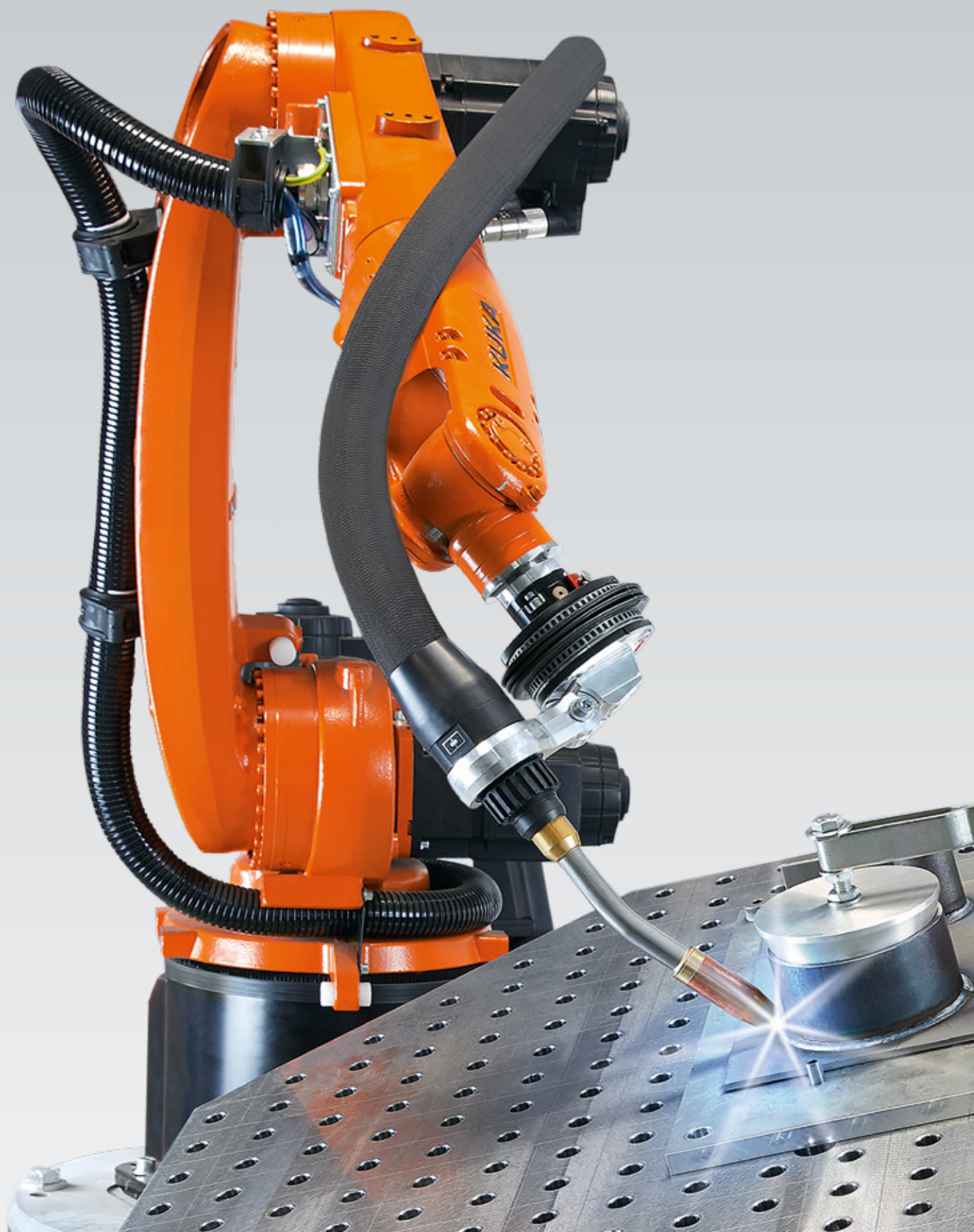


KUKA



Perfected quality
_Robots for arc welding



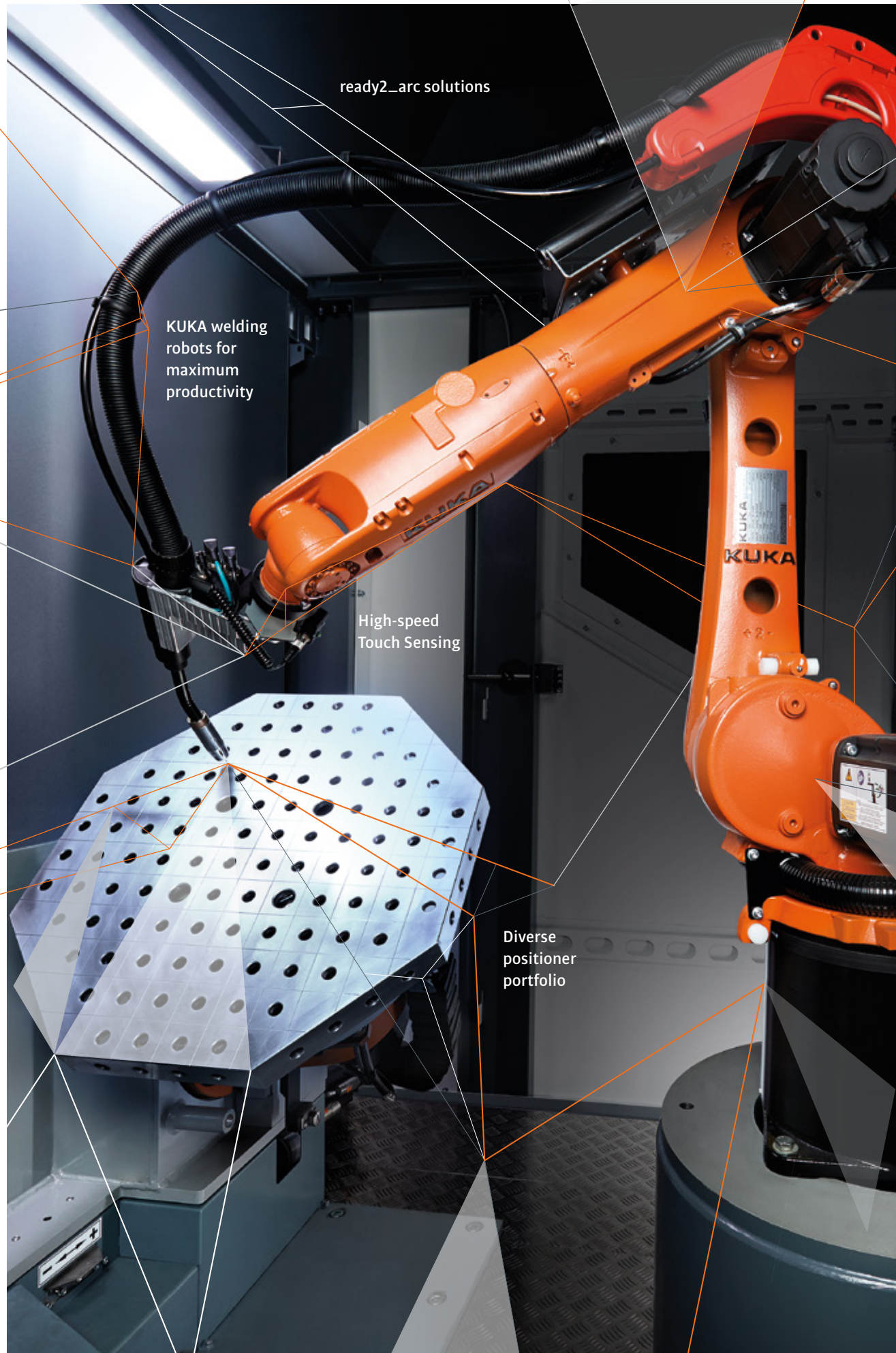


Always one step ahead

Industrie 4.0-ready arc welding

For our customers in the central metalworking sectors, it is important to manufacture large and complex machines which are processed to perfection down to the tiniest weld seam. This is a challenge that future-oriented automation solutions and intelligent robotics from KUKA were designed to meet. Our welding robots stand out for their significantly increased productivity made possible by a greater number of more precise process steps, reduced cycle times and long maintenance intervals.

As a thought leader and trailblazer, KUKA offers permanent security of investment as well as smart integration capability into the digital and networked production world of Industrie 4.0 and the Internet of Things. The result is greater effectiveness and flexibility throughout the entire value creation chain.



Not all robots are the same. Service-proven arc welding with KUKA

Industrial welding robots must master numerous challenges simultaneously. Besides absolute quality and reliability, they must ensure simple operator control and high productivity.

Using the proven KUKA six-point program for arc welding, we work with you to develop a suitable robot system which optimally supports the work output of human personnel and provides supplementary assistance at decisive points.

1 Success despite price pressure

The pressure on prices will increase drastically in the metal industry. To remain successful, you have to continuously remain one step ahead of your competitors. We help you to gain a clear advantage in the highly competitive marketplace through the use of tailor-made, robot-based automation solutions. Pages 6 – 7

2 Maximum efficiency

Would you like to keep maintenance costs to a minimum? And achieve all this at maximum efficiency? For decades, our robots have had high-quality mechanical systems which stand out for such characteristics as long maintenance intervals, maintenance-free cable sets and excellent repeatability. Pages 8 – 9

