

Logistics - the final frontier

How important are efficient logistics to the major car companies?

A review of the opinions of Chrysler, Ford, GM, VW and the Toyota system

by Andrew Lewis Yiakoumi and Ian Henry

In the 1980s the car companies restructured their supply bases and introduced the idea of different levels of tiers of suppliers. The number of direct production parts sourced from suppliers fell, the size of major component companies increased – as they continue to, of course – they also took on more responsibility and the idea of systems or module supply came into being. Systems or module supply can mean different things to different companies, and even within a car company there might be different definitions depending on the plant or the model concerned.

Following the supply base restructuring, efforts were switched to transforming vehicle assembly. Although production tasks in many car companies are still carried out in-house when outsourcing would be more efficient, the major assemblers are moving on to the next big idea – modernizing logistics throughout the supply chain, from raw material supply to final delivery of the car to the customer.

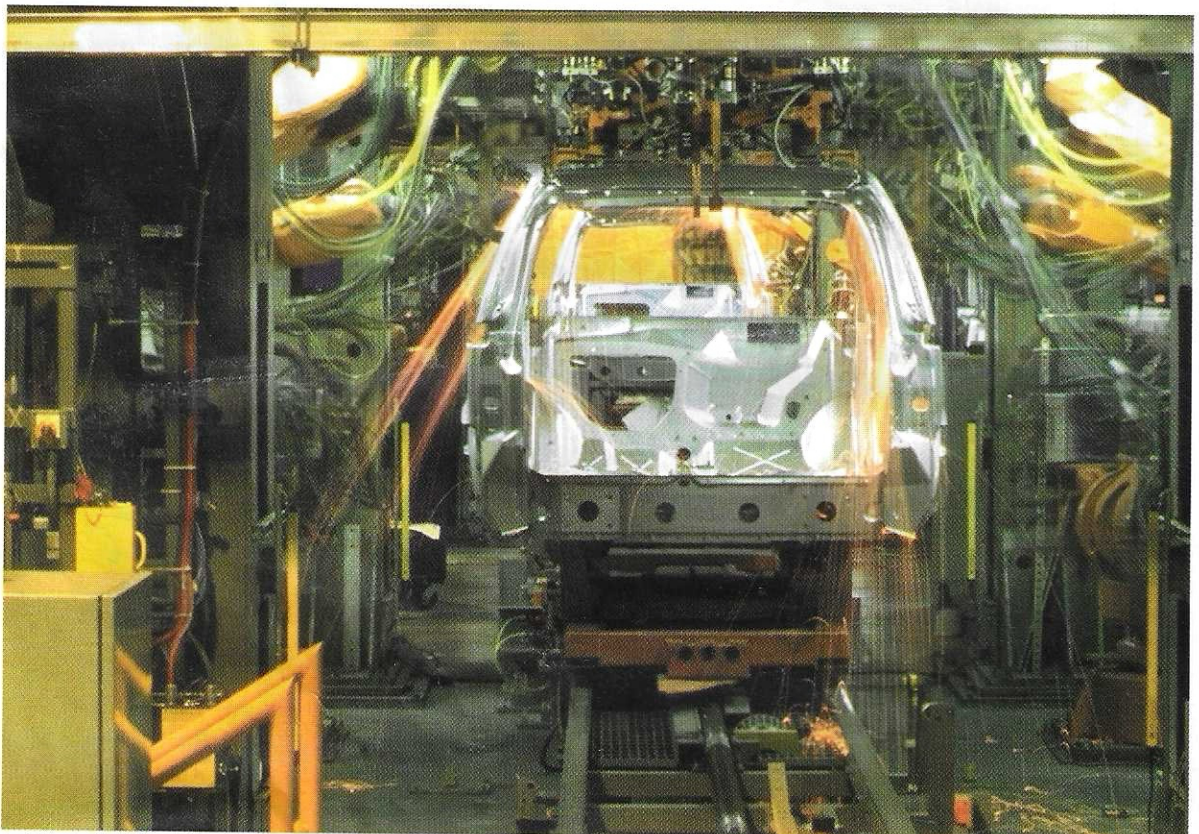
Transforming the logistics system may prove to

be the biggest challenge facing automakers. Logistics affects every aspect of the company's operations, including the purchasing and production systems that the assemblers have spent much of the last two decades redefining. As has been said elsewhere by many people, the only certain thing in the car industry today is constant change.

In view of the huge importance of logistics to the efficient operation of car companies and the multitude of changes that are now underway, we sought the views of senior executives of four of the major global car companies – the Big 3 from North America, Chrysler, Ford and General Motors, plus Volkswagen, the biggest volume manufacturer in Europe, which also has major global expansion plans. Many of the ideas and approaches now being applied by the car companies reviewed here draw their original inspiration from the success of the Toyota Production System (TPS), which we profile at the end of the article.

The following interviews reveal the many challenges which the car companies are facing, namely:

The next big idea – modernizing logistics – from raw materials through production to final delivery of the car





EVER ENGINEERING

Customized supply chain solutions for auto manufacturers

Inside the most successful supply chains are intricately engineered processes and solutions created to overcome any disruption, meet consumer demand, and foster business growth. At Ryder, we work behind the scenes creating the most detailed and smoothest running supply chains with customized warehousing, transportation services, contract manufacturing & contract packaging, e-commerce fulfillment, last mile delivery, and innovative technology. This way, you can focus on creating your products as we design ways to get them to market quicker. Discover how Ryder Supply Chain Solutions can make your operation *Ever better*[™] at [ryder.com](https://www.ryder.com).



SUPPLY CHAIN | DEDICATED TRANSPORTATION | FLEET MAINTENANCE SOLUTIONS

- should they globalize or run their logistics on a regional basis?
- can software and IT systems cope with the scale of information that needs to be managed?
- how far can improved logistics cut the time to market and give them a real competitive advantage?
- how can logistics improve the overall supply chain, from sourcing through manufacturing and onto delivery?
- what is the role of logistics providers and how much responsibility can they take from the car companies?

All the companies we spoke to face the same challenges. Their approaches have similarities and individual nuances, which suggest that many new challenging opportunities already exist for the logistics service providers, with more to follow.

Chrysler – setting global policy with local implementation

We began with Dave Hodgson, Executive Director of Supply for Chrysler Corporation. For Chrysler, the same rules about modern, state-of-the-art logistics practices have to be applied to outbound as well as inbound logistics. Cutting waste, time and inventory from when a vehicle has been fully assembled and is ready to roll out of the plant until it finally reaches the customer or the dealership is a key task and one which Dave Hodgson's area is now tackling.

We asked Dave Hodgson to begin by explaining the features and the guiding principles of the structure within which he works:

Chrysler operates a centralized system for controlling purchasing and supply. As far as possible everything comes through our department here in Michigan, and that includes our plants in Europe and South America. We are also responsible for the procurement of the logistics service – we don't just say what has to be done; we also negotiate with the logistics companies, sorting out contracts and their specific tasks.

At what point do the logistics processes start? With the product, the manufacturing facility, or the sourcing and supply of parts?

In theory, any successful process has to begin with the customer – what the customer wants, when, where, in what quantity. Ultimately, manufacturing processes have to be “pulled” by the real or perceived requirements of the market. These requirements should define facility locations and size, and determine the sourcing and supply of parts; they should therefore be the determining factor in how logistics link up the whole supply chain. In the real world, we may be placed in a situation



Dave Hodgson,
Executive
Director of
Supply,
Chrysler

where the sourcing and supply of parts, or the manufacturing facility is constrained in some way and then logistics begins with an analysis of constraints and their impacts.

So what does Chrysler do and what do your suppliers do in the area of logistics?

