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Proactive constraints management in automotive supplier parts capacity planning

Demand volatility is a major factor in the modern automotive industry. Consumer demand is harder to predict than ever, which means that OEMs have a harder time predicting which parts to produce for their clients. The result is that when an order comes in and an automaker needs to slot production of a particular vehicle into their plans, they find themselves facing a parts shortage from the supplier's end.

Automakers are working with increasingly lean supply chains, meaning that an unexpected spike in demand could produce a situation in which no buffer exists with which to achieve the necessary capacity. In order to combat this increase in volatility, automakers need to get a lot smarter about their demand capacity planning. This begins by splitting the task into its separate components: Automakers need to find a method for forecasting demand that is more accurate and can be put into practice over the course of longer planning cycles. At the same time, supplier must create an infrastructure that makes it possible to match their capacity to automotive demand. Automotive supply chain solution planning is one of the most complex processes in the supply chain world due to globalization, change in manufacturing nuances, consumer demands and new disruptive trends that have had an impact on the vehicle supply chain network for raw materials and parts from supply base.

Capacity Planning Process

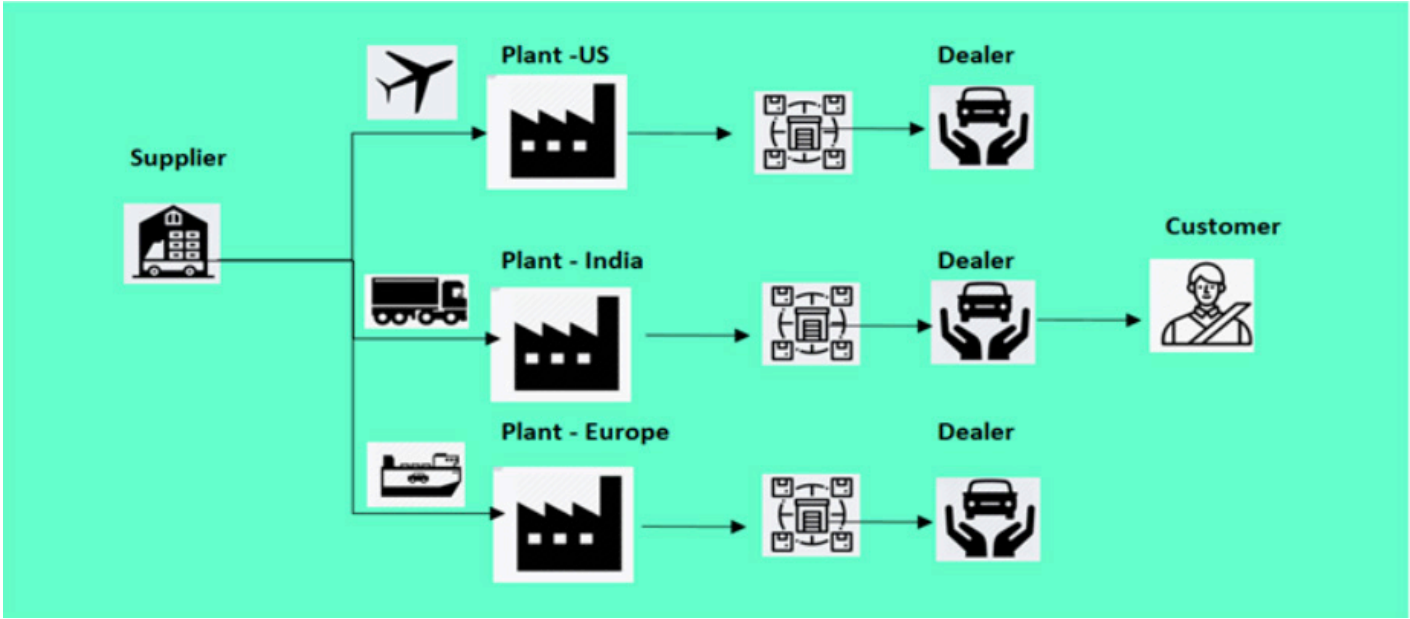
Capacity planning is an important element of manufacturing, and refers to the process of matching production capacity with sales demand. Capacity planning is essential to determine the optimum utilization of resources and plays a key role in decision-making processes such as extension of existing operations, modification to existing product lines, and starting new products, etc. The ultimate goal of capacity planning is to meet the current and future level of the requirement at a minimal wastage. Effective capacity planning is dependent upon factors like production facility (layout, design, and location), product line or matrix, production technology, human capital (job design, compensation), operational structure (scheduling, quality assurance) and external structure (policy, safety regulations).

