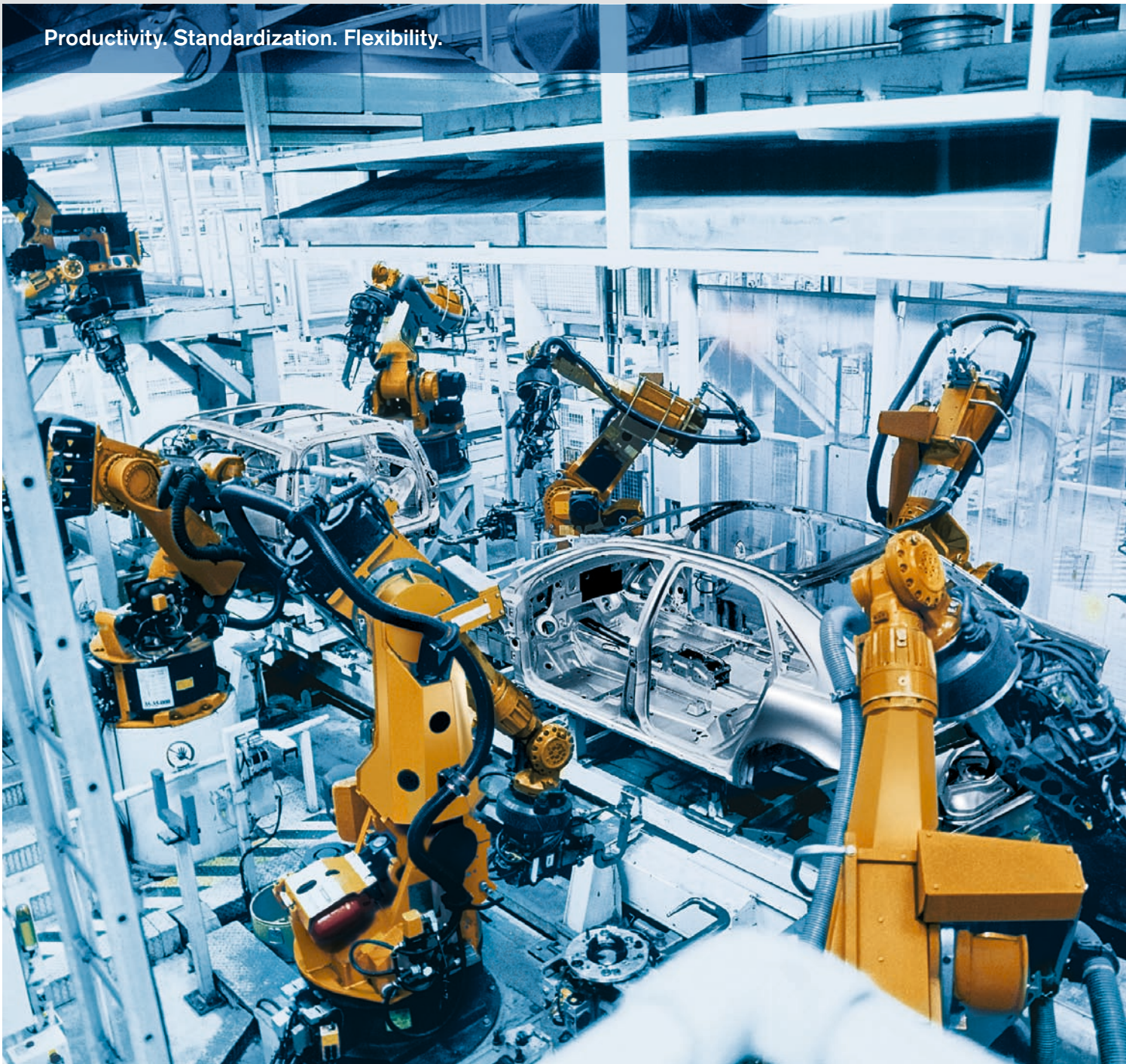


Rexroth – Your Automation Partner for Body Shop

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.

