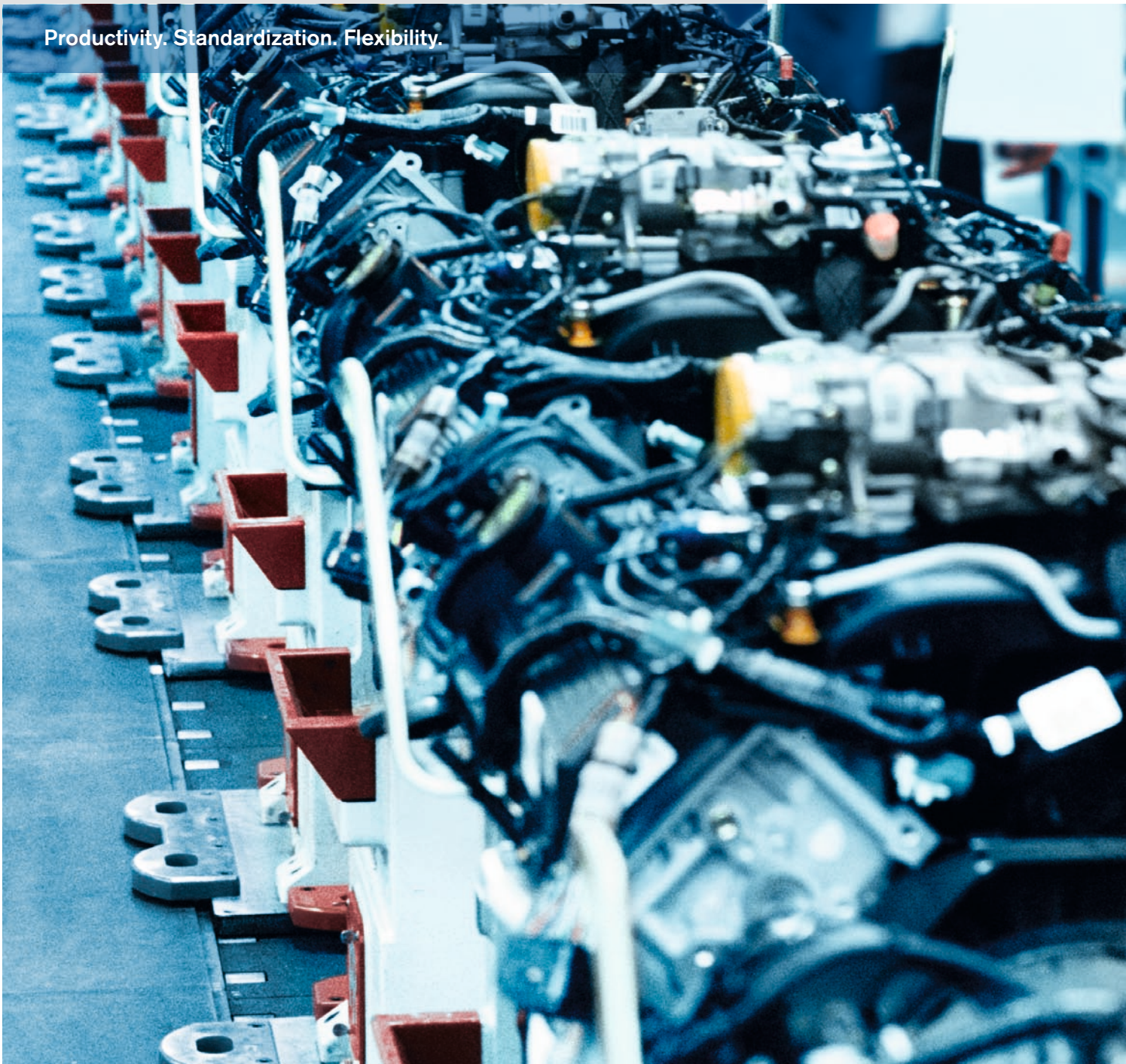


## Rexroth – Your Automation Partner for Engine, Gearbox and Axle Assembly

Productivity. Standardization. Flexibility.



# Bosch Rexroth. The Drive & Control Company

**Rexroth is the global leader in the supply of all specialized and integrated Drive and Control technologies. The company of the Bosch Group stands for highest quality and service to customers.**



Whether the need is electric drives and controls, hydraulics, pneumatics or linear motion and assembly technologies, only Rexroth offers the full spectrum of automation technology from a single source.

Rexroth supports automotive manufacturers around the world by supplying innovative components, modules, and systems and services designed to enhance production efficiency. Rexroth products always incorporate state-of-the-art technology that consistently adheres to international standards in the hardware and software sectors.

