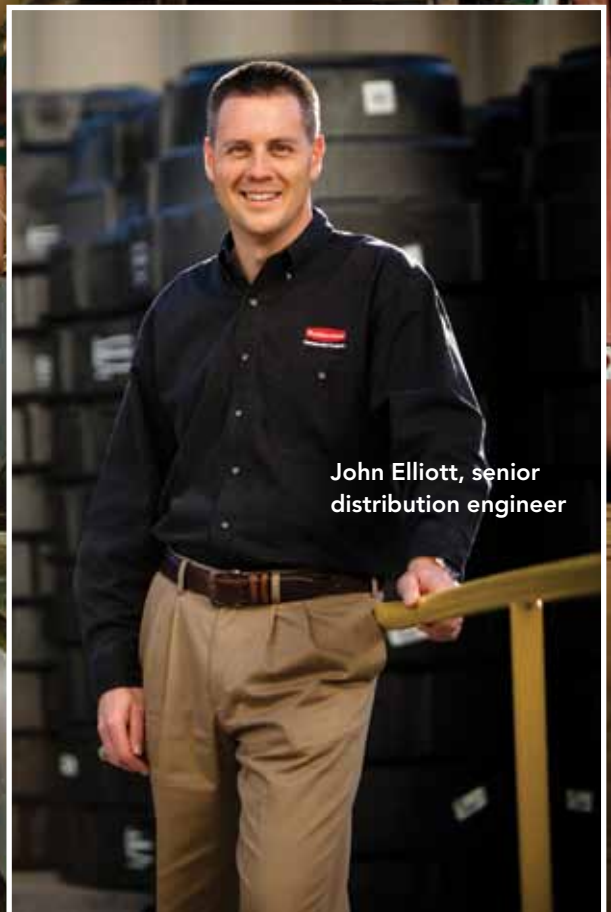


Rubbermaid Products'



John Elliott, senior
distribution engineer

Commercial retrofitted AS/RS

By updating an aging manual storage system with automated cranes, Rubbermaid Commercial Products reduced costs and improved safety.

By Bob Trebilcock, Executive Editor

Reduce, reuse and recycle. Those are the three R's of the sustainability movement.

Going green may not have been one of the reasons Rubbermaid Commercial Products chose to retrofit a manually operated, high-bay warehouse with automated storage and retrieval cranes (Dematic, formerly HK Systems, www.dematic.com) last year at its 750,000-square-foot manufacturing plant and distribution center in Winchester, Va., but the three R's are certainly in play.

The company was able to reuse and recycle the existing rack infrastructure in a 20-year-old, high-density storage area containing 56,500 pallet positions in 200,000 square feet. Meanwhile, by replacing 10 aging manually driven stracker cranes with 28 automated cranes, Rubbermaid reduced the amount of labor associated with operating that section of its operations. As a side benefit, automating the storage area has also created a much safer work environment and provided room to grow in the future.

Launched in November 2008, the project unfolded in four distinct steps over an 11-month period

- choosing a solution and vendor,
- designing the system and processes,
- preparing for the installation, and
- finalizing the installation.

Taken as a whole, it was a textbook example of solid design and project management coming together to deliver productivity gains with materials handling automation.

"We were able to bring this project in on budget and realize the payback we expected," says John Elliott, senior distribution engineer. Beyond that, adds Elliott, Rubbermaid is only using a fourth of the available throughput capacity of the new cranes. "We are positioned for significant growth," he says.

Time for renewal

Winchester, Va., is the headquarters for Rubbermaid Commercial Products, a division of Newell Rubbermaid that manufactures a diverse line of products for business customers including waste management, facilities maintenance,

and materials handling products. The Winchester facility employs 800 associates in manufacturing and distribution operations, stocks an estimated 7,000 stock keeping units (SKUs) and ships about 1,800 pallets a day in a 24/7 operation. Shipments are primarily full pallet and full case quantities that may go to customers or to replenish stock at the other two locations. In addition to the 750,000-square-foot facility in Virginia, Rubbermaid leases another 700,000 square feet of distribution space nearby to distribute to big box retailers and a third site in Victorville, Calif., that distributes to 13 West Coast states.