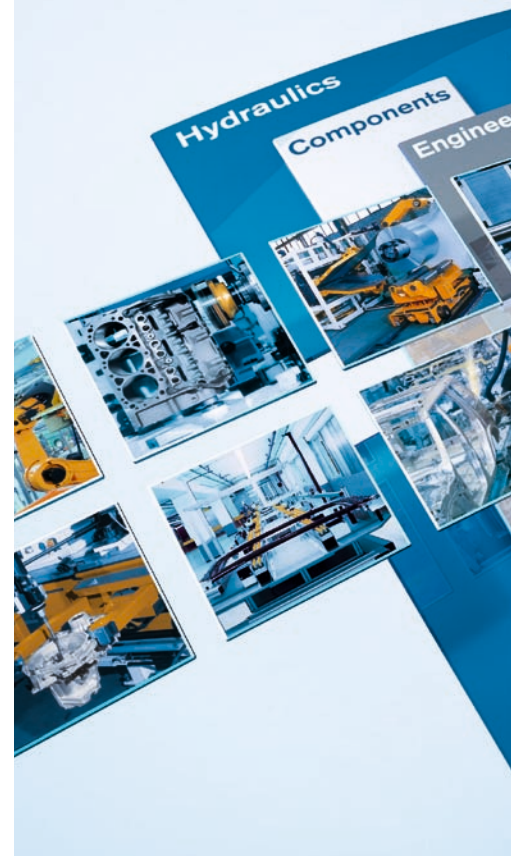
Rexroth supports automotive manufacturers around the world by supplying innovative components, modules, and systems and services designed to enhance production efficiency. Rexroth products always incorporate state-of-the-art technology that consistently adheres to international standards in the hardware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





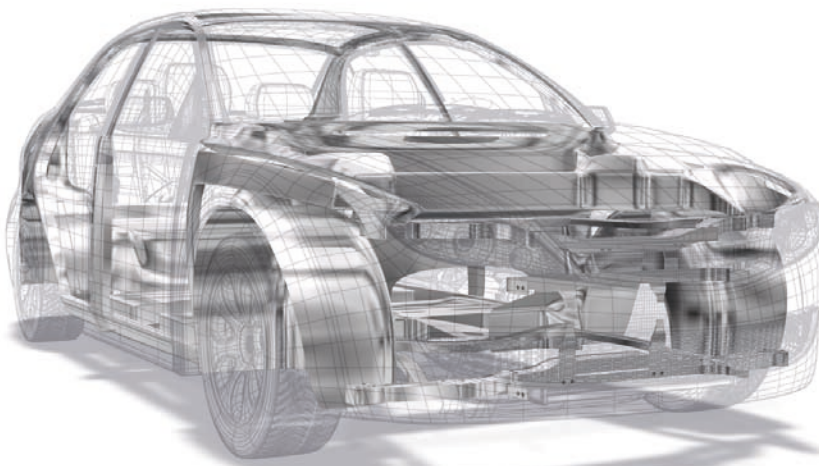
Technical and economic advantages: an extensive array of Drive and Control technologies from a single source.

Production Areas – Body Shop

Whether production facilities for floorpans, engine compartments or sidewalls, roof automation, door lines, assembly sectors or finishing areas: body shop demands particularly high requirements from automation.

The automation employed in the body shop must accommodate flexible production while employing simple engineering methods that save both time and effort. Electric and pneumatic actuators must reliably move powerfully in harsh operating environments. Special emphasis is given on welding as well as press-automation and metal forming as they have to validate, fully document, and secure the steps of the process beyond the basic task.

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**



Challenges for Body Shop

In body shop, sturdy components and flexible automation concepts define productivity. Automated welding equipment must be capable of coping with the most varied material combinations. In addition, threading technology must consistently comply with increasingly stringent safety requirements.