Rexroth pursues the objective of zero-defects in all products and services. The company adheres to an established process-oriented quality assurance system based on tools and methods that have been tried and tested in the automotive industry.

## **Common Experience – Common Language**

Many years of close cooperation with the automotive industry create a common ground: Rexroth's processes and products precisely reflect the requirements of the automotive industry.



Rexroth relies on close cooperation with machine manufacturers and automotive manufacturers to develop automation components along with solutions for enhanced productivity and superior quality. In addition, Rexroth's processes and approaches make it the ideal partner for the automotive industry. As a company of the Bosch Group, Rexroth stands for consistency, innovation and quality as it continues to meet the most challenging demands of automotive manufacturers.





## Engine, Gearbox and Axle Assembly

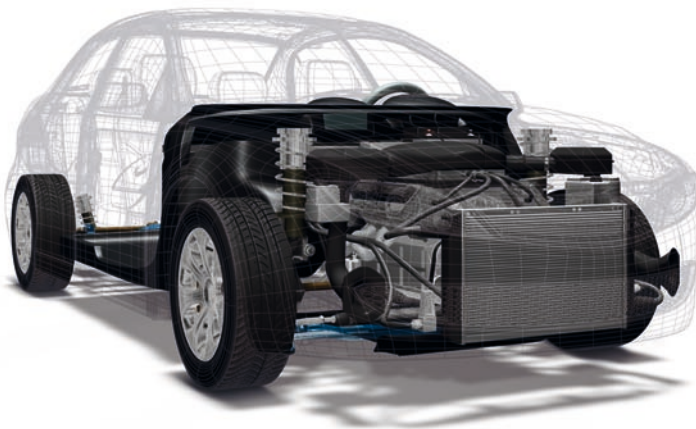
There is no other area of production in which so many different automation technologies come together as in drive train assembly. This is where Rexroth's universal drive and control solutions offer clear customer benefits.

**Technical and economic advantages: an extensive array of Drive and Control technologies from a single source.**

Precise CNC-controlled joining operations, coordinated robotic movements, exact and reliable fastening or material flow that is optimally tailored to the assembly of different variants. The wide range of tasks in the assembly of engines, gearboxes and axles is executed with a high degree of productivity, making it necessary to combine different types of control system and automation components. Rexroth supplies the entire range of drive and control

technologies from a single source. Rexroth's components and system solutions simplify the complex automation in engine, gearbox and axle assembly with an universal engineering environment and PLC.

For additional information about Rexroth's capabilities regarding components and solutions, please consult our publications describing the specific technologies and our detailed brochures for the individual automotive industry production areas, or just visit our site at: [www.boschrexroth.com/automotive](http://www.boschrexroth.com/automotive)



# Challenges for Engine, Gearbox and Axle Assembly

**Assembly operations require a new degree of flexibility and a high level of productivity. This requires customized assembly lines. Standardized systems and components significantly reduce complexity while increasing availability.**

**Openness:** Precisely at the interface of CNC, motion control, PLC and tightening controls, uniform and open interfaces considerably increase the degree of freedom and reduce engineering complexity.

**Engineering:** A uniform engineering environment and a universal runtime system for all controls reduces engineering complexity over the entire life cycle of the assembly line.

**Documentation:** To record all relevant production and quality assurance data demands intelligent actuators with open interfaces to the higher-level production software.