Since its launch in 1969, the division has grown into one of the top three performing units for parent Newell Rubbermaid, and it continues to expand. Two years ago, the division purchased Technical Concepts, a company that distributes a line of complementary products such as hand sanitizers and bathroom deodorizers. In addition to growing the volume of product shipped, that acquisition also has an impact on the profile of the shipments that go out the door. "In the past, we primarily shipped large units such as trash cans that might have been stacked 20 to a pallet," says Elliott. "Today, we might

PHOTOGRAPHY BY JEFF HUTCHENS



Rubbermaid installed the first of 28 new cranes in the spring of 2009.

also ship a pallet with 10,000 small air fresheners on it.”

The 28-aisle, high-bay, high-density storage area was installed in 1989. Seventy-feet tall, it featured 10 manually operated stacker cranes. Six aisles were dedicated to components, materials and work-in-process (WIP) to support manufacturing while the other 22 aisles stored finished goods. After 20 years of service, the system had become expensive to operate and maintain. “The area was staffed 24/7,” says Elliott. “It was also becoming difficult to find available parts for maintenance and the prices of those parts were going up.”

There were also safety concerns. Not only were employees working 70 feet up in the air, but the masts were beginning to show their age. With the system deteriorating and business requirements growing and changing, the time was right for a new system.

The right solution

The retrofit project was the single biggest capital investment at the Winchester plant. An automated solution, however, was not the first choice, says Elliott. In the early stages of the

evaluation process, Rubbermaid considered several different proposals to update with another manually operated system. The proposal to automate the area with 28 aisle-dedicated cranes came later in the selection process, after Elliott and his team thought they were going to move forward with a proposal for a smaller-scale automated solution. Two things changed.

The first was the introduction of a rotating fork materials handling device that can operate in a very narrow aisle (VNA) and be retrofitted to a building with standard post-and-beam rack. In this instance, there is just 65 inches between the racks.

In this unique design, the crane extracts a pallet from a storage location and then rotates 90 degrees so that the profile of the load is no wider than the overall profile of the storage and retrieval (S/R) crane. The crane rotates 90 degrees again to put a pallet away in a storage location.

“Up until we saw that design, we didn’t think it could be done with automation,” says Elliott.

The second was that in a tough economic environment, all vendors were

sharpening their pencils as they put their quotes together. On paper, the combination of automation, improved productivity and labor savings made the most sense. What’s more, the state of Virginia made funds available for the investment as well as funds to retrain and redeploy employees who had worked in the high-density storage area.

“The way we planned this project, no one lost a job,” says Elliott. “They were redeployed to other parts of our operations, including four crane operators who became lead technicians for the new system.”

Before sending out a purchase order, however, Rubbermaid conducted a significant amount of due diligence. “This system is the heart of our business,” says Elliott. “We had to get this right.”

There were a number of site visits with all of the proposals. The automation supplier demonstrated how its solution would work with an S/R crane in a test area that matched the dimensions in Rubbermaid’s plant. “Seeing that demonstration gave us confidence that we had a capable supplier with the engineering disciplines we would need in house, and they assured us they had people they could dedicate to us at every stage of the project,” says Elliott. The purchase order was let in November 2008.

Scoping the project

Between November 2008 and April 2009, Rubbermaid assembled a project team from across its operations, including operations, maintenance and IT, as well as representatives from relevant vendors, such as the automation solution provider and its warehouse management system (WMS) provider.

IT representatives, for instance, needed to plan how the different systems would communicate with each other and hand-off instructions. Early on, the team had to decide whether the warehouse control system (WCS) that directs the AS/RS would manage inventory in the system, which is common, or if the WMS would determine putaway and retrieval locations. In this instance, Rubbermaid kept the WMS in charge of inventory. “We have different

sized locations, and we have aisles dedicated to components needed to keep the manufacturing lines running and finished goods aisles for distribution,” says Elliott. “We were more comfortable controlling inventory with the WMS instead of turning it over to the new system.”