Almost everything is organized by our department here and we get perhaps as much as 98 percent of our parts FOB at the suppliers' plant. We buy and manage the transport service which could come either from our in-house department or from a third party supplier. We have a subsidiary, Chrysler Transport Inc., based in Detroit which collects from our suppliers in Michigan, Indiana and Ohio. Elsewhere we use outside suppliers. We expect the logistics company to carry out at least half of the physical aspects of logistics themselves; they can sub-contract some of it if they want to, but we expect them to do the majority themselves.

Production control is not outsourced at Chrysler, but we are trying to eliminate some control activities, such as parts tracking, follow-up and expediting. We do this principally by perfecting the parts delivery process, ensuring that all shipments are shipped and all parts arrive on the assembly line at the right time and in the right quantities. We use our logistics providers' resources to help us with communicating “behind-condition” situations, satellite tracking and bar code reading.

So the suppliers themselves do not have a major role in logistics?

They don't have to organize the transport, but they must have systems in place to be able to supply parts directly onto our trucks either in the right order for line build or in the right batch sizes to our sequencing centers. ➤



We have to work closely not just with manufacturing, but also with the sales and marketing teams, regionally and in individual countries
— Hodgson

▷ ***How do you relate what you do to your manufacturing?***

We have to work closely not just with manufacturing, but also with the sales and marketing teams, regionally and in individual countries. In the same way that we have a centralized logistics policy, we also have a centralized manufacturing scheduling policy.

Can you explain how that works?

Together with the sales and marketing teams, we gauge how many vehicles we should build on a rolling basis. We start from the top, for example with North American market forecasts and what our market share goals are. That gives us an idea of the total number of vehicles we might build, and we divide this between different models and variants, which in turn are divided between countries where we sell vehicles.

This gives us a fairly detailed idea of how many vehicles we are going to build of different trim versions. This information is released in broad terms to suppliers three years ahead. We then give suppliers a detailed production plan on a rolling 15 month basis; this shows what our detailed build forecast is by month and by week. But remember that this is a plan and it changes.

How do you take into account actual customer or dealer orders?

You have touched on a very important point. Everything we build is actually against an order. We tell the suppliers how many vehicles we intend to build and how many of different versions, but every vehicle built is made in response to a real order from a customer or a dealer or a national

distributor. We do not build for stock!

So any vehicles in compounds or in the supply pipeline are effectively pre-sold?

Yes, but not always to an end customer. Dealers and distributors buy around 90 percent of our vehicles. Of course, we help them manage their own inventories, but we are taking as much cost out of our system as possible and this is a major contribution. The onus is on the dealers to know their market, so they order vehicles that people want.

Does this mean that a customer can walk into a dealer, order a car and you can slot it into the production schedule more quickly?

It certainly should do. At the same time, if the dealer or the distributor has done his work properly, then because the majority of demand actually comes from a limited set of options or variants, then it is possible that a specific order could already be in the system, and we can pull it out and re-allocate it.

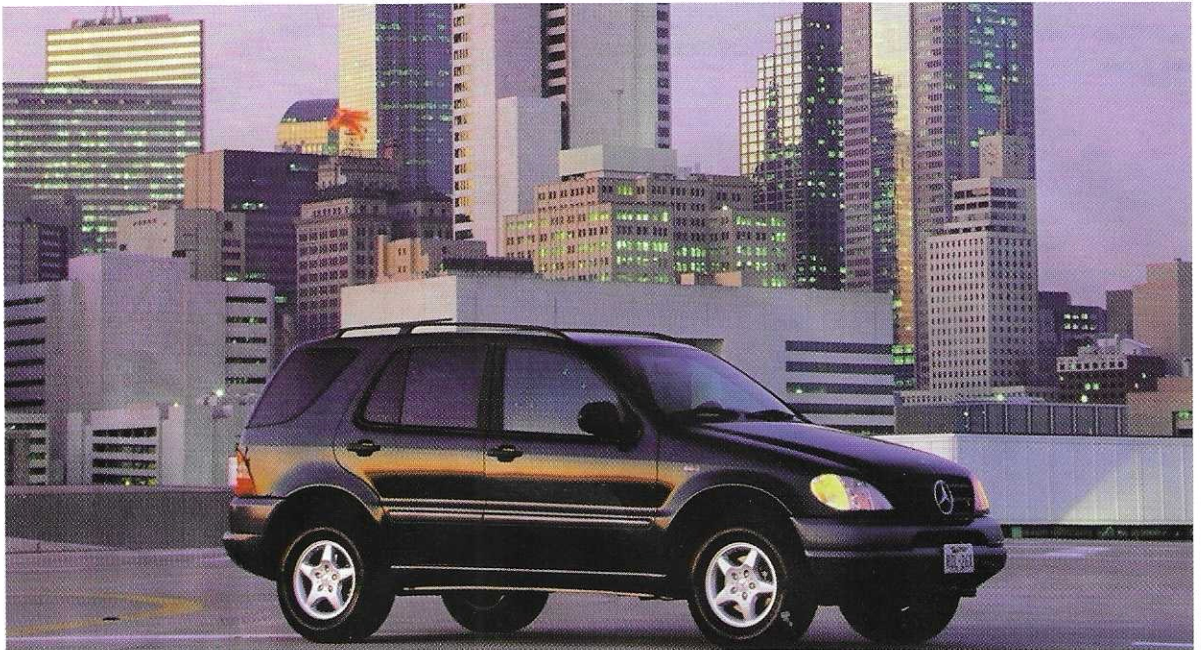
So if I went into a dealership tomorrow, when could I get my car?

In North America, 20 days if the dealer does not have it – that should be the maximum, but it could be less. In fact, we need to reduce it.

Some of your competitors are talking about 14 or 15 days!

Exactly! Chrysler has a similar process to Ford's "15-Day Car Program", where a sold order is matched and swapped with a similar "in process" stock order, providing a vehicle in 10-20 days depending on dealer location. If a swap is not ▷

We have scale economies and benefits here and Daimler-Benz does in Europe, so there must be some potential for further savings
– Hodgson



➤ feasible, we aim to produce and deliver the car within 20 days. We also closely match vehicle configurations in dealer stock with most current customer preferences. This has the effect of reducing demand for custom orders since customers should find the exact vehicle they want already in stock at the dealership.

Returning to the logistics of production, how widely do you use the supply in line sequence (SILS) principle?

We are concerned simply with the most efficient delivery system. If this means that suppliers should ship in line sequence, then that is what they do. But we don't have to have it all done in this way. It clearly makes sense for the cockpit and the seats to be delivered in build sequence. Other parts go to our sequencing centers. We have also reduced line-side inventory to just two hours. While we obviously need to have inventory, we keep it outside the plant in sequencing centers or at suppliers, saving space and the time of production workers.

To make all this work, you must need some powerful, sophisticated IT. How does it work?

When a dealer clinches a sale, he enters this onto his computer, which is linked into the production scheduling system here. The software can identify if a vehicle with the same specification has already been ordered on a pre-sold basis and, if necessary, this sale can be diverted. If it has to be built in direct response to this order, then the system can tell the dealer when the vehicle will be made and when it will be shipped out of the plant.

And is this system also linked to the supply base?

It is – I spoke earlier about the 15-month rolling manufacture schedule. This is updated regularly and a specific order can be fed into the system. When this involves a specific trim requirement, then the relevant suppliers are also automatically informed. Ideally, this information will be passed on from the systems or Tier 1 supplier to his Tier 2 or Tier 3 suppliers as well.

Can you give us some idea of how effective your system is?

We have cut three weeks or more out of the communication loop by using EDI. We have calculated our system saves \$71 per vehicle – so we can save nearly \$200 million a year!

Chrysler, even before the merger with Daimler-Benz, had been globalizing its manufacturing activities, with plants in Austria, Brazil and Argentina. Does your logistics system work there as well as in North America?

It does, but because we are still focused on North America in production terms, our systems start here and get applied in the rest of the world afterwards. We are responsible, however, for Chrysler logistics worldwide and I have people reporting to me in our production locations in Europe and South America.