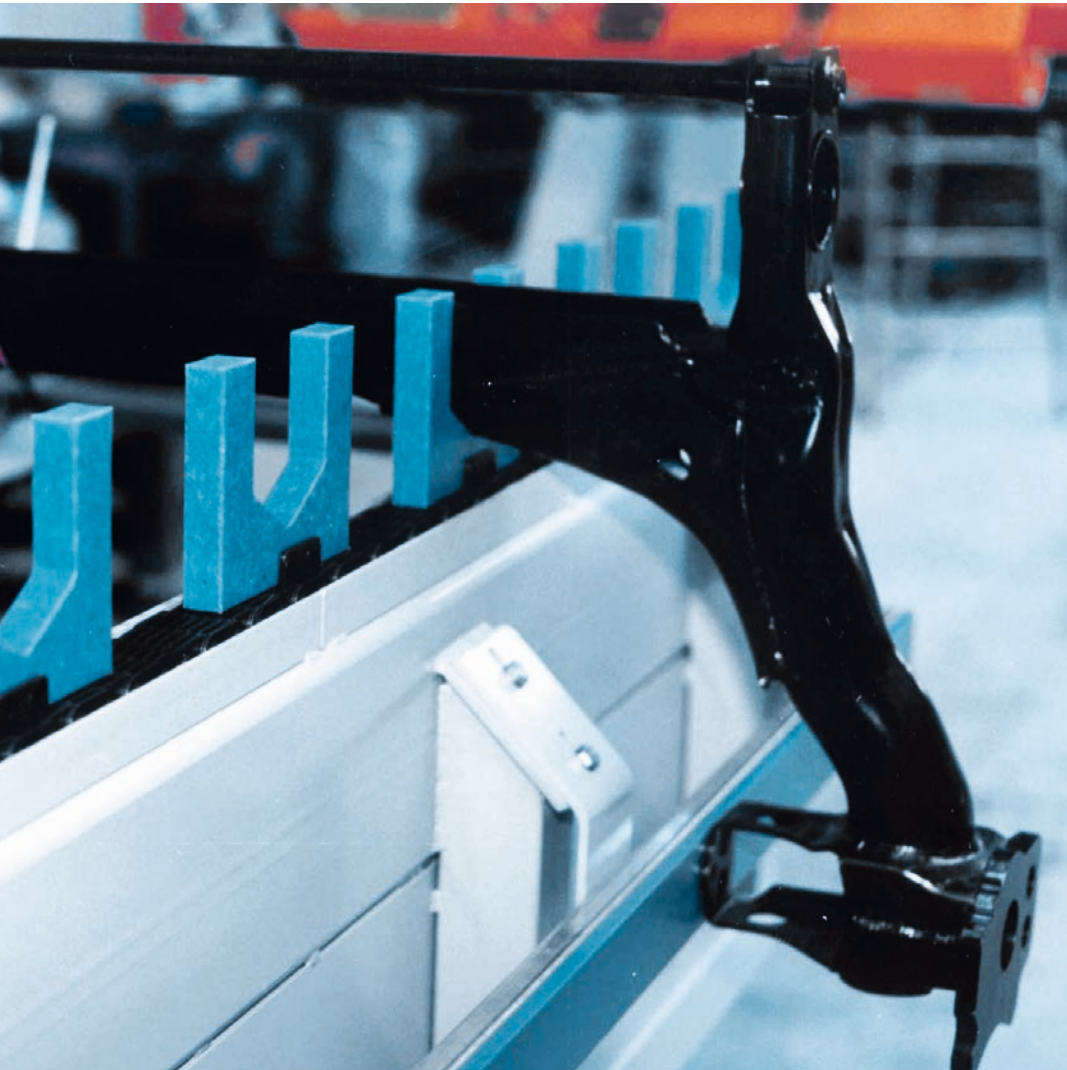
**Flexibility:** Assembling different variants using the pull principle and quickly converting the assembly line to execute different tasks are among the key challenges in engine, gearbox and axle assembly.

**Reliability:** Assembly lines can achieve close to 100 percent availability only if all components and modules afford maximum service life and reliability.



**Safety:** Protecting operators and maintenance technicians against injury is always right on top of the priority list. It is equally important to ensure that machines and systems are readily available to meet production goals.

**System solutions:** Controls and drives that are scalable in hardware and software facilitate the modularization of the assembly line, thereby increasing flexibility for the conversion to different tasks.

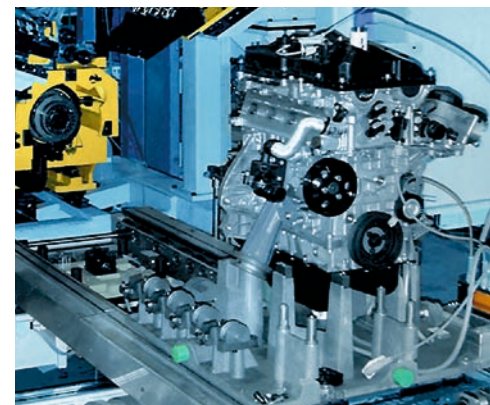


Maximum precision and flexibility in engine, gearbox and axle assembly.

**Total Cost of Ownership:** The total cost of an assembly line over the entire life cycle is made up of a great many factors, and purchase price is only one of them. Simple adjustments to new tasks, service life, maintenance costs or reusability have a great influence on the total cost of ownership.

concepts based on actual conditions enhance availability and reduce service costs while supporting optimal integration of planned maintenance into production cycles.

