Versatile tools for productive automation
Industrial robots of the IR/IR-S series

Engineering Passion
## Facts and figures

### Application areas

- **Consumer goods**
- **Packaging**
- **Automotive**
- **Medical/pharmaceutical**
- **Electrical/electronics**
- **White goods**

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<thead>
<tr>
<th><strong>Applications</strong></th>
<th>Insertion, demolding, machining, installing</th>
</tr>
</thead>
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<td><strong>Special features</strong></td>
<td>Versatile, high rigidity, great degree of freedom, investment security, cleanroom-compliant</td>
</tr>
<tr>
<td><strong>Working space</strong></td>
<td>Ball</td>
</tr>
<tr>
<td><strong>Payload</strong></td>
<td>6 – 210 kg</td>
</tr>
<tr>
<td><strong>Reach</strong></td>
<td>1610 – 3900 mm</td>
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<tr>
<td><strong>Standard accessories</strong></td>
<td>Gripper, quick changing units, belt conveyors, linear axis [7th axis], protective housings</td>
</tr>
<tr>
<td><strong>Control system concept</strong></td>
<td>Integrated (in combination with a KraussMaffei injection molding machine) or stand-alone (for injection molding machines from other manufacturers)</td>
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<td><strong>Clamping force range</strong></td>
<td>500 kN to 40,000 kN</td>
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<td><strong>Transfer variants</strong></td>
<td>Standardized transfer direction for floor and bracket installation</td>
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Versatile tools for productive automation
Industrial robots of the IR/IR-S series

KraussMaffei industrial robots implement complex demolding processes with a wide variety of grippers and freely programmable sequences of movements for wide swiveling ranges. Six axes enable enormous flexibility, even in spots where linear robots cannot be ideally used.

Our IR/IR-S series is the solution for comprehensive, customer-specific automation requirements. KraussMaffei creates custom production cells with standard components – from pick and place to turnkey solutions.

Your advantages at a glance:
- Turnkey automation solutions from a single source
- Optimal positioning and space-saving installation types for injection molding machines
- Excellent operating concept
- Integration of various peripherals
- Flexible gripper solutions
Transparent technology
Take a tour of the IR/IR-S series

Flexibility is critical
Space-optimized production units or mobile assembly cells

Simple operating concept
MC6 machine control system:
Programming – setting – operating

Economical turnkey solutions
Technologically sophisticated and advanced

One contact for injection molding machinery and automation
Fast, competent processing without having to define interfaces
CE conformity, free of charge
High degree of assurance – low costs

IR-S stand-alone version
High level of flexibility and wide range of applications

Safe home traverse
at the touch of a button
No collision

Proven energy and signal routing
Attachment unit or gripper interface module
Flexibility is critical
No limits for your requirements

KraussMaffei provides you
space-optimized production units and mobile cells with the
shortest return to service time, according to your require-
ments. Our industrial robots implement complex demolding
processes with various gripper concepts through six axes,
freely programmable sequences of movements and wide swive-
ling ranges.

Heavy-duty basic units
Industrial robots are designed for extreme ambient conditions and continuous oper-
ation – for example, when welding body components. When used in plastics
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in every design appropriate to their type, even if they have large volume or are difficult or intricate. Even in an extended state, they retain their enormous rigidity and can be manipulated at high speeds. Through careful product handling and precise post-mold processing of components, a higher and, above all, uniform component quality is achieved.

**Multi-talented, with six axes**

With their reach, payload and kinematics (six axes move freely in space), industrial robots effortlessly solve various tasks. Even expansion of technologies or basic change to production steps in a system are no problem when considering the reach and payload. Also when used in technical cleanrooms, industrial robots are optimally suited due to their design. Only a small cleanroom is needed, which reduces the maintenance and operating costs. Say, for example, six axes are not sufficient, as with large machines up to approximately 4,000 tons. Then we connect additional linear axes on which the industrial robots can drive to the injection molding machine. What if there is only little space around the injection molding machine? Then we simply suspend our industrial robots from the ceiling.