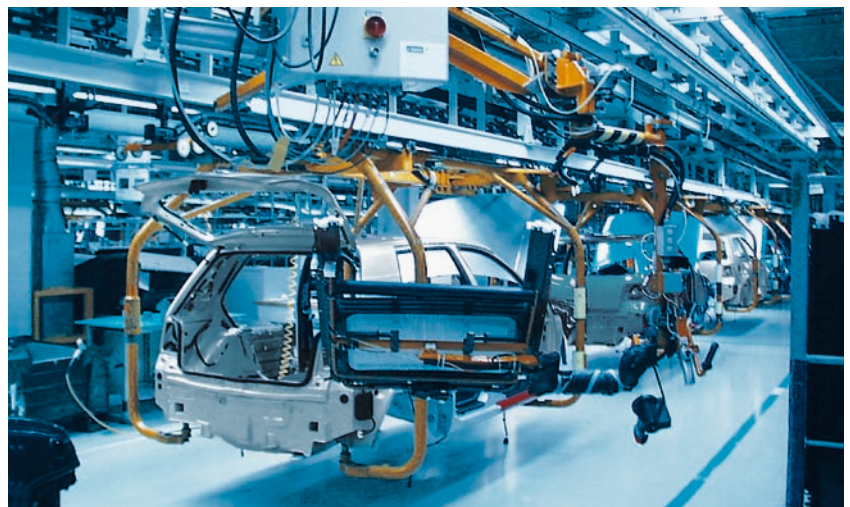
Engineering: Intelligently designed, standardized software solutions reduce engineering effort, even in complex automation projects. Easy reuse of written program parts, entire PLC programs and data – even at various automation levels – reduce both effort and error sources.

Standardization: In body shop, increasingly frequent model changes combine with modified process sequences to produce extreme demands for components suitable for repeat application. Scalable standard components with open interfaces, a custom automation concept specially conceived for modular assembly structures, and an object-oriented engineering environment simplify the revision process when adapting to new assignments.

Flexibility: A prominent feature of body shop are the highly complex assembly structures that stem

from a production flow embracing various models, factors that place maximum demands on the automation. Simplified programming and object-oriented data structures are decisive when it comes to fast implementation of changes.

Flexible automation solutions for a wide variety of versions.





Body shop makes maximum quality demands on automation technology.

Material flow: The punctual and careful availability of components of the most varied dimensions, geometries and weights demand precise scalability in electric and pneumatic actuators.

Production environment: The new environment demands sturdy components that also resist sparks and welding slag.

Availability: Apart from high-quality components, automatic diagnostic systems that assist machine operators in localizing errors within complex systems are essential elements in ensuring that production facilities remain consistently available.

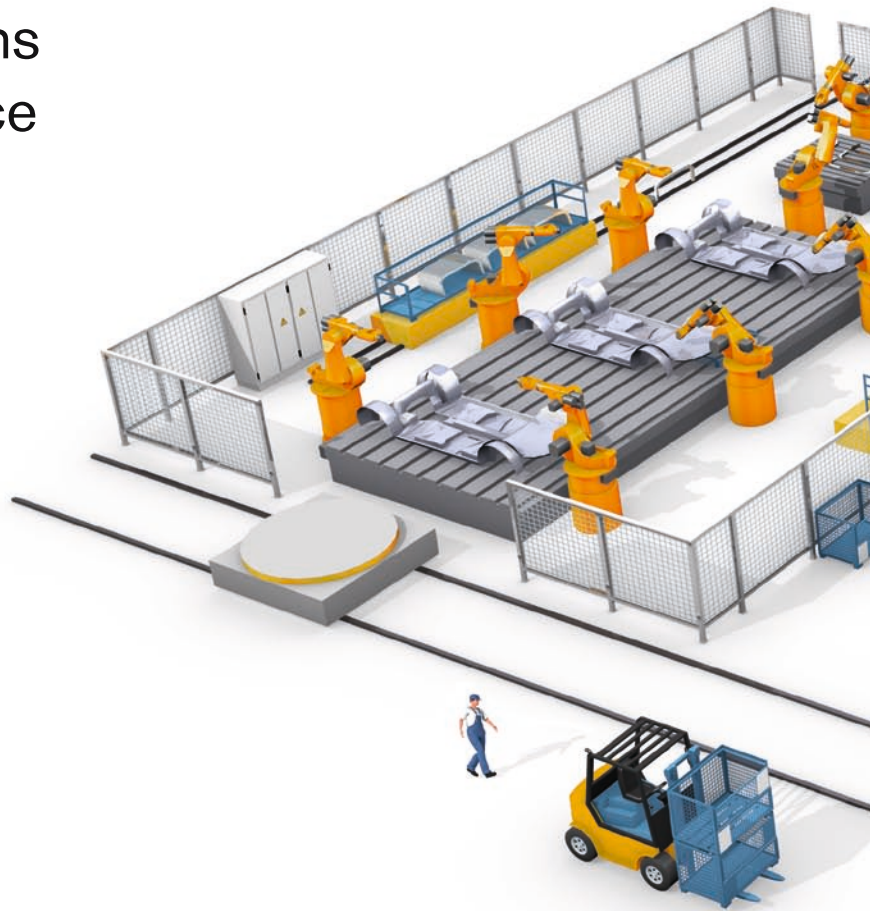
Materials: The ever more stringent safety requirements have increased

