

Automotive component industry positioning paper

Introduction

In recent years, companies in the automotive component industry have experienced the impact of globalization. Radical changes are occurring as the number of players in the market is being reduced, competition is increasing, and new business processes are introduced to improve efficiency and quality and reduce costs.

The major automotive manufacturers (OEMs) and Tier 1 suppliers have been in the forefront of adopting new manufacturing practices, e.g. lean production, Just-In-Time (JIT) inventory. These practices are being driven down to Tier 2 and Tier 3 suppliers. Suppliers are noticing changes in the relationship with the OEMs who are abdicating responsibilities in the areas of development, sourcing and planning. In addition, suppliers have to manage a complex component life cycle to the OEMs and to the after-market (parts and accessories). Often there is an additional pressure, government regulation, which seeks to address environmental issues or imbalances in local markets.

To secure business, component makers must demonstrate that they can deliver the required design, quality, service and price. This means that they must maintain or reduce costs, continuously improve quality, keep up to date with global developments in their market, and adhere to any regulatory requirements.

The goal for component suppliers is to produce the right parts in the right quantity at the right price, delivered at the right time to the right place.

In order to deal with the changing dynamics in the market, key business issues facing component manufacturers are:

- Flexible manufacturing practices
- Supply chain and inventory management
- Operational efficiency and control
- Integration and collaboration

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Flexible manufacturing practices

The automotive industry is moving away from the traditional practices of manufacturing where a master production schedule and material requirements plan (MRP) determine the production schedule – “pushing” goods out depending on inventory and production schedules. Increasingly, modern automotive manufacturing methods aim to “pull” goods through production based on demand requirements. New practices like lean

manufacturing, kanban and takt time * address important manufacturing goals of shorter lead times, improved production flow and faster cycle times. In the quality control field, Six Sigma practices are being pursued to reduce defects and improve processes.

In order to implement these practices successfully, companies need to have systems that enable them to gather, organise and analyse information using metrics such as balanced scorecards.

* See Terminology at the end of the paper

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To support these new practices, ERP software must include functionality that provides flexibility to schedule and manage orders, with or without using an MRP. Instead of the traditional Make-To-Stock practice (which assumed long production runs), automotive suppliers require capability to manage shorter production lifecycles using processes such as Make-To-Order, Assemble-To-Order, and Configure-To-Order. As production can also vary according to product or customer demand, component manufacturers also need the ability to dynamically plan, control and synchronise production runs of differing length operating independently.

Assembling and manufacturing automotive components is not a trivial task, as some components like transmission systems involve hundreds of parts. The Bill of Materials (BOM) must therefore be able to handle complexity and a very large number of parts.

With growing production complexity, and the need to speed up product cycle times, the more likely it is that production problems and bottlenecks become critical and costly problems. Having a system that gathers information about production operations allows more effective management of production schedules and workloads. This enables companies to identify problems and use information to schedule jobs taking into account available resources and promised delivery dates.

Managing the product life cycle of components is a major issue for automotive component suppliers. For the different types of market – OEMs vs. after-market – there can be different change and revision levels for products. In addition, as safety and environmental compliance issues start becoming a factor in the automotive industry, component manufacturers will need to keep records of engineering data, including input sources and materials used. Implementing engineering changes involves analysis of how a change will impact inventory and current orders, and how to ease the transition from one part design to another. This requires a strictly administered change control mechanism with appropriate sign-offs through multiple steps from design to production, that can update operational BOMs and inventory requirements, include annotations, and provide archiving and retrieval capability.

Supply chain and inventory management

To keep their own costs down, OEMs are increasingly transferring the burden of inventory to their suppliers. Component suppliers need to change their inventory and supply chain practices to support this.

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By adopting a JIT approach to inventory, component manufacturers can ensure they have enough stock to meet current and expected customer requirements. As any problem in the supply chain can damage a supplier's ability to deliver, which could be very costly, effectively managing the supply chain is critical. Supply chain management focuses on the processes that are needed to synchronise supply to customer demands, allows the optimisation of inventory held, and minimises waste. For supply chains that involve suppliers overseas, it is important to have visibility of what is happening with goods in transit, to keep track of associated costs and to get accurate landed costs.

For most component suppliers, managing the forecasts, schedules and call-offs from OEMs is difficult. Most monthly or weekly forecasts are only accurate to about 10 percent; daily call-offs are far more accurate. Balancing stock against ever-changing manufacturing schedules, and reconciling the different plans against prior dispatches and forecasts requires sophisticated requirements planning, order and procurement handling, material control and inventory management.

