KEY COMPONENTS OF COST-EFFECTIVE PRODUCTION CELLS

LRX/LRX-S linear robots
KraussMaffei is a premium partner for the plastics and rubber processing industries worldwide.

Whatever you aim to achieve in plastics or rubber processing, KraussMaffei is your partner. We are the only company with intensive expertise across the three main engineering fields. And we have a strong track record in integrating this expertise to develop new processes and systems.

Ready for any challenge
Our Injection Moulding Machinery Division supplies machinery and systems from 35 to 4,000 tonnes for standard applications and for all processing variants, together with fully automated solutions. We have a strong customer base in all the relevant industries worldwide.

Our Reaction Process Machinery Division supplies machines and complete systems for processing polyurethanes and other reactive materials. Completing our product portfolio, Automotive Component Systems supplies foam moulds, cutters and routers. Our customer base is wide, with a focus on the automotive, construction and white appliances industries.

Our Extrusion Technology Division supplies machinery and systems for compounding, for pipe, profile and sheet extrusion, physical foaming, and the production of technical rubbers and intermediates for tire production. Machinery from the company’s range – from single extruders to complete extrusion lines – is used in many industries, including chemicals, pharmaceuticals, automotive, construction, furniture and packaging.

People for Plastics
We are the “people for plastics”. We are your partners from the first exploratory discussion, through development to commissioning, servicing and operating your system, and final disposal. At all times, you are assured of outstanding competence in planning and engineering, as well as reliable and fast spare parts, service and support.

Adding value for customers
We put our expertise to work for your success. With machine ranges engineered for modularity, we can deliver application-specific solutions based on our wide range of standard modules and specially engineered solutions. This strategy offers customers technical and cost advantages.

Close to customers around the world
As an international company, KraussMaffei has a presence in all the major markets for the plastics and rubber processing industries and employs over 3,000 people worldwide. Our sales and service network keeps us close to all our customers around the world.
Boost efficiency and value-added in injection moulding – with LRX/LRX-S robots

There can be no real argument about what makes an injection moulding production process successful. It has to be a high productivity machine with top quality output – in connection with an efficient automation system. The choice ranges from a low-cost entry solution to custom solutions for complex tasks, with all the steps along the added-value chain fully automated.

Whether you need low-cost linear robots, sophisticated gripper solutions or turnkey robot cells – we partner with you every step of the way, from project planning, through commissioning to after-sales service. We’ve been working in this field for more than 25 years, specializing in robot solutions for injection moulding. And we’ve already installed more than 2500 complex systems with our customers.
TRANSPARENT TECHNOLOGY

Take a tour around an LRX/LRX-S robot

- High-precision gearing for optimal power transmission
- Absolute position sensor system: The robot always knows its exact position
- Servo drives: Fast acceleration and short cycles
- LRX robots feature integrated control: Easy to operate
- Communication via VARAN bus technology: High control accuracy within close tolerances
LRX-S standalone version
Flexible and versatile

Dynamic safety zones
Extremely safe, even in complex installations

Electrical cabinet on the Z-axis
Compact design

Parallel drive by all axes
Fast part removal and highest demoulding flexibility

Highest modularity
Custom configurations
It all comes down to custom automation – for clamp forces between 35 and 5400 t

Linear robots have three linear axes and up to three wrist axes. They can perform various tasks in an injection moulding process: inserting, part demoulding, post-processing and others.

Universal
KraussMaffei’s LRX/LRX-S series of linear robots is available in a large number of variations, for pairing with injection moulding machines with clamp forces ranging from 35 to 5400 t. Our robots can be used with any brand of injection moulding machine from any manufacturer.

High system functionality
The LRX/LRX-S series control system is based on the tried-and-tested control concept of KraussMaffei injection moulding machines. As such, the robots are easy to teach, program and control. Also contributing to high system functionality is the availability of standardized peripherals such as conveyor belts, sprue chutes and safety guards, which all operate perfectly together within the production cell. LRX/LRX-S robots are highly dynamic, fast and precise. They achieve part-demoulding times of under one second with repeat accuracy of ±0.1 mm.

Matrix for pairing LRX/LRX-S linear robots with KraussMaffei injection moulding machines and with machines by clamp force
The LRX series includes a huge range of variants, from LRX50 to LRX1000 and payloads from 5 to 100 kg, which can be matched with injection machine tonnages from 35 to 5400 t.
The right automation solution for every production task – efficient, compact and customized

Looked at from any point of view – including technology and costs – the perfect teamwork between the linear robot and the injection moulding machine means that an LRX or LRX-S robot will always be the system of choice.

