

JIT

When ASAP Isn't Good Enough

BY TOM MURPHY

It was a dark and stormy night a little over a year ago that caused the unthinkable.

Toyota Motor Mfg., the auto industry's model of efficiency, had to shut down its Georgetown, KY, plant for nearly a day because an ice storm in the Midwest left roads unpassable. Indiana and Illinois were like an Arctic wasteland, and suppliers had no way to ship parts to Kentucky. Toyota's 8,000 employees got the day off because they couldn't build their 2,000 vehicles.

A day of lost production does not sit well with Toyota management, so something had to be done. Japan's largest automaker decided that if it can't control the weather, it should at least get better at tracking it and responding to it.

So this past December, Toyota hired a small company from Wichita, KS, WeatherData Inc., to be its own private forecasting agency in North America. Using National Weather Service equipment, the company's 18 meteorologists monitor weather conditions between the Georgetown plant and all 330 suppliers delivering parts to it. An impending storm prompts Toyota to re-route trucks or have them leave several hours early when necessary.

The payoff came on Jan. 2, when a blizzard socked the Midwest and disrupted production at Ford Motor Co.'s truck plants in Louisville, KY. But nearby in Georgetown, Toyota's production was uninterrupted. The precise forecasts allowed Toyota to juggle routes and stockpile parts before the storm hit.

This episode illustrates Toyota's ability to adapt and use new technology to its advantage. But more than that, it shows the extreme steps that automakers and suppliers must take to maintain the deli-

cate logistical balance necessary for modern assembly of automobiles in this era of "just-in-time" (JIT) delivery.

Trucks can break down, so today many are equipped with global positioning sat-



WeatherData President Michael Smith was all smiles when his company helped keep Georgetown open during the blizzard that struck the Midwest at the beginning of the year.



halt. Backup plans and preventive maintenance are essential.

Japanese automakers demonstrated years ago the benefits of JIT, which requires suppliers to make only what is needed when it is needed. The benefits are numerous: An emphasis on workplace organization makes employees more productive, quality goes up as process is constantly reviewed and improved, and parts no longer need to be stored in costly warehouses. A company truly doing it well finds itself lean.

Today in North America, automakers and suppliers embrace JIT and lean manufacturing. But how well are they doing it? Is there still a canyon separating Japanese automakers from the former Big Three in terms of manufacturing efficiency?

"There's no question there has been a compression of the gap," says author James Womack, who documented Japan's manufacturing superiority in his 1990 book, *The Machine That Changed the World*. "What used to be a hopeless chasm has gotten to be a bridgeable gap."

Still, Mr. Womack says JIT will never

Toyota Motor Mfg. has hired WeatherData Inc. in Wichita, KS, to keep an eye on the skies between Toyota's plant in Georgetown, KY, and the 330 suppliers delivering parts to it.

elite (GPS) systems to allow for better tracking and faster response. Parts can be damaged during shipping, so they are packed carefully in more protective containers. Trucks can sit idle at toll booths and borders, so they are starting to be equipped with transponders to communicate information about the shipment and driver well in advance to prevent costly delays.

These steps are necessary because any break in the supply chain brings the clocklike precision of JIT to a screeching

be fully adopted by U.S.-based automakers until they start demanding the same amount of product from suppliers day after day and week after week. He says it's not uncommon for U.S. automakers to tell suppliers to ignore the official schedule for planned production.

"**Look at Toyota** and their order patterns, and any supplier will tell you Toyota runs a clean schedule. It's the same every week," Mr. Womack says. "But General Motors and Ford are all over the place. One day a supplier gets an

order for 100 parts, and the next day the order is for 600."

What results is a violation of the JIT concept: Suppliers must hold large stocks in their facilities to meet the sporadic demand. The cost of holding that inventory ultimately makes its way to the customer. Mr. Womack visited a Tier 1 supplier recently who had to keep inventory on hand because OEM demand would vary as much as 300% from one day to the next.

"If you want suppliers not to hold onto large stocks, then you need to make an effort to match what you do to actual demand," says Mr. Womack, president of the Lean Enterprise Institute. "It's a mystery as to why some OEMs can't level their demand."

