

Plastic Electronics – Precise and productive automation solutions



Plastic Electronics – Flexible electronics "off the roll"

Today's electronics industry faces constant challenges as resource and energy costs rise. To combat this you need to develop processes and products faster and achieve higher levels of process stability. The automation solutions from Rexroth can give you the competitive edge you need.

Saving energy and resources and reducing costs

Plastic Electronics "off the roll" describes the production of foldable or organic displays, roll-up tablet PCs, and organic solar cells on flexible base materials as well as printed RFID chips. The products are printed like newspapers in a manner that is environmentally friendly, conserves resources, streamlines costs, and is compatible with volume-based production techniques. This technology extends from the laboratory to the factory and opens up an entirely new world of product possibilities.

Key industry know-how

Bosch Rexroth has always been quick to discover and promote future technologies and developments. The solar industry is just one example of this and provides a solid basis for evolving Plastic Electronics. Accomplishing the new tasks in this area requires solid know-how in two sectors of industry: printing and electronics. Bosch Rexroth has acquired many years of valuable experience in both application environments and is familiar with the coating processes in the electronics industry and the traditional production processes used by the printing industry.

The best from both worlds

Profit from our know-how! Bosch Rexroth can introduce you to a wide variety of automation technologies for the roll-to-roll process based on its targeted, comprehensive know-how. A specialist in drive and control technologies,

we offer highly precise and productive production methods for the modern electronics industry.

Roll-to-roll process

Using roll-to-roll technology facilitates the continuous, rapid coating of flexible substrates with ultra-thin coating layers. Using organic materials could thus dramatically reduce the costs associated with RFID labels.



Core applications for Plastic Electronics



Bosch Rexroth – Industry experience and expertise

- ▶ Well-founded industry know-how in the printing and electronics industries
- ▶ The specialist in all drive and control technologies
- ▶ Global presence

Numerous innovations, including:

- ▶ **Open core engineering:** The new flexibility in software engineering allows PLC and IT automation to come together by accessing control and drive functions.
- ▶ **MultiWeb tension control:** For different web tensioning areas in the plant.
- ▶ **Web buffer:** Brief stopping of a web section for carrying out inspection work, for example. Stopping the web transport process throughout the entire plant is not necessary, and productivity is improved by dramatically reducing cycle time.
- ▶ **Inline laser machining:** Controller-based control systems from Rexroth make laser machining possible during continuous web transport. This eliminates the need to stop the web transport process in the machine.

Successful partnerships with Bosch Rexroth

- ▶ **Organic coating:** Rexroth offers the world's largest automation spectrum for semiconductor production and the electronics industry.
- ▶ **Printing industry:** Rexroth has been an automation specialist in all printing processes for over 20 years.
- ▶ **Research and development:** Rexroth plays a key collaborative role in research projects such as Solience (organic photovoltaics).
- ▶ **Industry standards:** Rexroth is actively involved in standardization committees such as the VDMA OCE committee.

Automation solutions for applications and subprocesses

Rexroth has the right solution for the roll-to-roll, roll-to-sheet, and sheet-to-sheet automation processes. You are provided with systems or components specially coordinated for and harmonized with your application – from the control system, drive control units, and motors through to predefined technology functions for easy engineering.

Technology functions from Rexroth – Meeting complex requirements with ease

Technology functions and function libraries in conjunction with the Rexroth IndraMotion MLC control platform streamline your engineering activities.

- ▶ Function libraries and pre-defined technology functions make easy work of complex processes
- ▶ Efficient modifications for new machine modules and system designs

Web buffer for vision control applications

- ▶ Brief stopping of a web section for carrying out inspection work, for example
- ▶ Continuous web transport in the plant
- ▶ Better productivity thanks to reduced cycle times

Registration

High-dynamic servo-drives and compact linear motion technology minimize feed times during format changes. Stepless electronic transmissions also make format changes without delay.

