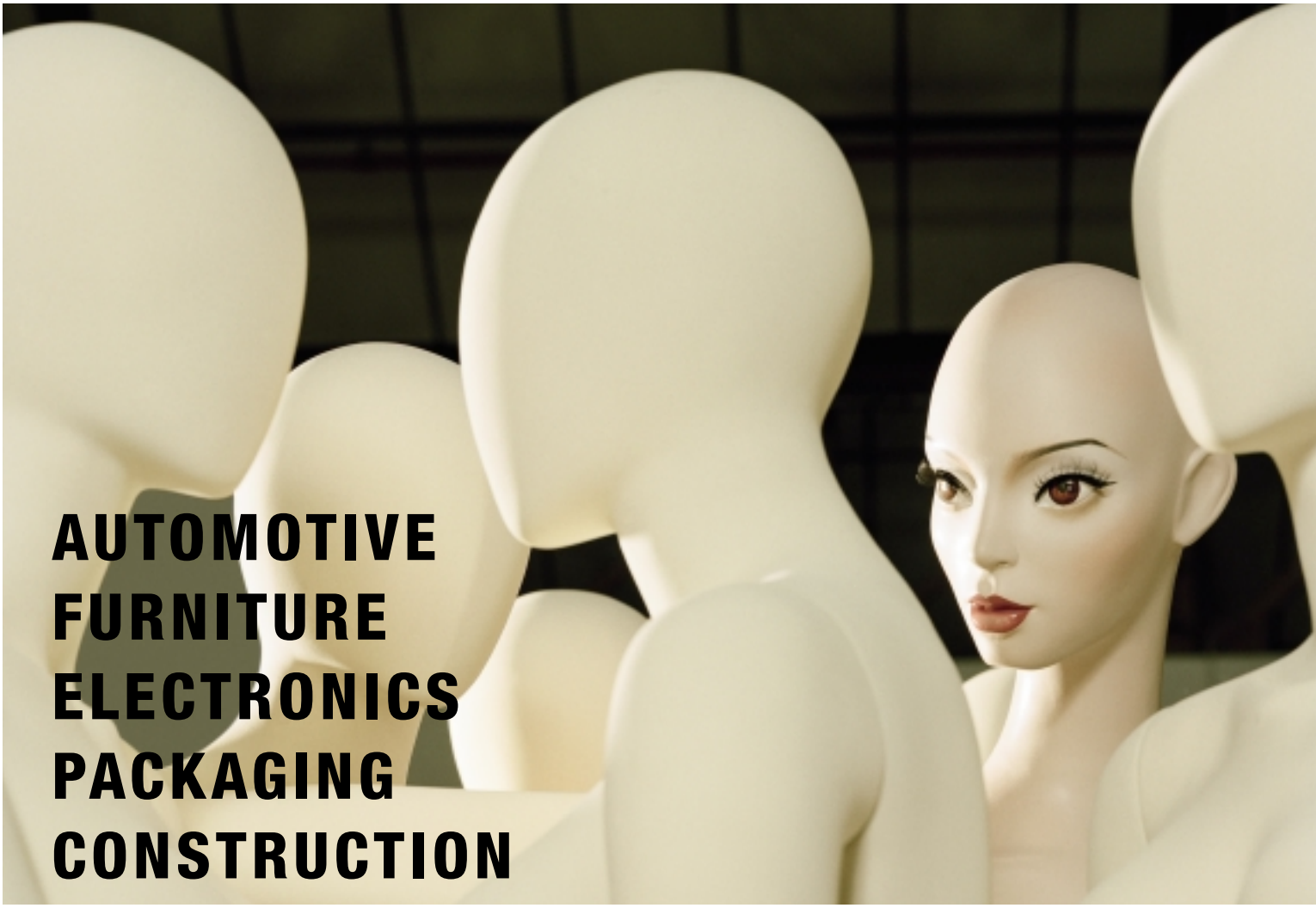
DISHWASHERS BUMPERS BEER CRATES
CHAIRS PC HOUSINGS SIDE TRIM PANELS

KUKA ROBOTS FOR THE PLASTICS INDUSTRY

WORKING IDEAS

KUKA

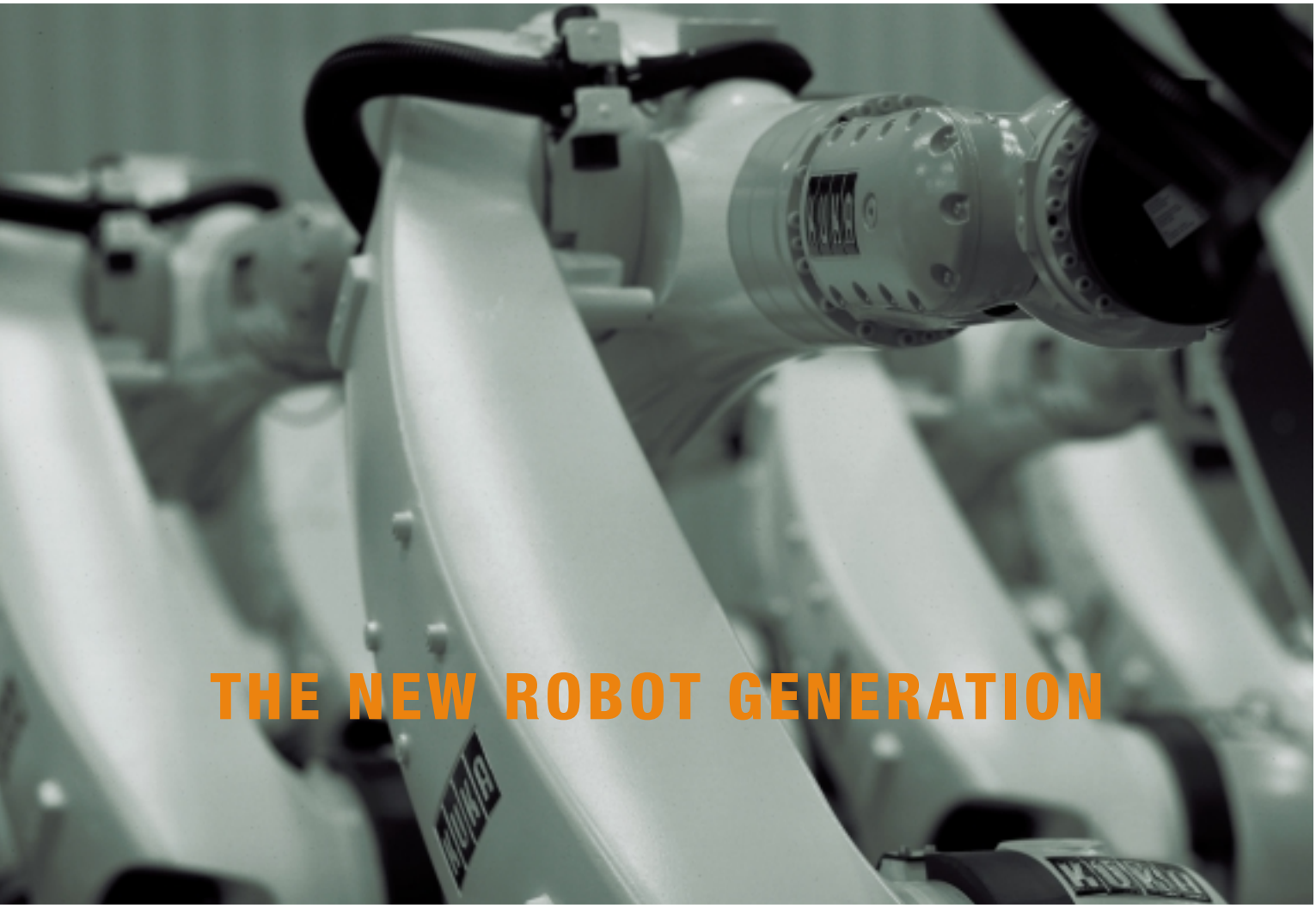


AUTOMOTIVE
FURNITURE
ELECTRONICS
PACKAGING
CONSTRUCTION

Automotive manufacturing, packaging, furniture. Now in their 3rd generation, the new robot types from KUKA have become firmly established in the diverse plastics market. Even lighter, even more flexible, even more compact – and specially adapted to the needs of injection molding, blow molding or PET processes – they offer you the right solution for any task and any application.

The uniquely broad spectrum of KUKA shelf-mounted and floor-mounted robots leads to custom-tailored systems and optimized processes. A special KUKA advantage is machine synchronization: the position sensing system of the machine is continuously coordinated with the robot position, thus guaranteeing optimal cycles, reducing wear on the robot arm, and preventing costly collisions between the mold and the end-effector.
Whether plastic presses, extruders, or foaming machines, in standard environments or in special situations such as clean rooms or harsh ambient conditions – KUKA robots shorten cycle times and reduce rejects while increasing the availability and productivity of your systems.

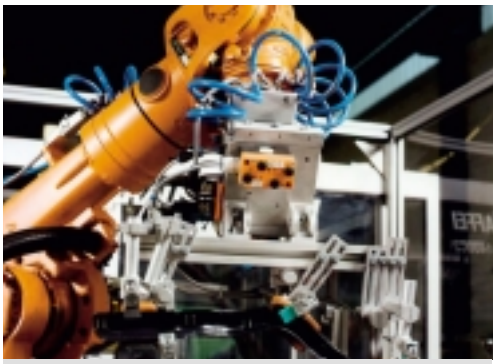
Loading
Precise loading of a machine with film and inserts for back injection and foaming



THE NEW ROBOT GENERATION

Unloading

Reliable unloading: from micro-components for medical equipment to bumpers for minivans