That decision required modifications to the WMS as well as changes to the network, programmable logic controls (PLC) and Ethernet.

The next phase was to map out all of the process steps for the machines. Those steps had to cover every eventuality. That’s because an operator on the machine could make decisions and adjustments that would now have to be controlled by automation. “We had to think through every single handling step from start to finish that an operator used to perform,” says Elliott. That required building logic for different sized products and different sized rack locations. It also required new controls for the conveyor system and a validation process to prevent the wrong pallets from being inducted into the system. For example, the induction conveyor won’t deliver a pallet to a crane until the expected license plate bar code on a pallet is scanned while the pallet simultaneously blocks the correct photo eye sensor. Likewise, the system was programmed to interleave putaway and picking activities to optimize throughput.

Putting in a new system also created an opportunity to start with a clean slate and put in new processes to optimize the flow of materials throughout the facility. One new process involved how to handle hot orders. The WMS releases work to the floor based on priority. In the past, if a hot order came into the system, a crane operator could retrieve a pallet and drop it off at an outbound station for pick up. Now, the whole automation system is optimized around priority. “If someone comes in with an emergency order, the system can change the priority of the picks,” says Elliott. “If there are already pallets staged on the outbound conveyor, the system will bump up the priority of the pallets in the way so the crane can deposit the hot item for pickup.”



In addition to the AS/RS, Rubbermaid relies on a high-speed conveyor and sortation system (top photo) to deliver cartons to the shipping area. Once there, product is palletized and staged for delivery (bottom photo).

Laying the foundation

By February of 2009, the cranes were in production. Back in Winchester, Rubbermaid began the physical work of installing wiring and data drops for the controls and machines. A 3,000-amp breaker was installed to accommodate the new equipment.

Rubbermaid also began welding together the floor rails for the new cranes. They were put to the side of the aisles so that the old cranes could continue to operate. That was important since Rubbermaid was not going to shut down

its operations for the implementation. Instead, it expected to install the system piecemeal, bringing up a few aisles at a time while still running the old system.

In April, a team from Rubbermaid visited the Salt Lake City plant where its cranes were being manufactured. One machine was installed in a test rack that matched the width of Rubbermaid’s aisles and the openings of its racks. During the test period, the system handled a load that matched Rubbermaid’s biggest load. The group put it through the paces in manual



Automation has created a safer work environment and is enabling Rubbermaid to control the growth of its labor while adding capacity.

mode, automatic mode and recovery mode, while simulating the controls that would actually be used to operate the system.

At the end of the test, “we only made a few minor changes to the crane motion,” says Elliott. They were ready for implementation.

Implementing the system

In late May, the first aisle was shut down to install the first crane. “We started with just one aisle so that if something went catastrophically wrong, we would only have one aisle tied up and could continue to operate,” says Elliott.

The first installation took three weeks. Some minor physical modifications had to be made. In addition, changes were made to the logic in the WMS to better match the physical locations to the product. Once those changes were made and the crane was in place, it was tested for several days before it went into production.

“The lift truck operators did a fantastic job testing the new logic and controls,” says Elliott. “We learned very quickly that the system would

not induct the wrong pallet unless the pallet was labeled incorrectly. We knew that the accuracy in the building was going to improve.”

Having worked the bugs out on the first aisle, Rubbermaid installed the remaining 27 cranes in about 16 weeks. During this period, Elliott made a point of being a visible presence, working each day side-by-side with the installers on a folding plastic table in the facility.

“People knew I was there and if there were issues, I was able to address them promptly,” he says. It also was an opportunity for salaried staff and hourly associates to suggest ways to improve the system that could be incorporated then and there. Another contributing factor to the success of the project was that hourly

associates, who had been working in the storage area, were deployed as quickly as their old machines were decommissioned. “We had backfilled positions in the plant with temporary workers so that we could accommodate our hourly associates once their old positions were eliminated,” says Elliott.

