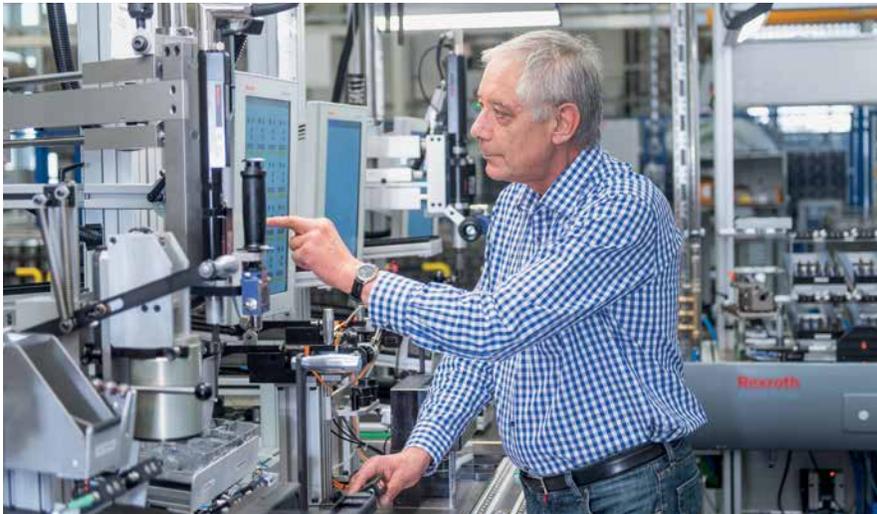


Drive & Control profile

Competitive Edge 4.0



Each associate carries a Bluetooth tag that stores the necessary information and automatically transmits it to the assembly station which then adjusts itself based on the preferences of the associate.

Assembly stations that adjust themselves to the associates and products that know which stations they need to move to next? It sounds good – and will soon become a reality at the Homburg Bosch Rexroth plant.

Bosch Rexroth Production Planner Nicole Arendt remembers the hottest day of June 2013 very well, when the go-ahead was given for a forward-thinking project at the Rexroth assembly plant in Homburg, Germany. Not the best of days to be at your most creative, she thought. But that was exactly what was required of the project team as they pondered their options in a meeting room at the

invitation of General Project Manager Andreas Jenke.

“We were given the task of building a versatile ‘Industry 4.0’ line. The subject of this connected industry was nothing new. And it was clear that the new technologies could help us respond to changes in the market with greater speed and flexibility. But at the start, we were certainly asking

Challenge:

Improve the efficiency and versatility of a new electrohydraulic valve assembly line at the Bosch Rexroth Homburg plant.

Rexroth Solution:

Utilize Industry 4.0 technologies, including improved logistics and connectivity, self-adjusting assembly stations and on-screen instructions tailored to individual workers to transform production flow and flexibility.

Results:

- Each associate carries a Bluetooth tag that stores the necessary information and automatically transmits it to the assembly station
- Assembly stations adjust to individual associates and display text in the appropriate size and language
- The workpiece carrier incorporates an RFID tag identifying the valve being assembled, guides the product along the line and requests all materials required for assembly
- Over 200 different hydraulic valves are assembled into a single value stream on the assembly line

ourselves what this type of line might actually look like,” recalls Production Planner Berthold Roser, shaking his head and laughing. Together with his colleagues in Homburg, he developed the requirements of the project from a plant perspective. Now these plans have not only become a sophisticated concept, they have turned into an entire line.

No Setup Required

The connected industry line had its grand unveiling at the production conference in Horb, Germany, in 2014 and is used to produce electrohydraulic valves for tractors. Its development has been characterized by one thing above all else: lots of discussions. “Working in a cross-divisional team was completely new to me. In particular, the interfaces between logistics and production, production planning and central IT are extremely important for the new line,” explained Arendt. In the project team, associates have worked together in a constructive way to implement new and innovative ideas. Arendt herself will provide technical support for the assembly line. “I have been involved from the beginning and have been able to use my product knowledge to contribute to the planning process.” Together, the Rexroth team has developed a line that allows an extensive product range to be produced without the need to perform technical or logistical setup tasks. Her colleague Berthold Roser agrees: “The sooner production and logistics become involved in the project, the more beneficial it is. That’s because those of us in planning don’t know what improvements in ongoing operations have been integrated into existing lines. We were able to use this knowledge for the new line.”



