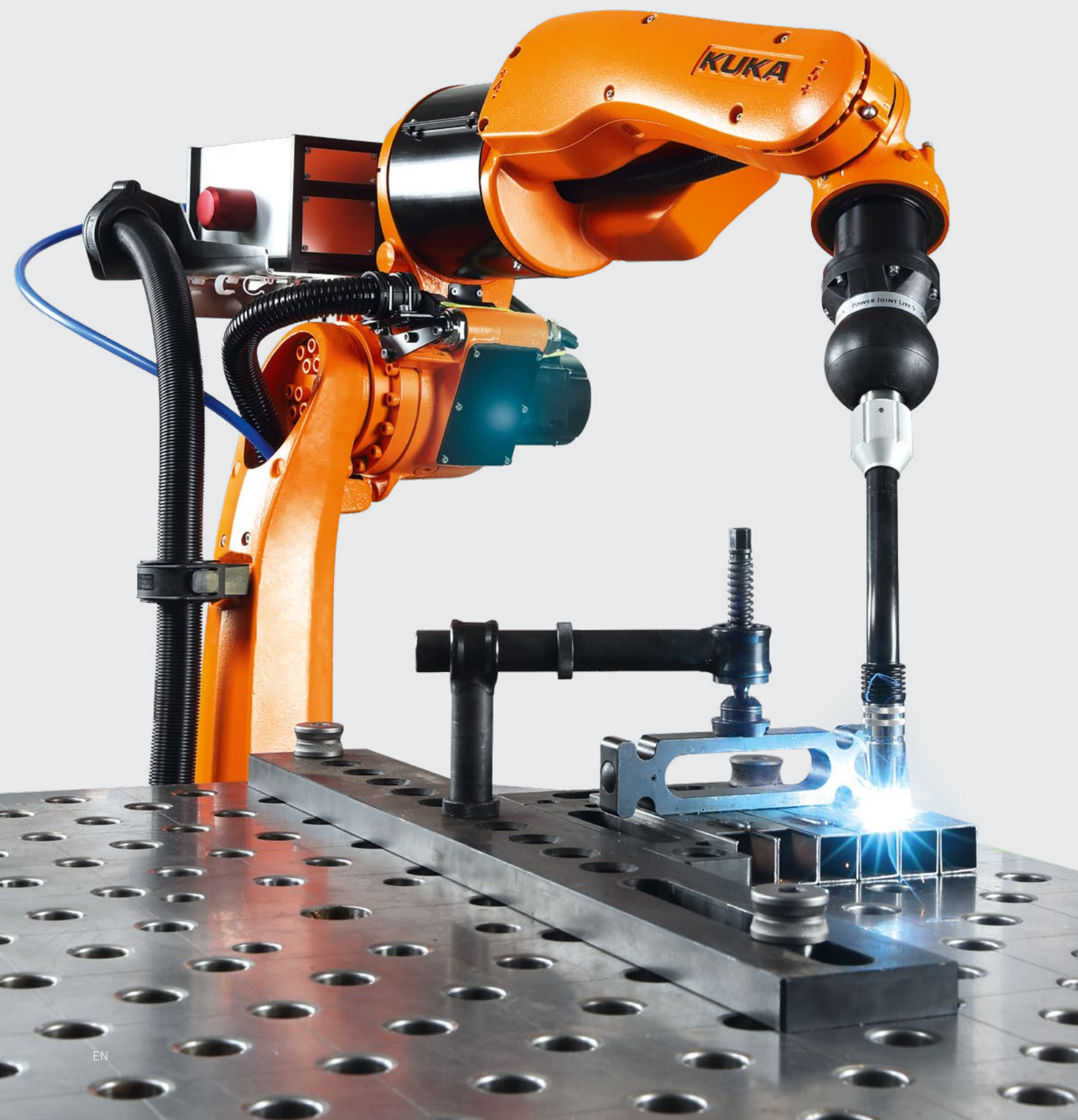


# KUKA



Perfected quality  
\_Robots for arc welding

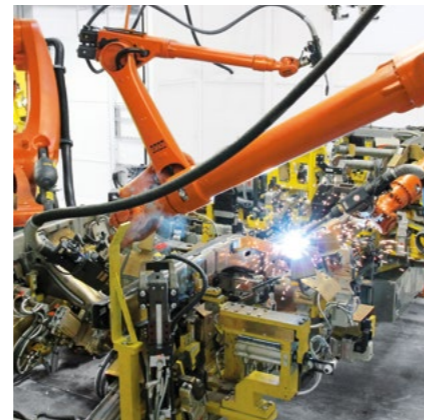
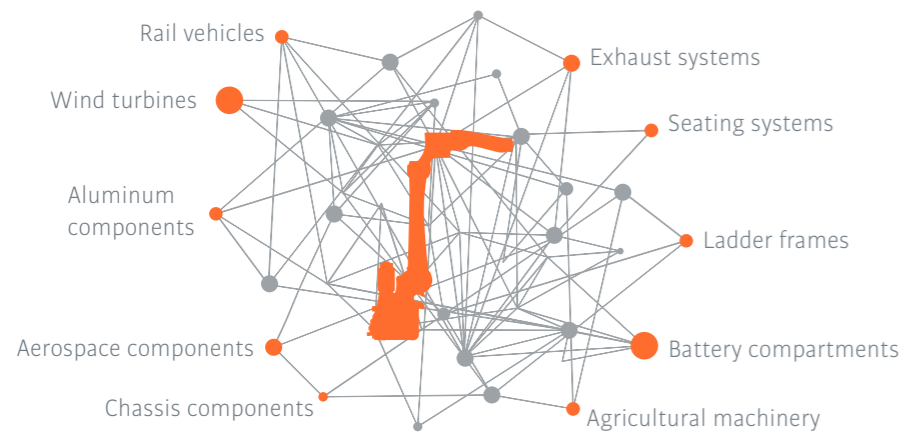




# KUKA robots in practice

## Flexibility in different applications

KUKA welding robots are robust and flexible, making them suitable for a wide range of welding tasks. For confined workspaces and sites with limited access, we offer a broad spectrum of linear axes and positioners. Our wide-ranging portfolio and many years of experience are of particular benefit when it comes to the highly automated and linked production lines of the automotive and components industry. However, we can also support small-batch production and newcomers with intuitive teaching aids and a proprietary offline programming system. KUKA supplies suitable solutions for thick plate welding, such as seam tracking systems and software for multi-layer weld seam structures.