We set the strategy that these production plants must follow. If they can do something to the same standards in a more efficient way, with local practices then of course they can do that. There is a manager in Austria for example who is the local expert on the Chrysler processes and how they have been adapted for Austria. Similarly, I have someone in Brazil for the Dakota pickup plant and in Argentina for the Cherokee and Grand Cherokee plants.

▷ *What impact has globalization had on your logistics, both on a manufacturing and a sourcing basis?*

The automotive industry has always been global, in that operating internationally was always common amongst the large manufacturers. But improved telecommunications, political and economic change, and improved logistics have allowed greater coherence and coordination with distant operations. The flexibility that this has brought to facility and sourcing decisions has made logistics processes more reliable and robust than in the past.

To what extent can a global approach be taken to logistics and how much has to remain on a regional basis?

Theoretically there are no logistics processes that cannot be approached globally. In Austria, the decision to operate regionally is dictated by the particular market. The strongest influences are telecommunications infrastructure, physical infrastructure and the availability and sophistication of logistics service providers. Local customs and regulations have also to be considered. Although the ultimate goal might be to run our regional operations with one set of logistics processes worldwide, for now we are setting global policy with local implementation.



How do you think the merger with Daimler-Benz will change things?

We are slowly beginning to identify ways in which we can work together. It is early days yet, but we will both have ideas to contribute. You also have to remember that we run different IT systems and this could be the major challenge for us.

Could you imagine taking on responsibility for the M-class and Freightliner plant logistics and passing over responsibility for your Austrian plants to the Germans?

Everything is possible, but it will be well into 1999 before we can be really clear what will happen. Nonetheless, we have scale economies and benefits here and DaimlerBenz does in Europe, so there must be some potential for further savings.

We have spoken a lot about inbound logistics. Your responsibilities encompass outbound logistics too. Can you explain a little more about these?

We apply the same principles of efficiency and effectiveness to the delivery side of the business as we apply to sourcing. We have found that greater use of the railroad network is preferable to complete reliance on road transport. In fact, 70 percent of our finished product moves around North America by rail. The key part of this is the efficient use of mixing centers. These are similar to sequencing centers for production parts. Mixing centers take vehicles from our many production plants and ship them directly to dealers or regional distribution points in the most efficient volumes.

**We have reduced
lineside
inventory to
just two hours
-- Hodgson**

In summary, how can an effective logistics strategy give a manufacturer competitive advantage?

Competitive advantage is created by delivering greater value to the customer. Logistics has several roles to play in adding value, i.e. the traditional aspects of having the right product, in the right place, at the right time. However, modern logistics goes beyond this to create value through reducing costs and cycle times. As we improve our distribution networks, the customer's expectations of "right time" for the order-to-delivery cycle of a car is reduced.

To get the view from the 'sharp end' of Chrysler's logistics policies we spoke with Ed Krajca, Manager International Supply and Customs, Chrysler

Ed Krajca has over 15 years experience of working at Chrysler in a variety of logistics and transport roles.

➤ *Please can you explain your main role in Chrysler's international operations?*

Essentially I am responsible for ensuring all the relevant parts and complete kits reach our overseas plants. It all begins here in Detroit at our export center through which all our North American-sourced parts flow.

Do you organize the supply for the CKD operations or just the full manufacture operations?

No, we are responsible for the CKD operations in China, Egypt, Venezuela and some smaller activities in Asia, as well as the manufacturing plants in Argentina, Brazil and Austria. But we still ship in kit format to Argentina and Brazil, although we are trying hard to move away from this, especially as the Argentina plant is really what we call a full manufacture plant.

Do all the plants present the same sorts of problems and challenges?

We have to get the kits and volumes together in the same way no matter where we are shipping to, but we don't ship at the same frequency to all locations – for some plants, there is less pressure from time and volume angles; for example, in Egypt we only assemble eight vehicles a day!

Would it be true to say that the European operations now run in much the same way as your US plants?

Yes, we now run the logistics for both the Voyager and Grand Cherokee plants in the same way as we do for North America – except we have to improve the packaging to cope with the demands of international travel. The real challenge is the combination of the distances and the volumes.

This places great stresses on our export center. Simply making sure that everything gets there on time and undamaged demands discipline and organization – and a good IT system. We also expect our shippers to have the IT capability which will allow them to know where each shipment is at all times.

And we are also at the mercy of the elements, the sea! It takes 18 days to get a shipment from our export center in Detroit to the plant in Austria, 12-14 of which are spent on the ocean.

What is the main route

actually taken to Europe?

We use several East Coast ports, such as Newark or Northolt, or we'll use Montreal, depending on the sailing times. Everything lands in Rotterdam or Antwerp and from there it goes on its own chartered train to Austria. We have a staging or sequencing center in Austria which re-organizes the shipments so they are ready for the production line.

And how much do you ship?

Around 60-70 containers a day – at least 400 a week.

And to Brazil?

Here the build volumes are lower, so the amount we ship and the frequency of shipments are less. We ship more like 40 containers a week to Brazil, which spend about 24 days on the seas. We also ship another 12 containers a day or 50 or so a week to the CKD plants around the world.

Is there anything else different in Brazil from a logistics viewpoint?

To some extent there is, because we are increasing the degree of local content and extending the flexibility of the plant. We are trying something new there, with Dana, which supplies a rolling chassis directly into the plant.

Can you explain what that means in practice?

Yes – Dana delivers a fully assembled chassis, with wheels, and around 200 parts fully welded onto the frame; it is shipped directly onto the line in our factory from Dana's plant nearby. We also source complete seat systems, plus glass and tires locally.

You have your export centre in Detroit, but how much of the total process do you manage yourself? ➤

We now run the logistics for both the Voyager and Grand Cherokee plants in the same way as we do for North America – Ed Krajca

Automotive SOURCING



➤ We involve several other suppliers in what we call our 'extended enterprise'; for example we have our cardboard supplier on site at the export center, along with Ace Packaging, the company which actually makes up the boxes. We then use FX Coughlin to provide the physical transport to the ports.

Now that the merger with DaimlerBenz has gone through, will you be looking to provide logistics support for the M-Class assembly operation in Graz?

We are already working closely with MBUSI to develop a logistics system for this programme. But there is a long way to go before we can conclude what we will do. We may set up a centre in Tuscaloosa and ship from there, or we could bring all the parts to our export center in Detroit. One thing is almost certain – we will share the train from Antwerp or Rotterdam. Whatever we do, we hope to have it agreed by early November!

Ford 2000 – still on target?
We then spoke to Ray Pittman, Executive Director of Material Planning and Logistics (MP&L) at Ford in Detroit.

Ray began by explaining his overall view of logistics and the Ford philosophy:

Global material planning and logistics began with the Ford 2000 program in 1995; we are the custodians of the order-to-delivery process and we're charged with harmonizing MP&L globally. Our initial operational priorities were to locate missing parts in the point of fit in our assembly plants worldwide and to relaunch our global CKD operations headquarters at our Dagenham site in the UK. In addition, we had to launch a major program in Brazil with the Ka and Fiesta, with most of the components coming from Europe.

We have been very successful in that initial operation of getting missing parts out of the system.



Our principle is zero missing parts on line. Our job is to be sure that this is accomplished at every plant around the world every day.

How successful has the relaunch of your global CKD operation been?

We view the relaunch of our CKD operations as one of the major accomplishments of the new Ford organization. Last year, we shipped over 100,000 vehicle lots worldwide; this year, the CKD business is down significantly, which is due in part to the Asian crisis. We have been able to make the CKD operation very efficient because we run it alongside our mainstream manufacturing activity, with the same quality and performance objectives. The idea of common practices in MP&L and manufacturing worldwide is really the cornerstone of Ford 2000.

Can you describe your core tasks?

We cover all the functions in the order-to-delivery process. We have a joint order management team with ourselves and manufacturing and marketing. This sets the daily production schedule for all our assembly plants worldwide. We schedule all of our assembly plants centrally.