3 Easy and straightforward

Our innovative software technologies, such as KUKA.ArcTech or KUKA.SeamTech, enable the fast and easy programming of weld seams. Any software package can be operated using our clearly structured KUKA smartPAD user interface. Beginning on page 10

4 Ready for Industrie 4.0

The degree of technological maturity in production environments and their components is key for customer development towards Industrie 4.0. Since every company defines its own current situation, every customer requires an individual strategy. Together, we analyze your existing circumstances and incorporate these factors into the planning. Beginning on page 15

5 Top quality despite time pressure

Production conditions are extremely difficult and the time pressure is immense. Nevertheless, customers demand 100 percent quality. Our individual robot systems provide outstanding path accuracy – regardless of whether the welding process involved is MIG/MAG, TIG, plasma or a special welding process. Pages 16 – 17

6 Freely combinable modular system

Would you like to be as flexible as the market in which your company has to prove itself on a daily basis? With our compatible linear units, you can immediately increase the work envelope of the robot many times over. Our high-precision positioners can also be docked onto the robots. Pages 18 – 19

KR CYBERTECH series

The welding specialists with an infinitely rotating 6th axis

Equipped with many innovative technical details, the KR CYBERTECH generation convinces with utmost precision in the low payload category. Thanks to a repeatability of 0.04 mm, the robots can exploit their strengths to the full – even at high speed – and offer an impressive dynamic performance and optimal motion characteristics throughout their entire work envelope. The result is constantly homogeneous manufacturing quality and success in the face of high pressure on prices.