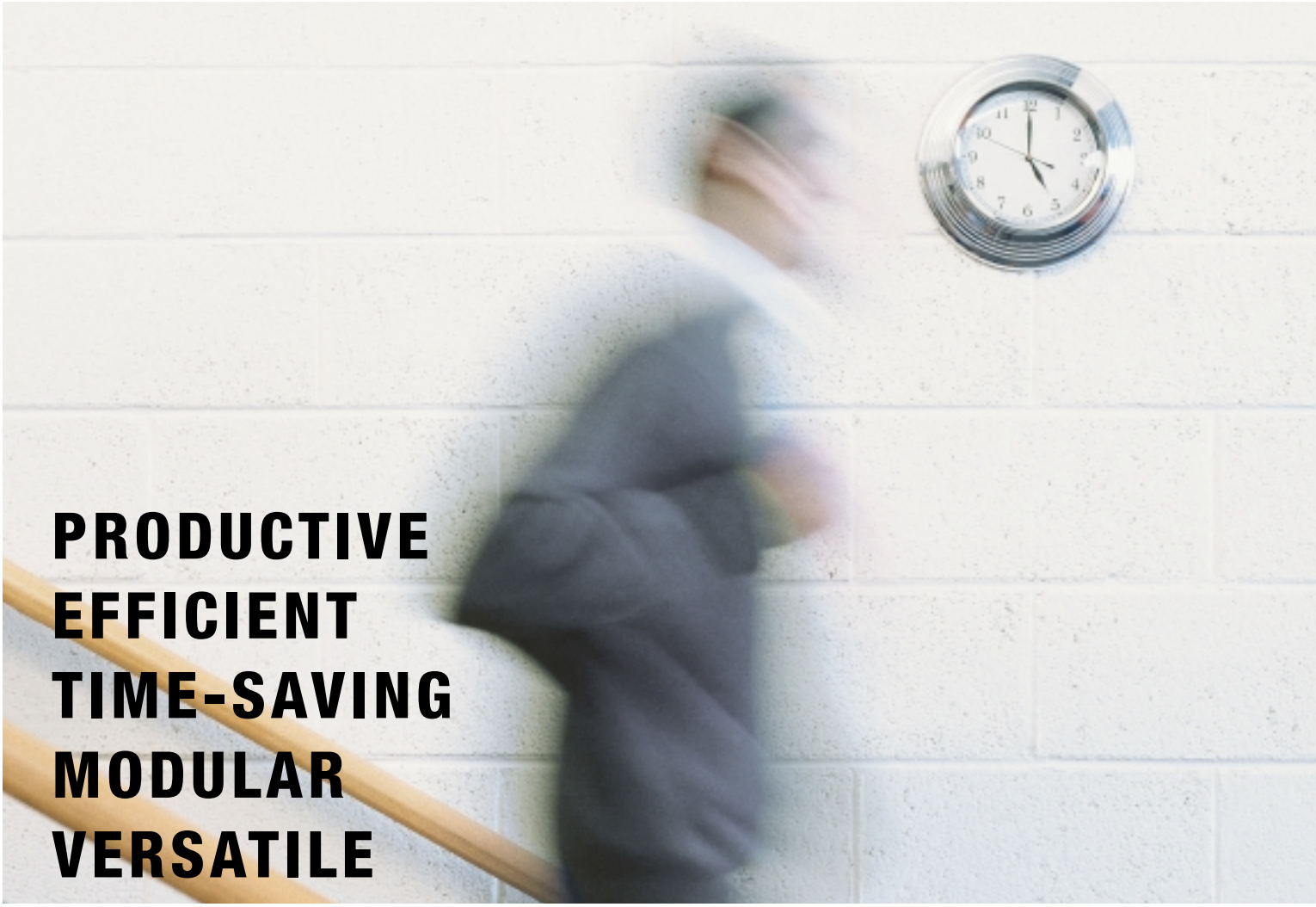


Machining

Accurate trimming of plastics, laser machining, flame-machining, deflashing, assembly and integrated quality control

