To automate *or not* to automate

German auto parts manufacturer febi bilstein is reaping big gains from automation. Here's what the company learned when it automated conventional distribution processes.

By Bob Trebilcock, Executive Editor

To automate or not to automate, that is the question.

With apologies to William Shakespeare, the decision to automate conventional materials handling processes may not be as profound as *Hamlet's* soliloquy on life's big questions, but for companies like Ferdinand Bilstein, which goes to market as febi bilstein, that decision was every bit as important.

"Logistics is a core competency for us," says Frank Boecker, logistics director for the German aftermarket auto parts manufacturer and distributor based in Ennepetal. "Our order fulfillment systems must be very fast. It is our competitive advantage."

To maintain that edge, febi invested nearly $50 million in a new logistics center with a highly automated storage and order fulfillment system (Witron Integrated Logistics, www.witron.com). The new distribution center in Ennepetal consolidated two DCs separated by 35 miles into one 363,000-square-foot campus, which was opened at the end of October 2008 and has been fully operational since March 2009.

The new system features high-bay automated storage and retrieval systems (AS/RS) featuring 21 stacker cranes, 40,000 pallet storage positions, and 136,000 tote storage positions along with a goods-to-person order fulfilment system. The system manages 24,000 stock keeping units (SKUs) and more than 100 million parts while processing 1,000 orders per day.

More importantly, the new system has allowed febi to increase throughput while simultaneously reducing head count from more than 400 employees to 350 in operations. Most of that savings was the result of operating two shifts per day instead of three shifts per day with the old system.

In all, febi saw a 20% increase in productivity in the first full year of operation, followed by an additional 20% increase in productivity in 2010. "Automation has been an unqualified success for us," says Boecker.

At the same time, like *Hamlet*, febi bilstein took time to consider the question of whether to automate or not to automate.

The new system at febi includes a mini-load AS/RS (shown) and a unit-load AS/RS. The units enable goods-to-person piece- and case-picking order fulfillment solutions.

A history of market leadership

A family-owned company, Ferdinand Bilstein has been in business since 1844. Today, the company is one of the world's leading manufacturers of after market car and truck parts, with subsidiaries in 11 countries and distribution capabilities in five of those countries.

A key selling point of febi's go-to-market strategy is a high availability of parts—the company stocks more than 100 million parts at all times—combined with market-leading delivery times and the ability to dispatch stock orders within one day. For instance, from the Ennepetal facility, febi delivers orders to customers in Germany within 24 hours, to Europe within three days and within five days to the rest of the world. The company can fill and pack a new order in as little as two hours.

Over the last decade, febi faced business challenges similar to many distribution operations in North America.

- **Business growth:** Despite a global recession, febi's business was growing by more than 10% per year in recent years.
- **Complex order fulfilment requirements:** As a global company, febi was confronted by increasing customer requirements, such as country-specific legal requirements that dictate special individual labels to goods in several markets. "This is a major prerequisite for breaking into new markets," says Boecker, "but without the capabilities of our automated system, it would have entailed a disproportionately high amount of money, labor and effort."
- **Smaller and more frequent deliveries:** Febi's customers no longer want to stock inventory. Instead, they rely on febi to deliver smaller but frequent reorders. Compared with 2008, the company has seen a rise in small volume orders of almost 20%.
- **An aging workforce:** Febi was focused on increasing productivity so that it could retain jobs in a tough economy. At the same time, as with North America, febi was confronted by an aging workforce that could benefit from ergonomic solutions. "We needed productivity improvements but we also knew that ergonomics was one of the solutions that would allow us to achieve productivity gains with changing demographics," says Boecker.

Finally, febi was running out of space in its existing conventional DCs. In 2005, the company was operating a 131,000-square-foot conventional distribution center in Ennepetal and a second facility about 35 miles away. "We had storage capacity for 20,000

Totes are delivered from the mini-load AS/RS to workstations. Febi employees played a role in the ergonomic design of their work areas.

pallets and we were shipping pallets from one logistics center to the other location," says Boecker. "We determined that we would run out of logistics capacity in about two years and our chairman told us we needed to come up with a solution that would meet our needs until 2015."