the use of high-strength steels and innovative alloys for safety-relevant components. For weight reduction, many manufacturers also employ aluminum components. This mix of materials demands the highest flexibility and process safety in resistance welding.

Automation Solutions from a Single Source

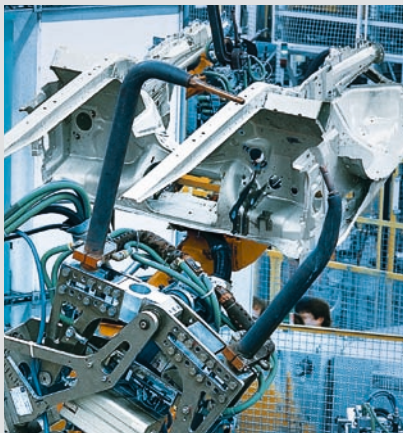
Rexroth offers a comprehensive range of automation concepts for body shop.

Rexroth supplements its broad spectrum of pneumatic components, intelligent electric drives and modular, standardized PLC systems with innovative system solutions for resistance welding, along with press automation and metal forming – all from a single source. Numerous other components, from linear motion and assembly technology to safety rails complete the product range.



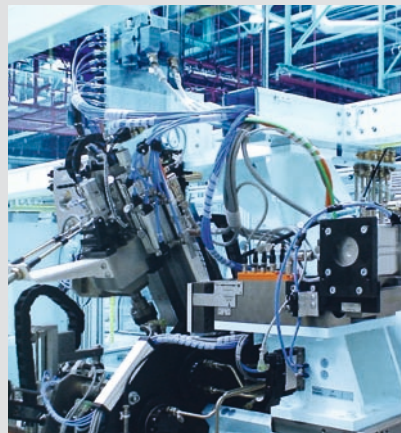
Welding

Absolute process security, even with the most varied combinations of materials (page 8/9).