Palletizing

Hanging in transport frames, setting-down in trays or hanging in a painting skid



PRODUCTIVE
EFFICIENT
TIME-SAVING
MODULAR
VERSATILE

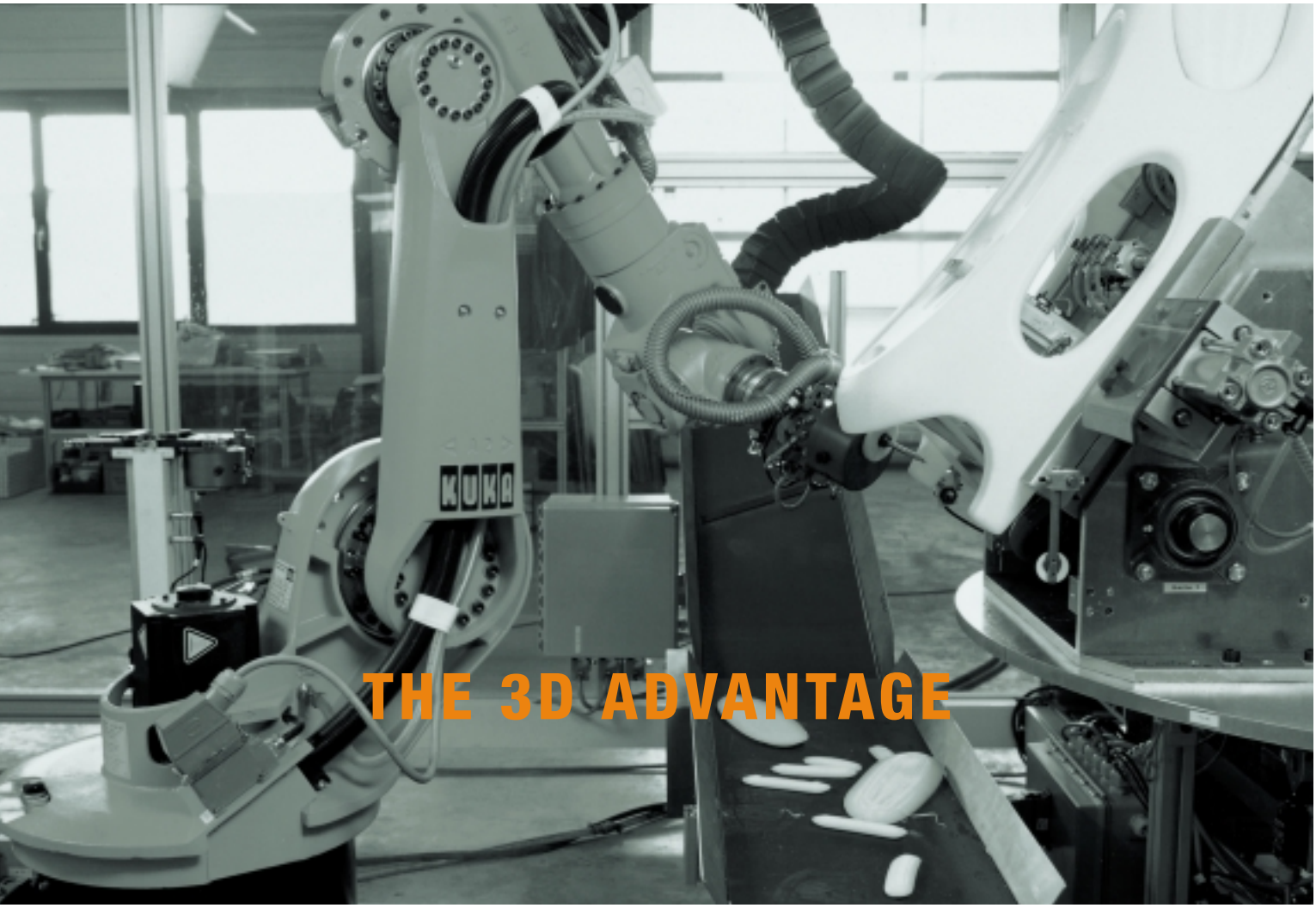
New 3rd generation KUKA robots have been further developed specially for the plastics market, offering you numerous benefits: they optimize work processes, shorten cycle times and make efficient use of non-productive time which previously went unused. They thus open up enormous potential for value creation, extending far beyond the automation components themselves.

The advantages of the 3rd generation ...

- Reduced weight of the robot arm
- Reduced floor space requirement
- Less space required overhead
- Larger envelope depth to the front and below for demolding and setting down parts
- Robot knee (intersection of axes 1 and 2) moved forward and down to move around obstacles
- Point of application just above the fixed tool clamping surface
- Optimal synchronization with the machine due to improved software packages

... and the benefits for you

- Optimized cycle times through the use of non-productive time for finishing
- Complex removal from molds with 3D undercutting
- 3D unloading synchronized with the machine
- Reduced rejects
- Higher availability
- Up to 30 % greater output
- Reduced personnel requirements
- Up to 40 % time savings for unloading
- A second handling unit for delicate operations is no longer needed
- Ideal combination for high carrying capacities and precise unloading



THE 3D ADVANTAGE

6-axis robots give you the decisive edge

6-axis robots offer many advantages compared to linear gantry machines: they have longer service lives and lower maintenance requirements, and are a more secure capital investment. Peripheral equipment is not article-specific and can be re-used. Complex components can be demolded either with force or delicately. And thanks to their great flexibility and freedom of movement in 3D space, non-productive time can be used effectively.