Automation implementation

At first glance, automation appeared to provide an answer for each of those challenges. However, febi did not leap directly from conventional warehouse processes into automation. Instead, the company made the move in two steps.

The first step was to implement a semi-automated order picking system—what febi refers to as an Order Picking System or OPS—in the existing facility in Ennepetal. This featured 38,000 tote storage positions and a four-aisle, goods-to-person order picking system.

"We knew that automation was going to be a big step and a big investment," says Boecker. "Before taking that step, we wanted to understand what automation would mean to our processes and how a larger, more automated system might work, so we began with the first investment."

That first system included a goods-to-person picking solution. The system delivers totes from a mini-load AS/RS to an ergonomic workstation in the sequence that the associate will pick the items. Today, that system is primarily used to aggregate slow moving parts.

But this wasn't just about swapping a manual order picking process for an automated system. Febi also realized that an effective change management strategy was critical for the system to gain acceptance by febi's workforce.

For instance, febi associates helped design the interfaces and displays on the screens that direct picking. Their input was also critical in the design of the workstations themselves to accommodate an aging workforce.

One of the changes was to install some 30 lift tables that allow the associate to adjust the height of their work space. "They really helped us design the area, and we have other initiatives to improve working conditions in the facility today," Boecker adds.

When the system went live in 2005, febi trained key employees on the use of the system. Those employees, in turn, trained the rest of the staff.

"What we learned is that we were much more efficient and productive with automation, and we could turn orders much faster," says Boecker.

Orders are prepared for delivery in the packaging area. Febi can assemble an order in as little as two hours.

The febi logistics center also handles over-sized items (left) and custom packs items in a value-added processing area (below).

Going live with automation

With the first system a success, febi began planning for the new distribution center.

The new facility was constructed next to the facility in Ennepetal at the end of October 2008 and has been fully operational since March 2009. After three and a half months of parallel operation, the new DC was linked up to the existing semi-automated pallet warehouse and four-aisle order picking system that was opened in 2005.

The new system includes a 10-aisle automated small parts warehouse with 98,000 tote spaces. In addition, a seven-aisle, high-bay warehouse includes some 40,000 pallet storage positions. The two systems combined cover the vast spectrum of febi's portfolio of spare parts.

With the new distribution center, febi is able to store more than 24,000 different articles with minimal space required. According to the output plan, the system can process more than 230,000 picks, which corresponds to 27,000 order lines per day.

The order picking system integrates an automated small parts warehouse with a distribution loop and upstream picking stations. The system stages the articles for a given order at the picking workstations in the correct sequence according to the goods-to-man principle. They are then picked and packaged into the shipping carton. The optimal size of the shipping carton is determined using a prior volume calculation.

Heavy, voluminous and bulky articles are stored and picked with the pallet picking system, which is also a goods-to-person system. The warehouse control system directs all necessary pallet movements from the high bay warehouse and signals the stock removal quantities to employees with pick-to-light displays.

The dynamic picking front is generated for a given order by transfer cars. The order pallet is staged centrally at the picking front between the individual warehouse pallets. As a result, the paths that the employees have to take, as well as their lifting duties, are minimized and the work can be performed ergonomically despite an article range of many different sizes.

The two buildings are connected by a bridge. That allows the warehouse management system (WMS) to synchronize orders that are filled across the two systems. Consequently, the customer is always supplied with the ideal package size.

Adding automation has also allowed febi to redesign its picking process. In the past, one worker was in charge of filling an entire order for a customer, everything from picking the parts to printing out the labels and paperwork. Today, the components of an order are distributed among employees.

"One employee is tasked with picking parts of the boxes for an order, and another packs the parts and compiles the paperwork," says Boecker. "What's more, our employees are cross-trained on each step and rotate jobs so that they don't get bored—and make mistakes—doing the same job over and over." Cross-training also allows Febi to move staff between departments as demand shifts.

Finally, the old pallet and tote warehouses have been reintroduced into the total logistics concept to provide further storage capacity.

"With the capacity of the new facility we are ideally equipped for the future even as our business continues to grow," says Boecker.

Lessons learned

Febi has been working with the two systems for more than two years. Over that time, automation has delivered some significant improvements. In the first year that both systems were in operation, productivity improved by 20%. In 2010, febi experienced another 20% productivity improvement.

