are capable of 75,000 HP or higher.

HOW INDUSTRY DYNAMICS ARE INCREASING SUPPLIER COMPETITION

Supplier relationships have become critically important to the performance of the aerospace and defense industry over the last three decades as cost containment, compliance and greater regulatory pressures have consolidated supply chains. The following factors are continuing to change the nature and performance of supply chains today:

Greater specialization and consolidation of the supplier base

Without question this continues to be the most powerful factor influencing the current and future direction of the industry today. Gone is the tight, rigid hierarchical structure of supply chains so typical in the 1990s and previously; today there are networks and ecosystems of suppliers that thrive on information and knowledge communication and collaboration to survive and grow.

Exponential increase in compliance and regulatory requirements

With the pace of compliance and regulatory requirements accelerating, aerospace and defense suppliers are faced with the daunting challenge of staying in compliance while attaining profits on a per project basis. International Traffic in Arms Regulations (ITAR), AS 9100 Rev. C and Defense Contract Audit Agency (DCAA) compliance are just three of many requirements that have reshaped the entire industry and will continue to well into the future.

Greater focus on technology transfer between the DOD and private sector

The DOD had taken a hands-off approach to managing suppliers in the past. No more. Today they are actively involved in project management on defense-related projects, including the infusion of valuable intellectual property (IP) into new projects that have the potential to redefine engagement and containment strategies.

FIVE STRATEGIES FOR STREAMLINING PROGRAM-BASED MANUFACTURING IN AEROSPACE AND DEFENSE

1. Creating a single, unified system of engagement across an entire manufacturing operation has been shown to improve bidding and estimating by over 50% in Plex customers and across the industry. By creating a single version of the truth of all bidding and estimating activity, CFOs are better able to see how the many different approaches to defining new projects and being able to only commit to the most profitable ones. The highest performing project teams have developed constraint- and rules-based approaches to evaluating the value of every potential project, ensuring only the most profitable ones are accepted.

2. Planning years ahead for multi-mode manufacturing support saves thousands of hours and potentially millions of dollars. The most challenging area that is changing rapidly for aerospace and defense suppliers is mixed or multi-mode manufacturing. For many, the ability to develop process-based agility across make-to-order, assemble-to-order and stock-to-forecast or make-to-stock is critical for their long-term profitable growth. The following graphic provides an overview of these dominant manufacturing strategies. For aerospace suppliers who are looking to move into new markets, excelling at all three of these is critically important to their ability to attract profitable projects in the future.

Comparing Manufacturing Strategies

	Definitions	Guided Selling	Quote-to-order or Sales Configuration	Product Configuration
Assemble-to-Order	- Suited for volume purchases - Quotes should be automatically generated			
Build-to-Order	Product inter-relationships and model bill of Materials created automatically for prospects			
Configure-to-Order	Nested product configurations and majority of product assemblies are customized			
Engineer-to-Order	All items from Build-to-Order and the integration of CAD applications and PLM workflows.			

Aerospace and defense suppliers need to also have a plan for spanning the full breadth of to-order strategies shown below to make the most of every potential project. From contracts and customer requirements being minimal for assemble-to-order to the majority of contract and program requirements on engineer-to-order, aerospace suppliers need to start thinking about agility now to be ready in the future. Gaining a high level of agility needs to start at the platform level of their IT.