Quality resulting from extreme accuracy

Due to the outstanding path accuracy of our robots, there is no need for complicated reworking. Programmable limit values for the weld parameter data sets ensure adherence to weld parameters, and integrated data set management enables maximum quality assurance for the weld seams.

Ready for immediate use at the push of a button

With an availability of 99.998%, the KUKA controllers KR C4 and KR C4 smallsize-2 ensure the highest possible level of production reliability. Among other ways, this is ensured with shielded, maintenance-free robot cable sets and sealed gear oil chambers as standard.



The new KUKA hollow wrist
With the KR CYBERTECH portfolio, KUKA is also introducing a particularly compact hollow wrist. At 150.2 mm, it is around 52% more streamlined than that of the KR 16 arc HW. Its sleek design enables the automation of manufacturing processes even in cramped spaces that could not previously be accessed.



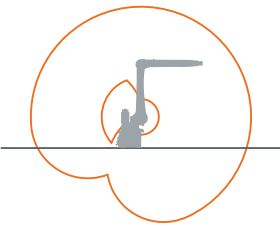
Maximum freedom of movement
Space-saving and intelligently integrated cabling allows KR CYBERTECH robots maximum freedom of motion in any installation position.



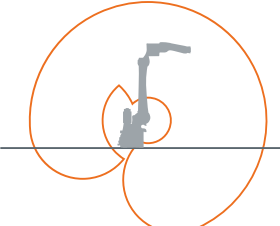
Flexible mounting options
Flexible cell design thanks to floor, ceiling, wall or angle-mounted positions. Increased accessibility thanks to the CYBERTECH series' optimal use of space.

KR CYBERTECH nano		
Type	Reach	Rated payload
KR 6 R1820	1,420 mm	10 kg
KR 6 R1820 arc HW	1,620 mm	8 kg
KR 8 R1620	1,820 mm	6 kg
KR 8 R1620 arc HW	1,420 mm	8 kg
KR 10 R1420	1,620 mm	8 kg
KR 8 R1420 arc HW	1,820 mm	6 kg

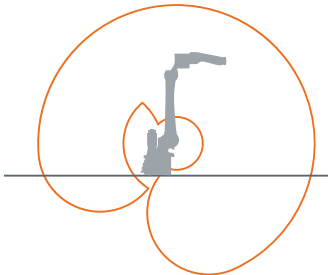
KR CYBERTECH		
Type	Reach	Rated payload
KR 8 R2100 arc HW	2,101 mm	8 kg
KR 8 R2010	2,010 mm	8 kg
KR 12 R1810	1,810 mm	12 kg
KR 16 R2010	2,010 mm	16 kg
KR 16 R1610	1,610 mm	16 kg
KR 20 R1810	1,810 mm	20 kg
KR 22 R1610	1,610 mm	22 kg



Work envelope of the KR CYBERTECH nano



Work envelope of the KR CYBERTECH arc nano



Work envelope of the KR CYBERTECH arc

Everything is included automatically
With the KR C4 smallsize-2 controller, the automation of the future is already included. It reduces costs for integration, maintenance and servicing. The big plus: the efficiency and flexibility of the system are sustainably increased since all integrated controllers share a common database and infrastructure.



ready2_arc

Maximum efficiency thanks to faster integration

With ready2_arc, take advantage of our flexible solution for automated arc welding. The major advantage of this package: it is compatible with all common power sources.

This comprehensive solution is based on KUKA’s longstanding experience with welding packages from a wide range of manufacturers and with the automation of complex welding processes. They are available with welding equipment from various suppliers. Thanks to KUKA’s

close collaboration with leading power source suppliers, ready2_arc packages meet the growing demands of sectors such as tier 1, automotive and general industries.

Reduced complexity.

Dedicated to customer needs.

Faster time to market.