**Customer-specific system solutions**

We know how the articulated arm kinematics can best be used, and we develop the best possible solution for you. The payload is less critical and the reach is more important when selecting the robot devices. Hundreds of successfully created applications make us specialists in integration and after-sales service for industrial robots. This expertise will pay off for your company.

**Cost-effective investment**

As the master of the injection molding process, the injection molding machine determines the cycle time. This means that highly economic performance depends on the efficient use of non-productive time. Industrial robots play their part. Their special kinematics are used for deflashing, flame treatment, mounting and much more. Their high levels of productivity lead to increased profitability. Downtime goes down to around zero, and higher output reduces manufacturing costs. That means higher robot investment costs can be quickly amortized through better use of downtime. In addition, complex, elaborate grippers are replaced by using robot kinematics.

**Make targeted, full use of potential – not only with new machines**

We automate standard new KraussMaffei injection molding machines with industrial robots. Due to our many years of automation experience in the plastics processing industry, we can offer you solutions for integrating industrial robots for older KraussMaffei machines or machines from other manufacturers at any time.

**The right partner for every purpose**

According to the specific application or individualized customer request, we choose the robot with the corresponding options for integration into the system. This ensures that the selected robot will be the best fit for the special features of your application. Our system partners are the renowned robot manufacturers Kuka, Motoman and ABB. Your benefit from this partnership is plain to see: you always enjoy the competent and direct support of your KraussMaffei contact person.

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**Your advantages:**
- Individualized solutions
- Flexibility, with six axes
- Reduction of manufacturing costs
- Short amortization period
- Long-lived investment
Assembly and installation
We have the optimal solution for your production

KraussMaffei provides you with four basic options to integrate the industrial robots of the IR/IR-S series perfectly into your specific production situation.

Space-saving production cell:
shelf mounting
Our shelf-mounted (S) version industrial robot is usually installed on the fixed (mold) platen of the injection molding machine. This solution is primarily used for large machines with over 650 tons clamping force and high-volume components. Industrial robots are also installed on machines with limited access to the mold, as in the case of side-mounted mold change carriages that have dimensions that exceed the clearance between the tie bars.

For limited space situations:
Wall mounting
The wall-mounted (W) version is the optimal solution if only very limited room is available in your production space or if the space below the demolding position is needed for other processes. It is, for example, conceivable to install an additional packaging apparatus, securely and compactly housed in the area below the demolding position, which can have a different design depending on the article. In addition, this solution for integrating KraussMaffei industrial robots of the IR series provides you with another important benefit: the special sequence of movements (swinging in from the side) significantly reduces cycle times.

When peripherals must be integrated:
Floor mounting
The floor-mounted (F) version is the classic among all the various assembly options provided by the industrial robots of the IR Series from KraussMaffei. They are especially characterized by the industrial robot's large horizontal working radius. This makes it possible to integrate elaborate peripherals, such as additional installation or inspection stations. The enormous flexibility of the industrial robot can in this case be used optimally. A further bonus point is that this version can then also be used with excellent results if a laminar flow box is installed above the machine for clean-room applications.
The solution for complex take-out automation: integration into the injection molding machine

The integrated II version is the optimal alternative if only a small machine installation space is available, yet at the same time a complex demolding process is involved. Both of these requirements are fulfilled ideally with the integrated version, in which the machine’s protective housing is expanded and the industrial robot is mechanically integrated. Cleanroom applications can, in this manner, be realized both easily and cost-effectively. An additional advantage for you: the commissioning time is shortened to a minimum after preinspection by KraussMaffei.

Your advantages:
– Optimum use of existing available space
– Integration peripherals
– Reduction of cycle time
– Implementation of cleanroom applications

Floor mounting – for a large horizontal working radius

With complex take-out automation: integration into the injection molding machine

Flexible standalone cells
(Here: training cell for user training)
Technical and economical advantages are included
And easy for you to use

The IR Series from KraussMaffei provides you with various advantages: a simple operating and control concept and a uniform interface and CE conformity.