**Condition Monitoring:** Measuring wear and tear online makes sure, that the right part is replaced at just the right time. Maintenance





# Automation Solutions from a Single Source

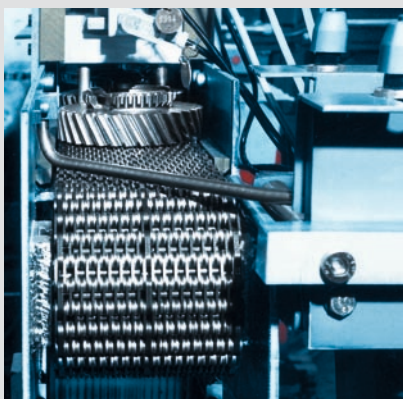
**Many automation technologies,  
one partner: Only Rexroth offers  
the combination of all control,  
tightening and material flow  
technologies with interfaces  
tailored to one another.**

Rexroth supplements the complete range of automation systems for fastening operations, material flow and handling with control solutions featuring one uniform runtime system and one universal engineering tool. This increases flexibility and productivity in engine, gearbox and axle assembly with coordinated interfaces and transparent data access.



## **Toothed chain conveyors**

Safe and reliable transport of workpieces.



## **Tightening and press-fit systems**

Modular system solutions in tightening technology reduce wiring complexity and provide maximum process reliability (see page 8/9).

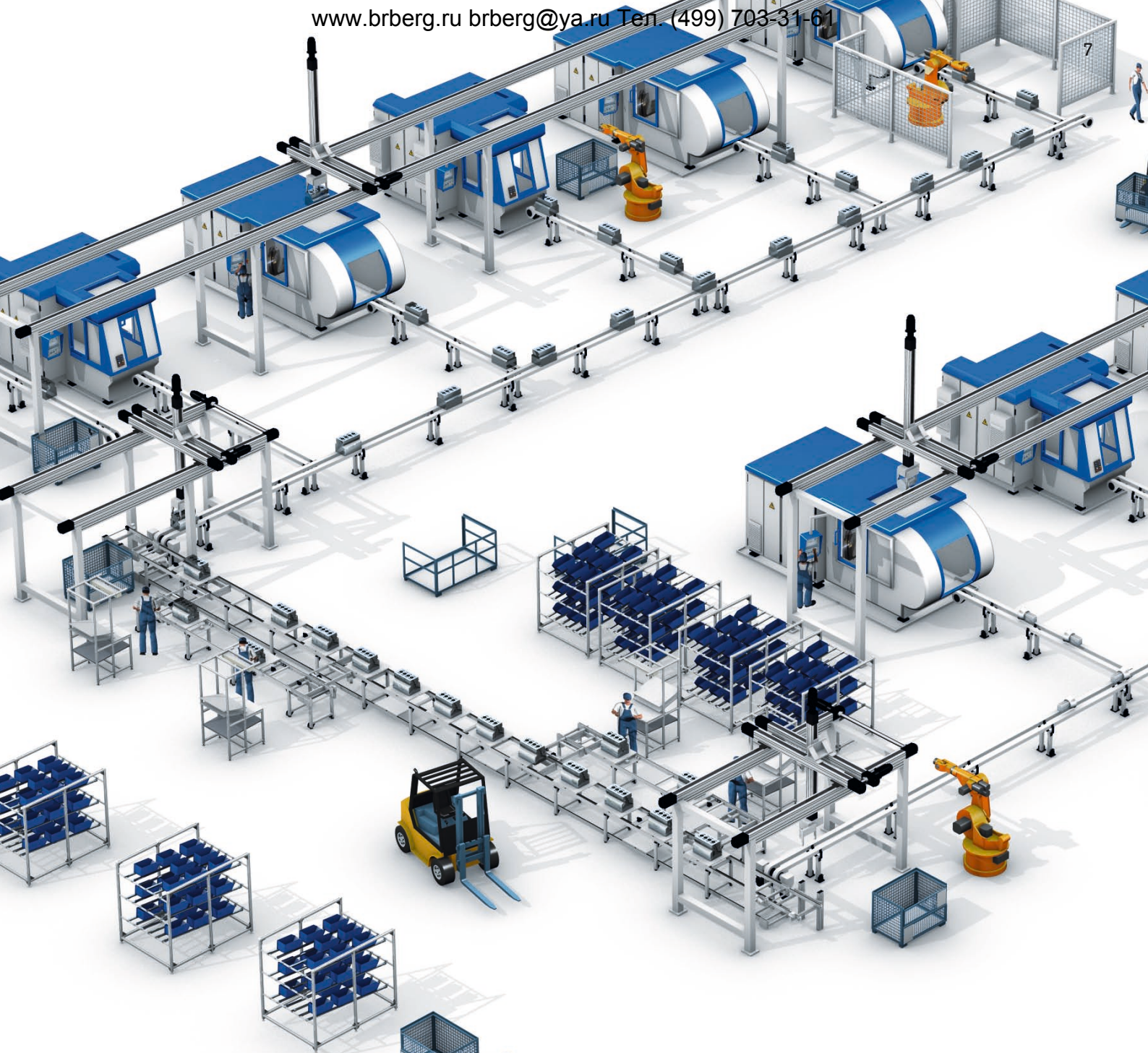


## **Controls**

CNC, motion control, PLC and robotic controls consistently use one universal runtime system and engineering tools (see page 10/11).





