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Smart Flex Effector makes robots more sensitive

Manuela Kessler | 26.04.2022 | Lohr am Main / Germany | PI 004/22

A retrofittable compensation module with sensors and kinematics in six independent degrees of freedom expands the field for factory automation

- Passive and active compensation during joining processes with minimal tolerances
- Tactile handling: Touch, grip and place objects safely and flexibly
- Quick teaching: automated and manual
- Higher productivity thanks to seamless process monitoring and correction



Sensor-supported compensation unit for articulated and linear robots: The Smart Flex Effector increases precision and productivity, avoids errors and allows greater automation. (Image source: Bosch Rexroth AG)

Small component, big effect: The Smart Flex Effector, a new, sensor-based compensation module from Bosch Rexroth, gives robots and Cartesian linear systems human-like sensitivity and thus offers new opportunities for factory automation. Processes which are difficult to manage can now be automated, optimized and monitored through simple retrofitting. Thanks to a kinematics system that works independently in six degrees of freedom, the tactile all-rounder with sensitive touch precisely records the position of the work piece and passes the information to the robot control unit for active compensation purposes. Typical applications are joining processes with minimal tolerances, complex assembly work or difficult handling tasks. Errors and rejects are minimized and teaching and commissioning can be carried out more easily and quickly.

The Smart Flex Effector is designed for handling loads of up to 6 kg. For machine manufacturers and users, it opens up a wide range of new applications which were difficult or not possible to realize with previous equipment such as passive compensation units, force torque sensors and visual systems. The applications range from process automation and quality monitoring to teaching and the controlled handling of objects.

Quantum leap in process automation

With its differentiated kinematics, the tactile all-rounder is able to correct processes with great complexity and tight tolerances, for example in the case of positional deviations between the

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tool and the work pieces or in complex joining processes with minimal tolerances. Thanks to this tactile sensitivity, tasks that were not automatable can now be performed by robots.

Quicker teaching

In another area, the Smart Flex Effector also reduces the time previously needed for teaching processes. Thanks to the 6D position recording, the robotic control system can read the exact coordinates for gripping and placing points directly. Repeated learning during operation is therefore possible in an automated manner. Robots can also be taught manually – simply by moving them into position by hand.

Sensitive handling of objects

Even during sampling, the Smart Flex Effector can be used to recognize positional deviations and, with the help of the sensor system, to determine the exact position of the object. The robot accurately picks up assembly or handling objects, positions them in a controlled manner and places them reliably or sorts them. Even parts made of glass or other sensitive materials can now be handled safely. In order to ensure maximum productivity, the compensation module can be actively moved into the zero position and electromechanically locked for fast transfer runs.

Improved quality thanks to transparency

As part of process monitoring, the Smart Flex Effector makes not only documentation easier. Quality too can be improved as deviations are recognized immediately and either corrected or reported to the control system. This avoids errors and unnecessary costs owing to rejects or follow-up work.

High connectivity, easy installation

The Smart Flex Effector offers an RS-485 interface as well as an I/O interface for exchanging data. Installation is extremely easy: For a passive compensation function, the Smart Flex Effector is simply screwed to the robot flange and the gripper. The locking function and data transmission are available as soon as the unit is connected to the power supply and the control system.

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

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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, 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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