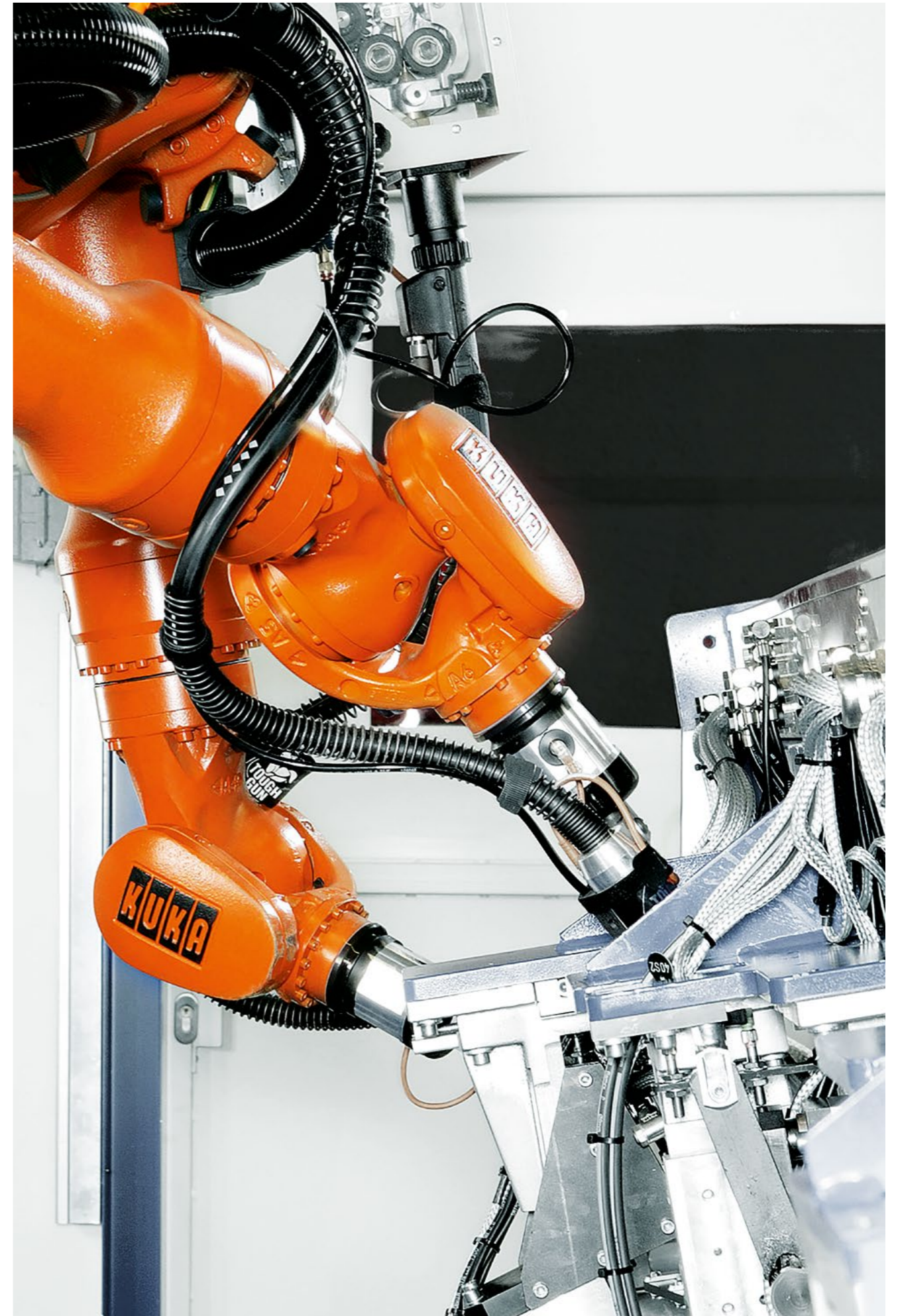


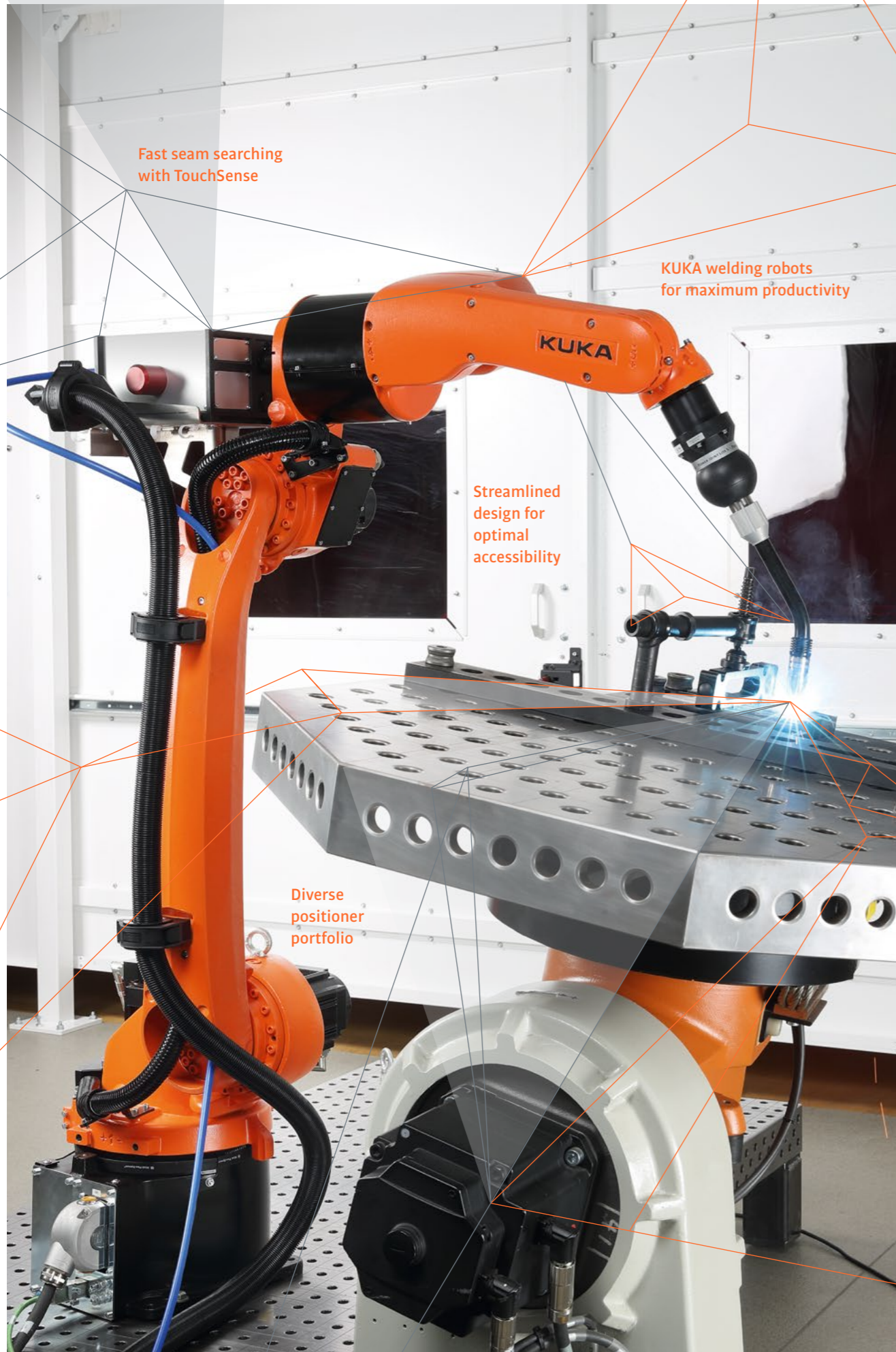
Jigless welding in commercial vehicle production: the handling robot positions the workpiece for welding by the two welding robots.

