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New perspectives for factory automation

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Bosch Rexroth develops Smart MechatroniX into a solution landscape and presents a world first for robots

- Smart MechatroniX solution platform growing horizontally and vertically
- Plug and produce for dispensing tasks: Smart Function Kit Dispensing
- The Smart Flex Effector, a world first, gives robots new skills and sensitivity



The Smart MechatroniX platform opens up new possibilities for mechanical engineering and production companies, enabling them to increase their level of automation and simplify their system design. (Image source: Bosch Rexroth AG)

Bosch Rexroth continues to drive the digital transformation of linear motion technology and is further developing its Smart MechatroniX platform. With new products and solutions, mechanical engineering and production companies can increase their level of automation cost-effectively and simplify their system design at the same time. In addition to the new Smart Function Kit Dispensing, Bosch Rexroth is presenting the Smart Flex Effector, another world first: The intelligent, sensor-based compensation module gives robots human-like sensitivity and allows complex processes to be automated. The Smart MechatroniX platform is also being expanded with new partner solutions on an ongoing basis.

In 2019, Rexroth Linear Motion Technology started focusing on the Factory of the Future. The Smart MechatroniX solutions developed for this purpose reflect global market requirements: Flexibility and sustainability, intelligence and connectivity, transparency and profitability. Recognizing that users are looking for an effective and economical way to increase their level of automation, Bosch Rexroth is constantly expanding the Smart MechatroniX platform. The new products and solutions are much more intelligent, flexible, connected and software-based and allow even manual assembly processes which were prone to disruptions to be automated. In this way, Bosch Rexroth contributes both to the economical production of different lot sizes and to greater competitiveness and cost-effectiveness.

New Smart Function Kit: Plug and produce for dispensing tasks

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Following on from the Smart Function Kit for pressing and joining applications and the Smart Function Kit for handling tasks, Bosch Rexroth has added another package of solutions to its range of mechatronic subsystems. The Smart Function Kit Dispensing is based on a multi-axis system which can be selected digitally, configured online and ordered in just a few minutes.

The fully pre-aligned subsystem for spreading, filling or spraying is supplied ready to install – with innovative control technology, energy supply, motors, connecting elements and pre-installed operating software. Thanks to the intuitive set-up procedure with the help of a wizard and visual process definition, commissioning, process configuration and, optionally, connection to a higher-level control system now take just a few minutes. As a result, the Smart Function Kit helps companies to start production sooner and increases their competitiveness.

Smart Flex Effector: New opportunities for automation

Small component, big effect: The Smart Flex Effector, a new, sensor-based compensation module with differentiated kinematics, gives robots and Cartesian systems human-like sensitivity and thus signals a paradigm shift in factory automation. With the help of its unique spatial referencing properties and functions, a wide range of processes can be stabilized economically and made transparent. Even highly complex assembly processes which were technically impossible or possible only at great cost can now be automated for a reasonable price. Employees can be relieved of monotonous work and deployed more gainfully elsewhere.

A typical application for an assembly process which, in the past, could not be automated was found at a Bosch plant: Here, a robot equipped with the Smart Flex Effector places sheets of glass in a refrigerator so sensitively that the shelves do not tip or break. In another pilot project, circuit boards are positioned in motor control devices without bending the delicate solder pins. This seemingly straightforward assembly procedure is however complex because it cannot be programmed explicitly to repeat itself. By referencing positions and transferring correction data on an ongoing basis, the robot is able to position the circuit boards with the sensitivity of a human hand.

The Smart Flex Effector also simplifies many typical procedures in a production setting, for example through automatic readjustment or teaching systems, e.g. by guiding a gripper by hand.

The wide range of functions bundled together in a single retrofittable component break down the boundaries of factory automation and open up entirely new possibilities even when using existing production equipment. After all, the existing production cells can be supplemented by the Smart Flex Effector with no need for major conversion work. Likewise, new production facilities and flexible assembly cells can be put in place much more easily and cheaply because the Smart Flex Effector significantly reduces the requirements as regards the accuracy of the systems.

