



The e-Supply Chain of the Future in the Automotive Industry

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The automotive industry supply chain will in future be widely electronically integrated – the e-supply chain is emerging [1]. Market changes and sales orders are available online throughout the entire supply chain. The electronic link between customer and vendor covers everything from order management, intelligent forecast systems, and scheduling functions, to virtual marketplaces. The greatest challenge will be to keep the e-supply chain highly flexible.

Customer Orientated Sales and Distribution

Online sales and distribution of new vehicles over the Internet is already a reality in the USA and is also beginning to establish itself in Europe. This is putting huge pressure on the major vehicle manufacturers, who still use traditional means of sales and distribution via dealers. As a result, OEMs (original equipment manufacturers) will in future also sell new vehicles online, which will lead to significant changes in the supply chain. In particular, customer demand for online delivery date confir-

mation requires complete information transparency, a genuine pull system, and high flexibility in the supply chain from order control to the vendors.

This in turn means that today's prevalent and, generally speaking, inflexible planning system will be replaced by a juxtaposition of customer specific (make-to-order) vehicle orders and orders produced for stock (make-to-stock). In addition, intelligent forecasting will be created on the basis of real orders, which can be used to communicate trends in customer behavior to the key vendors. The Inter-

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net is the right platform to facilitate such complete transparency (see diagram 1).

Efficient Procurement

The close logistical link, joining customers and marketplace to OEMs, opens up new possibilities for process integration between OEMs and their direct vendors. The implementation of an e-supply chain will give key suppliers a made-to-measure view of relevant orders at the producer, which will largely replace delivery schedules. The vendors can then make their own decisions about production orders. Should any bottlenecks arise at the vendor, the OEM receives a web-based confirmation in real-time. Mutual transparency improves the quality of cooperation in a completely new way.

The purchasing process will also undergo parallel changes. It will become more common for assembly plants to procure modules from the direct vendors and so the choice of vendors will lend even more importance to development. The purchasing process of the

future will focus on monitoring the entire supply structure. Highly standardized part spectrums can be put out to tender, bought, and procured over electronic marketplaces.

Rapid Product Development and Implementation

Speed is also a key factor in the development process. To achieve a time-to-market of 12 to 15 months for a new vehicle model, open development processes will emerge in which development partners are highly interlinked. Complete transparency is in turn a prerequisite that must be satisfied. New models, which are developed so quickly, will no longer require a period of 5 or 6 months at full production capacity. The start-up process of the future will only amount to 4 weeks. To do this, all the important start-up management processes must be standardized, which once again demands complete data consistency.

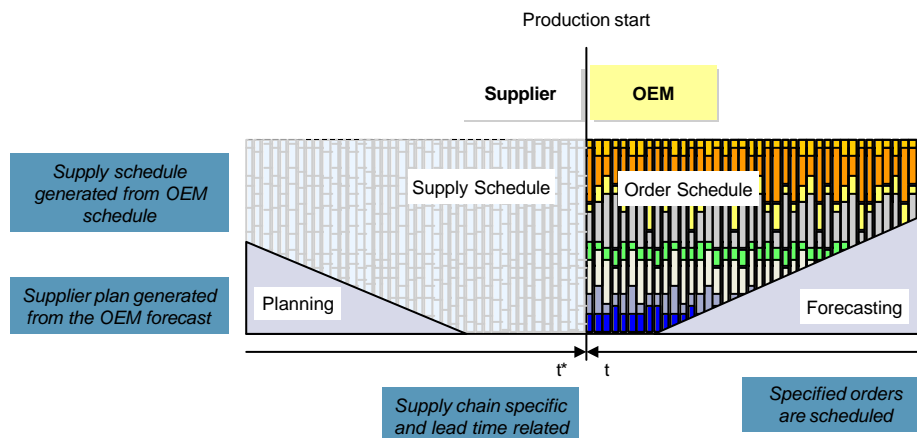


Diagram 1: Transparency of real orders for OEMs and vendors

IT Systems Are the Basis

Regardless of whether processes are speeded up in sales, production and assembly, vendor links, or vehicle development – information technology remains the basis for exhausting all available resources. Electronic integration with an e-supply chain is the key to future competitiveness in the automotive industry. Ultimately, IT resources will in future make it possible to leave out entire process stages, which are indispensable at present, for a particular part of sales orders (see diagram 2).

From Vision to Reality

The mySAP.com Automotive industry solution was developed against the background of these visions and concepts, and provides solutions to support business processes for all enterprises and business partners involved in the automotive industry. In this way, supplier and sales chains can be synchronized and optimized.