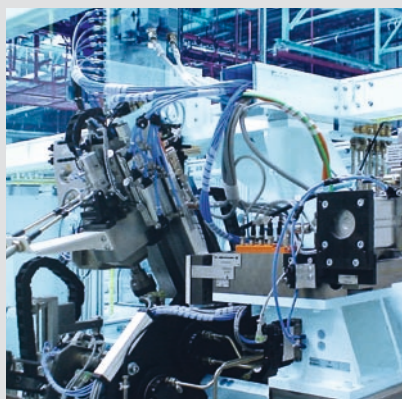
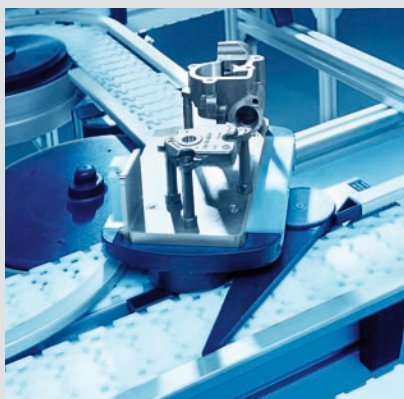


### **Assembly technologies**

A broad range of modular transfer systems guarantee an ideal flow of materials and information (see page 12/13).

### **Pneumatics**

A wide spectrum of sturdy components with intelligent linkage.





# Tightening and Press-fit Systems: Systematic Tightening

**Benefit from unrivaled experience:** Rexroth has successfully installed more than 40,000 tightening applications in automobile manufacturing plants.

Servo amplifier, control and communication unit in a compact case: The Rexroth tightening system is **modular** in its design and can service between 1 and 40 tightening channels without the need of a switch cabinet. Here, the spectrum of finely differentiated tightening spindles covers the range from 0.6 to 1,000 Nm. One single cable serving both as power supply and communications cable, with a length of up to 100 m connects the controls and tightening spindles.

The universal, digital, single-cable solution reduces wiring complexity. In addition, it guarantees interference-free data transmission regardless of the length of cable and connections, provides maximum **system security**, and ultimately increases productivity. Rexroth tightening systems communicate with the higher-level controls using common communications protocols such as Ethernet and PROFIBUS.



**High quality – high availability:** Rexroth tightening technology is tested in endurance runs with more than a million cycles under full load.

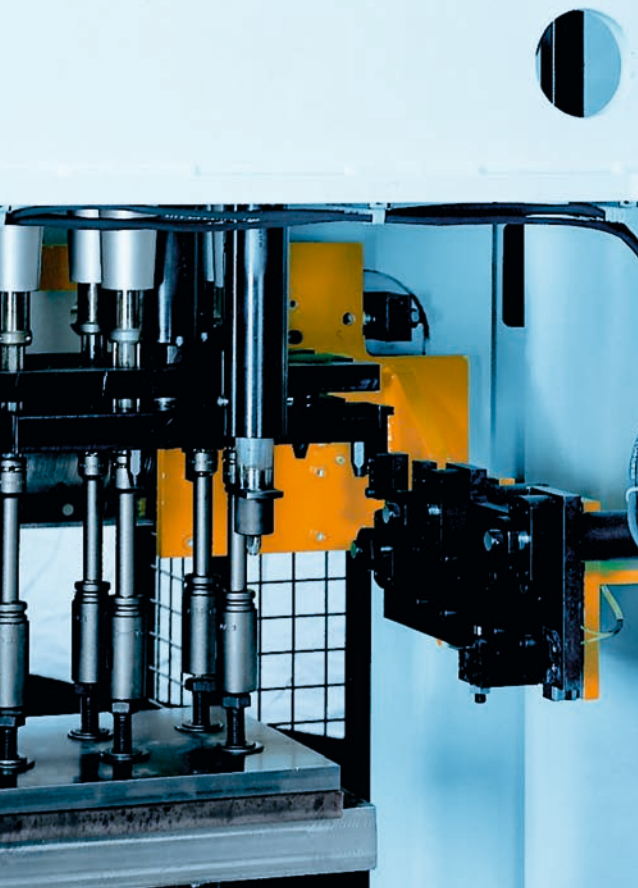






The ErgoSpin series of handheld nut runners supplement the range of stationary tightening spindles.