The company is now looking at whether to add automation to its warehouse operations in other countries as well. More importantly, febi believes it can meet its goal and maintain its market-leading logistics position well into 2015. "We now have an entirely future-proof logistics system that combines maximum effectiveness, cost efficiency and flexibility," says Boeker. "This further strengthens our service and cost leadership ambitions within the industry and provides us with a sustainable competitive advantage." □

Automation in high gear

Febi's new distribution center uses unit- and tote-handling automated storage, conveyor and goods-to-person picking in an ergonomic work environment.

By Bob Trebilcock, Executive Editor

A high-bay, unit-load automated storage and retrieval system (AS/RS) and tote-handling mini-load storage systems are the primary components of febi bilstein's logistics center in Ennepetal. The logistics center is comprised of two buildings completed in two phases. In Phase 1, febi converted its original conventional warehouse into an automated logistics center. Phase 2, which is connected to the original building by a bridge, was built later and is responsible for the majority of the order fulfillment.

The system uses sophisticated order fulfillment software to deliver pallets and totes to order selectors in sequence with a goods-to-person order fulfillment scenario. The result is a system that can handle increased order volume, higher throughputs and improved customer service levels without adding labor.

Receiving: Inbound pallets are typically received **(1)** in the Phase 1 building. Pallets are staged in the receiving area and scanned into the warehouse management system (WMS) and checked by the quality assurance department. The WMS then determines a storage location.

Putaway: From the receiving area, slow-moving pallets are stored in a pallet rack in the manual area in Phase 1. The remaining pallets are placed on a pallet handling conveyor **(2)**. Pallets that remain in Phase 1 are inducted into the unit-load AS/RS **(3)**. Pallets destined for the Phase 2 building travel by conveyor across a connecting bridge **(4)**, where they are received and

Ferdinand Bilstein, Ennepetal, Germany

SIZE: 130,850 square feet in existing building/231,425 square feet in new center for a total of 362,275 square feet

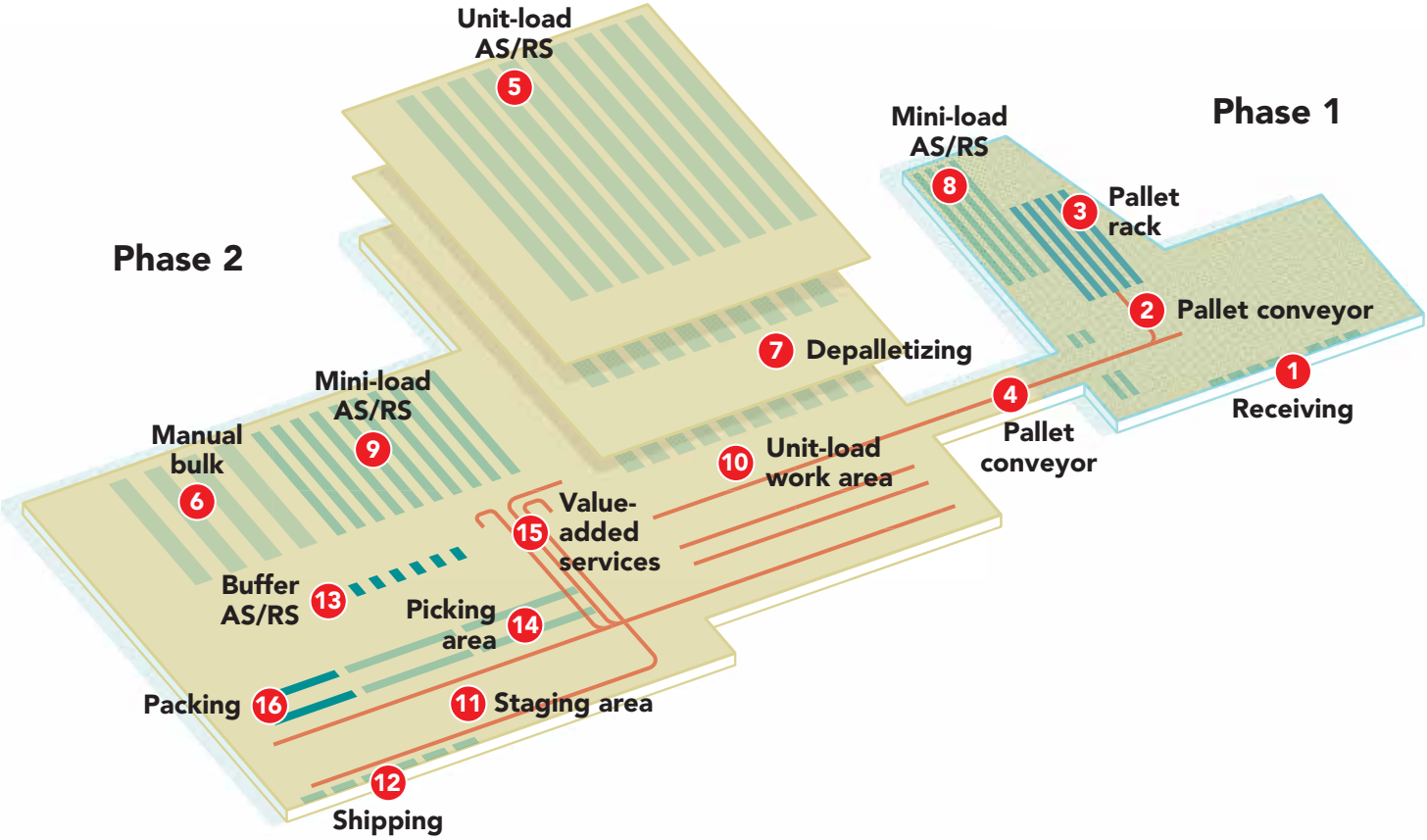
PRODUCTS: Car and truck parts for the independent aftermarket