Compact welding cell for baby carriage components

Fully automated arc welding system for the production of ladder frames

Cooperating robots for challenging welding tasks





Fast seam searching with TouchSense

KUKA welding robots for maximum productivity

Streamlined design for optimal accessibility

Diverse positioner portfolio

## 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 6-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 Top quality despite time pressure

Production conditions are extremely difficult and the time pressure is immense. Nevertheless, customers demand 100% quality. Our individual robot systems offer outstanding path accuracy – regardless of whether the welding process involved is MIG/MAG, TIG, plasma or a special welding process. Pages 4 – 5

#### 2 Success despite price pressure

The pressure on prices in production is set to increase drastically. 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 8 – 9

#### 3 Standardized and yet individual

Get off to a flying start in automated welding with our modular cell4\_arc portfolio. Quickly available and individually preconfigured – for steel or aluminum, for solving problems of all sizes. Utmost manufacturing efficiency, compact solution in confined spaces. Pages 10 – 11

#### 4 Easy and straightforward

Our innovative software technologies, such as KUKA.ArcTech or KUKA.SeamTech, enable the fast and easy programming of weld seams. KUKA.Handguiding in conjunction with preconfigured power sources makes it easy for you to get started. From page 12 onwards

#### 5 On-board process monitoring

To safeguard your welding quality, process parameters can be freely entered in the newly revised process data software from KUKA and compared with limit values. Monitoring is carried out directly on the robot controller – without additional hardware. From page 17 onwards

#### 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

# KUKA robots for arc welding

## The right robot for every application

From the smallest subassemblies in the furniture industry to complete side panels for freight cars: KUKA has the right robot in its portfolio. From the compact KR AGILUS KR 6 R700 with a reach of 700 millimeters to the KR IONTEC KR 20 R3100 with 3,100 millimeters, we cover a wide component spectrum with 6-axis kinematic systems. Should you wish to process larger components, all robots can be traversed up to 30 meters on KUKA linear units. To ensure optimum accessibility during welding, you can choose from a large portfolio of single-axis to 5-axis positioners in different sizes and with different payload capacities. All linear axes and positioners can be controlled by our KR C5 robot controller.

### Quality resulting from top 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. Integrated data set management enables maximum quality assurance for the weld seams.

### Decades of experience for absolute production reliability

Technical availability of the robot and controller has increased from generation to generation; paired with our first-class service, this takes your production to the highest level. Among other ways, this is ensured with shielded, maintenance-free robot cable sets and sealed gear oil chambers as standard.



#### KR AGILUS

Type	Reach	Rated payload
KR 6 R700-2	726 mm	6 kg
KR 6 R900-2	901 mm	6 kg
KR 10 R900-2	901 mm	10 kg
KR 10 R1100-2	1,101 mm	10 kg

#### KR CYBERTECH nano

Type	Reach	Rated payload
KR 6 R1840-2 arc HW	1,843 mm	6 kg
KR 6 R1840-2	1,840 mm	6 kg
KR 8 R1640-2 arc HW	1,641 mm	8 kg
KR 8 R1640-2	1,640 mm	8 kg
KR 8 R1440-2 arc HW	1,441 mm	8 kg
KR 10 R1440-2	1,440 mm	10 kg

#### KR CYBERTECH

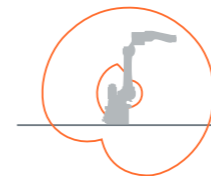
Type	Reach	Rated payload
KR 8 R2100-2 arc HW	2,101 mm	8 kg
KR 8 R2010-2	2,013 mm	8 kg
KR 12 R1810-2	1,813 mm	12 kg
KR 16 R2010-2	2,013 mm	16 kg
KR 16 R1610-2	1,612 mm	16 kg
KR 20 R1810-2	1,813 mm	20 kg
KR 22 R1610-2	1,612 mm	22 kg

#### KR IONTEC

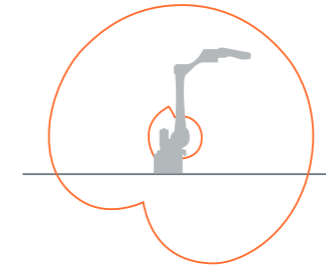
Type	Reach	Rated payload
KR 20 R3100	3,101 mm	20 kg