Our goal is 15 production days of orders scheduled to the day; and then to hold those orders to that day. One of the key starting points for achieving a 15-day order-to-delivery process is to have 15 days of production orders by vehicle line by plant fixed, and we are now achieving that in North America and Europe.

Where does the MP&L process start?

In new product programs we are involved from the start. We participate in the sourcing process where we decide which manufacturing assembly plants are going to build our new products and we are there to identify the logistics impact of each alternative considered. Our goal is to make the lowest total cost sourcing decision with regard to how the commodities are going to be sourced.

How do you relate to the engineering department?

We work very closely with engineering because we have about 320,000 part ➤



Ray Pittman,
Executive
Director of
Material
Planning and
Logistics, Ford

We had to launch a major program in Brazil with the Ka and Fiesta, with most of the components coming from Europe
– Ray Pittman

Automotive SOURCING

records in the total Ford build material list and we change about 5,000 of these every day, for quality improvements, cost reductions or added features.

And how successful are you?

We're running between 0-2 percent on average for missing parts at the point of fit in North America, Europe and South America.

Moving on to the inbound logistics process – how much of this do you control?

What impact has globalization had on your MP&L organization from a manufacturing and sourcing perspective?

When we launched Ford 2000 in January 1995, we went from being four regional companies (North America, Europe, South America and Asia-Pacific) to a single global company. Each of those regions were relatively independent business units with their own engineering, manufacturing, purchasing, and therefore sourcing strategies and supply bases. With Ford 2000, we became a single global company with a single business plan and a single product plan. We are creating products off

Our principle is zero missing parts on line
– Ray Pittman



We manage the inbound transportation centrally to be sure that the inbound material gets to the point of fit on time. The responsibility for the process then belongs to our manufacturing operations who produce components at manufacturing plants and assemble vehicles at assembly plants. Once that vehicle comes off line and is gate released, it is our responsibility to get it to the dealer.

We develop the production schedules, we ensure the build material is correct, we tell the suppliers what material we need in the plant, we manage the inbound transportation centrally to be sure it gets there and we manage the outbound transportation centrally to be sure finished vehicles get to the dealers.

common platforms to use worldwide.

We also control the design of the systems, the software and the business practices that move material through the production system around the world.

So, to what extent can a global approach be taken to MP&L and how much has to remain on a regional basis?

We use common standards and common systems. But the day-to-day management of MP&L operations has to be conducted on site. So, for example, the daily production scheduling for South America is maintained and operated by a central core group in Brazil, but detailed plans are

➤ sent back here. The day to day operation of the business is regional and local.

What problems does international shipping of components cause you?

Because we make parts in every region where we build cars, and ship them around the world, inevitably there are supply problems. The core MP&L group helps with a global solution when problems arise. We bring Ford's leverage to bear in local customs issues whenever required. We also leverage the volume of traffic movement by Ford worldwide to get the best ocean-going logistics rates, the best rail rates, and the best truck rates as we consolidate our transportation supply base worldwide into a few major providers who are also going global.

We also use major global logistics providers to bring the quality and speed of service that are essential to the 15 day order-to-delivery objective. Furthermore, as railroads are privatized, rail is going to play a much bigger role in transportation; you will see rail companies that want to be global operations.

Can you measure the efficiency and the cost benefits of getting a part to a specific place one day earlier?

We relate our logistics cost to a cost per unit on the finished vehicle. So, we look at how efficient the logistics system is in getting parts from the supplier to the point of fit and we drive those costs down, by finding and eliminating waste in the sourcing, transportation and customs network. We take time out of the system wherever we can and we

will pay more for transportation if it reduces inventory substantially.

Is a day or a time unit measurable in costs?

It's the cost of a day's inventory. Normal transportation, the lowest cost of delivery, might be by sea, but we will fly some electronics components to our plants because their value is so high the reduced inventory more than pays for the incremental cost of air freight.

Moving on to finished vehicles, how does your organization impact upon the distribution of the finished product?

We manage the outbound transportation process as well as all the inbound processes; historically we have averaged about 12 days from factory to customer. In North America to achieve this, we have created four regional mixing centers which allow us to ship immediately from gate release to a mixing center where the vehicles are batched and loaded for a specific destination – we've got 55 destinations in North America alone. Creating the four mixing centers allows us to take four days out of that delivery process and get it down, on average, from 12 down to 8. We launched the mixing center system in January this year, but we have had a major problem with railroad congestion; because the economy is so strong, the railroads had underestimated the amount of capacity that they were going to need and so there has been real competition among all users of the rail system in North America – the automotive industry only represents about 6 percent of goods hauled by rail.



➤ We manage the outbound transportation process as well as all the inbound processes
– Ray Pittman

We are working with logistics specialists to enable us to launch our lean logistics system simultaneously around the world

– Ray Pittman



➤ *How much of your production control is outsourced to specialist logistics companies?*

We see production control as a core competency. At the same time, we are working with logistics specialists to enable us to launch our lean logistics system simultaneously in or at all our assembly plants around the world. We do not have the resources to handle a simultaneous launch of that magnitude ourselves and we've brought in specialists to help us launch Europe, North America and we're just starting in South America.

How is all this organized?

We have three layers. The first layer is at each assembly plant where a logistics provider helps optimize inbound material flows for each assembly plant. We have four logistics providers in North America providing that service to our assembly plants, and three in Europe, and we've just created one for South America.

Then there is the second layer, i.e. a network manager for North America, who has to optimize the entire network. There are obvious opportunities for cross-docking operations at key locations in North America to optimize the flow into our plants. Most suppliers cannot cope with hourly delivery into three assembly plants, so we need to ship to a cross-dock facility and then move the material to our plants that way – these are what other companies call sequencing centers. We're still at a very early stage in Europe, but it's reasonable to assume that we will eventually have a single network manager at layer two in Europe. In South America, the joint venture company that we've sourced is not only the provider for each of our four

plants, but it is also the network manager for South America.

Ultimately, the next step would be a global network manager to manage it all, i.e. the third layer.

Ford has been one of the leaders in using supplier parks. How successful has that concept been and are you looking to use it even more?

We're very pleased with the results so far particularly in Saarlouis and at Valencia; at Saarlouis we have moved a lot of sub-assembly into a supplier park, so we have been able to refit Saarlouis for the launch of the new Focus without adding any major building additions. This has been a real win-win situation – keeping our core vehicle assembly activity business inside our plant and putting the sub-assemblies in the supplier park. This requires very close cooperation between Ford, the supplier and the local business unit or the country business unit really. In both Valencia and Saarlouis there has been a lot of cooperation with local government in terms of land acquisition, investment in the buildings, recruiting and training people for the supplier park. And so you really have to look at each situation on its own business merits based on those type of inputs.