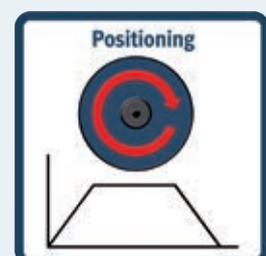
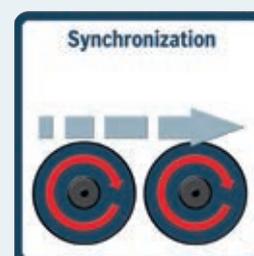
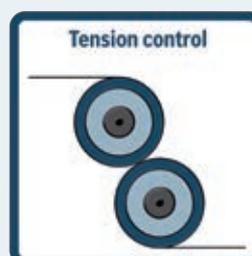
- ▶ Improved accuracy using the same mechanicals thanks to perfect control algorithms
- ▶ Higher production speed while maintaining the same defined level of printing quality
- ▶ Increased machine outputs of up to 1,200 m/min.

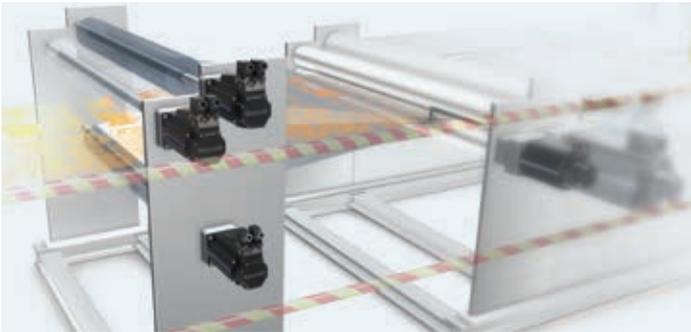
MultiWeb tension control

Modern roll-to-roll machines require different web tension zones to ensure a stable, reliable process. MultiWeb tension control uses a "decoupling" technique to facilitate multiple tension zones in a machine.

- ▶ Fewer web tension changes for sensitive materials
- ▶ Less time required to operate the machine

Predefined technology functions assist you in realizing comprehensive, demanding applications.





▲ **Lamination process – Decentralized drive system technology considerably reduces wiring costs**

▼ **Laser process – High-performance control technology improves accuracy while maintaining high throughput**



Components and systems from Rexroth – Integrating complex processes more easily

Lamination process

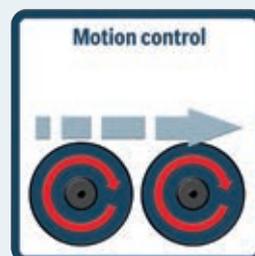
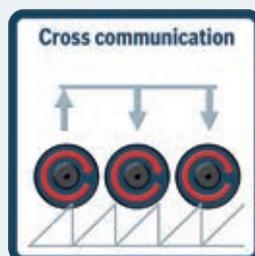
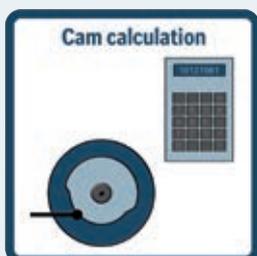
The process of joining multiple film-like layers with a base material requires exact web tensioning across a large area while maintaining a high web speed.

- ▶ Open system architecture for easy integration of third-party components
- ▶ Minimal waste
- ▶ Compact control cabinet building to reduce the installation surface of the machine

Laser process

High-performance, controller-based control systems from Rexroth make laser machining possible during continuous web transport.

- ▶ Continuous web transport in the machine
- ▶ Higher productivity of machine via faster cycle times
- ▶ Lower costs and no control cabinet required, since an additional control system is not needed