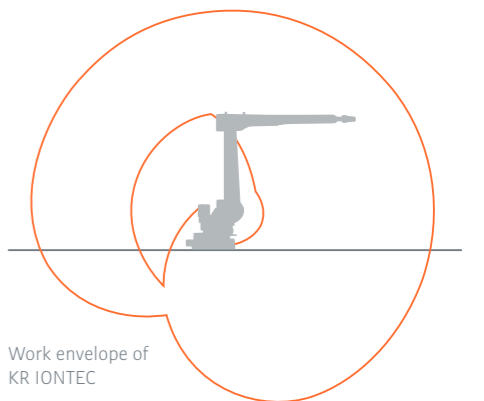
Work envelope of KR AGILUS-2



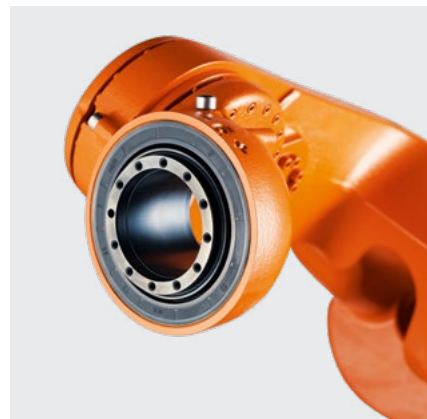
Work envelope of KR CYBERTECH nano ARC



Work envelope of KR CYBERTECH ARC



Work envelope of KR IONTEC



#### KUKA hollow wrist

Our hollow wrist is optimally suited to arc welding applications in confined spaces. It allows rotation of the torch about axis 6; depending on the welding equipment, infinite rotation is also possible. Installation is easy – with dress packages routed close to the robot to relieve strain.



#### KUKA in-line wrist

Our in-line wrists with IP67 certification impress with their streamlined design. They have been designed to master even the harsh ambient conditions encountered during welding and to withstand lubricants and other fluids.

**The beating heart at the center of the production of tomorrow**  
Maximum performance, connectivity and flexibility – with the ground-breaking latest generation of robot controllers from KUKA that set the pulse of automated production racing. The KR C5 can be seamlessly integrated into existing infrastructures and immediately delivers added value with more efficient performance in all areas of application.