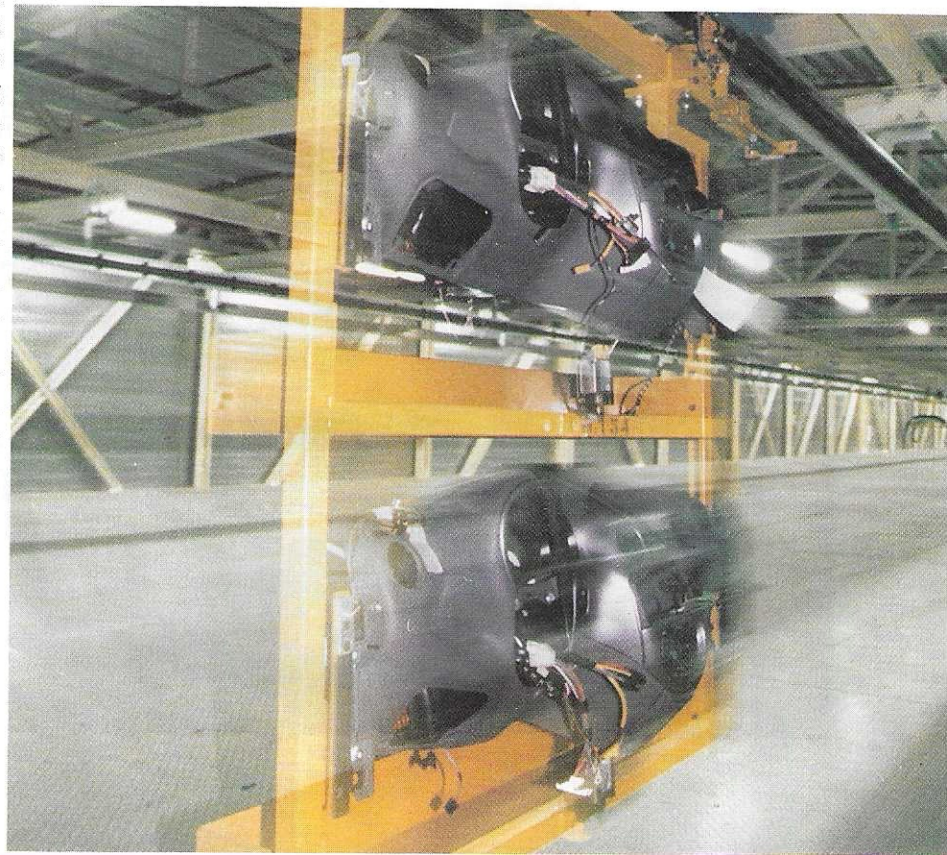
What is the future for the supplier park and for module supply combined?

If you want to look at where we're going, look at the Amazon project in Brazil where we want to do modules in a supplier park. However, our vision there is to have the suppliers as our partners in a greenfield site. We're going to create a business unit comprising the local Ford operation and its

➤

We relate our logistics cost to a cost per unit on the finished vehicle

– Ray Pittman



➤ key suppliers. The buildings may even share common walls on the site or they'll be very close. But this is not just about assembling sub-assemblies – it's really to do with engineered modules, for example, a complete instrument panel designed as one module, engineered and assembled by one source. Another would be the rear axle assembly, including the suspension and brakes, all engineered as one module and assembled by that module assembler on site; it's a much higher level of integration. We're looking at about 15 modules for this project.

Finally, if we can turn to your information systems, how does Ford use its information systems to optimize its logistics?

Think of a triangle of a team made up of our assembly plants, our materials suppliers and our MPL car function. They operate a real time information system where they share the status of material on hand versus the material required to build the day's production schedule. Because this is available on a real time information network, the supplier and the plants are able to make adjustments as required. We can revise the production schedule if the part shortage can't be solved. The key is the production system we use, CMMS3, Common Manufacturing Management System, version 3. In this real time system the supplier, the plant and the any one who needs to can see the real time status of material on hand or in the pipeline versus what's required and take appropriate action. The next step is to extend this to include the sub-suppliers.

You want to involve everyone?

One of the basic principles of Ford's global purchasing is that suppliers are partners and that maintaining a strong positive relationship is one of our prime objectives. To that end, we constantly review the status of our relationship to be sure that we are open and honest with each other and that we are taking immediate action to resolve any issues that may be coming between us that we aren't aware of.

PC&L – Moving from supporting the manufacturing process to driving it. Over at GM we investigated the way in which it is achieving greater efficiency through better logistics. We spoke to Nick Matich, Executive Director of Production Control and Logistics (PC&L) for General Motors in North America.

To begin with, how would you summarize how an effective logistics strategy can give a vehicle manufacturer a real competitive



**Nick Matich,
Executive
Director of
Production
Control and
Logistics,
General Motors**

advantage?

I think that as we look ahead to the future, the ability to move material quickly from raw material to finished product and put it in the hands of the customer is going to provide the manufacturer who can do that well with a competitive advantage in the marketplace. That is what this business has always been about and I think as you get a view of lean processes and then you combine lean processes with fast processes, you will make the most efficient use of resources in total and come closest to satisfying the needs of the customer.

What does PC&L start with? Does it start with the product, the manufacturing facility or the sourcing and supply of parts?

I think that is one of the shifts, at least in GM, is that you can't pick one single starting point, you have to look at the entire process and make good decisions on balance. If you start with one element, say the supply chain, and you work to optimize it based on solely where the assembly is or where the sources are or what the product is, then I think you risk sub-optimizing the overall process, so the answer is you have to look at the whole system.

We try to get involved early in the product development process and our goal is to give the material flow requirements to the purchasing community so that when we source parts, they have engineering specifications and they also have material flow specifications or statements of requirement, and both of those are understood in the sourcing process. If we have done that effectively, we are closer to optimizing total cost when we make those decisions.

Does PC&L drive manufacturing or is it ➤

➤ *the other way around?*

We try to get involved early in the product development process and our goal is to give the material flow requirements to the purchasing community
– Nick Matich

Well, that's an interesting question because the answer depends on which side of the fence you are on. When I was in the plants, I believed that we drove PC&L. Now that I have responsibility for PC&L, I'd like to change the view of this and suggest that PC&L drives manufacturing. However, I prefer to think in terms of sharing a common goal, to satisfy customers quickly. In order to do that, both the PC&L and the manufacturing functions have to be integrated so that we move the raw material to finished product very quickly and in a very lean fashion.

In the past PC&L wasn't considered one of the major functions of automotive manufacturing, has it become more important now?

Yes, in the past we have been viewed in more of a support function, and if you start to look again at where we can add value and where we can create competitive advantage, I think you have to recognize that we are vital to the business.

As the auto industry changes from a regional to a more global bias, what impact does this have on PC&L?

Anytime you expand the focus, whether it's on how you schedule production, or material, how you move material, going from regional to global just multiplies the complexity of the challenge. As we have said before, when you decide that you are going to be a global company that means you will engineer and source product around the world, you will manufacture and sell around the world. The challenge of integrating that and moving the material and scheduling all of the functions so that everything happens when it is supposed to is a real challenge; doing it just for a region is tough enough.

Is globalization one of the reasons why PC&L has become an ever more important function for automakers?

I'd like to think we have become more important because even in the regions its value is recognized. But clearly, when you aggregate all that up to a global perspective, it shows just how important all that coordination and integration is from the standpoint of running our business.

To what extent can a global approach be taken to PC&L, and how much has to remain on a regional basis?

There is a balance that you strike between the



two; you have to be strong and focused regionally, and then the requirement to integrate globally is extremely important. I don't know that there is a percentage because I think that it changes by regions of the world depending on how much business you do and where the market is in a given region. For instance the regional challenges versus global integration needs are different between North America and Europe, as between Asia Pacific and North America, or Latin America and Asia Pacific.

So the ratio between how you spend or focus, or how you do your activity regionally and globally, varies by region. The only given here is that the global side of this will continue to increase as we go forward, because clearly the markets where we will see the growth will be in Latin America and Asia-Pacific.

In order to support that from a materials management standpoint, we have to do one of two things: develop the supply base to support that region of the world, or continue to work at globalizing at least the logistics part so that we can move the material to the point of assembly and then improve distribution.

Sourcing on a global basis usually produces cost benefits, but how do you reconcile these benefits with the possible disadvantages that global sourcing has for managing the logistics chain?

First, global sourcing does more than just reduce cost, as it allows us to find the best global supplier, and that is a function of quality, price and service. If you just look at what has happened in North America over the last few years – as a result of global sourcing – we brought a supply base to North America that a few years ago we neither had access to nor took advantage of. When I evaluate the quality of that supply base, not only on price but on the service and technology it brings to us, it has been tremendous. Sometimes when we talk about global sourcing, we focus on the price, but the true value of that is as much in the quality, technology and service as it is in the price. Having said that, when we go out and globalize a supply



As a function, PC&L's goal is making sure we are all integrated and working together
 – Nick Matich

base, the purchasing and sourcing process needs to 'up front comprehend' the PC&L input. I think it requires more initial involvement of PC&L in the sourcing process. We have to give a material flow statement of requirements through the purchasing organization. What we do from a sourcing standpoint must totally support the manufacturing process. So I don't see it as creating a disadvantage. I see it as creating an opportunity. Being a global sourcer says we are a learning, listening organization. Not only have we found great sources, but we have also sourced consistently with our lean manufacturing strategy.