Like all mySAP.com industry solutions, mySAP.com Automotive permits the smooth cooperation of business partners both within and without the company, whilst using the most modern Internet technologies in real-time. The four key components from mySAP.com are:

- mySAP Marketplaces, the so-called Internet *business hubs*, which provide the technical infrastructure for processing electronic business processes for several business partners. Using the online marketplace, an integrated cooperation of complex, interactive business processes will also be possible, such as the joint development of a product or the joint planning of requirements quantities and dates for various business partners.
- mySAP Workplaces are open portals, which can be used via a standard web browser. They allow all users fast, uncomplicated access to all applications and information required for performing their

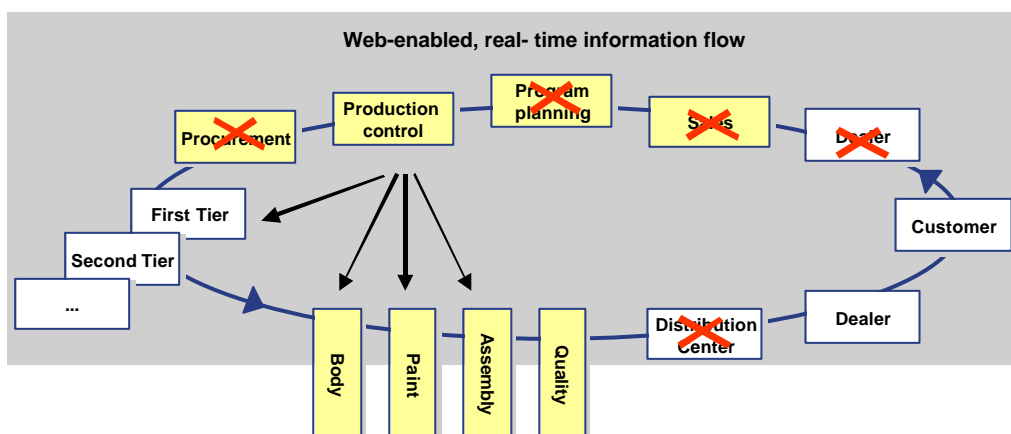


Diagram 2: The Internet changes business processes

tasks.

- mySAP Applications are the tried and tested application components from SAP for the areas *Customer Relationship Management (CRM)*, *Supply Chain Management (SCM)*, *Product Life Cycle Management (PLM)*, *Business Intelligence (BI)*, *Enterprise Resource Planning (ERP)* etc. These applications can be accessed through the mySAP.com Workplace just like non-SAP applications, and serve to support collaborative business processes.
- mySAP Application Hosting takes into account that all mySAP.com applications can be used over the Internet. This form of software is of particular interest to smaller companies, as the costs of hardware, implementation, and maintenance often represent a considerable burden.

mySAP Automotive uses these four key components from mySAP.com, to do justice to the requirements of the automotive industry. Enhancements have been made to improve the support offered to the complex and variant-rich automotive products, and to enable high order volumes to be processed and planned, taking into account the large number of customers, partners, and vendors even better than before. This includes in particular the integration and accessibility of processes.

In this way, even in the production development process, the master data for product, production process, and factory layout is already gradually built up and linked together, with the help of **integrated Product and Process Engineering**. **Collaborative engineering & Project Management** permits the integration of any number of external development partners in the development process. Development documents from a joint development process are available on an

Internet server, comments and further developments are exchanged amongst the partners, and notification about changes is sent by e-mail via workflow components. In addition, access to marketplaces is possible with integrated construction catalogs for the simple integration of standard components in the construction and then their procurement.

During the development process, an inter-linked product and process model is created, which acts as the basis for all following processes. With functions from SAP Product Life Cycle Management for example, production start-up in different plants is controlled using project and process templates.

mySAP Supply Chain Management carries out both long-term demand management, taking into account the different sales partners, as well as medium and short-term production planning, taking into consideration business aims such as an even utilization of the production locations and lines, minimization of customer delivery time, or minimization of the absolute schedule variance.

With the Vehicle Management System (VMS), a vehicle can be configured by the customer at the dealer, and its price determined. If the vehicle that the customer requests already exists, it is localized by the VMS (dealer in area, distribution center or other) and ordered. If the vehicle desired does not exist, a similar vehicle can be determined and localized. If the customer does not want this, it is possible to place the sales order directly at the OEM, using Real-time Positioning³ and to determine an exact and binding delivery date.