Strategic Capacity Planning Process

'Strategic Capacity Planning' is crucial as it helps the organization in meeting its future requirement. It ensures that the business remains competitive and achieves its long-term growth plan. Typical automotive capacity planning comprises assembly base and supply base capacity planning. Assembly base capacity planning deals with final assembly requirements from customers & dealers, job per hour, and resource requirements (man/mc), whereas supply base deals with micro-level planning of parts or items required to produce a final assembly. In real-time, one final car assembly requires approximately 1000 child parts. These parts or items are tagged to a particular supplier who can supply these parts to the assembly plant at regular intervals by considering the lead-time to procure raw materials, processing time to produce the child part and transit time to send the part to the assembly plant.

Complex Supply Chain Network Leads to Constraints?

Recent product development and technological improvement makes automakers think on optimizing the design and development cost on the concept of 'build anywhere and sell anywhere'. This means products can be designed in one place, and sold in other geographical areas, this is applicable to their suppliers as well. In this context Supplier X based out of India is delivering a child product to Automaker Y's plant located in India, he can deliver the same product to automaker's plant located in U.S. as well, and these are called globally-shared commodities or parts. The same Supplier X has a tie-up with another Automaker Z and supporting them with their existing capacity.



Natural calamities and pandemics like COVID-19 may affect the supply base and that leads to temporary or permanent disruption of supply from supplier base. These constraints lead to delay in making of the final assembly thereby creating a dent in the delivery timeline. The temporary disruptions from supply base can be managed by maintaining a buffer stock or safety stock from dealer end / yard stock from plant side. What if the constraint is a perennial issue hitting the revenue and operating margins of automakers? But what if the constraint part or commodity is a globally shared one (the same part is being supplied to multiple plants across the globe by the constraint supplier)?

Part Constraints are Reactive

Most cases of supply based part constraints are reactive in nature. Assembly plant teams are informed about the constraint status after it has occurred. Supply base will be put on temporary corrective action plan to support the parts with the limit they can supply. Assembly plant planning teams have to reschedule their original customer orders and free sales demand based on limited supply. In the cases of globally shared commodities, the scenario is worse as the limitation from supply will force global plants to cut the demand based on the allocation share and profit percentage.

Proactive Constraint Identification

How can we identify constraints before they occur?

Is there any way to identify constraints proactively?

Yes, definitely!

- **Certain indicators help to identify potentially risky suppliers. The change in mode of transport of parts from supplier:** Under normal circumstances, the long lead-time suppliers transport the parts by sea freight, but in constraint scenario, suppliers start shipping through airfreight instead of the regular mode.

- **Supplier working pattern:** Generally, suppliers work in tandem with assembly plants in terms of the working pattern. During constraint period supplier starts additional shifts to match OEM demand (ex: supplier changing their 2-shift pattern to 3-shift pattern or 24/7 support).

- **Supplier capacity utilization:** Supplier capacity utilization is at 85% to 90% on average during normal scenarios, but during constraint scenarios, the capacity utilization reaches more than 95% to meet the demand schedules from OEMs.

- **Will make quantity < transit quantity:** Assembly plants maintain a safety stock to match their daily production requirement for a particular part. It is called as 'will make quantity'. This will make quantity should be always greater than quantity in transit from the supplier. During crisis, time this will make quantity will be less than transit quantity.

- **Supplier shipment performance > 100%:** Past shipping performance tracking and their service delivery rating would help to identify troublesome suppliers.