Revolutionary operating and control concept
The robot can be operated from the injection molding machine control panel because the KraussMaffei industrial robot is integrated in the MC6 machine control system. Conversely, the machine can also be operated and programmed using the robot handheld pendant [see picture below]. The harmonious configuration of the user interfaces (“look and feel”) makes it easy for the user to find their way around the user interface and access the relevant information quickly.

Basic or high-end concept
There are two control concepts to choose from, depending on the complexity of the application: The basic concept and the high-end concept. Simple peripherals are integrated with the basic concept. If multiple different robots and complex peripherals must be integrated, the high-end concept is the right solution.

Cleanliness included
All drives and guides are enclosed in the robots. The result is a reliable, clean product area without danger of contamination to the components. This makes the devices of the IR Series also ideal for use in cleanrooms for which a low particle load is mandatory.
Proven energy and signal routing for grippers
Inputs, outputs, monitoring functions and valves are required for the demolding, loading or assembly gripper control system. KraussMaffei provides you with various solution concepts: the attachment unit and the gripper interface module. An attachment unit can be used as the central supply for the valves and signals for grippers or peripherals. It can be implemented on every robot size, because it is built on the third axis. It is supplied by a fieldbus cable and a compressed air line. A gripper interface module can take over the functions of the attachment unit in large robots. A small hose package leads to the gripper and the singularity of the robot can be bypassed. The options for the industrial robot can be expanded with the integrated demolding stroke and the larger reach of the robot.

Safe home traverse at the touch of a button
In automatic mode, we enable you to carry out the home traverse at the press of a button. In principle, there is a high danger of collision from the industrial robot’s special kinematics. When the system is at a standstill, manual maneuvering poses the danger of collision. This must only be done by trained personnel. With our standard programming, industrial robots of the IR Series can be driven into the safe home position by a simple press of a button on the control panel.

ECO function – speed adjustments outside of the mold
The ECO function enables the robot to adjust its traversing speed cyclically to the injection molding process. Simply pressing the Eco button selects the optimal machine setting for energy consumption. This reduces energy consumption and prevents wear. This takes place outside the mold; inside the mold, the robot travels at its maximum speed.

Programmable safety technology
With our simple-to-expand and programmable safety technology, you remain flexible in the future as well. You can react individually to later changes or expansions of your automation cell.

Uniform interface
With the EPS connector, you have a uniform interface for grippers and peripherals. The pneumatic and electric supply for the components is guaranteed by this connector. It has a compact design and is available in various equipment variants. You profit additionally from fault prevention (poka yoke principle) and time savings.

CE conformity
Your safety is important to us. That is why our customers who buy complete systems get CE conformity. As early as the quotation phase, all systems will be designed to be safety-compliant according to the applicable directives.

**Your advantages:**
- Great flexibility
- Simple operating concept
- More operating comfort with the complete control stand
- Economical, turnkey systems
- Integration of peripherals is possible at any time
- Easy-to-expand safety technology
- Exemplary energy and signal routing
- Home traverse at the press of a button
- Optimal energy setting
- CE conformity, free of charge
VisuX – ProgTechX – Remote service
Intelligent operation, programming and monitoring for the IR Series

ProgTechX programming support
Basic programs can be written quickly using the new ProgTechX programming support. This clever command library with what are known as in-line forms makes the programming process incredibly easy and ensures error-free programming.

Your advantages with ProgTechX:
– Reduced programming times
– Syntax errors prevented
– Pre-defined command sets with pre-assigned input options
– Programming library for operating sequences (e.g. loading, removing, archiving) is included

User interface VisuX
Industrial robots are highly complex. Our intelligent operating and control concept simplifies programming and operation enormously. The robots are operated either directly – via the robot control panel – or via the injection molding machine control panel. With the handheld pendant and the simplified VisuX user interface installed on it, the system user has an overview of all the functions that are essential for operating the production cell.

