LOGISTICS THE TOYOTA WAY

HOW SERVICE PARTS GET TO TOYOTA DEALERS.





Karen Wilhelm

In Brief

Toyota's parts distribution centers, as the facility in Mansfield, MA get service parts to dealers quickly while keeping on-hand parts inventories low. Among their strategies: effectively planning parts delivery routes, starting with leveling the flow of parts to the dealers. Their experience, despite recent challenges, offers lessons that other organizations can apply.



s far west as Buffalo, as far north as Bangor, and as far south as New Haven, CT, 112 Toyota dealers get service parts from the Mansfield, MA Parts Distribution Center (PDC). Dealers keep parts on hand for the usual repairs. They avoid holding a lot of inventory by using the "sell one; buy one" principle, immediately replenishing stock as they use it. If a dealer needs to order a special part, the customer wants it to arrive fast.

The Principle of Leveling

PDC's processes are designed to make that happen. Dealers place orders throughout the day. As soon as the dealer orders a part, the warehouse management system allocates it. There are four order cutoff times, the earliest for the most distant dealers. Their parts have to get on the road by 2:30 p.m. in order to deliver them by 7 a.m. the next day. Orders for other groups of dealers are picked, loaded, and shipped in the other three time slots. Whatever a dealer orders each day before the cutoff time goes out on a truck that night. Drivers have keys to an unattended secure area at each dealership and as they make their rounds, they leave parts at the dealerships and pick up returned parts and empty containers.

When PDC Manager Bob Gallagher first gained his logistics experience at General Motors, shipping vehicles from assembly plants to dealers, he learned a least-cost philosophy. He says, "We tried to get the best deal for moving the vehicles. If a truck holds ten finished vehicles, you wanted to get ten vehicles going from the assembly plant direct to one dealer to get the best rate. If you had nine cars for one dealer and one for another, the carrier would charge you for every stop. We always tried to get ten-car loads.

"When I came to Toyota, I was quickly told that that's waste. If a dealer gets ten cars in a week, don't

About the Mansfield Toyota Parts Distribution Center

The Mansfield PDC opened in the early 1980s. A two-shift operation, it employs 13 salaried and 43 non-union hourly associates. At about 187,000 sq. ft., it's relatively small yet holds about a 30-day supply of 65,000 part numbers, valued at about \$10 million. It ships \$7 million in customer sales a month. The facility is ISO 14001 certified and recycles nearly all its waste.

deliver them all at once. They believe you should level out your production so the dealer would get two cars each on Monday, Tuesday, Wednesday, Thursday, and Friday. That way the dealer can predictably schedule people to unload the cars and get them prepped. Plus, he doesn't have a big car carrier in the middle of his lot for four hours in the middle of the day trying to deliver all these cars."

Leveling the process or the load heijunka — is a key feature of Toyota's philosophy that has made its way from production to logistics. Gallagher says, "Toyota doesn't look at it as minimizing logistics costs, they look at what it's doing to overall production at the dealership. We do the same thing with parts as the assembly plant does with vehicles."

The Mansfield Fleet

The Toyota Mansfield PDC does not directly employ the drivers or own the trucks. The whole service is contracted out to independent carriers. As Toyota suppliers, they are helped to continuously develop their capabilities, conduct regular kaizens, and are tightly integrated with the PDC.

Gallagher started the first test of a Toyota PDC truck fleet in California in 1990. He says, "We didn't know if we wanted to be in the trucking business, so we didn't buy equipment or hire drivers. After a year, using a leased truck fleet was working fairly well so we just continued on with it." When Gallagher came to Mansfield, he used a similar arrangement.

The PDC uses two dedicated delivery carriers: MRK Logistics and Toyota's in-house trucking company, Toyota Quality Parts Express (TQPE). MRK Logistics handles the more distant dealers (33 of them) and TQPE handles the balance. TQPE's trucks are owned and serviced by Penske Truck Leasing, reducing the capital equipment cost of ownership and maintenance. The drivers are leased from CPC Logistics, keeping personnel management overhead low.

Joe Crane manages CPC's Mansfield PDC operations, directing and tracking the truck drivers and their loads. Crane is so close to Toyota shipping operations that he has a desk in the loading area. When CPC employees are getting the shipments ready and loading trucks, he's out there working with them and seeing what they're doing. Just as Gallagher did in California, Crane frequently rides the routes with his drivers, helping them to solve problems and identify targets for continuous improvement.

Drivers have standardized work for every function performed on the road and have been trained in how to most efficiently make a delivery. The drivers are part of the continuous improvement process. One kaizen, for example, reduced delivery time by six minutes per stop, saving almost eight hours a day in overtime.

Gallagher says, "Joe understands TPS (Toyota Production System). Understands Kaizen. Understands the



Leveling and Route Planning

Planning the routes does not begin with geography; it begins with leveling the flow of parts to the dealers. Work throughout the value stream is measured in order lines, not orders. An order line is a part number ordered by a dealer, regardless of the quantity of that part in the order. The daily average number of order lines for each dealer is analyzed, then the dealers are assigned to delivery routes balanced within a hundred order lines of each other. If routes were based on geography, one route could have 300 lines and the next could be 700.

Every six months, Crane and his team review each route, and make adjustments based on picking volume in order lines as well as the cube rates in the trailers. Everything must be planned to achieve level flow.

Only when the routes are balanced with dealer order volume does the planning go to geography. A route is designed in a loop, not a straight line. Drivers make deliveries on the way out to their farthest point and can continue to do so on their way back. The same driver goes to the same dealers every night.