Linear Motion System from Rexroth – Particulate-free transport in a vacuum

Coating at the highest possible level

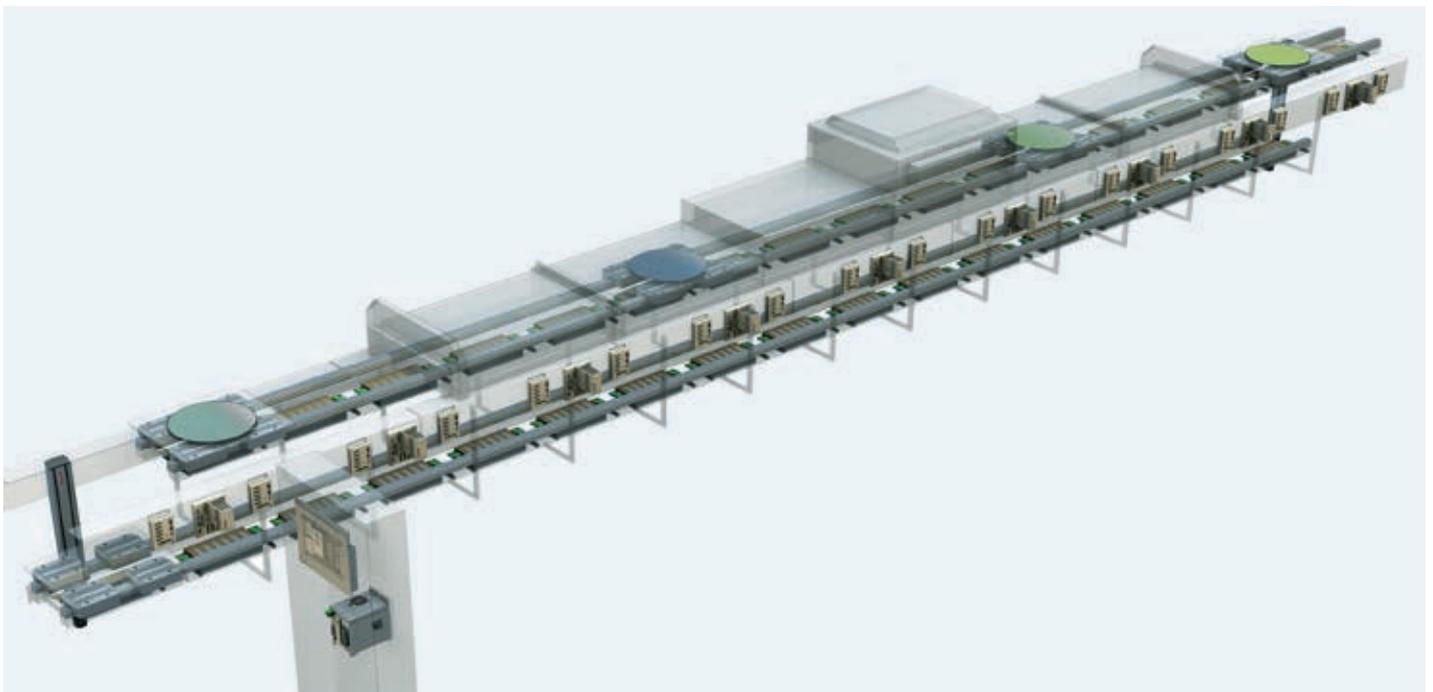
Ensuring particulate-free substrate transport is absolutely essential for demanding coating processes, especially when they involve OLED lighting applications. To this end, Rexroth offers the flexible Linear Motion System (LMS) for linear travel motions, which can be used under high vacuum conditions. It does not give off or discharge any foreign particles, thereby improving the quality of coating processes.

Coils mounted outside the chamber provide drive power for magnetic carriers. There is no need for seals, and availability increases because all of the electrical components are mounted outside the chamber. The technology is suited for virtually all load factors, precision levels and motion profiles. The system offers great flexibility. You can even move individual carriers forwards and backwards at different speeds.



- ▼ **Coating processes:
Particulate-free transport in vacuum atmosphere with Linear Motion System (LMS)**
- ◀ **NYCe 4000 from Rexroth: Motion control for LMS applications**

- ▶ Transport under demanding conditions (e.g. vacuum and high temperatures)
- ▶ No moving cables
- ▶ Improved availability thanks to wear-free electrics external to the process area
- ▶ Multi-carriers with different speeds
- ▶ Practically maintenance-free



References

Profit from our know-how! Recognized machine manufacturers trust in the many years of industry know-how and automation solutions synonymous with the Rexroth name. Rexroth is also regarded as an innovation driver in Plastic Electronics due to its close collaboration and involvement in research projects.