Your advantages with VisuX:
– The same logic as MC6 machines and linear robot control
– All the necessary robot functions are united on one interface
– Fast process adjustment
– Optimal diagnostics functions
– When integrated with IMM, reciprocal operation is possible and a common logbook is provided

First class support – with our remote service
Our modern control units give you the option to locate the causes of errors on your automation system quickly and accurately. This is where, in consultation with you, we connect via modem to the control unit concerned on your machine, and this enables us to quickly identify hardware or setting errors online and usually rectify them as well. This can prevent downtimes, and you save time and money. Free software updates can be installed using remote diagnostics. Even for integrating any software options that have been purchased, it is usually no longer necessary to engage a technician.

Your advantages with remote service:
– Immediate overview of the current state of your system
– Increasing system availability
– Support with programming
– Diagnostics: Log files can be retrieved online
– Installing software
Multisubmit control function
Centralized control of multiple processes

KraussMaffei is the first injection molding machine supplier to integrate the new Multisubmit control function into the MC6 operating concept of its industrial robots. The new programming function is available in conjunction with KUKA KR C4 Version 8.3 (Win 7) in the KraussMaffei control system and is already included in the standard specification.

With the new Multisubmit programming function, KraussMaffei has expanded its own ProgTechX command library. The central control element is the robot handheld pendant with KraussMaffei MC6 visualization system. The ProgTechX command library was developed as a programming tool.

The main application of Multisubmit is the activation of external, peripheral components operating simultaneously, such as conveyor belts with separators, assembly stations and drawer systems or withdrawable magazines.

A submit interpreter is a KRL program (KUKA Robot Language) that runs parallel to the robot program. Until now, there was just one submit interpreter (Singlesubmit) in the robot control system.

With the release of the new KUKA KR C4 Version 8.3 (Win7), seven independently operating subinterpreters were added to this function (Multisubmit).

**Your advantages:**
- Reduced acquisition costs thanks to the potential savings provided by an additional SPC (stored program controller)
- Increased productivity through simultaneous control of multiple processes
- High flexibility with regard to production changeovers and plant expansion
- Systems can be retrofitted at any time

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Multisubmit is implemented in the ProgTechX command library.
Compact and space saving
Thanks to the compact cell structure

Flexibility and mobility guaranteed
Thanks to heavy-duty load rollers and forklift straps

Compatible
Can be used on injection molding machines from 35 t to 160 t

Unique connection concept
Reduces costs when replacing molds or machines

Basic equipment for basic tasks
Highly flexible automation with industrial robots

Option to expand:
Quality check
Integrated QS parts diversion

Innovative MC6 control system
With various optional operating concepts

Transparent technology
Take a tour of the mobile automation cell

Perfectly equipped for your production
The reliable solution for flexible automation on injection molding machines

Take advantage of the diverse fields of application for KraussMaffei’s automation cell. With simple movements of the hand, the mobile cell can be quickly and easily docked, and used on injection molding machines that have a clamping force of 35 t to 160 t.

The mobile automation cell was specifically developed for the flexible production of injection molded parts. Thanks to the roller-mounted design, the cell can be easily and quickly moved between locations, from one injection molding machine to another, provided they have a suitable clamping force and size. A docking console is used to connect the cell to the machine. Plug-and-play means that the cell can be easily docked and undocked, reducing the lengthy time that is required for commissioning. If your injection molding machines are fitted with a docking console, there is now nothing stopping you from using an automation cell in your production.

It is no longer necessary to retroactively teach the demolding point, because our tests for repeating the docking and undocking processes show a high level of reproducibility.

And the control comes with a high level of flexibility too. The operating concept communicates in both directions. Thanks to this, the hand-held pendant on the robot control can be used to operate the injection molding machine, and the machine’s MC6 control system can be used to control the automation cell. This ensures reciprocal, perfect operation between the machine and the automation cell. It is also possible to operate the cell as a stand-alone cell.
Roller-mounted base frame for simple docking and undocking

Small robots and peripheral equipment – in an extremely small space

Easily accessible connecting lines – “plug-and-play”

Mobility in manufacturing
Simple to use

Design and function of the mobile basic cell
The main components of the mobile basic cell are a robust frame with casters and an enclosure. The cell can therefore be easily moved by the operator. However, with the two guide rails that are secured on the frame, it can also be transported using a forklift truck or a crane. As soon as the cell is correctly positioned on the injection molding machine, it is secured using adjustable feet. A compact enclosure that is also closed at the top and designed with robust PC automotive glazing means that the operator can look into the cell and ensures compliance with the necessary safety requirements. The safety concept is rounded off by a safety rail with door handle, key switch and request button.