The most important advantages of 6-axis robots at a glance

- Speed: fast and reliable – even for complex tasks
- Availability: nearly 100 %
- Stiffness: very high stiffness when removing parts
- Height: suitable even for shops with low ceilings
- Use in clean rooms: advantages of internally-located equipment; floor space requirements and costs for procurement and maintenance are very low
- Mold cost savings: inexpensive injection molds
- Cleanness and quality: quality is not compromised by contamination with oil, etc.; parts do not have to be cleaned

UP CLOSE ALONGSIDE ON TOP INVERTED CENTRAL

Whatever their position, KUKA robots are masters of the situation: depending on the specific requirements with regard to handling, paths, operator control, the position of the injection mold, safety, unloading with the safety gate open or closed, accessibility for maintenance, and floor space requirements, KUKA shelf-mounted robots can be installed on top of, alongside, or over the machine.

On top of the injection molding machine

Shelf-mounted robots are installed on top of the machine either on the operator side (mounted on a fixed tool clamping surface), or on the non-operator side. With both variants, connections to the robot (motor cable/data cable) should be made from behind, since the area above the injection molding machine is not used for unloading the parts.

- Clear layout
- Space-saving
- Unloading with safety gate closed
- Short unloading times
- Safety for operating personnel

On the floor next to the injection molding machine

With the robot positioned on the floor on the non-operator side of the machine, the safety enclosure of the robotic cell must meet the same technical safety specifications as the injection molding machine, since the parts are removed with the safety gate open.

- Good accessibility for maintenance
- Operation with small injection molding machines
- Retrofitting of existing automation solutions
- Low or medium clamping force ranges
- Ideal for clean rooms or shops with low ceilings

Over the injection molding machine

This alternative method of mounting the robot in an inverted position over the machine is preferable with machines subject to very strong vibrations. An ideal combination of process reliability and cycle time is thus achieved. The work envelope can be expanded significantly by means of a traversing unit.

- Flexible
- Space-saving
- Resistant to vibrations
- Unloading with safety gate closed
- Short unloading times

POSITION POSSIBLE

Process illustration

The range of possible applications for KUKA robots knows practically no bounds. In an overall process, a KUKA robot can carry out not only loading and unloading, but also the additional processing steps right up to the final set-down of the part. With a simple change of tools, a single robot type can be used to implement a number of different subprocesses. Example: removal of bumpers with subsequent high-precision finishing in the visible area. No additional periphery is required in this case.

Demolding

Thanks to its tremendous freedom of movement, the shelf-mounted robot can even remove parts from undercut molds more quickly, and either with force or delicately.

Setting down and locating

The robot holds the part in a device on its wrist where sprue can be removed or stamping operations can be carried out. The corresponding automation process can be expanded or modified step by step.

Removing sprue and webs

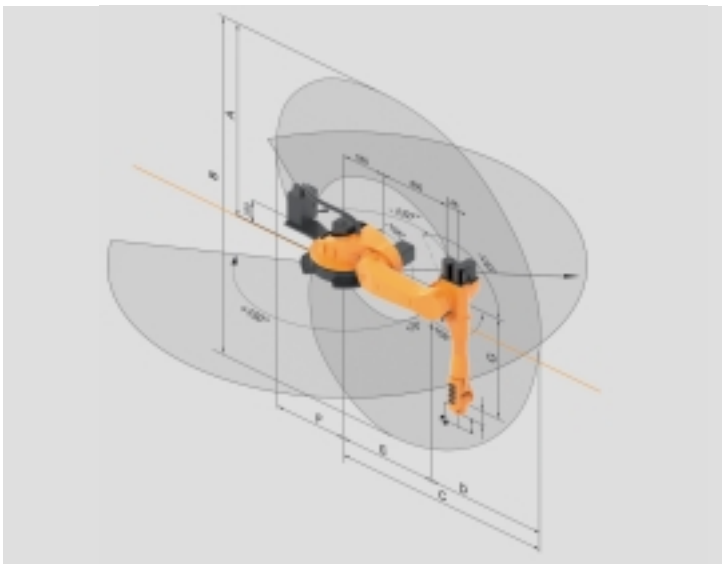
The robot removes sprue and webs along precise contours, even on the visible side of the workpiece. From the prototype to the production part, re-designs and component modifications can be made in a minimum of time by means of simple program changes.

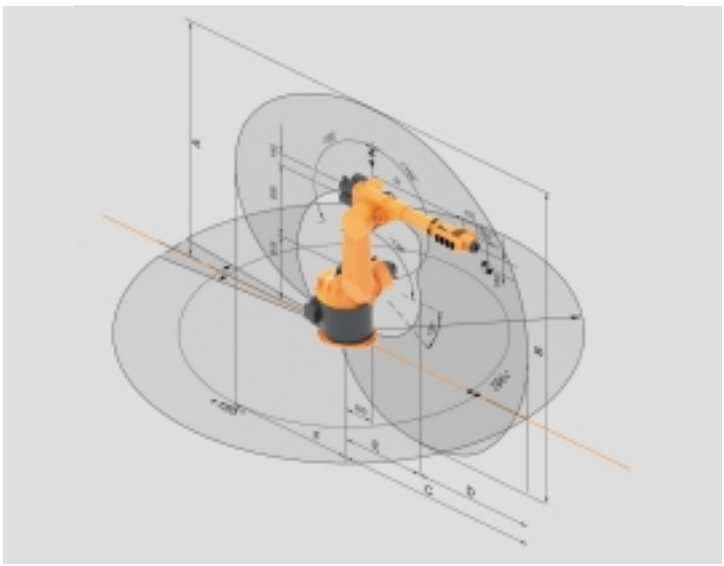
Inspection and final set-down

Machining is followed by a quality inspection and application of a barcode. Then the robot sets the component down on a cooling conveyor or – depending on the palletizing method – in a transport frame.