Pneumatics

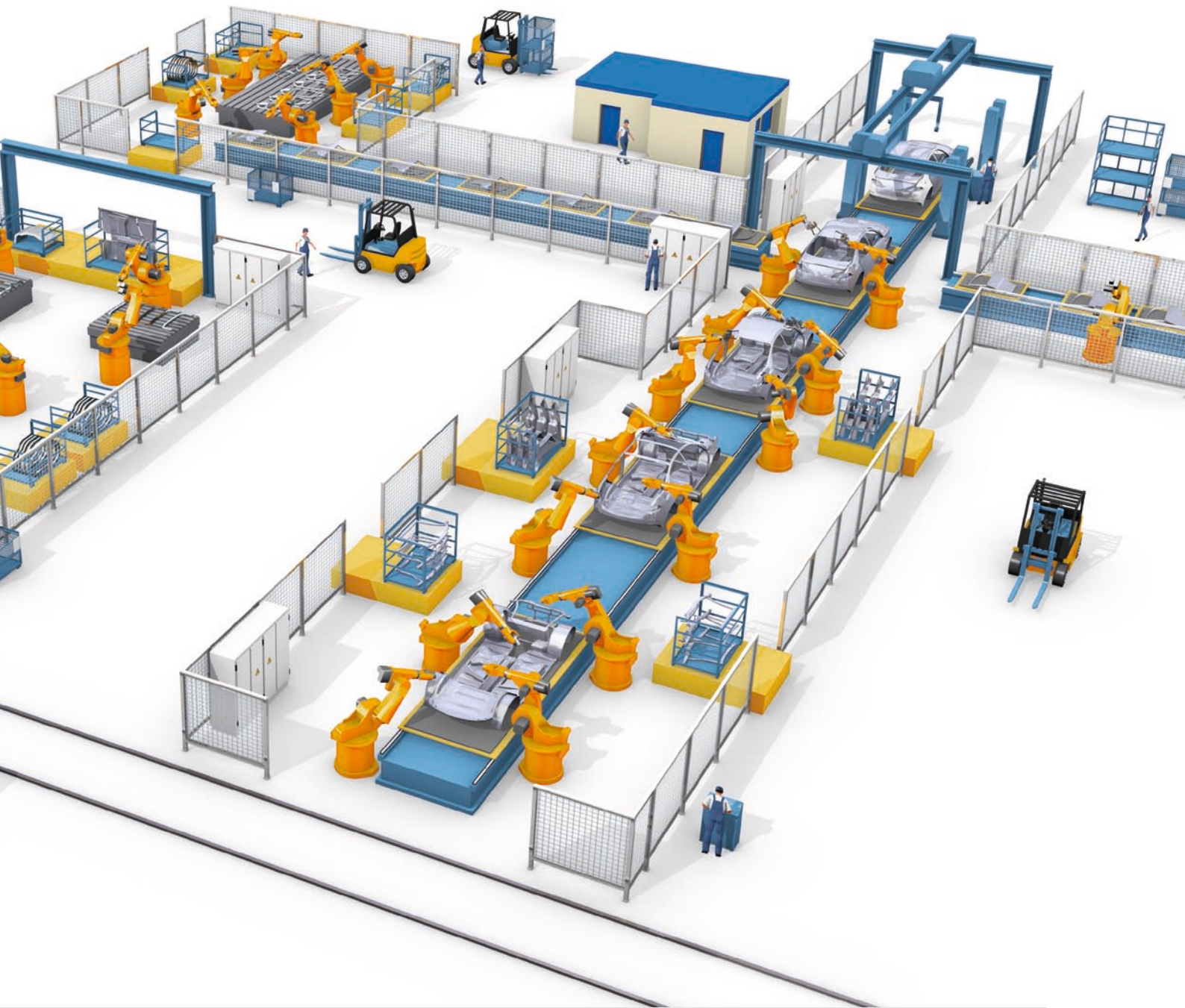
A broad spectrum of sturdy components with intelligent linkage (page 10/11).



Automation

Modular and standardized PLC system solutions with open interfaces designed for universal applicability (page 12/13).





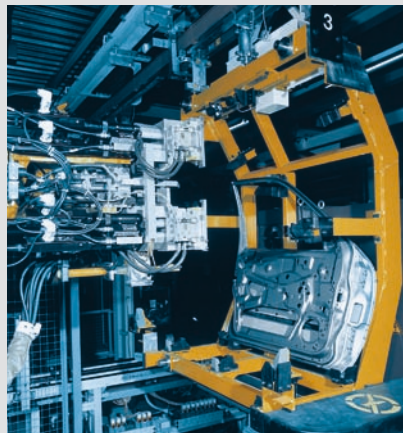
Transfer

Rexroth's components and systems combine material and information flows into a single entity.



Tightening

One system solution for stationary tightening spindles and handheld nutrunners simplifies standardization.



Safety

Always first: From the safety rail to the decentralized safety functions in the drive system.



