

World-class parts distribution

By updating the vertical lift modules in its aftermarket parts distribution area, Mazak increased productivity by 80%, reduced labor requirements by 44% and increased part numbers by 70%.

By **Bob Trebilcock**, Editor at Large

IN THE 24/7 WORLD OF MANUFACTURING, there is no margin for error. To succeed, equipment makers must not only produce world-class machines, but they must also be able to deliver world-class service when it comes to their aftermarket parts business.



Steve Trammel, manager of Mazak's North American Parts Center

features a state-of-the-art parts storage and retrieval system with 13 vertical lift modules (VLMs) (Remstar, 800-639-5805, www.remstar.com), including a wide unit capable of handling oversized parts. The area also includes pallet storage for heavy parts serviced by an automatic stacker crane. With the addition of pick-to-light technology, the order fulfillment system can handle as many as 2,000 orders in a five-hour shift—double Mazak's current requirement, giving the machine maker room to grow.

"We wanted a system that was capable of rapidly filling orders and managing 46,000 different part numbers ranging in size from small to large and light to heavy," says Trammel.

The benefits: In addition to providing the capacity to expand within the existing footprint, Mazak reduced its labor requirements by 44% and increased productivity by 80%.

Expanding in North America

Mazak may not be a household name outside the machine tool industry, but it is the largest metal cutting builder in the world with eight manufacturing facilities in Japan, the United States, the United Kingdom, Singapore and China as well as 30 technology centers worldwide.

The 500,000 square foot facility in Kentucky produces more than 30 different models, at a production rate of 130 machines a month. The aftermarket parts center maintains an inventory of more than \$65 million, stocking parts for every Mazak CNC sold in the Western Hemisphere.

"Mazak has made a very strong investment into its aftermarket services because we recognize that our equipment is running in many manufacturing facilities on a 24-hour, 7-day-a-week basis," says Trammel. "Customers are using lean manufacturing and multi-tasking machines to lower costs by reducing manpower, set ups and multiple operations. In this environment, it is extremely important that parts be available immediately."

The need for automation

Before the recent upgrade, Mazak's stockroom consisted of pallet racks and 12 VLMs that were much smaller than the new units. What's more, the system was completely manual: At the VLM, an operator would look up a part location in a location guide next to each of the units to figure out which tray number they wanted and then manually type in that number to get the tray delivered. When the tray arrived, the operator would have

"If one of our machines goes down, it's a crisis for our customer until that machine is back in service," says Steve Trammel, North American Parts Center manager for Mazak Corporation, a global manufacturer of advanced machine tools. "We're shipping 1,000 aftermarket parts orders a day, and 97% of them go out that same day."

To meet that challenge, Mazak automated the 45,000 square foot area designated for parts distribution at its Florence, Ky., manufacturing plant. The refurbished area



The parts center supports the high quality manufacturing machines sold in the Western Hemisphere.

to sort through 50 or 60 parts to find the specific one specified on an order sheet. The workers then carried the picked orders to the packing areas where they were packed and shipped.

But it wasn't just manual handling that created challenges. "Nobody orders parts at 8:00 in the morning," Trammel says. "Part orders usually come in the afternoon but we still have to get them out the same day for delivery to our customers. To push through up to 1,200 orders in a six-hour window, we were increasingly throwing more and more manpower at the situation."

Automating the aftermarket parts area emerged as a solution that would allow Mazak to manage more parts and same-day orders without continually adding labor.

Adding automation

The transformation of the parts center took a little less than six months. During that period some 19,000 new

Large parts and pallets are stored on racks serviced by a stacker crane.

part numbers were added.

The solution involved 13 new VLMs grouped in four pods in pick-and-pass workstations. Each tray can hold up to 1,100 pounds of parts. The trays themselves are 8 feet wide and 34 inches deep. One of the VLMs is a larger heavy-duty unit, which is designed for much bigger and heavier parts. Together, they create a 125-foot long picking area, with a conveyor line running in front of them.