SKUS: 24,000

THROUGHPUT: 1,000 orders per day

SHIFTS: 2 shifts/5 days

EMPLOYEES: 350 to 400 in operations



inducted into the unit-load AS/RS **(5)**.

Oversized pallets that may not fit in either AS/RS are stored in pallet rack in a manual bulk area **(6)**. In either case, once pallets have been putaway into storage, they are available to promise.

Replenishment: Items that will be piece picked or placed in an inner pack are stored in one of two tote-handling mini-load AS/RS systems. To replenish the mini-load systems, pallets are delivered from the unit-load AS/RS **(5)** to a depalletizing area **(7)**. There items are depalletized and placed into totes. Once complete, the totes are inducted into the mini-load AS/RS system in Phase 1 **(8)** or Phase 2 **(9)**.

Picking: Orders may include full pallet or mixed pallet shipments. Either way, pallets are delivered by the AS/RS to a workstation **(10)**. Full pallets are picked up and transported directly to a staging location in the shipping area. Otherwise, an order selector will be directed by the system to pull cases from the pallet and place them on a shipping pallet. Once the pallet is complete, it is delivered to a staging location **(11)** in the shipping area **(12)**.

Totes required for piece picking are delivered from the mini-load AS/RS **(9)** to smaller mini-load systems **(13)** in the picking area **(14)**. These are used as buffer storage and to deliver totes to the picking stations in the right sequence to fill orders. A display at the workstation tells order selectors which items to pick and in which totes to place them.

Packing: Once a tote is complete, it may be conveyed to a value-added service area **(15)** for kitting, for customer-required labeling or for any special packaging requirements. Once any value-added services are complete, the items are transported to the packing area **(16)**. There, a cubing algorithm will determine the optimal shipping carton for that order. Once the carton is erected, the packer will place the item into the shipping container.

Shipping: In the staging area **(11)**, parcels and pallets will be married together if they are part of an order. Then, they will be loaded onto an outbound truck in the shipping area **(12)**. □

System suppliers

Systems integration, WMS and WCS: Witron, www.witron.com

Tote conveyor system: FAS Forderanlagen Systeme GmbH (division of Witron), www.fas-saarbruecken.de

Pallet conveyor system: Binder, www.binder-foerdertechnik.de

Mini-load AS/RS cranes: TGW Systems, www.tgw-group.com

Unit-load AS/RS pallet cranes: Dambach Lagersysteme, www.dambach-lagersysteme.de

Totes: Georg Utz, www.utzgroup.com/en/6

Pallet rack: SSI Schaefer, www.ssi-schaefer.us