Can you quantify, and how do you balance the tangible costs of things like piece price, packaging logistics and transportation against the intangibles such as the negative impact on production line flow, flexibility etc?

As we look at our job, whether it is regional or global, there is an important balance to maintain. You need to take a 'total cost look' at this decision process, so that when you are making the sourcing decision, it is in the context of how the material is going to flow to the point of use. If you take that integrated view then the opportunities to truly get best total cost, best total quality and best total service, are much higher than if you just do these things in series. You run the risk of sub-optimizing and not realizing the total potential. As a function, PC&L's goal is making sure we are all integrated and working together.

How do you handle this challenge?

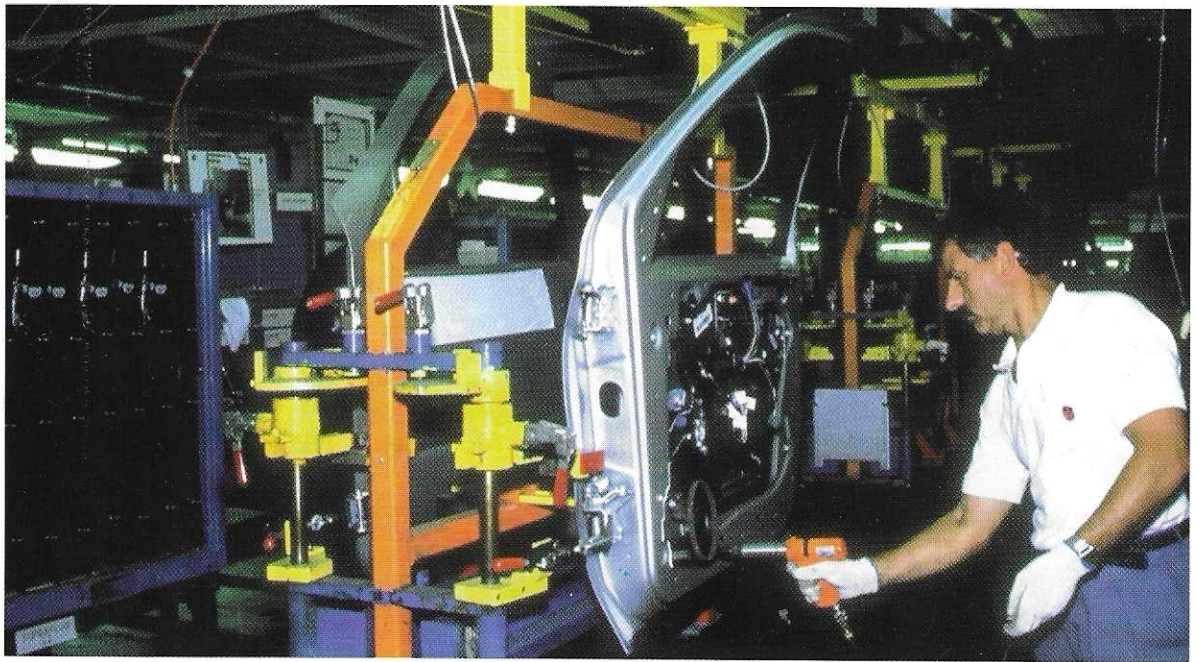
Seven days a week, twenty-four hours a day. Seriously, the issue of complexity is a very important one for a couple of reasons; firstly it does drive a cost structure in our business that cuts across all pieces of the business – if you are going to have more part numbers, you are going to engineer more, design more, source more, move more etc. Having said that I think that what we need to do, and where GM is focused, is: what is the intelligent level of complexity to offer in our products? There are things that we change in our products that the customer never sees or fully appreciates. If that complexity doesn't give us a competitive advantage in the marketplace, that ought to be viewed as an opportunity to reduce complexity and reduce proliferation.

We do need to make sure that we protect our brand image and the differentiation in the marketplace with the parts and with the features that the customer would see and use as a discriminator to determine to buy one product as opposed to another.

To what extent does PC&L influence advance sourcing?

It is trying to drive a common level across all elements of the business. That means a common manufacturing or assembly process around the whole world, that allows me to define a common material flow process. If I know that the way we install instrument panels in vehicles will be the same globally, then I know what the material flow requirements are and I can actually build a common

You must move everything fast from raw material to finished product
– Nick Matich



➤ material flow plan. I can use that as a source of input to the advance purchasing process in terms of a statement of requirements.

When advance purchasing goes out today, they have engineering statement of requirements, and to some extent they have a business statement of requirements so that then we can make better total cost sourcing decisions. I think this is an area where we have made improvements, but we still have tremendous opportunity.

PC&L is often thought a mechanism for the control of inbound flow of materials, but how does it impact on the distribution of the finished product?

In GM we have responsibility for the supply chain and if you start to think about how you want to distribute product to customers – if your goal is to be more responsive to a customer's needs and to be fast in response – then you can't do that without taking an overall view of the supply chain. That is exactly what we have done. It is a total supply chain view of our business and that goes from raw material to the point of delivery to the customer.

Manufacturers are reducing time to market, but they are now looking to introduce build-to-order programs. How will this impact on PC&L?

Distribution is always a function of what your manufacturing and assembly process is and what your schedule and supply base is. The answer is all of this ties together and if you are going to become what we would call a 'sense and respond' kind of enterprise, versus the old model of 'make and sell', you have to start with how you are going to get good sense inputs from the marketplace that are real time with regard to customer demand, and

how you translate that into a production schedule based on manufacturing flexibility; and also how you turn that into a material schedule based on an agile and responsive supply base. In addition, you must move everything fast from raw material to finished product. The elements of our business have not changed a lot, I think the new dimension is lean and fast. I don't see myself reinventing the functional elements of PC&L, but I do see us being more innovative as it relates to being lean, fast and agile. Companies that have done that well – be it within the automotive industry or not – are good examples which we need to learn from.

Vehicle manufacturers cite QSP as their main criteria; how does the service element impact on PC&L activities and what are the specific supplier requirements?

Clearly I have an interest in quality and service, as well as price. Quality, because if a supplier is incapable of making high quality parts then they will disrupt the flow of material to the assembly point. The service part of this is: do the suppliers that we decide to source with have the ability to be agile and responsive to our materials schedules? And in the new lean material flow world that demands more frequent deliveries, much smaller lot sizes, those kinds of elements, are all in my mind service inputs and are the kind so things the purchasing people need to understand. Those are what I call my statement of requirements to the sourcing decision process. Again I would emphasize that the supplier that has the ability to ship on a regular basis and in small lot sizes, if their quality is not good, is just as disruptive as sending no parts at all. So I believe there is a very strong link between quality and service. We do give input in terms of supplier performance to our pur- ➤

➤ chasing community so that if they make decisions going forward they have input from us on what are good suppliers from a quality and service standpoint.

Will the trend to supplier parks assist your task at PC&L?

The issue of supplier parks is still an open issue at GM and again you could envision, depending on which region of the world you are in, the opportunity to utilize supplier parks.

I suggest to you that the context that we look at this in is: how do I ensure my supply base is fast to respond and is agile to the kind of changes that we would make? That doesn't necessarily limit your thinking to supplier parks. In fact supplier parks are only one way to do this, the goal here is to lean out the entire supply chain and then speed it up. What might make sense in one region of the world may not necessarily make sense in another region.

How much is logistics control outsourced to specialist logistics companies to plan and coordinate, and what is the developing pattern in this respect?