PolyIC GmbH & Co. KG

PolyIC develops and markets products based on the printed electronics platform technology. PolyIC uses this technology to offer “touch sensors and passive devices” as well as “printed electronics products and displays”.

The collaborative venture between PolyIC and Rexroth started several years ago. Each company complements the technical expertise of the other, whereby PolyIC is a leading manufacturer of printed electronics. Rexroth, on the other hand, provides the system portfolio for automating highly exact web processes. The PolyIC-Rexroth venture thus exemplifies the level of collaboration that can be achieved when two such manufacturers come together.

www.polyic.com



Heliatek GmbH

Heliatek is the world's technology leader when it comes to organic photovoltaic systems that utilize small molecules. The thin, light, and optionally transparent solar foils are well suited to a wide variety of applications thanks to their unique properties.

Automation solutions from Rexroth assist Heliatek in production; proven drives and controls ensure exacting web tension along the 500-meter long foil while safeguarding a high level of machine availability.

www.heliatek.com

Industry-specific portfolio for Plastic Electronics

The cross-technology know-how of Rexroth forms the basis for innovative solutions that are offered to today's electronics industry and are available as separate components or as complete, customer-specific systems.



◀ Intelligent controls

Motion-logic systems from Rexroth give you access to very configurable controls for realizing fully-automated production applications. The open system architecture and modular, scalable hardware and software let you adapt the systems to meet your exact requirements.



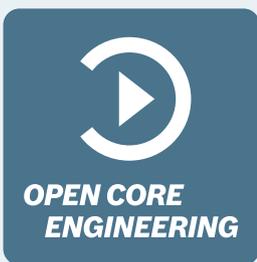
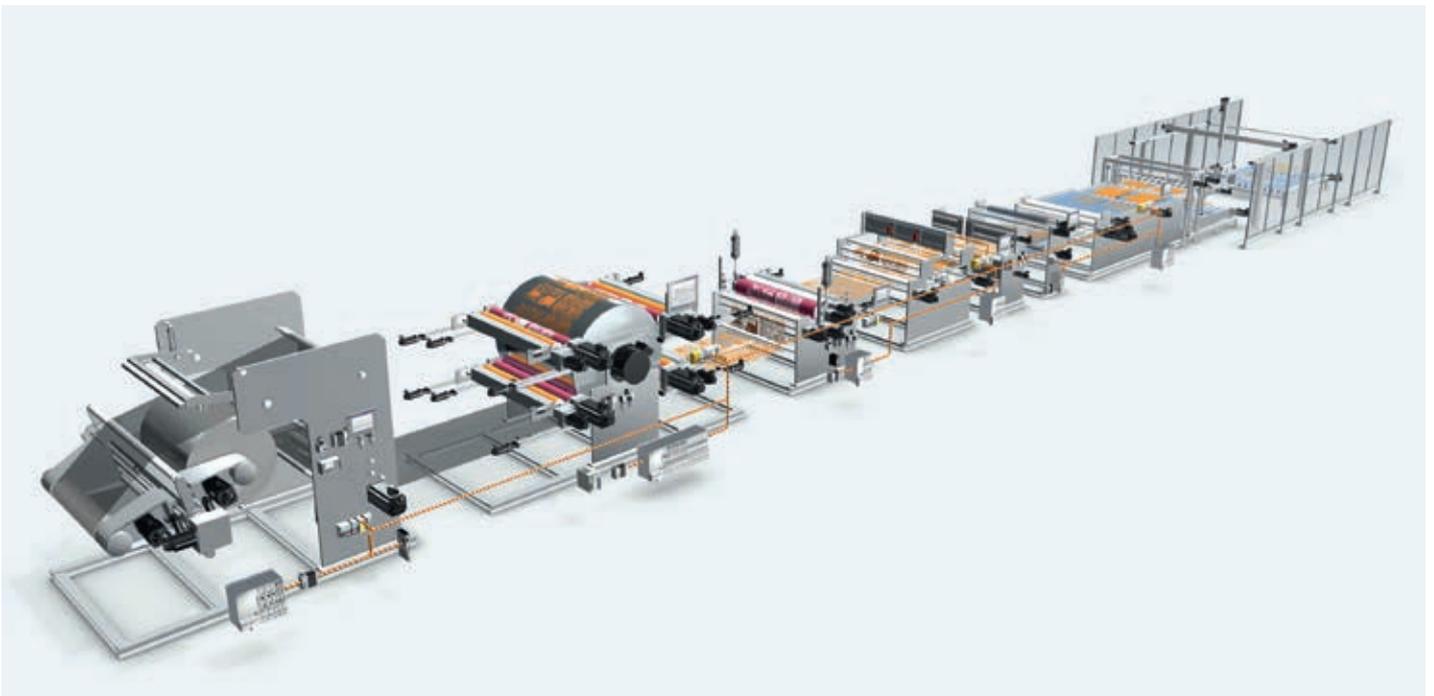
◀ Electric drives