A Ford Motor Co. executive concedes there is considerable room for improvement on all fronts.

"There's a lot of waste in the way we do business," says Andy Benedict, director of Ford's new Total Cost Management (TCM) Center. The Dearborn facility is devoted to helping suppliers get lean (which saves cash for Ford), and it betrays the need for continuous improvement.

"A supplier holds on to inventory because of poor equipment uptime and in hedging against equipment breakdown, or they're not sure of Ford's schedule requirements," he says. "Ideally, we'd like to get to no inventory."

If you're in a labor union, JIT is a godsend. Eliminate inventory and suddenly the threat of a strike becomes much more meaningful.

Seeing a Difference

Despite occasional difficulties, the consensus in the industry is that JIT and lean manufacturing have been enormously beneficial to automakers and suppliers alike. The concept has forced consolidation and streamlining of the supply chain and has improved quality.

Even Delphi Automotive Systems, which remains by far the world's bulkiest supplier after much downsizing already, attributes recent

improvements to its Delphi Manufacturing System, which was launched in 1997.

Delphi's measurables: Productivity is up 200% in some facilities, lead time for delivery has been reduced 90%, facilities have freed up as much as 50% of floor space, batch production is down in favor of smaller lot sizes, late shipments at premium rates are down 15% and inventory turns have improved 170%.

Keep in mind, however, that Delphi still reported \$1.8 billion in inventory as of February, down from \$2.3 billion as of 1997 when the program began. Delphi's goal is to bring that number down to \$1.6 billion in the next few years.

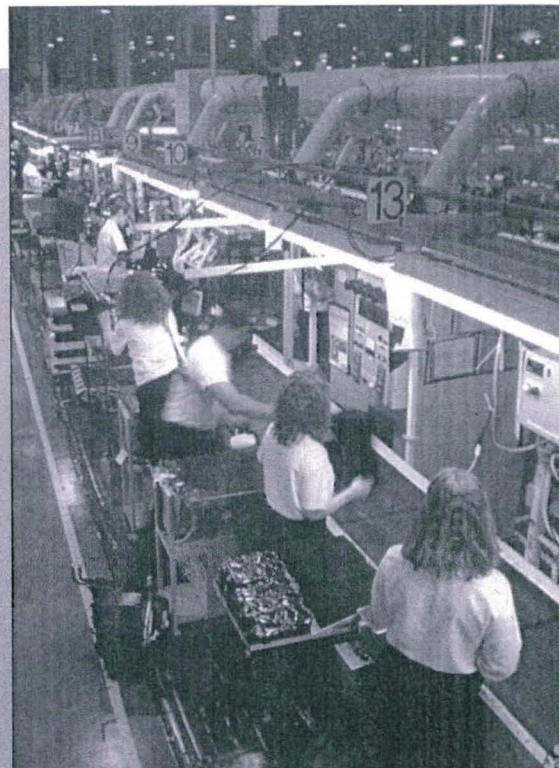
But achieving zero inventory is not possible because product is always being built or shipped, says Mark Lorenz, Delphi's vice president of production control and logistics.

Delphi's proposed solution resembles that of its OEM customers: to localize its supply base and reduce the amount of material in transit.

"We have lean sourcing requirements for our suppliers," Mr. Lorenz says. "We expect them to get lean so we don't play a shell game of hiding inventory so our suppliers hold it for when we need it. The incentive for the suppliers is they want to do business with us."

The bottom line is that OEMs and Tier 1 suppliers like Delphi want global capabilities, but ultimately it's easier to achieve JIT if the supply base is localized in all major markets to simplify logistics. It's starting to happen in the developing markets of China, India, Brazil and Argentina, Mr. Lorenz says.

But until the



Sixteen times a day, Denso ships climate control systems from its plant in Battle Creek, MI, to Georgetown.

supply chain is up to speed in these markets, there will continue to be a need for international shipments to meet JIT schedules.