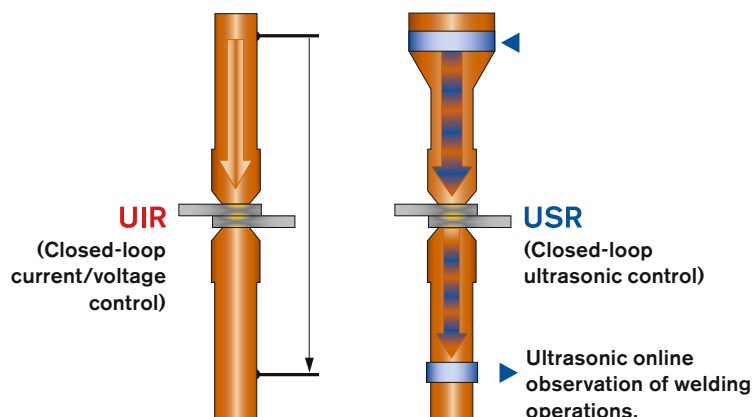
Resistance Welding: Process Security Online

Increasingly stringent safety requirements and the imperative to reduce weight are accelerating application of new materials in body shop. Flexible concepts for spot welding featuring absolute process security are vital in working with these materials.

Whether spot, projection or roll-seam welding, high-strength plates, aluminum or triple-sheet welds: Modular Rexroth resistance welding systems rely on adaptive closed-loop control procedures to provide absolute process security along with high flexibility. The ultrasonic measurement technology integrated within the process guarantees a system solution offering 100 % inspection and documentation of spot welds.

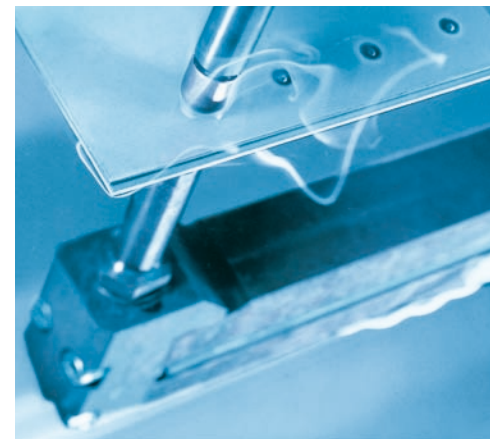
The measuring process monitors the quality of spot welds even as they are being applied. The system controls online the volume of the molten material and immediately displays the result. In this process, the system relies on adaptive current/voltage control, complete with a monitoring function to support flexible adjustments, to adapt to a huge array of differ-

ent material combinations. Even while the process is still in progress, this innovative combination of current/voltage control with ultrasonic testing provides data on all process-critical parameters, offering a detailed insight into the molten casting process of the welding points.



Rexroth's worldwide tried and tested resistance welding controls offer standard functions such as closed-loop constant current control, closed-loop pressure control and a welding rod maintenance concept featuring electrode grinding. For one mechanically identical assembly, users can choose

between alternating current and medium-frequency inverters. To control welding guns, Rexroth has developed both servo-pneumatic and servo-electric drive systems in the same size. The deciding factor is the job!



Ensured weld quality:
Adaptive closed-loop control systems effectively process highly-variegated material combinations.