By October 2009, the work was complete and the whole system was in operation. Productivity improved from the start. “We went live during the busiest time of the year,” Elliott says. “With the old system, we would have product staged for putaway across the southern wall of the building because the manual cranes couldn’t keep up. Once we had all of the cranes up and running, we had virtually zero staging unless a crane was down.”

After more than a year of operation, the system continues to deliver. “We now have a system with reliable equipment that accommodates our needs today and will grow with us in the future,” says Elliott. “It has been a total transformation of our VNA facility.”

Revving up distribution

The new AS/RS supports manufacturing, distribution and replenishment.

With the capability to handle up to 17,000 pallet movements a day, the automated storage and retrieval system (AS/RS) ① at Rubbermaid Commercial Products’ Virginia location is the engine that drives the manufacturer’s storage and order fulfillment operations.

Receiving: Pallets may be received from the manufacturing line or from Rubbermaid’s receiving dock and put away in the AS/RS ①. In either case, the lift truck operator scans a license plate bar code and is then directed to the appropriate induction conveyor. There,

the operator scans a location label to initiate the induction process.

Putaway: Once the pallet is placed on the induction conveyor, the warehouse control system (WCS) verifies that the correct label is on the pallet and that a photo eye has picked up the pallet. If those conditions are met, the pallet is automatically sized by a dimensioner for putaway. In this instance, the warehouse management system (WMS) rather than the WCS is responsible for choosing a putaway location. When the pallet is picked up by a second photo eye, a crane picks up the pallet and delivers it to the

storage location. The product is now available to promise in the WMS.

Picking: Product can be picked from the AS/RS, a case picking area ② or a non-conveyables picking area ③ for product that can't travel on a conveyor system ④.

AS/RS: Pallets can be picked from the AS/RS for delivery to the shipping dock ⑤, to the production area ⑥ or to the case ② and non-conveyables ③ picking areas. Once a pallet has been chosen, an AS/RS crane retrieves it and delivers it to a take away loca-

System suppliers

Systems integration, automated storage and retrieval cranes: Dematic, formerly HK Systems, www.dematic.com

Warehouse management system: Manhattan Associates, www.manh.com

Drive in, pallet flow and case flow rack: Mecalux, www.interlakemecalux.com

Lift trucks: The Raymond Corp., www.raymondcorp.com

Bar code scanning: Psion Teklogix, www.psionteklogix.com/us

Conveyor and carton sortation: Intelligrated, www.intelligrated.com

Conveyor control system: Pyramid Controls, www.pyramidcontrols.com

Stretch wrapping: Lantech, www.lantech.com

Extendable conveyors: Stewart Glapat, www.adjustoveyor.com

Tuggers: Motrec, www.motrec.com

Rubbermaid Commercial Products Winchester, Va.

SIZE: 750,000 square feet including manufacturing, warehousing and distribution

PRODUCTS: Products for maintenance and materials handling

THROUGHPUT: 1,800 outbound pallets per day

SKUS: 7,000

SHIFTS: 24/7

EMPLOYEES: 800 in operations

tion that can hold two pallets per aisle. Pallets destined for production will be delivered by lift truck. Pallets destined for

shipping will be picked up by an outbound tugger and delivered to a drop off area. There, a lift truck operator will pick them up and deliver them to a staging area ⑦ for shipping or to the appropriate case picking area for replenishment.

Case picking, conveyables: In the case pick area ②, operators directed by RF pick cartons to a belt conveyor ④. Cases are then scanned and sorted by a shoe sorter ⑧ to the appropriate dock door ⑤. There, the case is scanned to a mixed case pallet. Once a pallet, it is stretch wrapped and staged ⑦ for shipment.

Case picking, non-conveyables: In the non-conveyable area ③, associates are directed by RF to manually pick and label cartons to a pallet. Once the pallet is built, it is stretch wrapped and delivered to the shipping area ⑤ where it is married with conveyable items for that order and either staged ⑦ or loaded onto a truck as an outbound shipment ⑤. □