FLEXIBLE
LONG-REACHING
POWERFUL
CUSTOM-TAILORED
DIVERSE

KUKA offers you the largest product range of shelf-mounted robots, with a wide variety of reaches and work envelopes. These can be custom-tailored through the use of optional arm extensions or additional KUKA traversing units. The models which have been further developed especially for plastics processing have payloads from 6 to 210 kg.

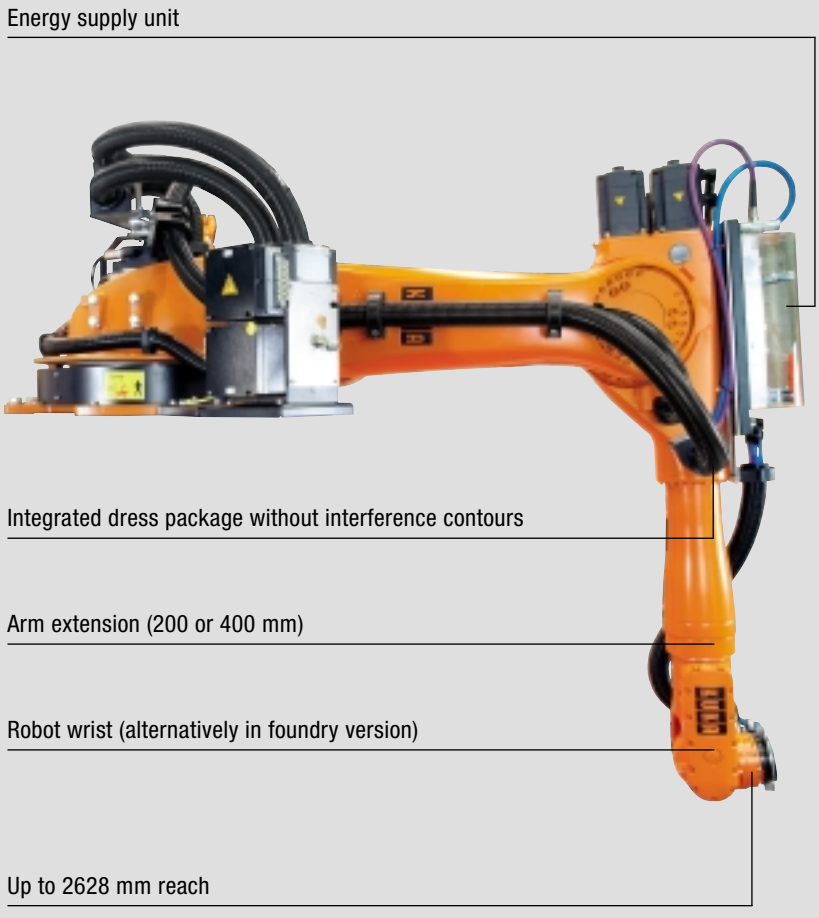




Work envelope	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	Volume (m^3)
KR 60 L30-3 KS	2,330	4,130	2,628	1,445	1,183	900	1,220	47.9
KR 60 L30-3	2,894	3,795	2,429	1,445	983	1,480	1,220	47.8

KUKA SHELF-MOUNTED ROBOTS

Configuration example based on a KR 60 L30-3 KS shelf-mounted robot



Only KUKA offers you synchronization of the robot and the machine

KUKA machine synchronization continuously coordinates the position sensing system of the machine with the robot position. Advantages:

- Optimal cycles and reduced wear on the robot arm
- No collisions between mold and end-effector
- Machine safety category 2
- KUKA.PLC for control of the system periphery included

Compact energy supply unit on axis A3

The energy supply unit is available in a choice of variants: Profibus DP, Interbus and CAN DeviceNet. The full configuration contains four vacuum suction nozzles with an air-saving mode, and includes four vacuum monitors with LEDs. The advantage: the more time used to generate the vacuum on the component, the more energy that can be saved.

Electrical EUROMAP E 12 or E 67

For reliable signal exchange between the machine and the handling equipment, the KR C2 control cabinet comes with either the EUROMAP E12 standardized interface, or the newer EUROMAP E 67.