Peripheral equipment and interior of the cell
A small robot from the KUKA Agilus series is used in the standard version. It has a payload of 6 kg and a maximum reach of 900 mm. It forms the core of the cell and, with a high working speed, is used to demold finished parts from the mold and deposit them on the conveyor. Using the VisuX and ProgTechX software packages, which are included in the standard version, the robots can be controlled in a way that is extremely user-friendly and easy to program. Furthermore, the standard cell is equipped with a conveyor that is 1500 mm in length and 400 mm in width and that transports the finished injection molded parts from the cell. To check the finished parts, we have equipped the cell with a QS system at this point. This means that the operator can easily divert parts out via the QS container at any time. There is no need to stop production in order to do this.

Docking console on the injection molding machine and mobile automation cell
To ensure that it is possible to connect the mobile automation cell with the injection molding machine, the machine must be equipped with a docking console. With simple and effortless hand movements, the operator connects the machine to the automation cell, both mechanically and electrically.

Docking console on the injection molding machine

Your advantages:
- Flexible production
- Saves time with shorter commissioning times
- High repeatability
- Individual control
Versatile peripherals
For complex automation solutions

Most varied of grippers
Whether simple grippers with standard components such as vacuum exhausters, parallel grippers, sprue gate grippers or complex inserting and demolding grippers, we have the perfect solution for you. Benefit from economical solutions with high holding force for your special requirements.

Precise sorting and feeding units
Sorting and feeding units are necessary for insertion technology or subsequent processes. For such processes, the robot requires the components to be in an exact, aligned position. A further plus point: the peripherals can be included directly in the robot control, so that only one control unit is required.

Different drawer systems
They are used for providing parts, exporting QS components and for buffer storage. In addition to single and double drawers, a combination of drawers and chutes is a further equipment variant. Each drawer system is equipped with a request and acknowledge button, as well as a protection guard.

Quick SCARA robots
These are quick, compact, 4-axis relocating robots, which move payloads of 5–10 kg to the required position at high speed for a reach of 350–850 mm.

Custom delivery systems
We can provide you with standard delivery systems such as belt conveyors, conveyors for different product types, roller conveyors and chain conveyors which are driven by motors or gravity. Depending on what your application is, we can create an optimum concept for you. Pallet cages, pallets, cardboard boxes and small load carriers with different designs (e.g. multi-track) can be conveyed to or from the processing line.

Depending on the application: the right camera systems and testing systems.
We have the right solution to suit your requirements: Simple camera systems are used when it comes to measuring, checking and counting components with straightforward shapes. Configurable image processing systems check safety-relevant components and complex geometries, undertake checks that need to be documented and carry out highly accurate measurements at high checking speeds. A great number of the tests run simultaneously, and require a great deal of lighting. Other checking systems, e.g. for pressure checking and short-circuit checking, are available on request and can be integrated into the production cell.

Your advantages:
– Single-source system solutions
– Individual modular peripheral concepts
– Integrating complex peripherals
– Quick product change-over
Almost automatic: Our co-operative project handling
Together towards success in just seven steps

1. Detailed project meeting
We work together with you to appraise the current state of your production, and discuss the pros and cons of existing production lines and concepts, and work out any potential improvements that could be made. In addition to this exchange of experience, we work with you to draw up an initial outline schedule for your planned project.

2. Drawing up different resolution methods
During the concept phase, we will outline various solutions for you, and these will serve as the basis for any further meetings and discussions. We will illustrate different scenarios for you and visualize complex technical designs.

3. Layout design
All components are laid out in 2D or 3D. The layout is the basis for finding the best possible arrangement of the peripherals in the production cell, and helps with optimizing cycle time and installation areas in order to integrate the system layout into your existing building layout in the best way possible.