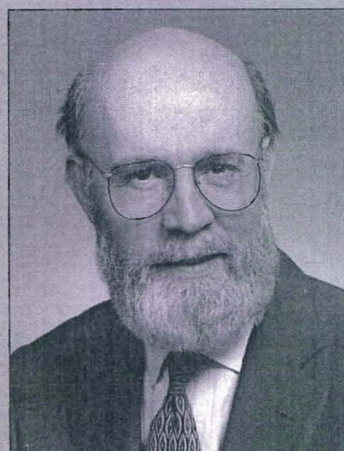
DaimlerChrysler AG is now starting overseas JIT shipments for assembly of its Mercedes-Benz M-Class sport/utility vehicle in Graz, Austria. The vehicle currently is built in Vance, AL, which receives engines, transmissions and other European-built parts from a consolidation center in Germany.

For the Graz launch, DaimlerChrysler has built a consolidation center in Alabama where U.S.-built components and systems for the M-Class are prepared for shipment to Austria.

"We ship parts and modules to Graz, and it's just-in-time and in-sequence," says Mercedes-Benz spokesman Trevor Hale. "But instead of 169 minutes, now it's 21 days." The 169 minutes represents the time Delphi has to build and deliver the cockpit module after it receives an order.

The new shipments to Graz presented a huge challenge: how to prevent body stampings from corroding after a few weeks at sea. Special oils and wrapping were attempted, but the problem wasn't solved until an elaborate triple-wall packaging method was employed.

But it's very difficult to ship certain parts overseas JIT, particularly interior components that are color coordinated and must arrive in-sequence.



Author James Womack sees trouble for JIT in the U.S. as long as OEMs fail to level their demand for parts from suppliers.

Hence, seating suppliers such as Johnson Controls Inc. tend to build plants (JCI has 70 of them) near the vehicle assembly facilities, a strategy that is key to GM's proposed Yellowstone modular assembly concept.

JCI has only about three hours from the time it receives an order until it must deliver a seat set, in sequence, to the customer.

With the push for modular assembly, JCI is preparing for an even greater challenge — to supply instrument panels (equipped with all gauges, climate control and structural components) for a North American customer with a lead time of only 65 to 90 minutes. The window is so narrow because the IP is one of the first parts installed inside a vehicle.

"We are launching a program this summer that will do that, and we will launch two more in 2000," says Roger Elenbaas, JCI's manager of transportation-Americas. "Like in seats, we will need to locate next to the assembly plant, and we will need to draw our supply base closer."

Logistics Industry Boon

Whether suppliers ship their goods down the street or overseas, it all means big business for the logistics industry.

If suppliers used to ship product a few times a week to their OEM customer, today under JIT they may ship several times a day.

Denso Corp., for instance, ships heating, ventilation and air conditioning (HVAC) systems 16 times a day from its plant in Battle Creek, MI, to Toyota's Georgetown complex.

With such shipping demands, a week doesn't pass without news of a logistics contract for a supplier or OEM.

General Motors Thailand recently hired APL Logistics to handle the flow of thousands of parts to a new plant outside Bangkok to build seven-passenger Zafira compact vans beginning next May. All parts will be delivered JIT and should virtually eliminate intermediate warehousing.

Lear Corp. has contracted with Coughlin Logistics to deliver parts to Lear's plant in Coventry, U.K., and then deliver finished seat sets to the Jaguar plant in Castle Bromwich for the new S-Type sedan.

Isuzu Motors America Inc. builds a

new \$88 million parts distribution center in West Chester, OH, to store, package and ship parts and engines.