The control systems monitors the tightening action of all tightening spindles and ErgoSpins, performs system diagnostics and controls all individual components in a tightening channel. Plug & Run, a simple system configuration, clearly arranged control and display elements, and simple and flexible parameter settings allow intuitive operation from the controls to the tool itself. This increases **flexibility** when adapting to new tasks through fast and reliable commissioning – an important contribution to reducing the **total cost of ownership**.



Reliable Rexroth technology also guarantees perfect results for manual applications.



Customer solutions for all operations: The ergonomic design of Rexroth tightening technology provides both power and accuracy.

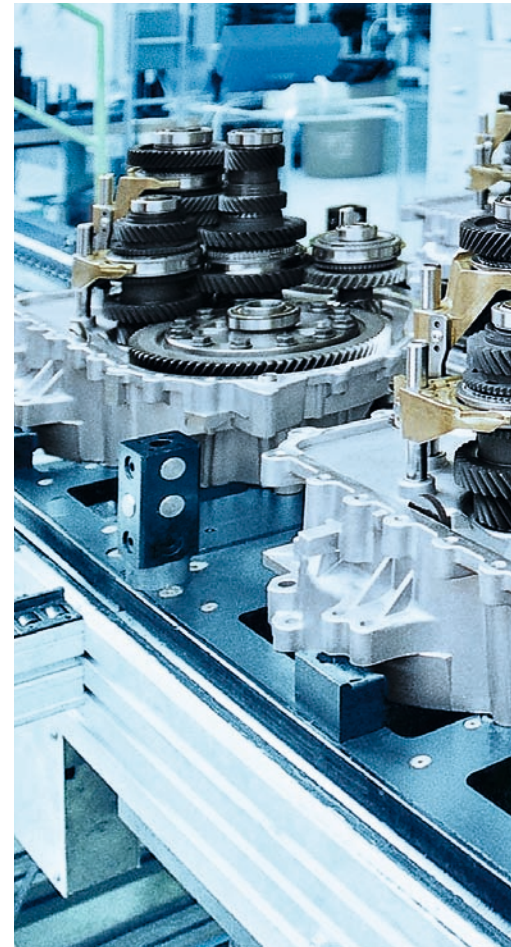
Due to their modular concept and compact construction, Rexroth tightening spindles can be used for a wide range of operations.

# Controls: One Control Family for All Tasks

Rexroth engineering tools make automation in drive train assembly simpler for all control tasks.

Within just a few years, Rexroth has renewed its entire range of controls and completely harmonized its runtime system and engineering tool in. From the CNC control with compact controller variants for high-precision handling applications to drive-based motion-logic integration, all control systems use the open runtime system according to IEC 61131-3, just like **system solutions** for coordinated point-to-point movements with up to 6 networked axes and kinematics for robot applications. Rexroth control systems cover all motion tasks within the assembly line with just one single runtime system.

The uniform engineering suite for control systems and intelligent actuators simplifies commissioning and conversion. This also includes an automatic diagnostic system for complex, PLC-controlled main production and assembly lines.