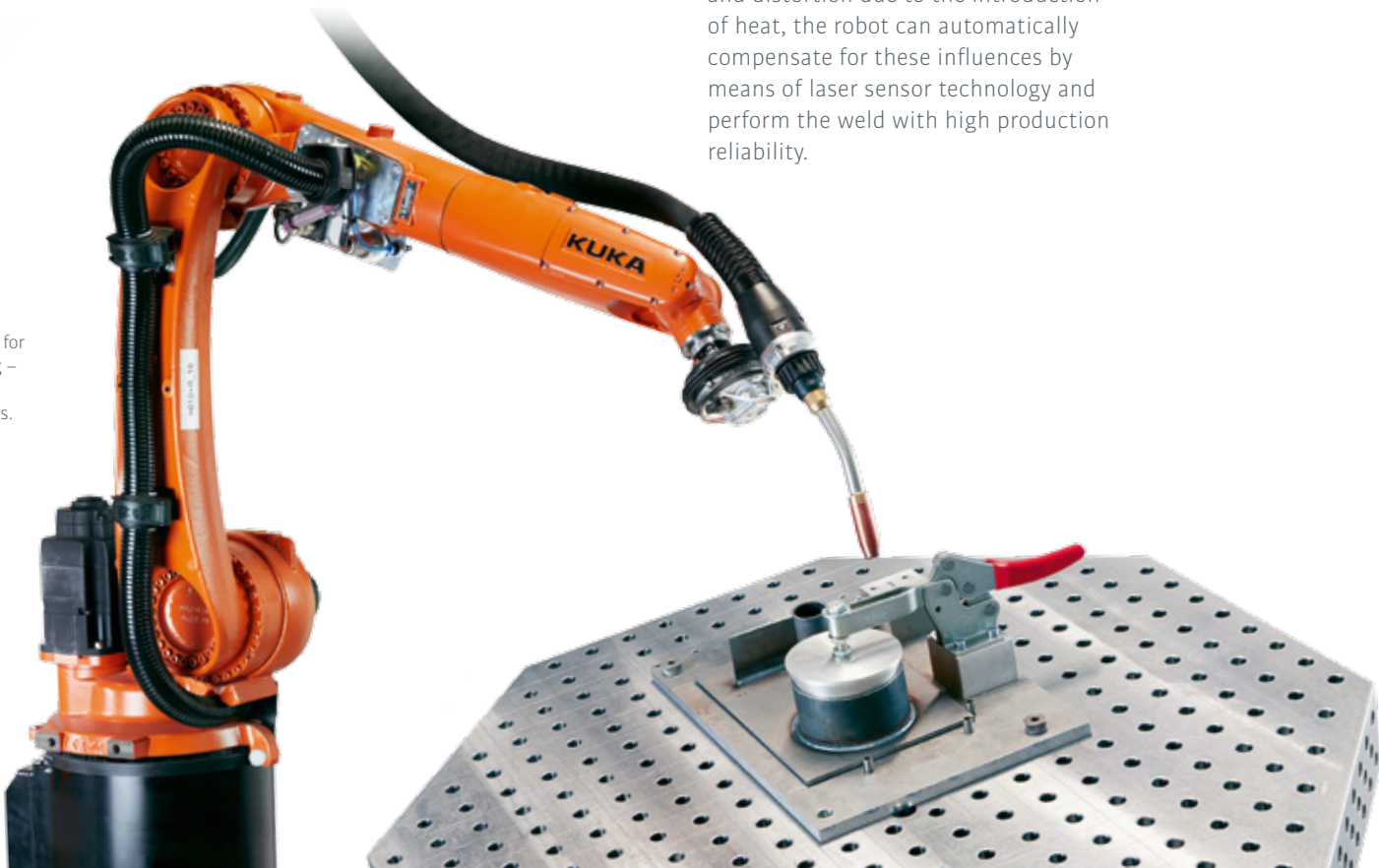
Global impact.



Top quality thanks to seam tracking

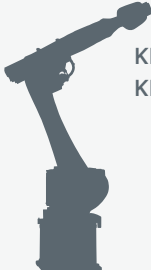
In the case of component tolerances and distortion due to the introduction of heat, the robot can automatically compensate for these influences by means of laser sensor technology and perform the weld with high production reliability.

ready2_arc
Flexible KUKA package for automated arc welding – compatible with all common power sources.



Perfected quality_Robots for arc welding

Three packages, one advantage: maximum flexibility with our modular system

Robot	 KR CYBERTECH nano KR CYBERTECH arc nano  KR CYBERTECH arc KR CYBERTECH arc		
ready2_arc package	Basic package For thin steel-sheet solutions Standard package For steel, CrNi and aluminum solutions Advanced package For steel, CrNi and aluminum solutions with special processes		
	  		
Options	• Torch 36° / 45° / S-36° • Torch cleaner • Wire spool holder • Torch retrofit kits		
Your solution	ready2_arc		

Seamless integration of technology partners.

Nearly all power sources from market-relevant manufacturers can be integrated seamlessly into the KUKA system landscape.



KUKA smartPAD

Easy and straightforward

Master even complex operating tasks easily – that’s what the KUKA smartPAD is designed for. The context-sensitive interface only displays the options relevant at the moment of operation. All six axes can be limited in their motion range using safe technology, monitored for operational stop or completely switched off.

Always up to date

All application and robot messages are displayed in the relevant local language and saved in the logbook.

One display – many functions

The KUKA smartPAD combines all operator control elements and features in an easily accessible manner. This enables the easy programming of simple, more complex and extremely challenging welding applications.



6D mouse and motion keys
With the intuitive 6D mouse, the robot can be moved in all directions as if the welding torch were being guided manually – without the need for repositioning. The 6D mouse can also be used in combination with the motion keys to make quick and targeted settings.



Integrated USB connection
USB port for direct saving and loading of application programs



Status keys
The status display offers the controls required during programming and production. The available functions include the following:

- Welding
- Wire feeding
- Gas
- Acknowledgement of power source messages



Antireflection touch display
Operator control is quick and easy via the well-lit 8.4" screen with an intuitive user interface. Safe and quick operation is even possible when wearing protective gloves.