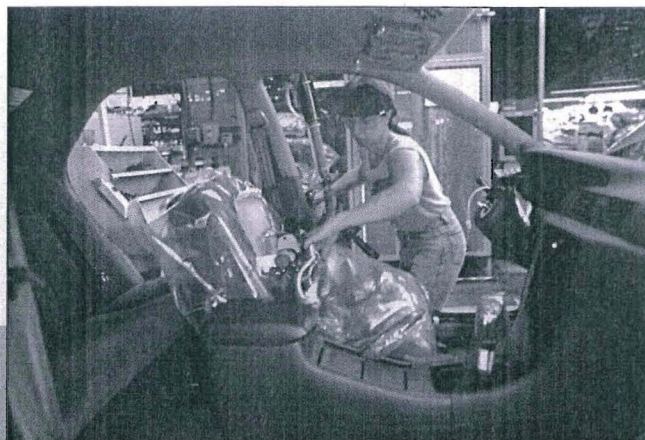
While the trucking industry is the direct beneficiary of JIT, Mr. Lorenz of Delphi says the rail industry also is becoming more responsive to tight schedules with "JIT Rail," which has been around a few years.

But the onus for shipping JIT has fallen largely on the trucking industry. Statistics from the American Trucking Associations confirm that heavy truck mileage across all industries was up 25% from 1992-'97 and was up 44% from 1987-'97.

out the details later."

And even though premium shipping rates are up, the price is worth it. "We just want to make sure we get there," Mr. Carroll says. "The market is so good in the U.S. that we just work through it."

Mr. Womack says he is alarmed at how little many OEM and supplier executives know about how much all this shipping costs.



At Georgetown (right), seats arrive line-side and in-sequence. At the Blue Water Bridge entry to Sarnia, Ont. (below), trucks wait to clear Canadian customs.



But motorists don't need statisticians to tell them there are more trucks on the road. Southeast Michigan's roads are barely passable (even when weather is good), and increased truck traffic is one of the culprits. As a result, every major highway in metro Detroit is under construction this spring.

Dana Corp. has 700 tractors and 1,400 blue and white trailers devoted to JIT in North America. But when a storm hits, sometimes it takes desperate measures to ensure the delivery of product.

"If there's a storm and the OEM is actually building vehicles, we've put product on 747s to get it done," says William Carroll, president of Dana's Automotive Systems Group. "You just do it and work

"Ask someone, 'Do you know the total logistics cost of your product?' and they can't tell you," he says. "The purchasing department puts a bid out and sources the item, and the assembly plant has no say in sourcing. The fact that it's on the wrong side of the world doesn't matter because the purchasing agent doesn't have to think about the logistics cost."

JIT has become an international trade issue, as governments have worked together to facilitate the flow of product across borders.

Northeast of Detroit at the Blue Water Bridge, which connects Port Huron, MI, to Sarnia, Ont., truck traffic is up 131% over the past 10 years. There was so much traffic across the bridge that a second

span had to be built. It opened in mid-1997. One official estimates 80% of the bridge's truck traffic is devoted to the auto industry.

Years ago, it was not uncommon to see trucks backed all the way across the bridge, but the auto industry has pushed hard to alleviate those bottlenecks.

At the Ambassador Bridge connecting Detroit to Windsor, Ont., officials are starting to receive electronic data on trucks and their drivers before they ever reach the border, says David Jolly, general manager at the bridge.

The system allows trucks to roll slowly through U.S. Customs (slowly enough for the agent to verify the driver's identity) with barely any wait at all. In the past, truckers might wait 15 minutes to clear Customs at the Ambassador Bridge.

Mr. Jolly says the system works well and lets the bridge play a roll in streamlining vehicle assembly.

"We're part of the assembly line here," Mr. Jolly says. "Everything we do is geared to getting them across as quickly as possible."

Toyota Rethinks JIT?

Toyota and Honda of America Mfg. Inc. raised a few eyebrows last year when ex-

ecutives of both companies were quoted in WAW sister publication *Ward's Automotive Reports* as saying they are rethinking some of the basics of JIT.

"Just-in-time has some problems in America," Michael DaPrile, Toyota Motor Mfg. vice president of manufacturing and vehicle plants, was quoted as saying. Suppliers are not as closely clustered around assembly plants as in Japan, and bad weather can be particularly disruptive, he said.

Manufacturing consultant Sandy Munro of Munro & Associates Inc. says he sees Toyota wanting to become more vertically integrated because of problems it has had with some North American suppliers.

"The quality hasn't been up to where it was supposed to be, or there was a sequencing screw-up or the warranty costs seemed to be higher than what they anticipated," Mr. Munro says.