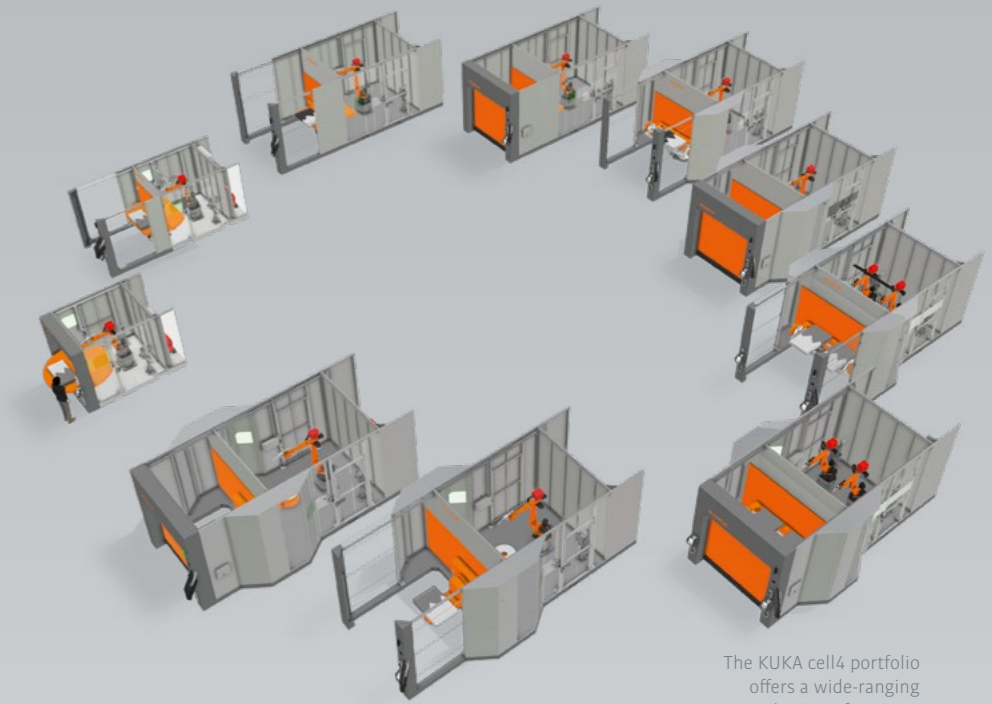


# KUKA cell4\_arc

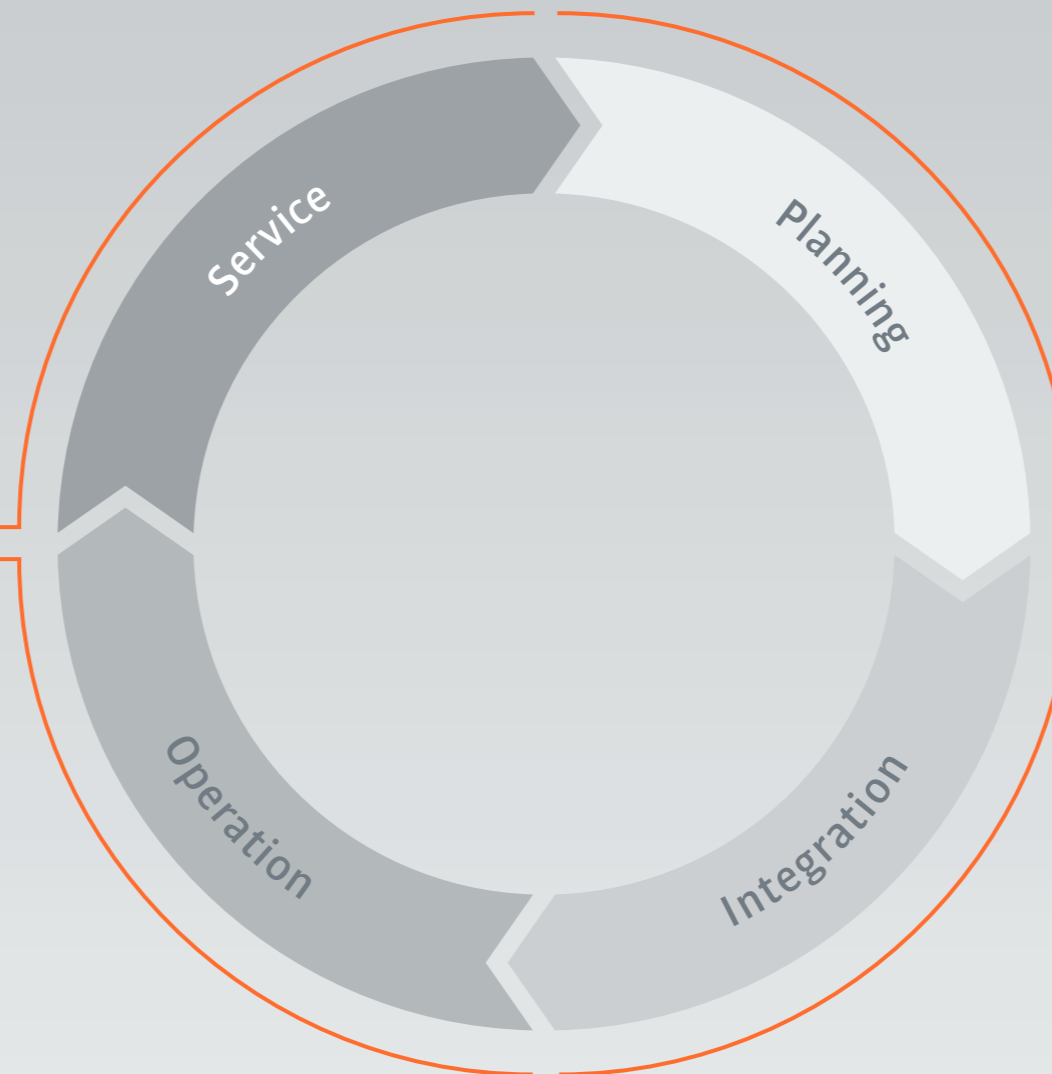
## Powerful concept

With its optimally coordinated components and tried-and-tested arc welding standards, the KUKA MIG/MAG cell is the ideal solution for your welding automation requirements. The intelligent cell concept offers configurable variants and options for your tasks in different performance classes.

Shape the complete life cycle of your system with a comprehensive package.



The KUKA cell4 portfolio offers a wide-ranging selection of options.



### Service

- Increased productivity and minimized downtime
  - 24/7 hotline
  - Global spare parts and service support
  - Remote Service
  - Service agreements and maintenance
  - Role-specific training courses
- Services for maintaining optimal performance throughout the entire life cycle of the machine

### Operation

- High system availability thanks to the use of service-proven components
- Future-oriented KUKA.Web HMI for clear visualization and operator control
- Web access to operating data with freely configurable dashboards
- Quality assurance by means of flexible process data monitoring and component-specific documentation

### Planning

- KUKA supports you in the planning phase
- Fast feasibility studies with KUKA.Sim
- Flexible financing models
- Short delivery times
- Modular structure enables adaptation to your production requirements

### Integration and commissioning

- Short installation times at the customer's site
- Simple integration of fixtures and other system components
- Easy programming with KUKA technology packages and ready2\_pilot
- Offline programming with KUKA.Sim

# KUKA smartPAD

## Easy and straightforward

Master even complex operating tasks easily – that’s what the KUKA smartPAD is designed for. The context-specific user 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 easy programming of simple, more complex and extremely challenging welding applications.

# Intuitive control package

## Precise and user-friendly

KUKA.Handguiding makes hand guiding and programming mere child’s play. The hand guiding mouse is quickly mounted on the welding torch and immediately ready for use. Manual guidance directly on the tool enables fast teaching of the desired sequences. Whether precise welding paths or approximate positions during handling, whether a maneuverable small robot such as the KUKA KR AGILUS or a heavy-duty giant such as the KUKA KR 1000 titan – with KUKA.Handguiding you can meet a wide variety of requirements simply and easily.

### Intuitive, reorienting 6D mouse

Operation of KUKA.Handguiding is child’s play and is carried out using an intuitive 6D mouse with no training required. Fastened directly with adapter to robot, welding torch or gripper, the mouse can be used from different positions and thus always remains within the user’s reach.

### Teaching directly at the tool

Action buttons of the 6D mouse enable quick access to freely selectable functions. From opening and closing a gripper to saving positions in the robot program or in combination with ArcTech for inserting application commands: a simple click suffices and saves precious time.

### Freedom of motion to the right degree

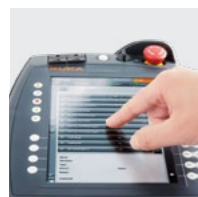
Move the robot exclusively on your desired path by simply deactivating directions that are not required. This prevents unintentional drifting and saves time-consuming corrections.

### Connectivity and flexibility

The wireless concept of KUKA.Handguiding is compatible with all standard KUKA robots and ensures maximum freedom for operator control.



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

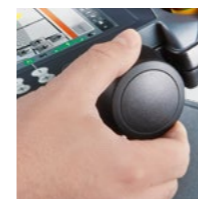


**Antireflection touch display**  
Operator control is quick and easy via the well-lit 8.4" screen with an intuitive user interface. Safe and quick operation is even possible when wearing protective gloves.



**Status keys**  
The status display and status keys offer optimal control during programming and production. The available functions include the following:

- Welding
- Wire feeding
- Shielding gas test
- Acknowledgement of power source messages



**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. Additionally, up to eight axes or external axes can be controlled directly using separate jog keys with no switching required.