4. Realistic cycle time diagram
The whole production process is visualized in order to simplify complex processes if necessary. The individual process steps are analyzed to optimize the main process steps and reduce the cycle time. This will provide you with a realistic estimate of the cycle time that is to be achieved.

5. Simulating the production process
The whole production process can be illustrated using 3D simulation. This will make it easy to spot critical procedures quickly, and the whole process can be improved even further if necessary.

6. Initial acceptance
Initial acceptance can take place in the TechCenter in Munich, which is when you will once again have the opportunity to assess with us how the injection molding machine and automation system work together, and carry out a comparison with the technical specifications (cycle time – process – quality). Changes can be made before delivery, so that you will not need to carry out any rework on site at your premises. Furthermore, you can tour the entire machine outfit, with its varied applications and different robot types, in the TechCenter.

7. Comprehensive service
We are there for you even after the automation system has been delivered to you, of course. We can provide you with various services for your machine or system. From commissioning your machine to individually agreed maintenance contracts and remote diagnostics. We are your single-source provider for servicing your injection molding system and automation.

Your advantages:
- Co-operative project support, documentation and specification
- Presentation of different concepts
- Layout design
- Overview of the planned production process
- Evaluation of the whole process
- On-site commissioning
- Technical changes at the supplier’s site
- Global spare parts logistics
Further information which might also interest you

Are you looking for a linear or side-removal robot? We can provide you the right robot for every production task.

We have also compiled extensive information on the subject of service for you. This will help you increase the flexibility of your injection molding machines and robots for ever newer process requirements, and continuously increase their capacity. We are happy to provide you with detailed information on this.

For example, ask us about:
- Linear robots of the LRX/LRX-S series
  The basis of economical manufacturing
- SPX10 sprue picker.

Visit our website to view our brochures and flyers on other interesting topics: www.kraussmaffei.com. On request, we would also be happy to send you the information and technical data for our products free of charge.
KraussMaffei
A strong brand in a unique global group

Cross-technology system and process solutions
Whether in Injection Molding, Reaction Process Machinery or Automation – the KraussMaffei brand stands for pioneering and cross-technology system and process solutions in plastics processing worldwide. For decades, our expertise, innovative ability and passionate commitment to plastics engineering have been your competitive edge. As a cross-industry system provider, we offer you modular and standardized systems as well as solutions customized to your needs.

There for you around the world
With our worldwide sales and service network, we offer our international customers an excellent basis for a successful business relationship. Due to the close proximity to our customers, we are able to answer your individual inquiries very quickly. We work out the best possible technical and economical solution for your product and production requirements together with you. Test our machine technology for your applications and let our experts put together an individualized service package for you.

Individualized service
Our employees from customer service, application technology and service help you with your questions and needs on every topic dealing with machines, systems and processes – around the globe, quickly and with a high level of expertise. We have developed an extensive customized service spectrum with our lifecycle design, which accompanies you throughout the entire lifecycle of your machines and systems. Take advantage of the personal interaction and flexibility we offer in our practically oriented seminars. We carry out customer-specific trainings either at your location or at our sales and service locations.

You can find additional information about KraussMaffei at: www.kraussmaffei.com

KraussMaffei Group
Comprehensive expertise

Unique selling proposition Technology³
The KraussMaffei Group is the only provider in the world to possess the essential machine technologies for plastics and rubber processing with its KraussMaffei, KraussMaffei Berstorff and Netstal brands: Injection Molding Machinery, Automation, Reaction Process Machinery and Extrusion Technology.

The group is represented internationally with more than 30 subsidiaries and over ten production plants as well as about 570 commercial and service partners. This is what makes us your highly skilled and integrated partner. Use our comprehensive and unique expertise in the industry.

You can find additional information at: www.kraussmaffeigroup.com

The KraussMaffei Group has a global presence. Countries with subsidiaries are marked in dark blue. In the white-colored regions, the Group is represented by over 570 sales and service partners.
Versatile tools for productive automation

Industrial robots of the IR/IR-S series

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