Continuous improvement in route planning and delivery standardized work has paid off. Crane says, "When I first started here, we averaged 500 hours a month in overtime. Now we average 42. We run the least number of miles now than we ever have, about a 15 percent reduction, and have reduced the fleet by five pieces of equipment — that's 30 percent. It's all because of proper route design, understanding of the volume for every dealer, leveling the loads, and improving the efficiency of every function."

Loading: Maximize Delivery Efficiency

Gallagher says, "We're limited for space for the amount of freight that we're shipping every day. When we bring that freight up to the dock, the carrier has only 15 minutes to get it into the truck. Any glitch will back up the whole system. Since I've been here we've rearranged that shipping dock at least a dozen times. Just when you think you've got it where it's perfect, then you'll find out that you really don't."

Unloading at the dealer is made more efficient by designating specific areas in the truck for each dealer on the route. All the material for that dealer is going to be in the same spot every night. The driver unloads from the left side to the right, all the way from the trailer door into the nose.

The flow of parts back to the PDC -reverse logistics - has also been considered in developing the standard process for loading trucks. Toyota allows dealers to return 7 percent of their dollar purchases each month, and of course, the largest dealers tend to have the largest volume of returns. Their outbound shipments are loaded in the nose of the trailer. When the driver gets to those dealers, it's toward the end of his route and the truck is mostly clear, leaving room for returned parts. For each of their stops, drivers are trained on how to put their dealer returns into their trailers to make the next stop more efficient.

Crane says, "Everyone looks at their internal customer. If I'm loading a truck, I'm trying to make it most efficient for the driver to make the delivery, and the drivers do the same thing for the customers when they make deliveries."

There is daily communication and an annual dealership site assessment to surface dealer concerns. Other communications focus on what the dealer, the drivers, and the PDC can do to make deliveries easier and more efficient.

Perfecting Packaging

Concern for optimizing part transportation loads from manufacturing to the dealer begins in the design of packaging, which is continually studied and changed. Bumpers used to be shipped in corrugated boxes. Now they are wrapped in paper and encased in bubble wrap. That prevents damage and doubles the number that can be shipped in a given amount of space.

Windshields are no longer shipped in boxes either. They are wrapped in plastic with dense foam around the edge of the glass. It saves a great deal of space in shipping and storage and reduces damage. The glass is visible to the associate handling it, not hidden in a box. "If I crack this in half," says Gallagher, "I'm going to know it really quick. If it's in a box I don't know what happens to it."

Caging the Shipments

Before parts go on the trucks, they are loaded into wheeled metal cages that roll onto the truck and off at the dealer's secure receiving area. The way the cages are loaded is important to preventing damage en route and making the driver's work more efficient.

In the ideal state, Gallagher says, "You want your plastic parts on top, your heavy metal, like wheel discs, at



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the bottom. You don't want any raw sheet metal next to plastic parts. That prevents a lot of damage." Parts picking has to be planned so that heavy parts are brought up to the loading area first. As the loader fills the cage the lighter parts come up to be placed there last.

Cage loading has been the target of a number of kaizen events, producing suggestions from the drivers and the warehouse associates that have helped define standard processes. One was initiated because of parts damage traced to improper cage loading. The kaizen revealed that not all associates, any of whom could be assigned any warehouse task at any time, were well trained in loading cages. That led to the decision to train specific associates to be loaders. The change resulted in reduced damage.

After another kaizen to further reduce parts damage, the trucking company took on the job of loading the cages. Gallagher says, "They have ownership from the time we give them a part until it gets delivered. That has continued to lower damage. Our damage rate now is 1/10th of 1 percent of our sales. I think the industry standard is 3 percent."

Takeaways

Joe Crane and Bob Gallagher have some recommendations for other managers who want to improve outbound logistics. Crane says the first thing is to understand the volume going on your trucks, and your trucks' cube volume. See whether trucks are being loaded efficiently. Standardize the delivery method. Furthermore, he says, have open communication with your drivers they know more than you do because they are out there every night. Ask the questions, listen to the answers, and engage them as part of the solution.

Often, a company's centralized logistics department dictates what trucking companies are assigned to your facility. They look at logistics as a separate cost center focused on minimizing its own expenses. At Toyota, if something raises logistics costs but also increases the efficiency of the operation, they weigh the benefits and act accordingly.

Crane gives an example of a typical approach to delivery, one that you may practice because "that's the way we've always done it." One retail chain's warehouse supplies stores twice a week. When the retail supplier's truck goes out with only one stop and a large load, the driver and the truck will be waiting at the store for five or six hours unloading. The supplier has to run more equipment and pay more drivers to service the stores because of that waste.

Toyota delivers smaller loads every day, providing better customer service, but also allowing the PDC to deliver to eight to ten dealerships a night. From shipping dock to the next destination, the loading and delivery of a product is just one small part of the extended logistics value stream from raw materials to the end customer. An entire network of logistics processes must be optimized and many decisions made. The principles of standardized work, leveling, and looking at cost and time in terms of the total cost of operations throughout the extended value stream can be applied from the simplest to the most complicated system.

Karen Wilhelm is a Target contributing editor and publisher of the blog Lean Reflections.



Before: truck interior, partially loaded.



After: A shelf for bulky items opens up space. Repeated improvements gradually reduce the number of cages in the trucks and the number of trucks on the route.

Resources

CSCMP (Council of Supply Chain Management Professionals), Lombard, IL; 630-574-0985; www.cscmp.org

Goldsby, Thomas and Robert Martichenko, *Lean Six Sigma Logistics: Strategic Development to Operational Success,* J. Ross Publishers, 2005.

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