Model-mix planning determines an optimum order sequence with start and end dates:

³ Real-time Positioning is currently in development and will be piloted in 2001.

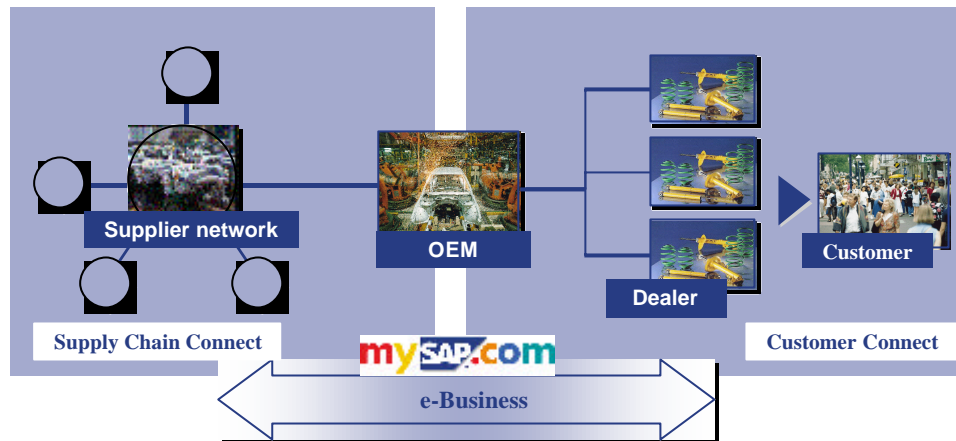


Diagram 3: Synchronizing supplier and sales chains

- Period-slot creation, for medium-term planning in a planning period of several days to weeks before production. It assigns the orders with an optimum capacity load to production lines, taking into account quantity restrictions.
- Sequencing, for operative planning in a planning period of a few hours to days before production. In sequencing, various restrictions can be taken into account. The optimum order sequence is determined using a genetic algorithm and taking into account the business aims.

The basis for real-time positioning, model-mix planning and the requirements calculation is the **rapid planning matrix (RPM)**, which reproduces BOMs, restrictions, and orders from products with many variants and large order volumes in the liveCache of a server. With liveCache technology both planning runs as well as requirements and range of coverage calculations can be carried in minutes⁴, and

⁴ In the DaimlerChrysler performance test the complete requirements planning was carried out for more than 43 000 vehicle orders in less than 48 minutes. The result of the performance test was clearly better than the initial requirements from the user.

forecast delivery schedules and pull-lists created and forwarded within the supply chain.

The **supplier workplace** was realized to improve supplier integration, in particular for companies that do not have EDI communication. With a simple Internet browser, suppliers can track up-to-date information such as delivery schedules, deliveries, and invoices in the OEM's system, at any time. In the case of deviations that lie above a definable threshold, additional warning messages can be sent in the form of e-mails or SMS messages. All those involved are thus informed in real-time and can react accordingly. The resulting flexibility allows the OEMs not only to optimize the production process, but also to react to errors within the supply chain, such as delivery problems (see diagram 3).

The Potential of the e-Supply Chain

The e-supply chain in the automotive industry is not an end in itself, but serves to link concrete company aims. For the European automotive industry, with its relatively high proportion of customer-specific vehicles, there is the following potential:

- An improvement of the delivery reliability for customers from 30-60 % today (week-specific) to over 90%.
- A reduction in delivery times for customer-specific vehicles from 8-12 weeks today to about 2-4 weeks in future.
- Through these improvements in logistics performance for the customer, and the linked paradigm change from a push to a pull system, a cost reduction of 13.5 billion Euro can be achieved, as well as an improvement in the profit margin in the vehicle process.
- In addition, a reduction of 7.8 billion Euro can be achieved through greater efficiency in the supply chain between the assembly

plants and the vendors.

This would mean a customer-oriented supply chain for European automobile manufacturers, and would simultaneously reduce total costs, at a very conservative guess, at around 6.2 %.

Literature

- [1] Wolff, S. et. al.: Managing the eSupply Chain in the Automotive Industry; Processes, Structures and Solutions; Whitepaper of SAP AG and the ZLU Logistics and Management Consulting, Volume 1; Walldorf 2000
- [2] Geiger, K. et. al.: Managing the eSupply Chain in the Automotive Industry; Processes, Structures and Solutions; Whitepaper of SAP AG and the ZLU Logistics and Management Consulting, Volume 2; Walldorf 2000