MODULARITY FOR ADDED VALUE – KUKA SHELF-MOUNTED ROBOTS CAN BE U

Interfaces

Euromap E 12
Euromap E 67

Energy supply units on axis A3

Energy supply systems

PlastTech synchronization software

Additional options e.g. HMI Studio, KUKA.PLC

Controller

KUKA KCP

KUKA KR C2

External peripheries, e.g. linear robots, assembly stations

Robots

Low payloads

Medium payloads

High payloads

The major advantage of KUKA shelf-mounted robots is their modular construction. And this begins even during their manufacture: the robot arm and its components are painted separately; sensitive components such as cables and motors thus remain unpainted, and do not stick to each other. Heat generated by the motors does not result in any unpleasant fumes. Not only can KUKA robots be used in a wide range of industries and applications, they can also be custom-adapted to any situation – by means of arm extensions, for example. The advantages: high availability, small number of components, and short delivery times.

SED FLEXIBLY

Modular components

Reach	Horizontal	1,801 mm	1,801 mm	2,101 mm
	Vertical	1,105 mm	1,105 mm	1,405 mm
Module		Wrist	Wrist	Arm extension 300 mm
				
Payload	6 kg	KR 6 KS		KR 16 L6 KS
	16 kg		KR 16 KS	

Recommended for injection molding machines up to 500 t

Reach	Horizontal	2,233 mm	2,433 mm	2,628 mm
	Vertical	1,402 mm	1,600 mm	1,800 mm
Module		Wrist	Arm extension 200 mm	Arm extension 400 mm
				
Payload	30 kg	KR 30-3 KS		KR 60 L30-3 KS
	45 kg		KR 60 L45-3 KS	
	60 kg	KR 60-3 KS		

Recommended for injection molding machines up to 1,200 t

Reach	Horizontal	3,100 mm	3,300 mm	3,500 mm	3,700 mm	3,900 mm
	Vertical	1,575 mm	1,775 mm	1,975 mm	2,175 mm	2,375 mm
Module		Wrist	Arm extension 200 mm	Arm extension 400 mm	Arm extension 600 mm	Arm extension 800 mm
						
Payload	100 kg				KR 180 L100-2 K	KR 210 L100-2 K
	110 kg			KR 150 L110-2 K		
	130 kg		KR 150 L130-2 K	KR 180 L130-2 K		
	150 kg	KR 150-2 K	KR 180 L150-2 K	KR 210 L150-2 K		
	180 kg	KR 180-2 K	KR 210 L180-2 K			
	210 kg	KR 210-2 K				

Recommended for injection molding machines over 1,200 t

Machines

SUPERIOR ON THE FLOOR, TOO – KUKA ROBOTS ARE FLEXIBLE IN ANY POSI

Interfaces

Euromap E 12
Euromap E 67

Energy supply units
on axis A3

Energy supply
systems

PlastTech
synchronization software

Additional options
e.g. HMI Studio, KUKA.PLC

Controller

KUKA KCP

KUKA KR C2

External peripheries, e.g. linear
robots, assembly stations

Robots

Low payloads

Medium payloads

High payloads

What applies to our shelf-mounted robots is just as true on the floor: whatever the nature of their application, whatever task your robot has to perform, and whatever the ambient conditions – our robots' modular design guarantees you the optimal solution. The KUKA KR C2 controller makes it possible to implement complete manufacturing processes, including the most varied of tasks and equipment – such as floor-mounted and shelf-mounted robots (and their synchronization) – through the use of an integrated control concept.

TION

Modular components

Machines

Reach	Horizontal	1,611 mm	1,611 mm	1,911 mm	
Module		Wrist	Wrist	Arm extension 300 mm	
					
Payload	6 kg	KR 6		KR 16 L6	
	16 kg		KR 16		

Recommended for injection molding machines up to 500 t

Reach	Horizontal	2,033 mm	3,102 mm	2,230 mm	2,429 mm
Module		Wrist	Wrist	Arm extension 200 mm	Arm extension 400 mm
					
Payload	16 kg		KR 30 L16		
	30 kg	KR 30-3			KR 60 L30-3
	45 kg			KR 60 L45-3	
	60 kg	KR 60-3			

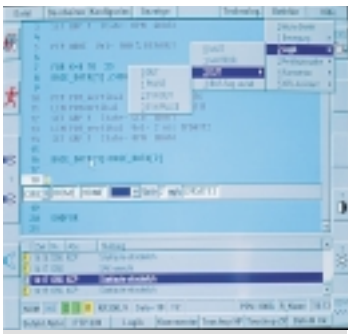
Recommended for injection molding machines up to 1,200 t

Reach	comp	2,400 mm	2,600 mm	2,800 mm
	Series 2000	2,700 mm	2,900 mm	3,100 mm
Module		Wrist	Arm extension 200 mm	Arm extension 400 mm
				