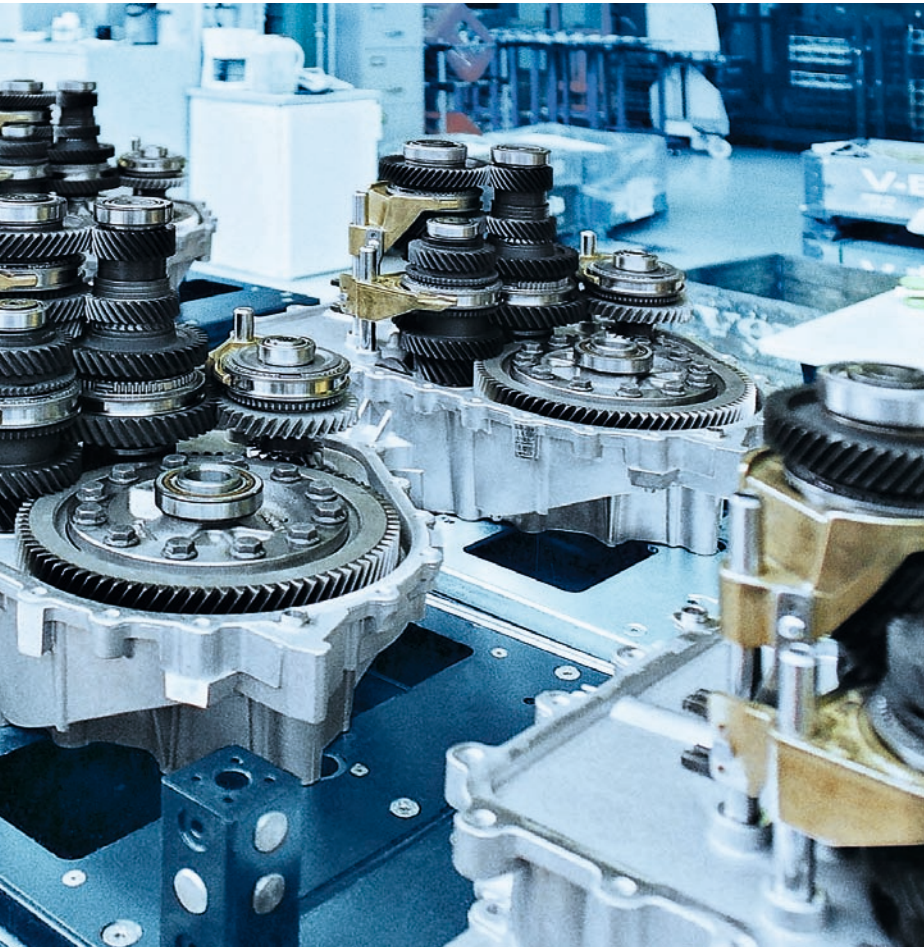


The tools and PLC libraries analyze process sequences and logic for errors as the basis for generating automated diagnostic reports. There is no need for programmers to produce their own diagnostic logic or HMI user screens onsite. Instead, they receive direct support from a configurator during generation of the PLC program.

All control variants use a uniform PLC runtime system.







Transmission assembly at Ford,  
Cologne

This guarantees a reliable, fast and uniform **fault diagnosis**, even in a heterogeneous machine environment, and increases assembly line productivity.

The control systems feature network capability and communicate using all standard field buses and Ethernet. All control systems

support the SERCOS III open universal bus, which connects proven real-time mechanisms with Ethernet physics. With SERCOS Safety and decentralized safety functions certified according to EN 954, Category 3, the drive and control solutions guarantee maximum **safety** for operators and maintenance technicians.



**Reduced complexity:** The uniform engineering suite for all controls and drive systems.

# Assembly technology and Pneumatic Systems: Economical and Intelligent

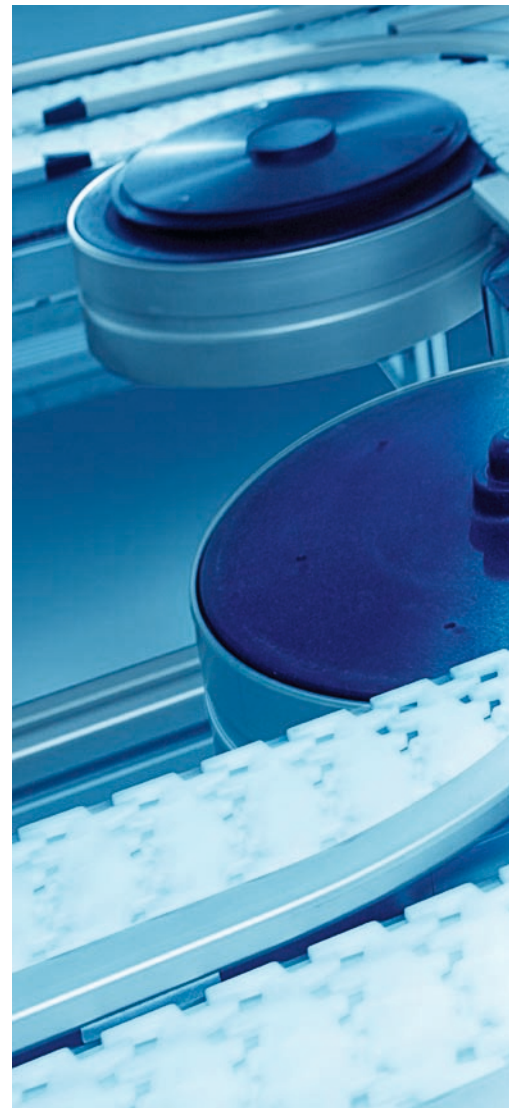
**Smooth-flowing, flexible work processes coupled with top efficiency and quality – these are the production and assembly requirements that can be met using high levels of automation. Modular pneumatic systems offer extraordinary flexibility for these situations.**

Production lines generally involve applying tension to or moving pneumatic components, handling tools and accessories, or providing assistance with test procedures. Countless joining and bolting operations are carried out pneumatically. The modular design of all components offers a maximum amount of flexibility. Replacements, additions or conversions can be carried out in a matter of seconds.