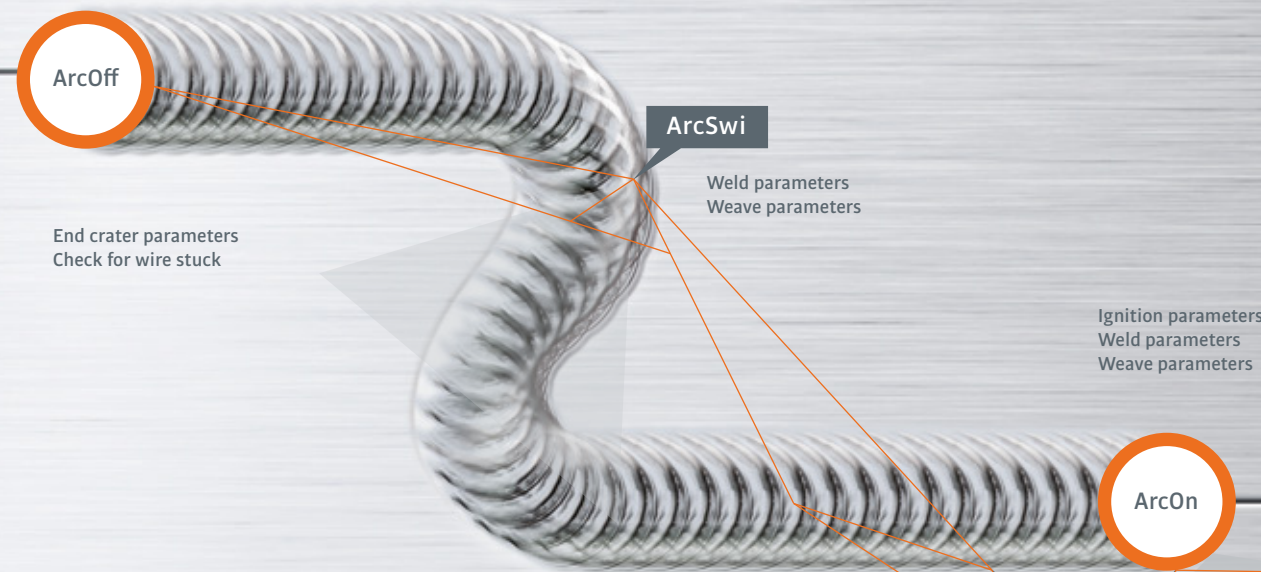
Teach pendant: KUKA smartPAD

Display	Scratch-resistant industrial touch display
Display size	8.4"
Dimensions (W x H x D)	240 x 290 x 50 mm
Weight	1,100 g

KUKA.ArcTech – application software

All parameters at a glance

Keep an eye on all parameters with the products of the KUKA.ArcTech family. The application software provides you with all the required functions for easy operation and programming in order to meet the highest production requirements.



Easy programming and management

KUKA.ArcTech weld parameter management ensures simple programming and optimization of weld parameters. This is achieved by mapping the WPS (Weld Procedure Schedule) on the controller and safeguarding it through the allocation of user groups.

For simple and convenient operation, several practical status keys are provided for the conventional KUKA smartPAD user interface to control the welding process and the power source.

KUKA.ArcTech Basic software

The optimal software package with all the functions for standard welding applications:

- Management of the weld parameter data set for ignition, weld and end crater parameters to implement WPSs
- Editor for online optimization of weld parameters
- Editor for offline optimization of weld parameters in application programs
- Freely definable production display
- Display of web pages for the visualization of power source websites, e.g. for the configuration and programming of weld parameters (e.g. Kemppi A7 welder)
- Manual TCP check



KUKA smartPAD
Programming of weld parameters on the smartHMI user interface

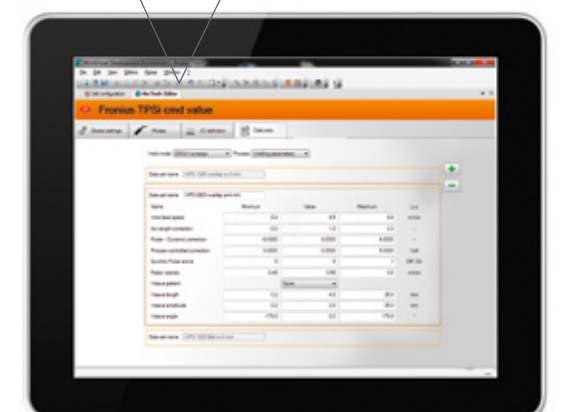
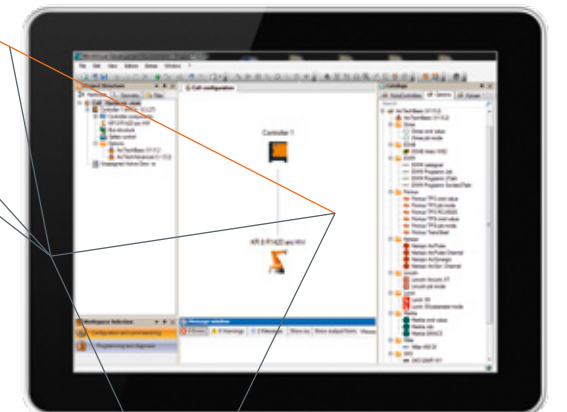


Optional expansion with KUKA.ArcTech Advanced

Supplements KUKA.ArcTech Basic software with additional functions for demanding welding tasks.

- Welding with KUKA.RoboTeam software for synchronized welding on a single part using up to four robots
- Advanced error recovery
- Programmable weld-specific error recovery
- Various thick-plate welding functions
- Weld parameter ramps
- Support of SKS Synchroweld™ and Fronius Dynamic Power Control
- PLC interface for weld seam sequence control
- Engineering interface for user-specific expansions

KUKA.ArcTech weld parameter management for the quick and easy definition of welding tasks. Every weld data set can be assigned process limits for quality assurance.