Payload	100 kg	KR 100 comp		KR 140 L100 comp
	110 kg			KR 150 L110-2 Series 2000
	120 kg		KR 140 L120 comp	
	130 kg		KR 150 L130-2 Series 2000	KR 180 L130-2 Series 2000
	140 kg	KR 140 comp		KR 200 L140 comp
	150 kg	KR 150-2 Series 2000	KR 180 L150-2 Series 2000	KR 210 L150-2 Series 2000
	170 kg		KR 200 L170 comp	
	180 kg	KR 180-2 Series 2000	KR 210 L180-2 Series 2000	KR 240 L180-2 Series 2000
	200 kg	KR 200 comp		
	210 kg	KR 210-2 Series 2000	KR 240 L210-2 Series 2000	
	240 kg	KR 240-2 Series 2000		

Recommended for injection molding machines over 1,200 t

SIMULATE CONSULT PROGRAM TRAIN CONTROL SUPPORT

KUKA control technology makes operator control of your robot easy. Integration into higher-level control structures is no problem. Special offline and simulation programs shorten start-up times and help you to optimize your custom programming.



Offline programming with KRC Office

With KRC Office, you can program your entire process offline. Your advantages: production can meanwhile continue uninterrupted. Conversion time is minimized. Newly created programs can be used without modification.

Simulating applications with KUKA Sim

With KUKA Sim you can create a simulation of your entire application. This enables system concepts, processes, cycle times, reaches, collision checks and offline programming to be tested in a targeted manner and, if required, optimized before commissioning.

Simple operator control with the KUKA KCP

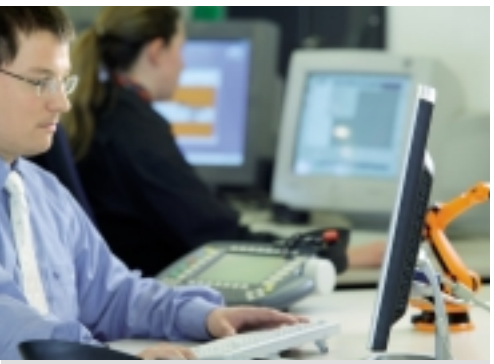
The KCP combines simple operator control with rapid programming: template forms and simple menu-guided programming make it easy to input commands; the 6D mouse can be used to move the individual robot axes intuitively and to save the corresponding coordinates directly.

Easy programming with the KUKA KR C

The robot controller can be programmed extremely easily thanks to its Microsoft Windows interface. It is expandable, can be integrated into networks via a bus, and contains ready-made software packages – important factors for the automation of the future.

Customer support

In addition to custom-tailored robot systems, spare parts, robot rentals and used robots, KUKA also offers you a wide range of services: from planning to commissioning and production – our employees support you during every phase of your project. And our worldwide, modularly structured seminar program imparts valuable expertise – and can also provide robot cells for training at your location.

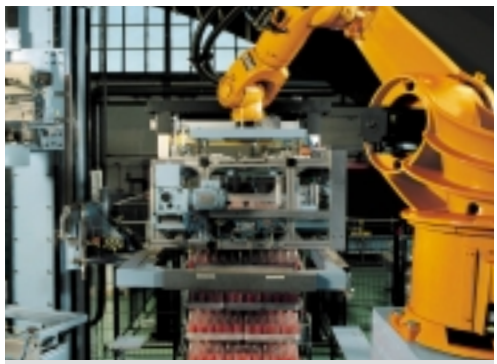


Planning

Customer-specific user interfaces, application software, offline programming, simulation, cycle time analyses, feasibility studies, documentation – even in the planning phase KUKA will provide you with whatever you need to ensure that your system will operate smoothly later.

Commissioning

We optimally integrate custom software modules, sensors, vision systems and robot tools, carry out load analyses while the program is running, and give you advice, support and instruction during the commissioning process – all to help ensure that your system is cost-effective to operate right from the outset.



Production

Programming, optimization, immediate assistance – with KUKA, the availability of your systems is in the best of hands. Let us prove it: with remote diagnosis, a 24/7 hotline, on-site servicing, updates and upgrades, customized maintenance agreements, spare and used parts, cutting-edge logistics, and much more.

The KUKA partner network

KUKA works together with selected specialists in various industries to implement the optimal solution for you. These system integrators are brought together in the KUKA partner network. Our close cooperation with manufacturers of plastics processing machines, system partners and innovative end customers is one of the main foundation stones of KUKA's success – and a constant challenge to optimize our solutions still further. Thanks to this expertise in creating custom solutions, and its dense network of regional training and service centers, KUKA has earned an outstanding reputation in the plastics industry.

KUKA Roboter GmbH is a founding member and partner in www.if-kunststoffindustrie.de

Innovations Forum Kunststoffindustrie

WM-Nr. 841878/E/2/09.05

CONTACT INFO ADDRESSES

KUKA offers a comprehensive range of products, with optimal solutions for every requirement and every industry. What can KUKA do for you?

Low payloads	Medium payloads	High payloads	Very high payloads	Special models
				
from 3 to 16 kg	from 30 to 60 kg	from 100 to 240 kg	from 360 to 570 kg	Shelf-mounted robots Palletizing robots Press-to-press robots Foundry versions

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