**Extreme flexibility, over 500 axis combinations**

KraussMaffei’s LRX/LRX-S series supplies the right automation solution for every production situation. For every machine tonnage there is a matching linear robot, preconfigured with the necessary axial lengths and wrist axes. A large number of axis variations, axis extensions and wrist axis combinations in all sizes make the LRX/LRX-S series extremely agile. There are more than 500 axis combinations to choose from.

**CE conformity for three different drop zones**

The LRX/LRX-S series has CE conformity for three drop zones: lateral-mounted robot, drop zone on the operator side, drop zone on the non-operator side. A lateral-mounted robot provides an extra benefit: you can reduce the work cell footprint by up to 3 m to save valuable production floor space. KraussMaffei offers a low profile LRX/LRX-S option with a telescopic Y axis as standard for production halls with low ceilings. KraussMaffei’s LR-S (standalone) series is also ideal for use with non-KraussMaffei injection moulding machines.

**Cost-effective standard versions – redefined**

The LRX robots are a logical extension of the LR series. Even as standard versions, they provide a number of essential features for efficient injection moulding production. Axes are optimized for sustainable, continuous precision operation, a
position sensor system enables fast, safe set-up for different applications. Basic removal tasks can be started immediately using pre-programmed software. For delicate parts, the ServoFloat function provides a gradual reduction in torque from a defined position – and thus safe set-up for gentle removal of delicate parts. The push-button activated “return to home position” function provides for safe robot withdrawal from the mould or peripheral equipment. Downstream processes do not need expensive extra control modules: external peripherals can be actuated, and palletizing programs are standard.

Intelligent, fully-integrated control system
The MC5 control system coordinates the injection moulding process and the robot; communication is via a VARAN bus. Process data are available in real time, programming is easy to learn and requires no in-depth programming knowledge, and operation is simple. All LRX/LRX-S robots have an ergonomic handheld pendant with touchscreen for optimal teaching and programming. Operating steps on the handheld and the MC5 operator display are identical. With the integrated solution, the entire process is controlled via a common operator display. For maximum data integrity and operator convenience, data for the machine and the linear robot are stored in the same file. Twenty safety zones, 5 of them dynamic, increase the efficiency of the operation.
PRODUCT INFORMATION AND TYPICAL APPLICATIONS

Keeping a grip on products – whatever the task, whatever the sector

With more than 25 years’ experience of building robot systems and grippers, KraussMaffei has a wealth of expertise extending far beyond standard automation tasks. Our core expertise lies mainly in engineering inserting and demoulding techniques at all levels of complexity. Whether the task is simple or complex, KraussMaffei experts can deliver modular, efficient robot solutions that pave the way for smooth production processes in every sector.

Electronics:
Modular, flexible, inexpensive
The challenge:
Automation solution for the production of keys for computer keyboards. Retrofitting an existing cell that was used for the production of glassfibre-reinforced PA housings for a computer control module.

The solution:
Retrofitting of an existing LRX 100 with a new gripper which was configured in its entirety from a standard modular system for the production of keyboard keys in different languages, with automatic separation. A 32- or 23-pad exchangeable vacuum gripper with a manifold system for ensuring automatic, cavity-specific separation and packaging of the keys. Provision of a gripper quick-change system for short set-up times during production changeovers.

The result:
Versatile solution based on standard modules. Inexpensive, flexible solution for stable production of delicate parts in all shapes and sizes thanks to a totally modular robotic concept.

Production of widely varying parts can be fully automated with efficient and intelligent gripper concepts.
Automotive:
Complex and versatile, but standard parts
The challenge:
Production of frame sections for door trim with three different décor materials in four variants, i.e., 12 different permutations. The process engineering challenge lies in multiple insertion and precision positioning of the décor materials in a 1-cavity mould, while achieving the shortest possible cycle times.

The solution:
Full automation of an 1100-t KraussMaffei MX injection moulding machine. Fully integrated lateral-mounted linear robot with 100 kg payload, including four inserting and demoulding grippers (one gripper for each variant). The décor materials are supplied via an automatic drawer system with pneumatic lift and article-specific holders. The grippers are fitted with an insert cylinder: after décor 1 has been positioned, the position of décor 2 is finely adjusted to give an exact fit.