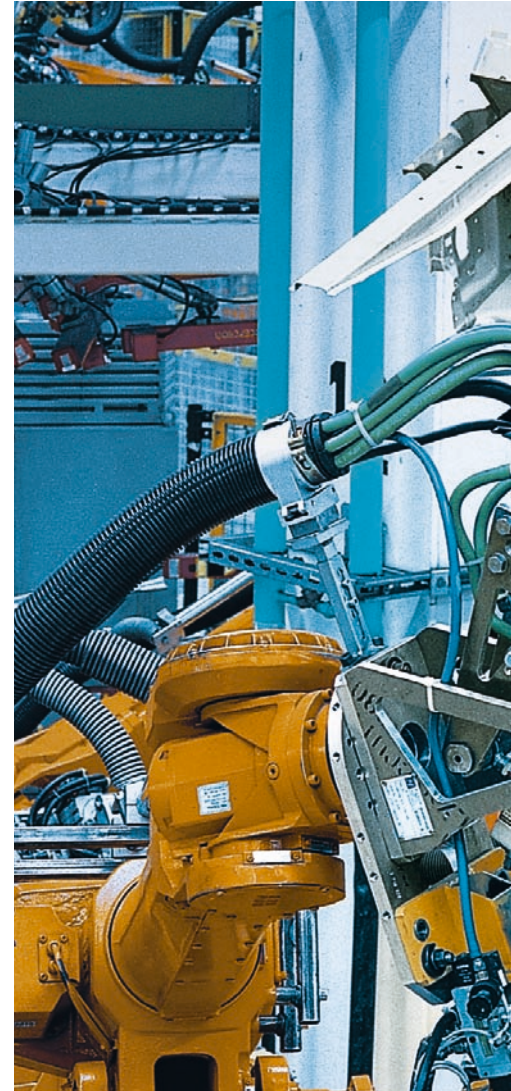
Pneumatics: Sturdy, Fast, Light

Materials handling, plate clamping and retaining, precise control of welding guns. Sturdy pneumatic drive technology has proven ideal for numerous body shop operations.

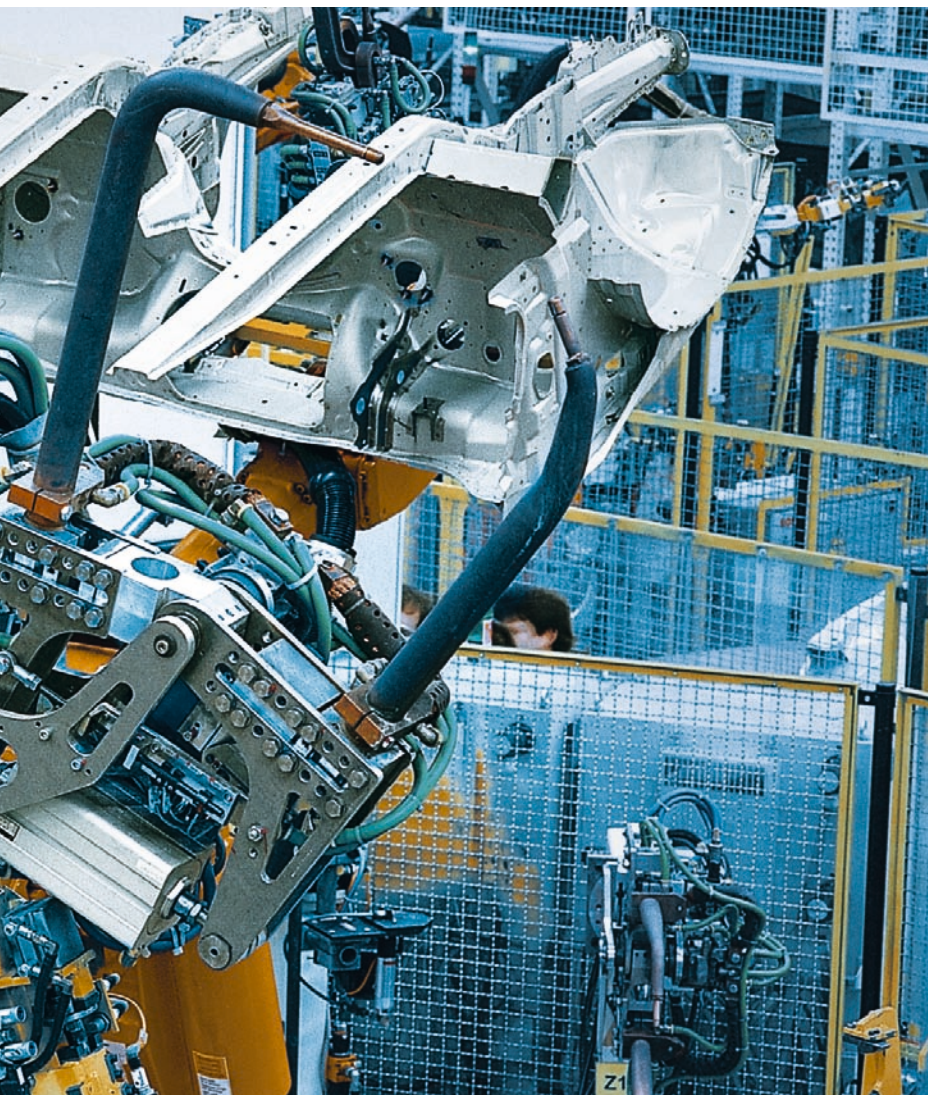
Compact and light-weight, yet powerful and sturdy. Impervious to electromagnetic fields, but linked to the automation system via field bus. Pneumatic systems satisfy these seemingly contradictory requirements by delivering reliable, perfect performance in numerous motion-control tasks within the body shop.