The connected industry line is packed full of features that make the job easier, like displaying text on screen in the appropriate font size and language based on the associate.

Individual Workstations

The line is packed full of features that make the job easier for associates. The assembly stations adjust themselves individually to associates and display text in the appropriate font size and language on a monitor screen. Information about the assembly steps is displayed in the appropriate level of detail depending on how qualified the associates are. Each associate carries a Bluetooth tag that stores the necessary information and automatically transmits it to the assembly station. “Our focus has always been on connecting humans, machines and products to increase agility, accelerate processes and manage the wide variety of products,” explains Tim Brügge, assistant to the technical plant manager in Homburg.

Project Manager Andreas Jenke confirms: “By providing context-sensitive information, we have been able to implement a highly intuitive user guidance system that focuses on the people in the value-adding process.” The workpiece carrier for each product also carries an RFID chip containing its identification number. The workpiece carrier guides the product along the line and requests all the operations and materials required for assembly from the individual workstations.

Aside from intelligent workstations and products, what differentiates the connected industry line from its predecessors? “Decentralized production planning is the key element,” Arendt explains. In the future, the line will no longer be

controlled from a central SAP system. Instead, the machines on the shop floor can plan for themselves. They report when they are available, when they require maintenance and when any faults occur. One important element is activeCockpit. This manufacturing coordination and control system, developed by Rexroth, uses apps with flexible enhancement options. "As has always been the case, a real person will still make the final decisions," says Arendt. "But their planning processes will be supported by the fact that all information will be available immediately."

From a Nucleus to a Production Network

Tim Brügge believes it is all about "managing complexity using connected industry and networking." He is sitting with Andreas Jenke in the office of Technical Plant Manager Frank Hess. "There are three important requirements for Rexroth: to increase our ability to absorb rapid changes in the market, to be able to get our products on the market quicker and to be able to cover the wide range of products with lower costs. Overall, we see this as a way to increase our competitiveness, including at site level," explains Hess. In the future, the networked approach will make this possible. "During implementation, it was important to follow the principles of our Bosch Production System in a consistent way. This system is the basis for the new and forward-looking connected industry solutions," emphasizes Jenke. "The new line is the nucleus for us," adds Hess. "Taking this as a starting point, we will add the individual applications and features to the value stream. That is the next step: integration from the supplier right through to the

customer." After that, the third step will be to harness the intelligence of the products and provide added value and services to the customer. Or in other words, to develop new business models. One vision is of a final product that informs the customer when it needs servicing or must be replaced, and at the same time places an order with the plant and the supplier.

Rexroth's major objective is for the production plants around the world to be linked to the connected industry standard, but to be organized on a decentralized basis. "All information and data will be available via the cloud, controlled by a lead plant," explains Hess. Brügge adds: "But first, we need to implement this system in the value stream in our own plant."

Increased Transparency and Safety

One floor below them, Nicole Arendt and Logistics Manager Moritz Hoffmann are working on making sure this happens. Together, they consider how provision of materials to the



The Rexroth connected industry line allows an extensive product range to be produced without the need to perform technical or logistical setup tasks.

new line might work. This is no easy task, as Hoffmann explains: "A multi-product line does of course have a lot more components. This makes it more challenging to make sure we always have everything in the right number and in the right place at the right time." In addition, the new line has to be integrated into the logistics of the plant and the other lines.



The connected industry line allows products to be produced economically right down to batch size one.

He is also working on the long-term objective of extending logistics to include suppliers and customers. “The borders between companies will become blurred,” he says. “We will work on an increasingly interconnected basis and exchange more information.” But initially, he hopes that the new line will offer greater security in planning as the digitization of data allows weaknesses to be identified more quickly – and before they become a problem. Nicole

Arendt nods in agreement: “In the future, we will see much sooner if there is a problem looming. We can reduce downtime, as we will receive a signal from individual components at an earlier stage. The spare part order will then be placed before the need for maintenance arises.”

All the project participants are excited about the availability of data. And Frank Hess is pleased that Rexroth has a strategic tool in the shape

of connected industry: “Rexroth is the lead supplier of automation components and connected industry features. But this means we are also actively positioned as the key user. This allows us to demonstrate the possibilities provided by factory automation components to our end customers. In this sense, the new line offers us a fantastic testing ground and helps us to make a sustainable increase in our competitiveness.”

Do you have an application worthy of a case study?

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