The VLMs are also equipped with pick-to-light technology. A light bar runs across the front of the unit and directs the operator to the exact location of the part to pick and displays the quantity to pick as well as the part number.

Same space with more parts

The dense storage provided by the VLMs allowed Mazak to keep the same footprint in the parts warehouse while increasing storage capacity within that space by 95%. For instance, the old VLMs handled 20,000 individual part numbers. All of those, plus another 19,000 part numbers are now being handled by the new VLMs, which has allowed Mazak to accommodate parts for new machine models without a problem. Another 7,000 oversized part numbers are stored on racking in the warehouse.

To ensure the accuracy of orders, Mazak created a five-point check system managed by the warehouse management system:

- 1) The warehouse ensures that it carries sufficient inventory so the part will be in stock when the order arrives from a customer;
- 2) every part is labeled with a bar code for identification;
- 3) the light strip on each tray displays the stock number and part name of

- items to be picked for a client order;
- 4) when the worker puts the item in the tote, the tote itself re-displays a visual, digital message of the pick order; and
 - 5) in the pack area the items to be shipped are checked against the original order for accuracy before it



Above: The VLM automatically delivers and stores trays of parts managed by the center. Below: Operators use light-directed picking to pick parts from the trays and place them in totes.




After picking, the totes are delivered to a packing station where the parts are prepared for shipping.

is shipped. This five-point check system has improved picking accuracy from 98% to 99.67%.

The system not only increased the density of storage, but operators were significantly more productive. “Previously, we were using nine work-

ers to handle 111 orders per worker, per day,” says Trammel. “Between running to pick the part, and then taking it over to packing, it was all we could do to get our orders out.”

This new system is run with five workers, each handling 200 orders per day. Orders picked per person per hour has increased by 80%—13.9 picks per labor hour before, and 25 picks per labor hour now. In addition, same day shipments improved from 95% to 97.5%. “Same-day shipping is no longer an issue,” says Trammel. “And in a 24/7 world, that has been a big improvement.” 

System suppliers

SYSTEMS INTEGRATOR, VERTICAL LIFT MODULE, & PICK-TO-LIGHT PICK SYSTEM:

Remstar, 800-639-5805, www.remstar.com

CONVEYORS: Intelligrated, 513-701-7300, www.intelligrated.com

WAREHOUSE MANAGEMENT SYSTEM:

Dove Tree Canyon Software, 619-236-8895, www.dovetree.com

STACKER CRANE: Automated Fork Truck, 801-676-8070, www.asrs.net

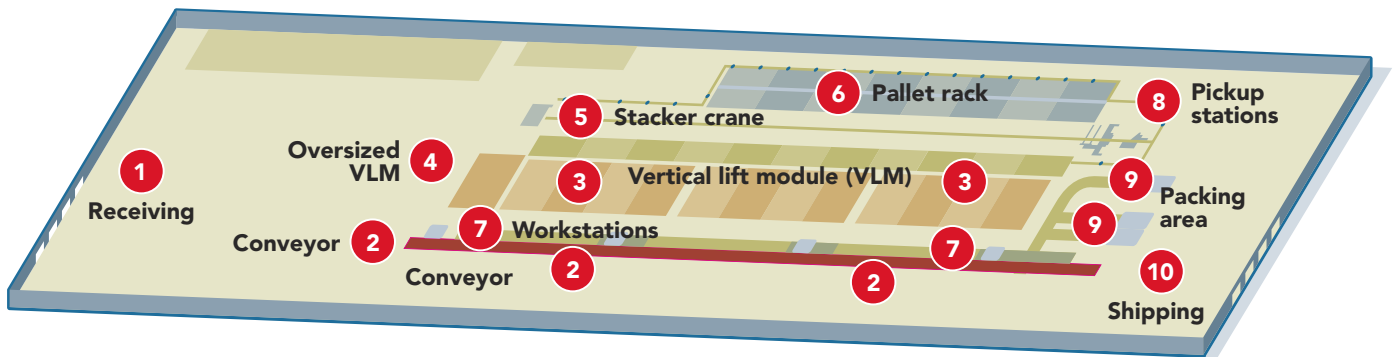
BAR CODE SCANNING: Datalogic (PSC), 800-929-3221, www.datalogic.com

