



Achieving Growth and Profitability in the Automotive Supply Chain

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The automotive industry is in the midst of unprecedented threats and change. Automotive brands are dropping sedan models and switching to new crossovers and all sizes of SUVs at a time when they are also in a race to design, perfect and deliver hybrids, all-electric vehicles, and soon autonomous vehicles as well. At the same time, supply chain challenges from trade wars and unexpected threats such as the Covid-19 virus are putting extreme pressure on production, growth and profitability across the industry.

The tumult of these changes and threats exist within a framework of rising consumerism and personalization that is forcing automotive companies to offer a wider array of new models and options at a faster pace than ever before. There is also increased consumer pressure for safe and connected vehicles that are essentially smart devices on wheels. All of this is adding complexity to the entire automotive ecosystem. To grow profitably in this environment, original equipment manufacturers (OEMs) and their suppliers must increase the speed and precision with which they are able to deliver vehicles customized to consumers' rapidly changing expectations.

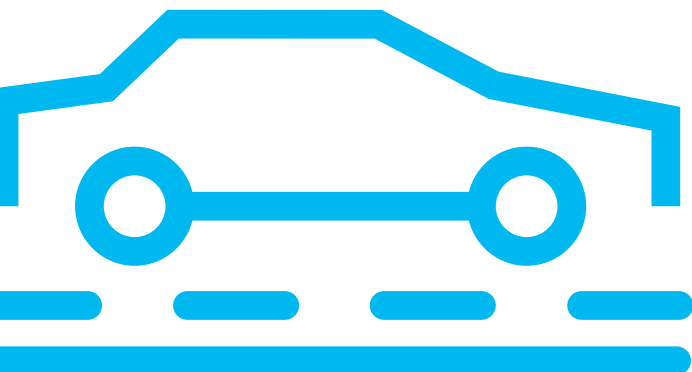
To cope profitably with the speed and diversity of today's multi-tiered production environment, automotive companies are increasingly dependent upon efficient build-to-order (BTO) manufacturing processes that provide just-in-time (JIT) and in-sequence deliveries to automotive assembly lines. Tier 1 and Tier 2 suppliers, as well as third-party logistics service providers, play pivotal roles in supporting these new practices and have the greatest need for related decision-support technologies.

Failure is not an option

While many industries are struggling to collaborate between trading partners, in the automotive industry collaboration is deeply ingrained. The JIT, in-sequence production processes up and down the multi-tiered automotive production landscape mean failure in any portion of the ecosystem can grind the entire process to a halt, the economic consequences of which are very steep. Just consider the supply chain dislocation caused by the coronavirus, for example. With the severe penalties OEMs place on such stoppages, failure by suppliers is not an option. Components, sub-assemblies and assemblies must be delivered as configured in the order, on time, in-sequence, every time.

Innovation + choice = complexity

Ever more complex navigation/infotainment centers, driver assistance and collision-avoidance systems, autonomous capabilities; the list of in-vehicle innovations has grown tremendously in recent years. Added to the move to electric vehicles and consumers' demand for personalization, these new systems and platforms have made vehicle production many times more complex than in the past. This puts incredible pressure on automotive suppliers to accurately build and assemble to an ever wider set of configurations. And since consumers not only want it their way, they want it NOW, mastering and delivering these complex configurations must be accomplished faster than ever to meet today's much shorter order-to-delivery times while balancing continued pricing pressure.



The build-to-order, in-sequence process

Automotive suppliers face two distinct, yet interlocking challenges. They must build and assemble components, sub-assemblies and assemblies to a wide and rapidly changing array of configurations, and they must deliver the finished products in the exact sequence and timeframe requested. To accomplish this successfully and profitably requires advanced, integrated BTO and supply in-line sequence (SILS) technology that directs each process, verifies compliance and moves it forward in the correct sequence.

Supply chain integration

BTO and sequencing systems do not live in a vacuum, however. They must interact with other external and internal systems in order to become part of the larger supply chain flow. Thus, the first step of the BTO, in-sequence process is to receive and validate an order, or change order, from the customer's purchasing system and pass it to the required internal systems. The supply chain integration components within the BTO and SILS systems handle this technical integration and reconciliation function.

Order management

When the supplier receives the order from an OEM or higher tier customer, it typically contains the vehicle number and composition, bill of materials, vehicle features/options, and the desired sequence and timing for delivery of the finished product. Order management interprets the order according to the supplier's terminology and assembly kits, and validates it against the engineering design to catch any errors or discrepancies before production begins. Valid orders are scheduled and released to production based on the timing and sequence in which they will be shipped to the customer, as well as internal production and material flow conditions.

Production management

Based on the order and the role of the supplier or service provider, BTO production may involve manufacturing, simple assembly or multiple levels of assembly. This may include using postponement and late customization techniques, as well as kitting and special packaging. There may also be multiple levels of testing, error proofing and build validation during production. This complex production process must also make provisions for change notices that may be received at any stage across the BTO and sequencing process. Finished goods may be placed into custom racking or other specialized shipping containers dictated by the customer. Production management directs this complex process from start to finish based on the specifics of the order and the timing and sequence of shipments.

Dispatch management

Dispatch management receives finished goods from production and directs all further kitting, packaging, labeling and quality control processes. This includes sequencing finished parts and assemblies into the exact sequence required by the customer for the customer's assembly line. There are generally three levels of sequencing involved, although more complicated sequencing may also be necessary.



First, parts or assemblies must be placed into any racking or specialized containers in the order in which they will be used on the customer's production line. Usually this will occur in the production process, but may also happen at the end of production by dispatch as the goods come off the production line.

Second, the racking or containers must be sequenced in the order in which they will be required to be brought to the customer's production line. This will be based off of the sequence number either contained in the customer order or sent later as the customer firms up their production schedule.

Finally, the racking or containers must be loaded onto a truck in the proper sequence for unloading at the customer site(s). This may be in reverse order of their actual use depending on whether they are taken directly to production or stored temporarily. The customer will specify these trailer loading requirements.

Visibility, event management and reporting

The foundation for the BTO and SILS processes is cross-functional visibility, event management and reporting. Visibility is critical to seamlessly move orders and work through the manufacturing and delivery process. It is the enabling function underpinning control tower technologies that connect supply chain processes so changes in one area are visible to the other areas, and adjustments can be made quickly.

Working hand-in-hand with visibility is event management. Event management, aided by artificial intelligence (AI) and machine learning (ML), provides

both alerting and corrective response when changes or disruptions occur. This keeps all operations in sync and minimizes the costs and time lost due to change orders, supply disruptions, unexpected production stoppages and other events. The longer AI and ML technologies are in place, the better and more cost effective the responses will be.

Reporting creates a history and analysis of the entire process. It helps to uncover trends, document production results and provide drill down to the root cause of problems.

The key to profitability

The BTO and sequencing process sounds quite straight forward when laid out as above. But in reality, with the explosion of new platforms, technologies and options in the automotive industry, coupled with ever-shorter order cycle times and increased pricing pressures, operations have become much more complex, time dependent and error prone than ever before. Tier 1 and Tier 2 automotive suppliers, along with third-party logistics service providers, cannot hope to profitably meet customers' demands for accurate, JIT, in-sequence deliveries without the latest in advanced BTO and SILS technology to guide them every step of the way.

The amount of change, innovation and pressure in the automotive industry will only continue to increase at an exponential rate. The key for suppliers to profitably thrive in this more complex and demanding world, now and in the future, will be through deploying the most flexible, comprehensive and efficient BTO and SILS technology now available in the market.