The electric drive systems cover the entire power range from 0.1 to 630 kW. Regardless whether they are distributed centrally in the control cabinet or decentrally in the plant, the systems meet all customer flexibility requirements. Use the scalable motion logic functions, certified safety technology, or Multi-Ethernet communications option for your customized solution.



◀ High-dynamic motors

The wide range of high-dynamic servo, torque, and linear motors fulfills all drive functions for e.g. powerful winders, precision feed axes, and high-dynamic cross-cutters. Direct drives reduce torsion in the machine to lengthen its useful life. Rexroth offers ATEX and UL/CSA servo motors for integration in explosive atmospheres.



◀ **Open Core Engineering**

Entirely new degrees of freedom and greater flexibility in software engineering.

**SAFETY
ON
BOARD**

◀ **Safety on Board**

Products and know-how for certified and compliant machine safety:

- Increased operational safety
- Greatly minimized downtime



◀ **IndraWorks engineering framework**

IndraWorks combines all tools for the entire engineering process – from project planning through to diagnosis.

sercos
the automation bus

◀ **Sercos technology**

One Ethernet-based automation bus for:

- High synchronization
- Cross communication
- High redundancy (e.g. ring recovery)

Rexroth Service – Your key to higher productivity

Maximum equipment availability and high efficiency throughout the entire lifecycle of your machines and plants: These are key factors that determine the productivity of your manufacturing processes. Rexroth offers a comprehensive range of services to help you achieve these targets. Both, globally and across all industry sectors and machines.



Our modular services reduce the complexity and costs associated with maintaining and repairing your production equipment. We guarantee quick access to qualified technicians who solve problems at the root, thanks to their comprehensive knowledge of all drive and control technologies. Besides we ensure expedited diagnosis and quick delivery of spare parts while minimizing costs by having specialist workshops close to you repair and overhaul worn components and modules. All carried out by uniformly high qualified personnel, covered by our network extended to more than 80 countries.

In addition, we keep your machines fit throughout their entire lifecycle and upgrade their efficiency to the latest state of the art. We analyze the benefits of retrofit measures, taking over the implementation in a practical manner – working together with you. Summarized, we combine higher productivity with better energy efficiency and defined safety standards – reducing your total cost of ownership significantly. Permanently boost your productivity with Rexroth as your service partner for all your machinery.



Spare parts



Repairs



Field service



REMAN



Modernization/Retrofit



Consulting

Detailed information is available from
www.boschrexroth.com/service





Your advantages:

- ✓ Boosted productivity
- ✓ Improved energy efficiency
- ✓ Achieved modularization
- ✓ Increased precision
- ✓ Safeguarded process stability
- ✓ Reduced time-to-market

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