#### Teach pendant: KUKA smartPAD

Display	Scratch-resistant, capacitive, industrial touch display
Display size	8.4"
Dimensions (H x W x D)	292 x 247 x 63 mm
Weight	1,100 g

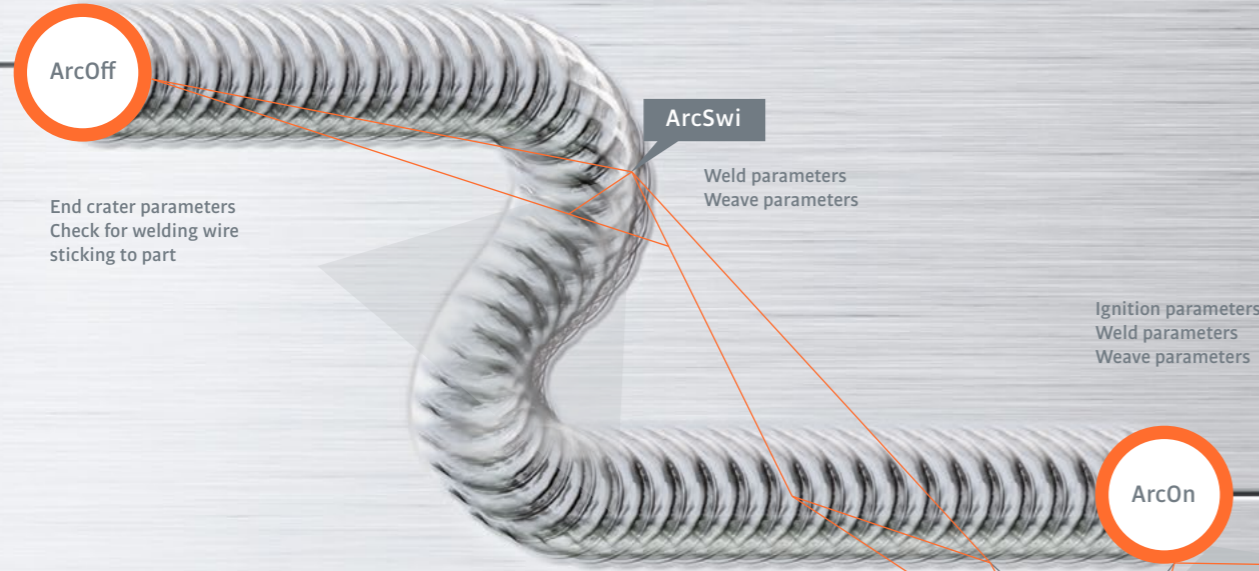
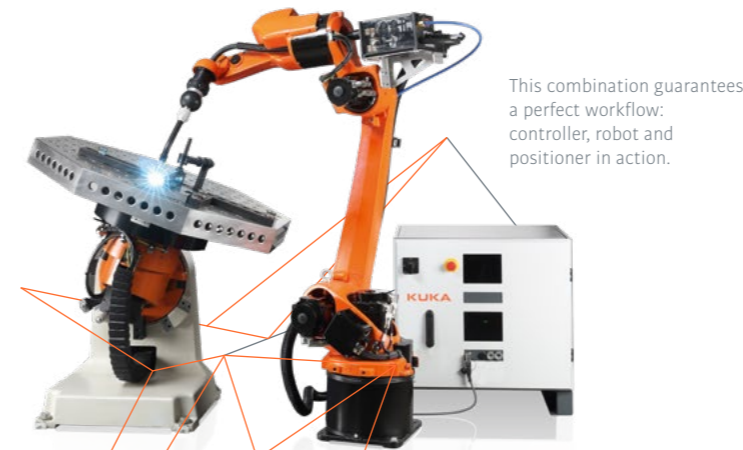


The path points are addressed by means of manual guidance directly at the torch during welding. Context-specific welding and motion commands can be entered using the buttons on the 6D mouse.

# KUKA.ArcTech – application software

## Simplicity, performance and quality

With the products of the KUKA.ArcTech family, you receive an automation solution that is optimized for welding applications. The application software provides you with all essential functions for easy operation and programming in order to meet the highest production requirements.



### Simple start-up and programming

KUKA.ArcTech weld parameter management ensures simple programming and optimization of weld parameters. This is achieved by mapping the weld procedure specification (WPS) in a weld data set.

For simple and convenient operation, several EasyTech status keys are added to the familiar KUKA smartPAD user interface. This allows intuitive programming of weld seams.

### KUKA.ArcTech Basic Software

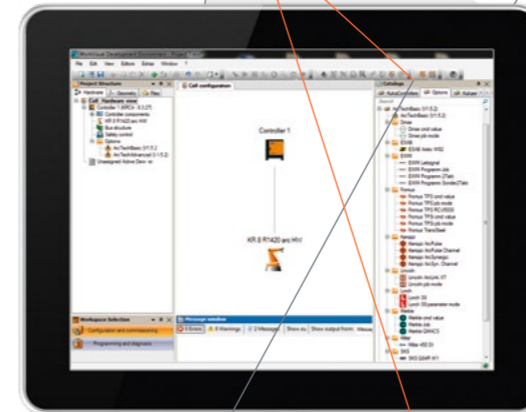
The optimal software package with all the functions for standard welding applications:

- One-click start-up via preconfigured welding source profiles
- Creation of documentation with all weld parameters as a system handover report
- Weld parameter management for ignition, weld and end crater parameters to implement WPSs
- Welding in a robot network for synchronous welding with up to four robots
- Display of power source websites for visualization and configuration of weld parameters
- TCP check routine for quick manual corrections

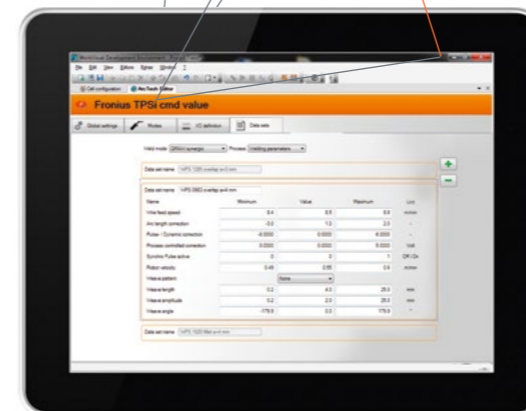


KUKA smartPAD  
Programming of weld parameters on the smartHMI user interface.

The KUKA.ArcTech web browser and the status message display of the weld power source are combined in a single display, enabling work to be carried out using a single device and with the welding process fully integrated into the KUKA environment.



“Drag & drop” configuration using preconfigured profiles for a wide variety of power sources minimizes commissioning risks and times.



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.

## Expansion with KUKA.ArcTech Advanced

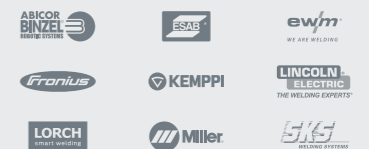
Supplements KUKA.ArcTech Basic software with additional functions for demanding welding tasks.