BAR CODE PRINTERS: Zebra Technologies, 847-634-6700, www.zebra.com

Mazak uses same space for more parts

The dense storage provided by the VLMs allowed Mazak to keep the same footprint in the parts warehouse while increasing its storage capacity within that space by 95%.

By Bob Trebilcock, Editor at Large



Mazak's aftermarket parts operation relies on staggered shifts to receive, pick and pack, and ship orders. A partial shift begins the day to handle receiving and cycle counting; a second crew works from 10 a.m. until 7 p.m. to handle picking and packing; while the remainder of the crew takes care of loading and cleanup from noon until 9 p.m.

Receiving and putaway: When a part arrives at receiving (1), the system prints out a receiving ticket with an embedded bar code label. The receiver scans the label on the ticket and the label on a tote. The tote is routed by conveyor (2) to one of the zones where parts are stored in vertical lift modules (VLMs) (3) for putaway. The system automatically delivers a tray while lights direct the operator on where in the tray to put away the parts from a specific tote. In addition, Mazak stores large parts in an oversized VLM (4) equipped with a roll-out table for easy access by an overhead crane. Parts that are too heavy to be handled by an operator are palletized and automatically put away by a stacker crane (5) in a pallet rack area (6). Heavy parts are stored on pallets in a racking area serviced by an automatic stacker crane. Parts are delivered to one of two pickup zones (8), and the putaway location is entered into the system. The crane picks up the pallet and delivers it to the storage location.

Mazak Corp. Florence, Ky.

PRODUCTS: Aftermarket parts for precision machine tools

SQUARE FOOTAGE: 500,000 manufacturing space, with 45,000 square feet devoted to spare parts fulfillment

SKUs: 46,500

THROUGHPUT: 1,000 orders per day

EMPLOYEES: 8 employees run the order fulfillment area

SHIFTS: Staggered shifts from 7 a.m. – 9 p.m., 6 days per week

Picking: Once an order is received and processed in Mazak's order processing system, the order is ready for picking. Each order is assigned to a tote with a fixed license plate, and is placed on a conveyor (2) in the front end of the system. That tote is then routed to one of four pick workstations (7). Each pod is fed by the mainline conveyor with accumulation capability.

When a tote arrives at a workstation, the operator scans it and then scans a light on the batch station to associate the tote with the corresponding light in the software. The opera-

tor can scan up to eight totes in a workstation, so eight orders can be picked simultaneously.

When the operator indicates, the VLMs ③ deliver the product to the operator, and a customer-specified bar code part label is printed. The lights will light on the VLMs directing the operator to the pick location and how many pieces to pick. The operator then picks the product as directed by the VLM, attaches the printed bar code label to the product, and turns around to place it into the correct tote or order as directed by the lights on the batch station. The operator then picks the next part presented by the VLM. This is repeated until the order has all parts required from that zone.

When an order is complete, the lights direct the operator to push the tote back onto the conveyor ②, where it either gets routed to one of three pack lanes ⑨, or it goes into another workstation ⑦ downstream for further fulfillment.