In the case of a glovebox door, he says Toyota switched its supplier for the product twice before taking over production altogether.

"They want to make sure when they do get something from a supplier, it's at the same level of quality that it's supposed to

be, it's at the right price and it's at the right time," Mr. Munro says. "Toyota's motto is, if you're successful, change. You have to be permanently dissatisfied in order to get better."

But a Toyota manager says its pressure on North American suppliers is merely in keeping with the JIT concept of continuous improvement.

"Some suppliers do an excellent job of JIT, and there are others that still build in batches," says Ed Cook, Toyota's general manager of parts control and conveyance in Georgetown.

"They don't build to the schedule of what we are actually using. They may carry one to five days of inventory," he says. "But what JIT as a total has done is to give companies the desire to do better. If your money is tied up in inventory, then you don't have working capital for other things."

On the whole, Mr. Cook says he is pleased with the suppliers pumping parts into Georgetown. Of those 330, he says 240 were 99% on-time in their deliveries in 1998, and 295 were 95% on-time.

But even these top performers can't rest on their laurels. "We're never satisfied that we have got Utopia," Mr. Cook says. □

Alive and Well

JIT thrives in its birthplace — Japan

BY ROGER SCHREFFLER

TOYOTA CITY — If Toyota Motor Co. is rethinking the basics of "just-in-time" delivery at its North American plants — as some reports have indicated — it's hard to see evidence of it here in Japan.

If anything, *kanban*, a form of "just-in-time" delivery particular to Japan, is likely to increase in importance as the industry shifts away from "mass production" of vehicles to "mixed production."

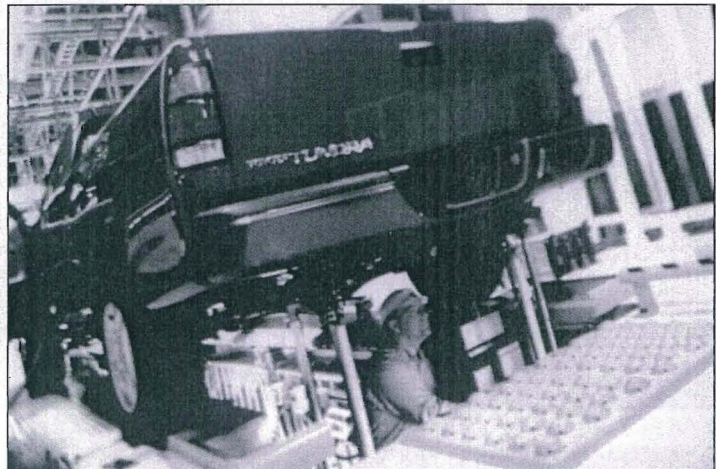
Recent visits to the automaker's Takaoka plant in Aichi Prefecture and Miyata plant in Kyushu confirm that the system is alive and well. Changes are being made — constantly — but these changes are mostly to fine-tune the system in order to keep pace with developments in technology.

For instance, Toyota now employs an electronic form of *kanban* for part of its distribution and logistics requirements.

This became essential in the early 1990s when the company opened two large plants outside of Aichi — Toyota Motor Kyushu Inc. in Miyata and Toyota Motor Hokkaido Inc. in Tomakomai.

Toyota Motor Hokkaido, in operation since 1992, makes automatic transmissions and aluminum wheels for the Japanese and U.S. markets. Toyota Motor Kyushu, which oversees Toyota's newest assembly plant in Japan, currently makes four models, including Lexus RX300 and ES300.

Shigetoshi Fujimoto, a senior plant official at Takaoka who is responsible for



Toyota hopes to replicate its JIT successes in Japan and Georgetown at its new \$1.2 billion plant in Princeton, IN, which makes full-size Tundra pickups and a forthcoming sport/utility vehicle.

final assembly of the Vitz and Yaris, and soon the Echo, all new strategic models in the subcompact segment, says there has been no basic change in the *kanban* concept since its introduction in the early 1960s. And that concept, he explains, is

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