The drawer system, the various grippers and receptacles are coded – to match the moulds and the injection moulding machine. This coding system ensures that the door modules are always made in the right combinations. Furthermore, the robot is fitted with a quick-change unit for the grippers and a standardized connector for media.

The result:
The coding system and the swappable grippers make for fast, error-free production of the various batches. Despite the complexity of the challenge, there was no need for custom designs. The various modules of linear robot, multi-level belt conveyor and drawer magazine were all drawn from standard parts. Thus, relatively little investment was needed for meeting this challenge. The automotive industry is characterized by ever-increasing numbers of variants, such as door trims. Automated production cells that are designed for variant parts boost production flexibility and reduce costs.
CUSTOMER BENEFITS

Adding value in your production processes – with precise, flexible and fast automation solutions

In developing its LRX/LRX-S series, KraussMaffei put a high priority on sustainably maximizing the added-value of your production processes – either with standalone robots or integrated solutions.

Higher yields – faster
Several factors contribute decisively to maximizing added-value in production processes. KraussMaffei addressed all these factors in engineering its LRX-S robots: parallel drive of all servo axes is standard, making part-demoulding times under one second possible. Early entry, a standard feature of LRX standalone robots, reduces mould-open time. High-precision gearboxes and rugged mechanical components guarantee high repeatability (+/- 0.1 mm), even at high travel speeds. Furthermore, the ServoFloat package ensures that delicate parts are removed gently, and will thus boost yields of complex shapes.

Built-in investment protection
An absolute position sensor system ensures that the robot always knows its exact position. This boosts the availability of your production cell, because after a stoppage or power failure, production can restart immediately without a move to reference point. And, thanks to a comprehensive catalogue of standard parts, you can be sure that your automation system will grow with your requirements and that you will be able to gradually retrofit more complex sequences.

Your benefits:
• High productivity thanks to fast cycles and fast parts demoulding.
• High yield thanks to precision mechanics and modern control technology.
• Safe, reliable operation thanks to the absolute position sensor system and dynamic safety zones.
• Inherent flexibility thanks to optional control concept and a wide choice of expansion possibilities.

KraussMaffei supplies turnkey systems for manufacturing plastic parts, like this system for producing pipe connecting sections.
Rely on us for a fast and competent response to all your service needs anywhere in the world. Whatever you need – from troubleshooting or training to spares or repairs – we’re on the job.

We’re dedicated to supplying service quality on a par with the outstanding quality of our machines and systems. We offer far more than spare parts and hotlines. We’ll work with you to choose the best and most cost-effective solution for your operation. We’ll help you test new applications and we’ll plan customized service packages.

**All-round service**

Our service offering is broad. We’ll configure your system, install and commission it, train your staff, plan measures to minimize your downtime risk and maximize productivity, and carry out maintenance, repairs and upgrades. You’ll find us fast, reliable and competent. Our hotline is manned by highly-trained and experienced service technicians. If necessary, we’ll get a technician to you quickly. Remote diagnosis, interfacing directly with your machine’s control system, can be a practical alternative. Spares for all important wear parts are available at short notice. We’re continuously expanding our service network to speed up spare parts shipment. Talk to us about the right service solution for your business.

**Customer trials and prototyping in our test lab**

The Injection Moulding Division operates a test lab fitted with the latest machinery and equipment. We can run trials, produce prototype parts and fine-tune processes on your behalf. We can work with you to test and evaluate processes, machines and equipment in order to identify the best approach for a particular project. Our highly-qualified application engineers are there to help you.

**Training with high hands-on content**

Courses are held in our lab and training centre, or, optionally, on your premises. We offer clearly-structured basic and advanced training in operation, process control and maintenance for KraussMaffei injection moulding machines. On request, we’ll plan and hold special courses on topics of your choice. All participants spend a high proportion of their training working hands-on with original KraussMaffei machines. A well-structured training program produces skilled operators and technicians, which will positively impact your up-time and productivity.

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Teaming up **KraussMaffei’s LRX and LRX-S linear robots** with any injection moulding machine from any manufacturer is absolutely unproblematic. These basic, budget robots are mechanically rugged. Set-up and operation are fast and easy.

Your business will benefit from their speed, precision, high repeatability, easy self-explanatory programming, and instant production restart after a stoppage. This makes LRX and LRX-S robots an outstandingly reliable, universal solution for automating your injection moulding production.