“The Smart Flex Effector allows a new level of automation, enabling mechanical engineering and production companies to handle significantly more processes in an economical manner. They can also simplify their system design considerably without having to resort to expensive advanced

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technologies,” said Michael Danzberger, Product Owner Smart End Effectors at Bosch Rexroth. “The additional costs for the compensation unit are low and it pays for itself quickly.”

Vertical growth through partner solutions

To complement the new packages of solutions, Bosch Rexroth is also expanding the Smart MechatroniX platform through partnerships. For example, gripper systems or dispensing heads from specific manufacturers can be put into operation very quickly with the Smart Function Kit subsystems because the specific parameters are stored in the system prior to delivery and are automatically retrieved by the software. With a view to seamlessly integrating the Smart Flex Effector into packages of solutions, Bosch Rexroth is also keen to enter into partnerships in the area of robotics and robotic peripherals.

Like Rexroth’s ctrlX AUTOMATION platform, the Smart MechatroniX solution platform too will grow as a result of partnerships in order to drive the transformation of automation technology on a broad basis. Thanks to Bosch Rexroth’s open system approach, the partner solutions can be linked to the Smart MechatroniX subsystems. Bosch Rexroth provides development facilities for partners and customers at various locations including the Customer and Innovation Center which opened recently in Ulm. In the laboratories there, Rexroth engineers work with customers to develop and test new application solutions in order to make improvements quickly. At the same time, these development partnerships are resulting in new approaches for automating previously manual processes.

“With Smart MechatroniX, we’re not only setting new standards when it comes to commissioning and performance,” said Dr. Simon Hertenberger, Head of the Mechatronics product area within Bosch Rexroth’s Linear Motion Technology Business Unit. “We’re also paving the way for modular production. The Smart Flex Effector allows self-learning production and assembly cells based on the artificial intelligence data streams and algorithms that it generates. As a result, many more processes can be automated including those that optimize themselves continually.”

Basic Information Bosch Rexroth

As one of the world’s leading suppliers of drive and control technologies, Bosch Rexroth ensures efficient, powerful and safe movement in machines and systems of any size. The company bundles global application experience in the market segments of Mobile Applications, Machinery Applications and Engineering, and Factory Automation. With its intelligent components, customized system solutions and services, Bosch Rexroth is creating the necessary environment for fully connected applications. Bosch Rexroth offers its customers hydraulics, electric drive and control technology, gear technology and linear motion and assembly technology, including software and interfaces to the Internet of Things. With locations in over 80 countries, more than 31,000 associates generated sales revenue of around 6.2 billion euros in 2021.

Basic Information Bosch

The Bosch Group is a leading global supplier of technology and services. It employs roughly 402,600 associates worldwide (as of December 31, 2021). The company generated sales of 78.7 billion euros in 2021. Its operations are divided into four business sectors: Mobility Solutions,

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Industrial Technology, Consumer Goods, and Energy and Building Technology. As a leading IoT provider, Bosch offers innovative solutions for smart homes, Industry 4.0, and connected mobility. Bosch is pursuing a vision of mobility that is sustainable, safe, and exciting. It uses its expertise in sensor technology, software, and services, as well as its own IoT cloud, to offer its customers connected, cross-domain solutions from a single source. The Bosch Group's strategic objective is to facilitate connected living with products and solutions that either contain artificial intelligence (AI) or have been developed or manufactured with its help. Bosch improves quality of life worldwide with products and services that are innovative and spark enthusiasm. In short, Bosch creates technology that is "Invented for life." The Bosch Group comprises Robert Bosch GmbH and its roughly 440 subsidiary and regional companies in some 60 countries. Including sales and service partners, Bosch's global manufacturing, engineering, and sales network covers nearly every country in the world. With its more than 400 locations worldwide, the Bosch Group has been carbon neutral since the first quarter of 2020. The basis for the company's future growth is its innovative strength. At 128 locations across the globe, Bosch employs some 76,100 associates in research and development, of which more than 38,000 are software engineers.

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