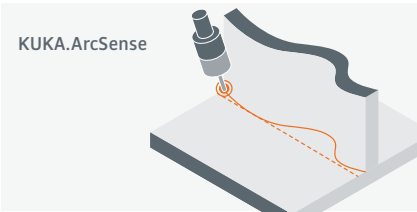


KUKA function and technology software

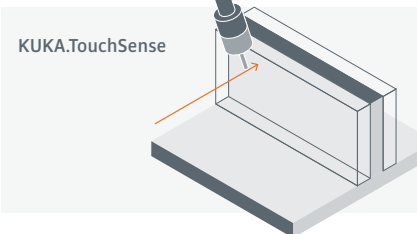
Maximum productivity and flexibility



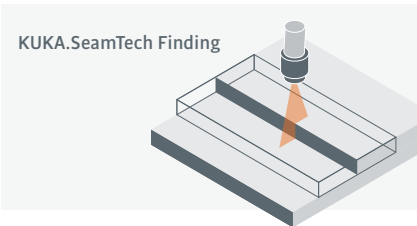
With the new version of KUKA.Sim, every system and every robot can be programmed virtually – offline and on any PC. Here, KUKA.Sim Layout supports the simulation as well as the creation of simple robot sequences. With its extensive component library and Plug&Play functionality, it is the ideal simulation software for sales teams for producing concept studies and accessibility analyses without cycle time specifications. The real-time connection of KUKA.Sim Pro and KUKA.OfficeLite enables the analysis of cycle times, the creation of robot programs as well as the definition of kinematic systems used in KUKA.Sim Layout. **The created simulations can be saved as a video or 3D PDF file at any time and played on any kind of PC.**



The through-arc seam tracking sensor (TAST) is reliable technology that has been proven over many years. Here, KUKA.ArcSense analyzes the actual weld parameters and can thus automatically compensate for tolerances such as heat distortion or workpiece inaccuracy. Arc sensor technology ensures optimum productivity and quality since the weld seam is welded where it should be. **Combinable with all KUKA welding robots, KUKA.ArcSense is a complete software solution which ensures maximum flexibility during the welding process.**



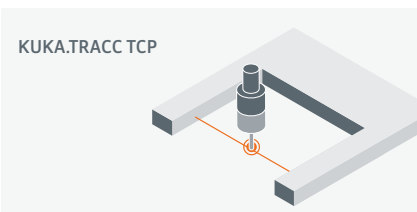
TouchSense enables a KUKA robot to locate parts or seams using the welding torch or an external sensor. The corrections are calculated using the comparative measurement of a taught master part. Compensation for resulting deviations can occur in up to six dimensions. Thanks to the optional Fast Measurement inputs on the KR C4 controller, the search can be carried out at a fast search velocity and with maximum accuracy in the measurement results. **This reduces unproductive time for search runs to a minimum in order to ensure the robotic system's highest levels of productivity.**



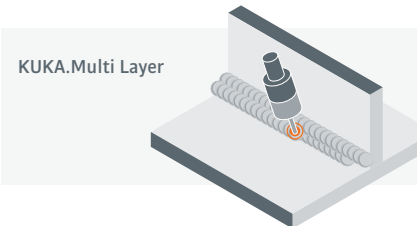
The great advantage of component or seam detection using intelligent line laser sensors is that it can capture multiple component geometry data in a single measurement. The KUKA.SeamTech Finding software uses the captured component geometry to calculate a linear and/or rotational offset of the component, seam or individual path points at great speed. The programmer can use these calculations to compensate for corrections in an extremely flexible manner in up to six dimensions. **In this way, the component can be processed with extremely high accuracy and process reliability.**



With KUKA.SeamTech Tracking, the robot can perform edge and seam tracking during welding using intelligent line laser sensors. Thanks to KUKA's particularly powerful EtherNet real-time interface, the sensor system can carry out high-precision robot path correction with ease not only at the typical MIG/MAG and TIG welding speeds but also at the very high speeds used in laser welding. Thanks to special commands, even the weld start and end can automatically be found. **This allows the robot to independently adapt the seam position and length according to the component being welded.**



With the automatic TCP inspection function KUKA.TRACC TCP, the robot becomes even more effective and independent. This option ensures that the weld seams are made in the correct position since the actual value of the TCP is always checked. This automatically keeps the productivity of the welding cell at the highest level and thus prevents time-consuming manual reprogramming after a collision or the exchange of the torch neck. **The special feature: during absolutely accurate calibration of the TCP, KUKA.TRACC TCP determines and takes into account welding torch inaccuracies.**



The KUKA.MultiLayer software option makes the programming of multi-layer weld seams easier since only the root position needs to be taught in a predefined program structure. For the filler and cover layers, it is only necessary for the offset values to be stored in a database. MultiLayer also enables the programming of every required welding sequence of several seams – **for each weld seam of a multi-layer weld.**

Ready for Industrie 4.0

KUKA Connect – all information close at hand at all times

KUKA Connect is a cloud-based software platform that enables users to access and evaluate their KUKA robots at any time and from anywhere. The platform allows customers to bring their product to market faster and adapt to regulatory requirements more quickly and can also increase efficiency and the customer's innovative strength.

We created KUKA Connect to make the conversion of data into information as easy as possible for our customers. With this continuously available tool, you will be in a position to increase the intelligence of KUKA robot systems throughout the entire life cycle. Anywhere. On any device.