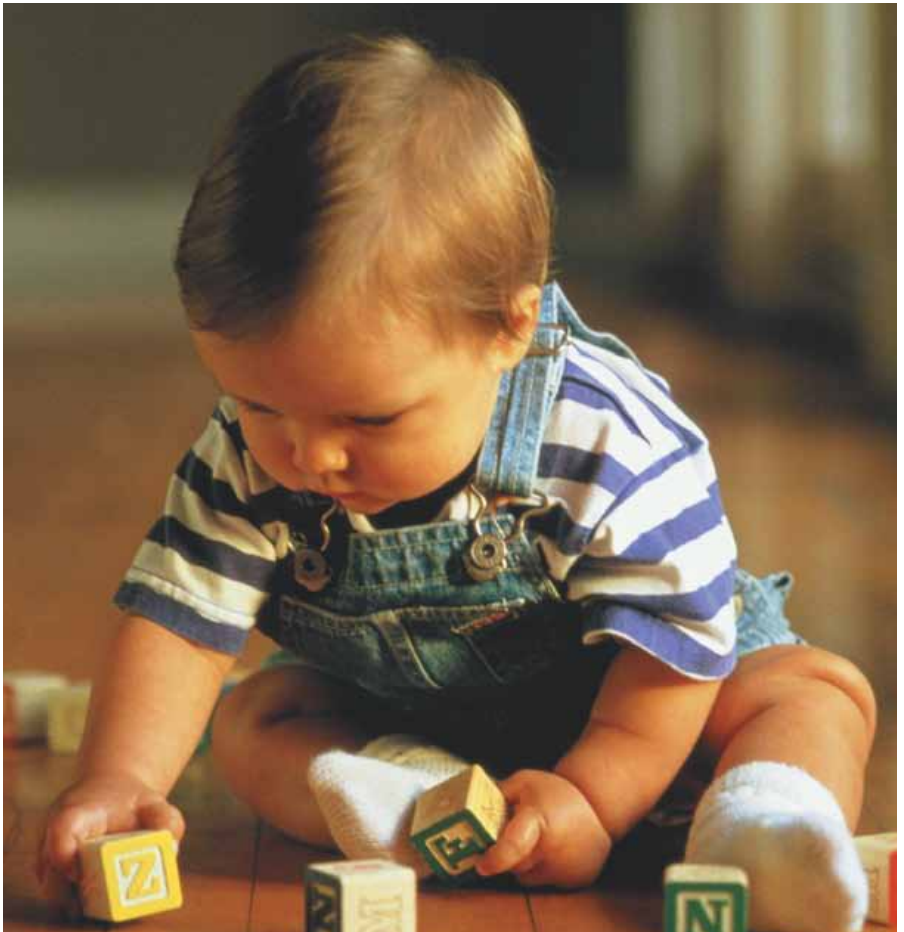
Large parts are separately delivered to the roll-out table in the oversized VLM ④ and are then moved to the packing area ⑨ by overhead crane. Meanwhile, heavy parts stored in the pallet rack ⑥ are pulled after scanning the pick label when the order is entered into the system. The stacker crane ⑤ retrieves the pallet and delivers it to one of the two pickup stations ⑧. Parts that can be handled by a packer are picked up at one end of the crane. Parts that require a lift truck are picked up at the other end of the crane.

Packing: Once all the items for an order have been picked, the tote is automatically routed by conveyor ② to a packing area ⑨. Red totes are used for priority orders that are taken immediately for customer pick up or door-to-door shipping. Once at the pack stations, sensors on the conveyors route the tote to the least full lane so as to not back up the orders in the pack line. Shipping information is automatically forwarded to the pack area, as well as to overnight shipping carriers to speed package pick up and delivery. Underneath the conveyor is another conveyor system for empty tote

returns, cycling the totes back to the front of the system, making for a very efficient operation.

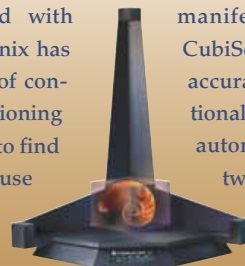
Shipping: Mazak's has integrated parcel shipping systems ⑩ from UPS and FedEx with its warehouse management system. Once a part is packed, a package is placed on a scale and the bar

code label on a pick slip is scanned. Data from the scale and Mazak's inventory management system populate the label. As the label is printed, the carrier sends an e-mail notification to the customer and sends shipping information back to Mazak's inventory management system to close out the order. ①



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