- **Supplier backlog quantity:** Actual shipped part quantity is less than scheduled shipped quantity for three consecutive dispatches leading to backlog from supplier.

Solution

Developing a proactive constraint algorithm would identify the emerging constraints and mitigate the risk of being short supplied from supply base

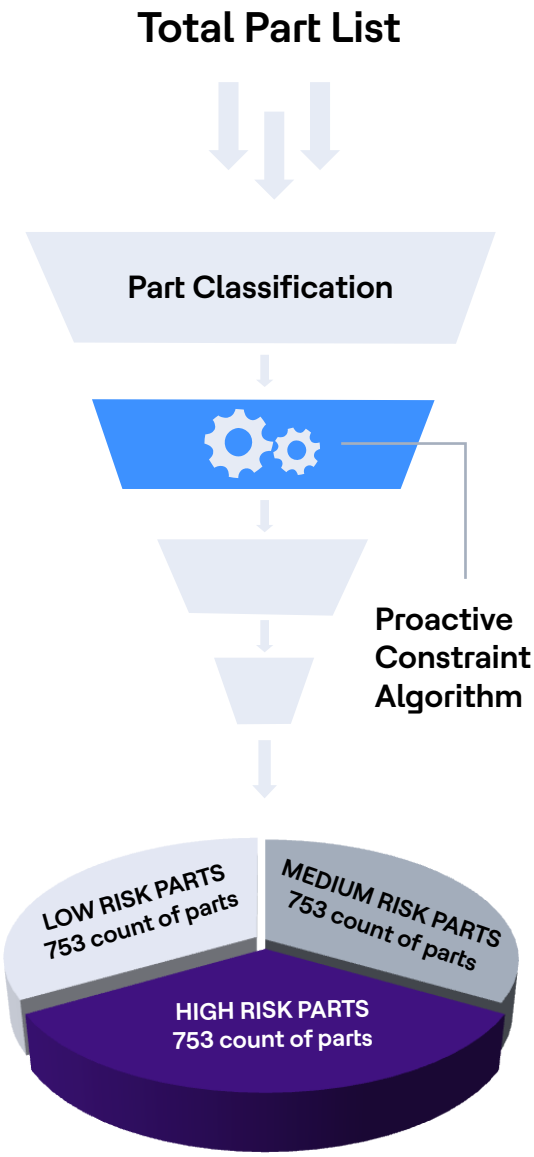
4 Weeks	Critical	High	High Capacity Risk
Shipment Performance < 100%	✓	✓	
Will Make < Intransit	✓	✓	
Backlogs	✓	✓	
Additional Shift		✓	
Air Freight Mode	✓		
Supplier Capacity Utilization >=90%		✓	✓

4 Weeks	Medium	Medium Capacity Risk
Shipment Performance < 100%	✓	
Will Make = Intransit	✓	
Backlogs	✓	
No Additional Shift	✓	
Air Freight Mode (Occasional)	✓	
Supplier Capacity Utilization >=80 ~ 95%		✓

4 Weeks	Low	Low Capacity Risk
Shipment Performance > 100%	✓	
Will Make > Intransit	✓	
Backlogs	✓	
No Additional Shift	✓	
Sea Freight	✓	
Supplier Capacity Utilization >=90%		✓

Part Classification Exercise Using Proactive Constraint Algorithm

Total part list or item list can be derived from the Bill of Material. Applying proactive constraint logic to the entire part list would classify the parts as high, medium, and low category.



Action Plan for High Risk Parts

- High risk parts or red category parts should be given more focus by providing a capital investment to supplier to increase the capacity.
- Developing an alternate supplier to mitigate the risk of short supply and thereby increasing the revenue.
- Localization of parts will reduce the risk of relying on import parts and reduce the transportation lead-time.

Conclusion

The proactive constraint logic can be built and customized for any supply chain solution, based on the type of industry. Periodic part classification exercise with the help of this logic would easily identify the high-risk parts and supply base, which creates constraints!

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