That is an issue that we are studying right now. I think that the level of involvement or coordination between lead logistics providers (LLPs) and PC&L communities to date has been well documented. The question for the future business standpoint is where do you see the core value of the PC&L function? What elements of PC&L do you consider strategic, and which of those elements you want to keep the capability and the resources in-house. There are going to be areas where you can leverage outside expertise in the context of how you do business and I think we have to be pretty intelligent in how we go about doing that. The level of involvement with LLPs has been good, but there is still plenty of room to pursue a broader relationship in that regard.

Overall at GM, PC&L is clearly a functional discipline which is in the throes of change, because it is going global but also because we see the opportunity to provide significant competitive advantage for our company.

VW's platforms for global success

Finally, we spoke to Johannes M Fritzen, Presi-

dent of Volkswagen Transport department, for a specifically European view.

How can effective logistics give a manufacturer competitive advantage?

Effective logistics can help a manufacturer to have a very effective global sourcing process that offers many opportunities to get the best deal from any competitive supplier around the world. In order to take advantage of global sourcing, you have to have an effective logistics system. In addition, the time factor is becoming more and more important. Time to market and time between, like in our case, ordering a car and receiving that particular car, has to be shortened drastically in order to stay competitive.

At what stage is logistics brought into the planning?

Logistics should be brought in as early as possible; it should be an integrated part of the overall planning process. Whether you start with your product or whether you start developing new markets, from the very beginning you should keep in mind that logistics is key to success. The vehicles have to be produced and assembled from thousands of parts sourced from all over the world. This may sound rather simple but this should better be kept in mind. Additionally, when it comes to factory layout, logistics considerations should also be foremost in your mind, for example, not only the geographical location of the factory, but also the internal infrastructure of the plant, in order to support logistics processes.

What impact has globalization had on logistics both from a manufacturing and a sourcing perspective?

VW is in the process of fully implementing the 'platform' strategy. Presently we are producing almost 50 models, and in the next few years we will add a few more, giving us roughly 55 different cars.

These cars will be built on four different platforms and these platforms are concentrated in different places in the world for various reasons. You could call these areas 'centers of excellence'. And naturally many of the suppliers will be in the vicinity of these centers.

The platform takes care of about 60 percent of the car and 40 percent is flexible and designed ➤



Johannes M Fritzen, President of Volkswagen Transport

➤ to what we call the 'hat'.

This allows us to individualize the platform for each specific brand and to specify the car in order to meet customer demand. That means we will have quite a lot of additional movements of materials all over the world to supply these platform parts to our factories and also as part of the inter-plant traffic: when VW plants are acting as suppliers to each other.

So the overall volume of transportation in the VW group will double or even treble over the next few years. This is also a result of the volume going up, but also because of the globalization of sourcing, manufacturing and distribution.

To what extent can a global approach be taken to logistics and how much has to remain on a regional basis?

There is a trend in the transportation and logistics world for service providers to act more on a global scale. VW and VW Transport have decided to restructure themselves to adopt a more global approach to logistics and transportation. There are certain logistic and transport processes that are on a global scale; however, there still remains a certain number of activities and certain types of services that we need to do more on a regional basis, for example on short distance and on any specific transport that is subject to national laws, e.g. hazardous goods etc.

There still will be some regional approach to sourcing and distribution, but the trend is towards the global approach.

Can you measure transport efficiency, for example cost against operational performance?

This is a difficult task of growing importance, because we already have quite an outstanding bill for transportation. As the volumes increase, we have to look at the cost-benefit balance. It is not an easy task but we are working with indicators to measure transport efficiency. There is a rising number of factors which are difficult to evaluate and put a cost on.

This is one of the fields where we are presently working on brand new solutions to continuously measure operational performance against service-level agreements and costs.

VW has a diverse range of products which must cause part number complexity. How do you

handle this challenge?

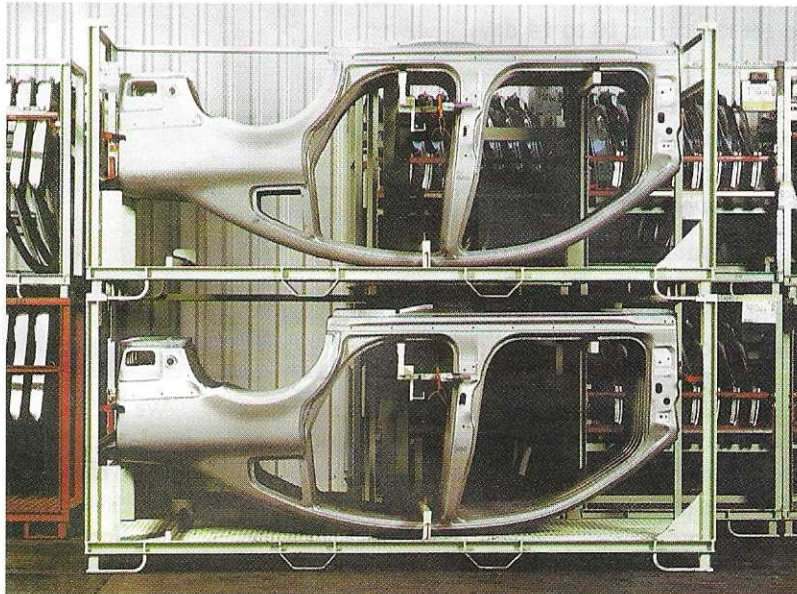
The platform strategy Volkswagen presently is implementing worldwide is another measure to reduce the part number complexity further. As much as 60 percent of the parts belonging to a given platform are the same over all brands and models.

Together with some function-based clustering we are able to handle this challenge.

A lot of automakers are trying to find a 14-day order-to-delivery car, how close is VW to this?

The 14-day order-to-delivery car is a target for some areas in the world. For certain products where we have left the start-up phase we are coming closer to this target, but we have not yet achieved this for those cars made to the customers' specifications.

It is of course no problem to deliver a car from



We keep the production as flexible as possible, hence when the official order comes in from the customer we then can react to this accordingly
— Johannes Fritzen

stock in 14 days, the challenge is to build a car that exactly meets the customers' first choice.

What we are trying to do is firstly to improve our forecasting systems to make them more reliable. Then we try to make our product planning process much more flexible so that it allows us to pre-order material and begin the production of the cars, leaving enough room for the customers' options, for example, the color, the engine, the radio. We are going to operate in a process that is simultaneous and not sequential, as it was in the past, when we started to order the material after the car has been ordered. Now we order material based on a sophisticated forecasting system.

However, we keep the production as flexible as possible, hence when the official order comes in from the customer we then can react to this accordingly. Through a procedure like this we save time between ordering and delivering the car. I doubt if this will work in the case of overseas produc- ➤

tion or deliveries, and perhaps we have to seriously consider late individualizing of the cars.