Production machines are connected in series. The connecting transfer systems are the nerve tracts for the assembly of engines, transmissions and axles. They reliably transport both very small components and heavy assemblies. Modules that are perfectly adapted to one another ensure a smooth flow of materials and information. This is why Rexroth combines mechanical and pneumatic components with controls and identification systems.

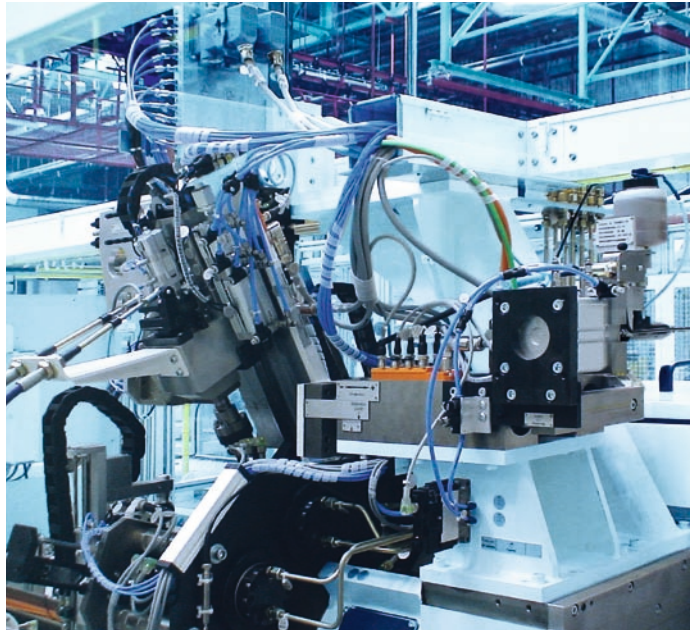
In addition, Rexroth uses this principle in the handling systems module, and unites linear motion technology, electric drive systems and pneumatics with innovative connection technology. This module capability considerably reduces assembly times and opens up new dimensions in reusability for all elements.

**Comprehensive modular construction system for assembly technology.**





For the integration of centralized and decentralized radio frequency identification (RFID) systems, Rexroth has developed identifying solutions that are scalable in function and performance. They fit different conveyor systems with standard mounting kits. Connection to high-order control and planning systems is realized via **open interfaces** to all standard field buses.



Test bench for 6-speed transmission at Opel, Aspen



In this way, Rexroth synchronizes physical transportation in drive train assembly with the flow of information and thus provides for **documented productivity**.

In addition, the basic mechanical elements supplement the product portfolio with a comprehensive aluminum profile system and EcoSafe protective fencing.

The VarioFlow chain conveyor system in a production line for oil pumps.

## As Global as the Automotive Industry

**Wherever vehicles are built or outsourced components are manufactured: Rexroth is always on-site to offer comprehensive support.**

Rexroth has a long history of cooperation with automakers across all continents. Whether they are automotive manufacturers or their top suppliers, Best-In-Class products and system solutions from Rexroth demonstrate reliability and productivity in hundreds of plants.

Regardless where the automotive industry establishes its new production plants, Rexroth is already there. Rexroth's large group of knowledgeable engineering, sales and service professionals have an increasing presence in over 80 countries. Bosch Rexroth AG focuses the application expertise garnered from its global activities on each individual site, anywhere in the world, and combines it with local competence. Project planning, commissioning, training and service: We always speak your language.





## Many Tasks – One Contact

**Faster and easier: This applies to automation and in daily collaboration. Rexroth's Global Account Management coordinates the entire array of joint activities for automotive manufacturers and their top suppliers.**



■ Automotive plants

■ Rexroth sites

Doing business with Rexroth is simple, even if the tasks are complex. Regardless of the continent or technology, Global Account Management in its role as the central partner and consultant consistently brings the best professionals to one table for a fast and reliable response to the challenges that arise.

Rexroth relies on uniform processes and standards – reflecting the practices of the global automotive industry. International cooperation with a single automation partner offers another advantage: It simplifies the global implementation of defined specifications for vehicle manufacturers to actively foster standardization.

### **Lifelong Partnership – Customized Service**

This reliability applies to the entire product and service life cycle. The comprehensive service network

reliably ensures rapid response. At Rexroth, our service concept extends well beyond supplying replacement parts and setting up on-site consignment depots. Rexroth Service personnel work on-site at the client's plant in close cooperation with the end-user. Condition monitoring and remote maintenance concepts combine with an innovative service package for all Drive and Control technologies to enhance equipment availability and improve the planning of maintenance cycles. From project-planning stage and operation all the way to retrofitting, Rexroth accompanies the automotive industry user through the entire life cycle of the automation system – in what is, in reality, a lifelong partnership.

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