With KUKA Connect, we make full transparency of in-production data possible through the intelligent connection of various layers. It allows you to access and evaluate your usage and consumption-related robot data from any end device.

Here is how KUKA Connect works: if the Nebbiolo box (edge) is integrated into a production cell, it automatically

identifies the connected robots. The harvested data are evaluated in the cloud via the existing micro services in accordance with the customer's requirements. This enables system operators to directly view the status and condition of their robots.

By incorporating the data, KUKA also offers practical services for the robots. For example, if a number of robots are deployed in a system, KUKA Connect automatically calculates optimized maintenance cycles for them. The responsible technicians are immediately notified of any service work required and the entire history is saved and made accessible for each individual robot.

With KUKA Connect, customers can access long-term analyses of their robot systems and can draw conclusions as to their incorporation in the process. For this purpose, KUKA provides the necessary infrastructure for its products and customers.

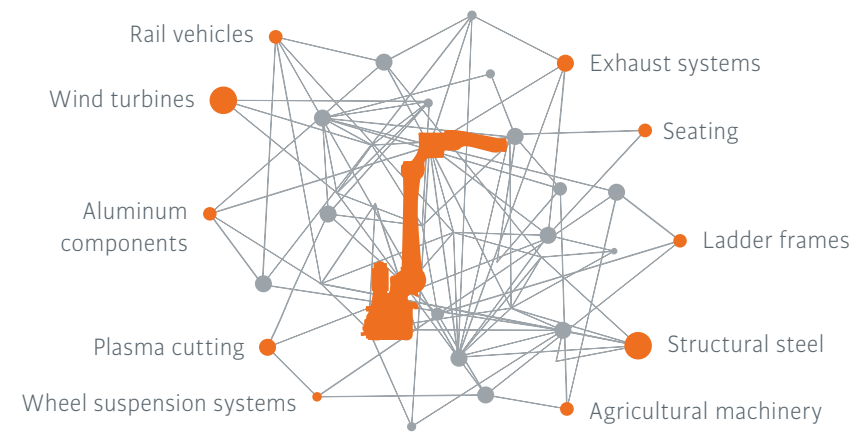
- **Operation:** production optimization
- **Maintenance:** robot condition monitoring, maintenance planning and schedule, anomaly detection and predictive maintenance
- **Service:** remote management, field services, spare parts management and knowledge-based services
- **Resources:** energy optimization and management
- **Date:** static robot data and dynamic operating data



KUKA robots in practice

Flexibility in different applications

Plate thicknesses from 0.5 mm to well over 10 mm – KUKA welding robots give you a vast range of options. Regardless of the time pressure the market imposes on your company, our robot systems make a permanent level of top quality possible. This enables you to meet your customers’ requirements even more quickly, flexibly and cost-effectively.



Fully automated arc welding system for the production of ladder frames.