Ability to deliver on-time is a critical requirement for component suppliers, but just as important is the sequence of delivery. The requirements of automobile manufacturing are geared towards delivery of parts in tandem with the assembly process – termed Just-In-Sequence (JIS). In order to provide JIS capability, supply companies need to be able to manage and monitor shipment and delivery according to sequence requirements.

Ensuring that quality is monitored and maintained requires traceability of raw materials and components from suppliers as well as goods going to customers. Tracking inbound items allows companies to check that raw materials and parts for production are ready when required, and that the items meet required quality specifications. Tracking outbound items is important for the quality management process because if a part is found to be faulty after it has been shipped there need to be means of identifying the destination of the part.

Operational efficiency and control

Operational areas are another avenue for component manufacturers to increase efficiency and reduce costs. To improve operational efficiency, companies need to have an integrated view of all aspects of operations – from purchasing and invoicing, to progress on the shop floor, in the warehouse and distribution centre, as well as management of assets. To manage operational costs requires management and control of operational parameters at a number of levels – from low-level detail to group-level information for budgeting, turnover and profitability assessment. All this information should be available preferably as and when required.

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It is not only in administrative support areas that companies can look for operational efficiency but also at the shop floor level. Obtaining regular information from the shop floor allows tracking of work-in-progress, job tracking and job costing so that companies can manage on-going job costs more accurately. In any industry where delivery execution is a critical measure, information is required to monitor that customer satisfaction is being maintained – this involves not only on-time deliveries but also ongoing quality control and follow-up.

Because of the unique nature of the industry, in which releases and orders can be made before payment, component suppliers also have specific requirements for functionality around receipt settlement, and release handling and accounting. This is a flexible environment and suppliers need to have capability to handle unique customer trading requirements as well as exceptions, cumulative accounting and complex pricing.

Integration and collaboration

Automotive suppliers are coming under increasing pressure to integrate of systems. Internally this is becoming necessary as manufacturing and operational efficiencies require better information. Externally the companies are being pushed towards electronic collaboration with customers, particularly the OEMs, in order to use automation to improve handling of orders, forecasts, shipment notices and other business processes.

Internally, companies have specific systems for plant operations, e.g. shop floor data collection or process control, but there is often no connectivity between plant floor and the company's ERP software. The integration of these stand-alone applications with the ERP system is important, but companies avoid doing it because of complexity, cost and lack of expertise. Consequently, information from these other systems is usually captured at set periods (daily, weekly, etc), and often manually, which means that the availability of information is sporadic, incomplete and could even have errors. The ERP system therefore cannot provide the overall, real-time information that it should.

Externally, the OEMs are trying to drive e-commerce down the chain to their suppliers in order to improve cost and production efficiencies. In some cases, a single communication hub or portal is mandated as the provider of inter-company processes and communications. In other cases, OEMs use their own proprietary communications based on established principles like EDI; some OEMs have started to move towards standards-based communications like XML.

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For automotive suppliers, it is critical that they have a capability to integrate information and processes within the company, as well as between themselves and their customers and suppliers, so that they can deal automatically with changes of whatever nature and pass information on to the required area to take action. Indications that collaboration should be considered include missed delivery schedules, information lag, and misinterpretation of data. By implementing collaborative processes, component manufacturers can get sequence shipment schedules faster, and where long-term contractual relationships are established, suppliers can set up self-service and workflow applications for sharing information with their trusted partners.

Summary

In order to maintain and improve levels of efficiency, quality and cost effectiveness, automotive component suppliers will have to look at different areas across the board to streamline their operations. Part of the solution requires re-examination of processes and implementation of new systems to enable greater flexibility, improve management and control, and increase sharing and collaboration with business partners. Given the increasingly complex world in which automotive suppliers operate, it is hard to see how better business practices can be instituted effectively without appropriate technology. In order to achieve their goals, automotive suppliers need to consider systems that provide an integrated view of past events and trends, current issues, process states and schedules, and forecast activities.

Terminology

JIT (Just-In-Time) is a scheduling system that ensures parts and materials arrive at the production line only as they are needed.

Lean manufacturing is a strategy that promotes a flexible manufacturing organisation which can produce to exact customer requirements, and focuses on simplifying operations, eliminating waste, and reducing inventory throughout the entire production system.

Kanban comes from the Japanese word for 'sign', and is a method of triggering replenishment based on actual usage of material.

MRP (Material Requirements Plan) is a business practice for managing materials through production lines, and designed to maintain sufficient inventory, maximize efficiencies and lower unit cost by producing products in large lots.

Takt time comes from the German word for a baton that marks time, e.g. by an orchestra conductor. It is used as a measure of the time or cycle it takes for a completed product to be finished.