- Advanced process monitoring functions and reactions: seam length monitoring and Advanced Error Recovery
- Programmable weld-specific error recovery
- Various function blocks for producing the most challenging welded joints, including for thick plate welding
- Sloping of weld parameters
- Support of SKS Synchronweld and Fronius Dynamic Power Control
- PLC interface for weld seam sequence control
- Engineering interface for user-specific expansions
- Editors for optimization of welding parameters

**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.



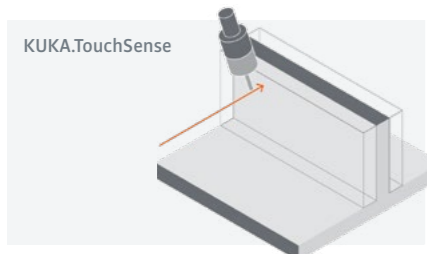
**Seamless integration of technology partners**  
Nearly all power sources from market-relevant manufacturers can be integrated seamlessly into the KUKA system landscape.





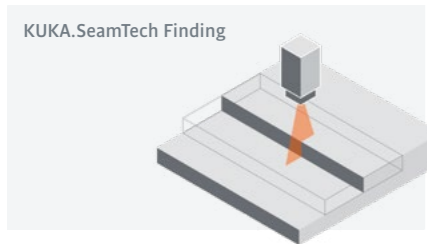
# KUKA function and technology software

## Maximum productivity and flexibility



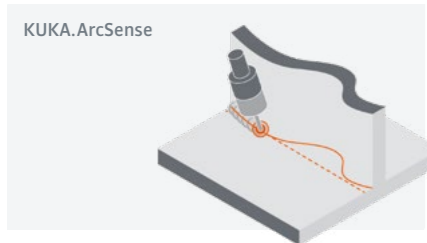
KUKA.TouchSense

**KUKA.TouchSense** can be used to implement component and seam detection via the welding torch of the KUKA robot or via external sensors. The corrections are calculated using the comparative measurement of a previously taught master part. Any deviations that occur can be compensated in up to six dimensions. Thanks to the Fast Measurement inputs on the KRC controller, the search can be carried out at high speed and with maximum accuracy in the measurement results. **This reduces the duration of the measurement motions to a minimum in order to ensure the robotic system's highest levels of productivity.**



KUKA.SeamTech Finding

The great advantage of component or seam detection using intelligent line laser sensors lies in the ability to capture multiple component geometry data in a single measurement. The **KUKA.SeamTech Finding** software uses these geometry data to calculate a linear and/or rotational offset of the component, seam or individual path points directly. In this way, position corrections in up to six dimensions can be configured extremely flexibly and easily in the robot program. **This method provides the basis for the optimized and process-reliable welding of components.**



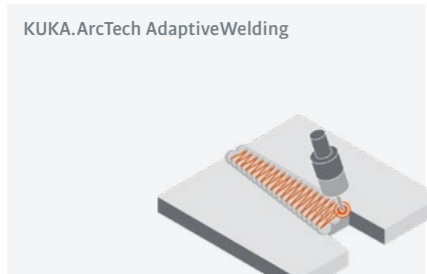
KUKA.ArcSense

The through-arc seam tracking sensor (TAST) is a reliable and long-established technology. **KUKA.ArcSense** analyzes a checkback signal (actual weld parameters) for this, thus automatically compensating for process-related deviations. These may be caused, for example, by heat distortion or workpiece inaccuracies. Arc sensor technology ensures optimal positioning of the weld seam. This results in maximum productivity and quality. **Combinable with all KUKA welding robots, KUKA.ArcSense is a software solution that ensures maximum stability and reliability during the welding process.**



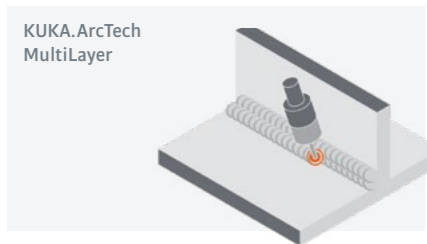
KUKA.SeamTech Tracking

With **KUKA.SeamTech Tracking**, the robot can perform edge and seam tracking during welding using an intelligent line laser sensor. Thanks to KUKA's high-performance 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 velocities, but also at the very high velocities used in laser welding. Using special commands, the weld start and end can be found automatically. **This allows the robot to independently adapt the seam position and length according to the component being welded.**



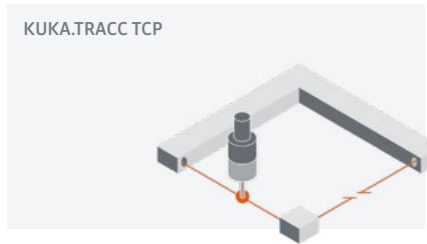
KUKA.ArcTech AdaptiveWelding

**KUKA.ArcTech AdaptiveWelding** expands the functional spectrum of KUKA.ArcTech Basic. Ever more stringent quality and productivity requirements on the automated welding of workpieces necessitate the integration of sensors and measured values. KUKA.ArcTech AdaptiveWelding processes measured variables such as seam volume, gap width or even the offset of edge heights in order to automate corresponding adjustments to weld parameters. It does not matter whether the deviations are detected in advance or during the welding process. The continuous adaptation of the parameters ensures consistent and reliable weld seam quality and boosts the productivity of the application. **With KUKA.ArcTech AdaptiveWelding, weld parameters can be continuously or gradually adjusted to component tolerances and other irregularities in the ongoing welding process via a configurable interface.**



KUKA.ArcTech MultiLayer

**KUKA.ArcTech MultiLayer** expands KUKA.ArcTech Basic to include user-friendly functions for quick and easy programming of multi-layer weld seams. The position for the filler and cover layers is determined via specific offset values based on the root layer programmed in a predefined program structure. In addition, MultiLayer allows for specific weld parameters to be defined for each programmed section of a weld seam. **To maximize productivity, KUKA.ArcTech MultiLayer can be combined with KUKA.ArcSense or KUKA.SeamTech Tracking. For the purpose of optimizing heat input, it is possible to perform other welding tasks after individual filler and cover layers.**



KUKA.TRACC TCP

With the automatic TCP inspection function **KUKA.TRACC TCP**, the robot becomes even more effective and autonomous. The function ensures that weld seams are reliably produced in the correct position, since the programmed TCP is checked against the actual value and corrected if necessary. This automatically keeps the productivity of the welding cell at the highest possible level and dispenses with the need for time-consuming manual reprogramming due to a torch collision or exchange of the torch neck. **The special aspect: KUKA.TRACC TCP calibrates the TCP during absolutely accurate measurement and thus also takes into account inaccuracies of the welding torch or collision box.**

# Visualization, monitoring and seamless documentation

## Application software package acts almost in real time

**KUKA.ProcessScreen** enables comprehensive and component-oriented documentation of your production data. Evaluation and analysis are also possible. The comparison with individually configurable limit values reveals any deviations – thereby assuring production quality. The results are available in tabular and graphical overviews at the touch of a button. **KUKA.ProcessScreen** is freely configurable for a wide range of different applications.