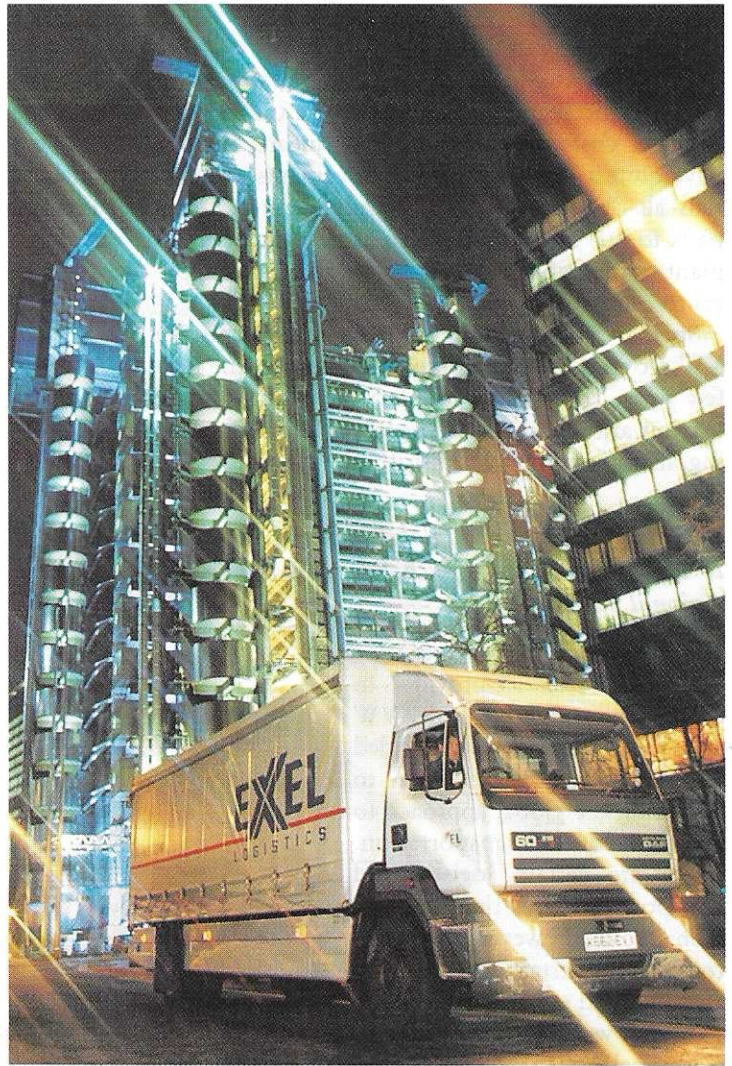
How does logistics impact upon the distribution of the finished product?

It may be that if we have to distribute cars from overseas, that we have to have finishing centers in the receiving and selling market in order to complete the last few percent of the car to come as close as possible to customer's first choice. This also means that we have to have a keen awareness of the marketplace, i.e. what does the customer really want. It will be of growing importance whether the customer is prepared to wait some six or eight weeks for a customized car, or whether the customer is prepared to compromise on customization in order to get the car in 10 to 14 days.

How much of the production control and logistics at VW is outsourced to specialist logistics companies, and what is the developing pattern?

The outsourcing of sub-assembly, modules etc. has been happening for more than 10 years. In certain cases, we have reached a situation where we wonder whether we have overdone it. The problem is that you have to maintain the necessary level of competence to still develop products, follow the market and to be the competent partner to negotiate in the broader sense, not just the price, but the product development in order to meet future customer demands. This competence has to remain with the manufacturer. If you outsource something you have produced in the past, over a period of years you lose the in-house expertise to deliver the optimum product. It then becomes difficult to fully evaluate the performance of your suppliers. This also applies to logistics, if you outsource the whole logistics process, you can lose the experts and the ability to negotiate with logistics providers. This demonstrates the borderline of what can be outsourced and what cannot. I think it would be too risky to go for just one global service provider. Using a variety of service suppliers seems to be a better idea and offers opportunities to improve things through benchmarking and best practice analysis.

Logistics is the exchange of information for materials and then the ability to flow the information back through the process. How does VW do this?



We are working on a new system which will be implemented first in Germany and will then immediately thereafter expand into other areas, which is an IT system for supply chain management. This will allow us to monitor all the production programs, including all the necessary material flows from our vendors and in-house sources. When logistics is ordering these materials, there is an immediate data flow to our forwarding and transportation companies. It will also allow us to track our transportation. In the future we will be able to experiment with our data and analyze which alternative production processes are feasible to react to the marketplace on comparatively short notice.

Volkswagen has developed this system in conjunction with other companies, but we do not adapt this system from others, as the internal complexity is too great. We are building our system based on common sense, it meets our demands and is lean, transparent and reliable.

What do you see as the next step in the use of IT systems in supply chains?

What we need is a system that can handle much more complexity than present systems can handle. A new generation of algorithms and hard- ➤

Using a variety of service suppliers... offers opportunities to improve things through benchmarking and best practice analysis
— Johannes Fritzen

ware will be necessary in order to handle increased complexity within a shorter time. This can be used in many fields, for example Volkswagen is working with an American-based institute and a number of forwarding companies on a routing system for the trucks to enable us to optimize the routes the trucks are taking. This was not as easy as it initially seemed to be.

The task of forecasting market demand could then go hand in hand with a forecasting system for logistics demand, which would allow us to move into the future supported by a learning forecasting system, so that we can order materials although we do not have the fixed specification from the customer – still without significant increase in stock.

Order to success – the Toyota Production System

The common theme running through the changes effected in the manufacturing and distribution systems of the automakers reviewed in this article can be traced back to the Toyota Production System (TPS). At the heart of the TPS is a commitment to a constant gain in productivity, elimination of waste and associated increases in quality. The Toyota system, ironically perhaps, has its roots in the division of labor developed in the early days of Ford, a time when the idea of integrated supply chains for parts and materials also came into being.

Toyota's original production volumes were tiny compared to Ford's, and scale economies in particular could not be achieved. Hence Toyota had to modify the Ford system to cope with lower volumes and greater flexibility and part variability. In addition, the Toyota system involved greater cooperation and trust between management and labor than was immediately apparent at Ford.

The three basic principals of the Toyota system are: management's commitment to the system, the involvement of all employees in the system and the institution of a framework for developing leaders' and employees' skills.

Equally, the Toyota system sets out to involve external suppliers on an equal footing with Toyota operations in the production process; this means that suppliers benefit from reduced inventories, improved labor relations and higher quality.

Following on from the three guiding principles are the two core ideas that the Toyota Production System involves arranging all production process in a single, smooth flow – and that all production is in response to a dealer order.

The corollary of this is the fact that building for stock is eliminated as far as possible.

The role of the car dealers in the production system is crucial. Every 10 days, they are required to inform Toyota of the number and specifications/types of cars that they intend to sell, and this information is updated daily. Toyota can then provide suppliers every 10 days with infor-



The Toyota system:

- management's commitment to the system
- the involvement of all employees in the system
- the institution of a framework for developing leaders' and employees' skills

mation about production plans. Thus, perhaps the most important feature of TPS is the way production reacts to real demand, creating a pull system, as opposed to a push system in which cars are built, pushed out into the dealer network and then attempts are made at selling them.

Of equal importance is the efficient organization of the production line. This is known as 'takt time' in Toyota-speak – 'takt' is actually the German for meter. Toyota defines takt as the quotient of daily working orders divided by the numbers of vehicle orders which have to be built that day. Having determined the takt time, the next stage is to determine the most efficient work flow, aiming for a steady, optimal work load for each worker who is expected to be truly multi-skilled, rather than a specialist on just one task.

The Toyota system then takes this on a stage further, to what it calls 'kaizen', or standardizing work. According to this theory, takt time, work sequence and stock management are all combined to maximize production efficiency. The idea behind kaizen is to mesh the idea of continuous improvement with human motivation, encouraging individuals to become involved in designing and managing their own jobs, highlighting problems or faults and taking on responsibility for addressing them.

Toyota also believes that the only way in which to achieve high levels of customer satisfaction is through a successful production and logistics system, which – as is the aim of all the car companies interviewed here – delivers the right car to the customer when he wants it, to the right quality level. Involving the workforce and the supply base in this is key.

The car companies interviewed here clearly draw inspiration from the ideas of efficiency and the need to switch to a pull production system that Toyota pioneered so successfully. ■



EVER ENGINEERING

Customized supply chain solutions for auto manufacturers

Inside the most successful supply chains are intricately engineered processes and solutions created to overcome any disruption, meet consumer demand, and foster business growth. At Ryder, we work behind the scenes creating the most detailed and smoothest running supply chains with customized warehousing, transportation services, contract manufacturing & contract packaging, e-commerce fulfillment, last mile delivery, and innovative technology. This way, you can focus on creating your products as we design ways to get them to market quicker. Discover how Ryder Supply Chain Solutions can make your operation *Ever better*[™] at [ryder.com](https://www.ryder.com).



SUPPLY CHAIN | DEDICATED TRANSPORTATION | FLEET MAINTENANCE SOLUTIONS