This low-maintenance drive technology is suitable for a wide range of applications. No matter whether it is the gripping function on a robot's arms, or the clamping function in a manual welding station, it furnishes precisely the right amount of force, from a light and compact package. The Rexroth product portfolio embraces a wide spectrum of pneumatic components, custom-made for the unique conditions encountered in body shop.

Robust, compact and intelligent: Rexroth pneumatic equipment satisfies an extensive range of demands.



Fast yet gentle transport of materials.



Free choice: servo-pneumatically or servo-electrically driven welding guns.



Light-weight pneumatic grips for robotic arms.

The product range encompasses an extensive selection of ISO and centering cylinders all the way to intelligent valves with field bus connections for INTERBUS-S, PROFIBUS and ProfiNet.

The compact valve supports, equipped with merely 16-mm wide

valves, save valuable space in the switch cabinet. Despite their modest dimensions, these pneumatics solutions offer generous flow volumes to furnish the force required for body shop operations.

Above all, Rexroth's pneumatic components satisfy a major

requirement for body shop use: they are superbly suited to the new production requirements. Neither sparks, beads of molten metal nor electromagnetic radiation interfere with their function.

High performance and flexibility, yet easy to program and use: Nowhere is the ability to implement new processes with speed and flexibility more important than in body shop.

Drive-based control systems for single and multiple axes join the controllers and PC-based open-loop control systems from Rexroth in relying on a universal PLC run-time system as defined in IEC 61131-3. This concept allows unlimited exchanges of programs and program components among the various control systems to enhance flexibility and avoid extra work from duplicated effort.

A vertical collage of three images showing industrial robotic arms in a factory setting. The top image shows a large orange robotic arm reaching over a car chassis. The middle image shows a blue robotic arm working on a car chassis, with a safety sign visible in the background. The bottom image shows a close-up of a car chassis being worked on by a robotic arm.

Systems and Solutions

Engineering

IndraWorks

Motion and Logic

IndraMotion

IndraLogic

MLD **MLC** **MLP** **MTX**

Drive-based Motor-Logic Controller-based Motor-Logic PC-based Motor-Logic CNC

Controller-based PLC PC-based PLC

Common IEC 61131-3 PLC platform

Controls and HMI

IndraControl

Drives and Motors

IndraDrive
IndraDyn

WFD **WPC** **WDC** **WTK** **WTC**

IndraWorks

ations in PLCopen motion function blocks. Regardless of whether the task requires pick-and-place with up to six coordinated axes or point-to-point motion: PLC ensures rapid execution of every automation operation in body shop. The control systems feature network capability with all standard field buses. Decentralized and modularized automation concepts in-

Easy to use:
Automation solutions
from Rexroth.



crease the need for mutual exchanges of data and signals between individual control units. High-performance Ethernet interfaces facilitate rapid transmission of status and lock actuation signals between these control units.

Rexroth relies on an automatic diagnosis system to simplify engineering and control of main

production and assembly lines, including highly complex assemblies with PLC control. The tools and PLC libraries integrated within the Rexroth framework 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 on-site.

Instead, they receive direct support from a configurator during generation of the PLC program. This guarantees reliable, rapid and uniform error diagnosis, even in a heterogeneous machine environment.

Intelligent Rexroth drives are the basis. They offer up to one hundred intelligent technological functions to decouple performance from functionality, thus allowing the user to choose between open-loop and closed-loop operation throughout a performance spectrum extending from 1.5 kW to 160 kW. Numerous safety functions, certified in accordance with EN 954-1, ensure optimal security levels for users and maintenance personnel along with minimal response times – and without supplementary hardware.

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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