Use of a single software package for the entire production system not only results in a standardized configuration and operator control philosophy that is independent of the application or process equipment used, it also ensures seamless process monitoring and reduces training requirements. Thanks to web-based technology, **KUKA.ProcessScreen** can be visualized



The state-of-the-art solution for documentation, reporting and monitoring of process data

on virtually any end device. The recorded process data are archived locally in a ring memory on the robot controller. They can optionally be transferred to a decentralized customer network for documentation of production processes. The easy generation of evaluations as tables or graphics is another bonus.

# KUKA.Sim and KUKA.Sim ArcWelding AddOn

## Fast, simple, efficient: decisive advantages in the planning of welding applications

**KUKA.Sim** provides you with a professional simulation environment for your KUKA robots. With **ArcWelding AddOn**, we also offer you advanced offline programming capability especially for your ArcWelding application.

**KUKA.Sim** already comes with extensive CAD import functions. You can implement automatic seam generation on the basis of CAD component edges using **KUKA.Sim ArcWelding AddOn** – including positions for moving to the component and away from it. The torch orientation required for this can be defined.

A visual preview of the torch along the path is also available. This ensures optimum orientation control during path creation.

### Features:

- CAD import functions
- Path generation by means of edge detection
- Best position generation of the positioner
- Definition of the positioning motions
- Torch preview
- ArcTech functions



ArcWelding application with KUKA.Sim

# KUKA products for arc welding

## Versatile and reliable



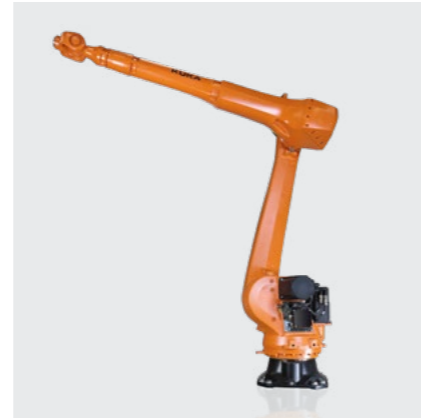
### KR AGILUS – the solution for compact installation spaces

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 controller. This robot is also available in dust and water-protected versions (protection rating IP 67).



### KR CYBERTECH – the solution for the most common applications

The KR CYBERTECH family includes machines for arc welding with payload capacities from 6 to 20 kilograms and reaches from 1,440 to 2,100 millimeters. With either a hollow wrist or an in-line wrist, KUKA offers the right robot for every task. This in turn ensures reliable welding results with maximum productivity and efficiency.



### KR IONTEC – the solution for large workspaces

The KR 20 produces supreme quality in the shortest cycle times – and, what's more, with unrivaled repeatability. The long arm with a reach of 3,101 millimeters enables an extremely large work envelope and expands the production options many times over. Proven standard components stand for reliability and durability.



### KUKA positioners

Depending on the production task and workpiece, we offer the right solution for every application. KUKA offers a wide range of positioners with payload capacities from 250 to 12,000 kilograms and up to five freely programmable axes.



### KUKA cell4 – welding cells for your production facility

Implement safe, reliable and cost-effective production with the standardized KUKA cell4\_production series. Whatever your application – arc welding, spot welding or laser welding: together with you, we will find the right solution for your specific requirements.



### KUKA.Sim

Simulate your production and processes with the fully-integrated KUKA.Sim software. From simple feasibility studies to complete offline programming: KUKA.Sim provides you with the right tools and functions.



### KR C5 – maximum performance, connectivity and flexibility

Compact, high quality and low energy requirements: the KUKA KR C5 controller enables space-saving solutions, is highly efficient and conserves resources. It can also be seamlessly integrated into heterogeneous automation landscapes – for more potential applications and maximum cost-effectiveness.



### Programming and hand guiding

Program your applications intuitively, quickly and according to your requirements. With the KUKA smartPAD, you control the entire process. In combination with KUKA.ArcTech and KUKA. Handguiding, welding technology commands can also be programmed directly on the welding torch using the mouse buttons on the 6D mouse.



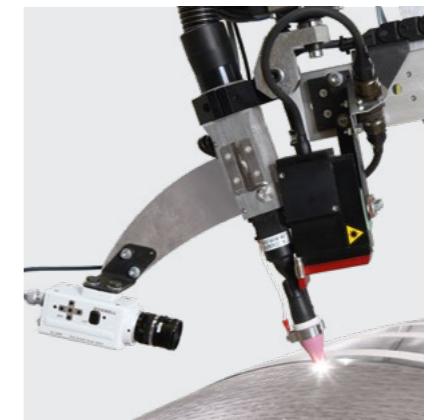
### KUKA linear units

With KUKA linear units, you add a further axis to the robot, thereby considerably extending its work envelope. 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.



### ArcTech as interface to the welding power source

Connect your power source to the KUKA controller quickly and easily. We are constantly expanding our extensive power source profiles to ensure the reliable connection of power sources from renowned manufacturers.



### Top quality thanks to seam tracking

Compensate automatically for component tolerances and material distortion. We offer interfaces for quick connection of the necessary sensor systems from the most commonly-used manufacturers.



### Perfect service around the clock

From programming the application to installing your system, and during planning or operation, we are happy to support you – with local service worldwide and around the clock!



-  [kuka.com/contacts](https://kuka.com/contacts)
-  [facebook.com/kukaglobal](https://facebook.com/kukaglobal)
-  [youtube.com/kukarobotgroup](https://youtube.com/kukarobotgroup)
-  [twitter.com/kukaglobal](https://twitter.com/kukaglobal)
-  [linkedin.com/company/kukaglobal](https://linkedin.com/company/kukaglobal)

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