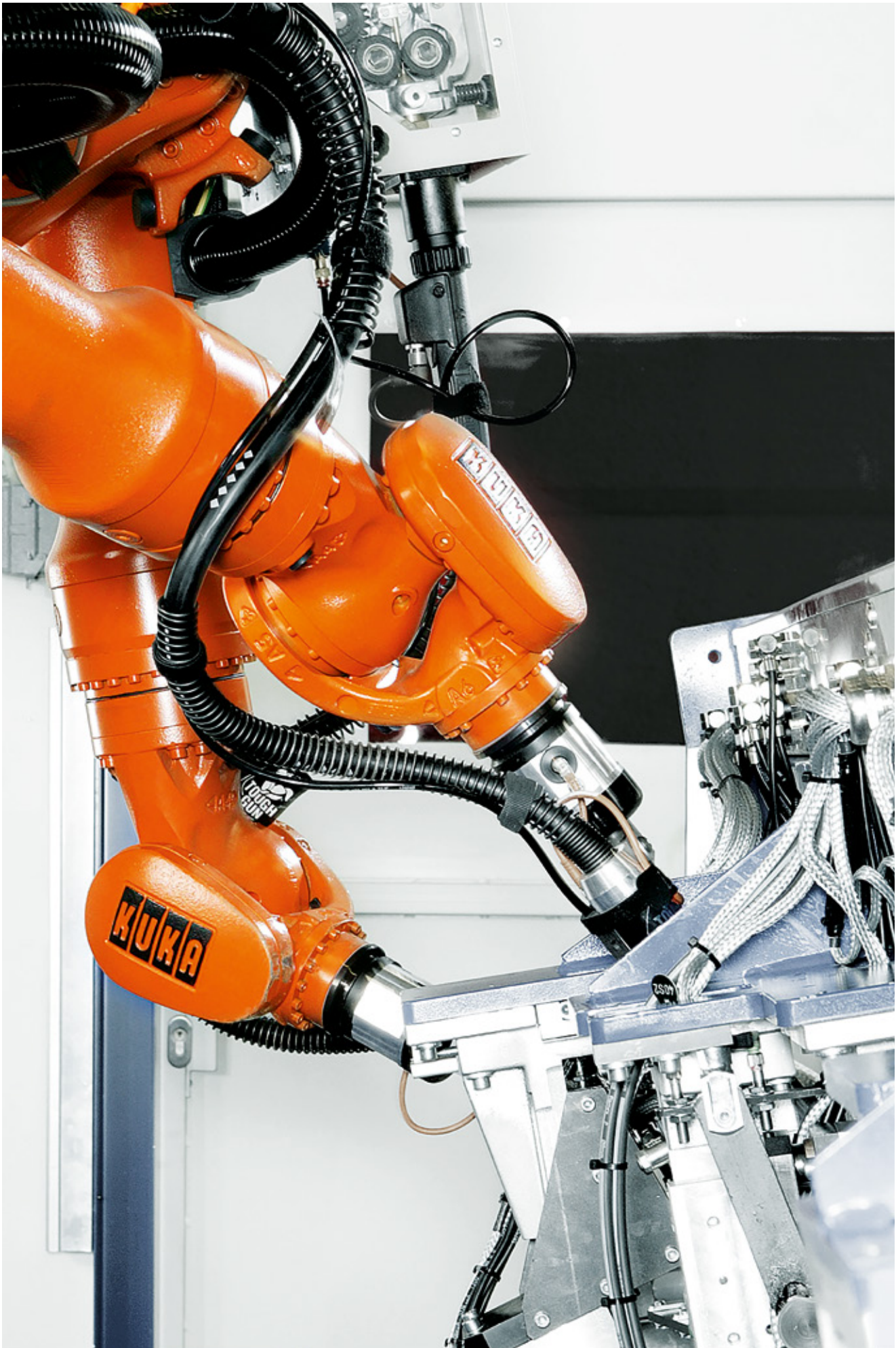
Welding of a motorcycle frame

Jigless welding in commercial vehicle production: the handling robot positions the workpiece to be welded for the two welding robots.



Welding of an articulated lever (concrete pump truck)

Robots cooperating for challenging welding tasks



KUKA robots and positioners

Freely combinable modular system



KR AGILUS – up to 10 kg payload
The KR AGILUS enables you to tap new fields of application through its versatility. Irrespective of the installation position – whether on the floor, ceiling or wall – it offers utmost precision in confined spaces thanks to its integrated energy supply system and service-proven KR C4 controller. This robot is also available in dust and water-protected versions (protection rating IP 67).



KR CYBERTECH nano – up to 10 kg payload
The specialized process robots of the KR CYBERTECH nano product family are perfectly tailored for use with small components (not restricted to handling). Benefit from maximum diversity for greater economical flexibility with minimum investment and energy costs.



KR CYBERTECH – up to 22 kg payload
These powerful and compact multi-function robots are specialized in handling applications – from the handling of large components to arc welding. KR CYBERTECH also convinces through greater integration density and minimal disruptive contours.



KP1-V
Thanks to its small outer dimensions, this single-axis positioner offers space-efficient automation solutions. The hollow shaft in the center of the face plate allows for a direct supply of energy and fluids. Work processes can be made easier and more efficient thanks to the ergonomic loading height.



KP1-H
Thanks to the wide range of tool radii and loading heights that are available, you can enjoy maximum flexibility in design. The integrated horizontal rotational axis provides high-precision positioning. Thanks to its infinitely rotating design, it is optimally positioned in any axis orientation.



DKP
Regardless of which axis it is using, this 2-axis positioner finds the required position quickly and precisely. The DKP allows for the highly process-friendly supply of energy and fluids through the center of the face plate. The tilt-turn positioner also ensures absolutely flexible processing of the workpieces.



KR 30 L16-2 – up to 16 kg payload
The KR 30 produces supreme quality in the shortest cycle times – and, what's more, with unrivaled repeatability. The long arm enables an extremely large work envelope and expands the production options many times over. Proven standard components stand for reliability and durability.



KUKA linear units
With KUKA linear units, you add a further axis to the robot, thereby considerably extending the work envelope of the robot. A great advantage: the linear units are controlled by the same controller as the robot. They can thus be integrated seamlessly into the work sequence – without the need for additional equipment.



KR C4 – the efficient trailblazer
The KR C4 controller is the all-rounder for the automation of tomorrow. It reduces costs in integration, maintenance and servicing. At the same time, the KR C4 sustainably increases the efficiency and flexibility of the systems – thanks to common, open industry standards.



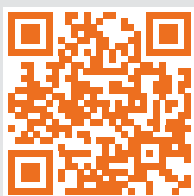
KP3-V2H
With this 3-axis positioner, tailor the dimensions precisely to your specific installation. Various tool radii and distances between face plates are available. All KP3-V2H positioners have the same hole pattern, thus enabling seamless integration. Integrated fork slots ensure simple transportation.



KP3-H2H
A broad selection of tool radii and distances between face plates is available for the KP3-H2H to suit your specific requirements. This 3-axis positioner has been designed with space-saving dimensions. Thanks to its infinitely rotating face plates, optimal processing of the workpiece is possible in any axis orientation.



Motor & MGU (motor/gear units)
Service-proven KUKA motor/gear units and motors enable simplified development and integration of customized solutions. The portfolio of motor and gear units includes variants with torques from 420 to 8,800 Nm. The power of the motors ranges from 300 to 8,600 watts.



www.kuka.com/contacts



www.facebook.com/KUKA.Robotics



www.youtube.com/kukarobotgroup



Twitter: @kuka_roboticsEN

Details provided about the properties and usability of the products are purely for information purposes and do not constitute a guarantee of these characteristics. The extent of goods delivered is determined by the subject matter of the specific contract. No liability accepted for errors or omissions. Subject to technical alterations.
© 2017 KUKA