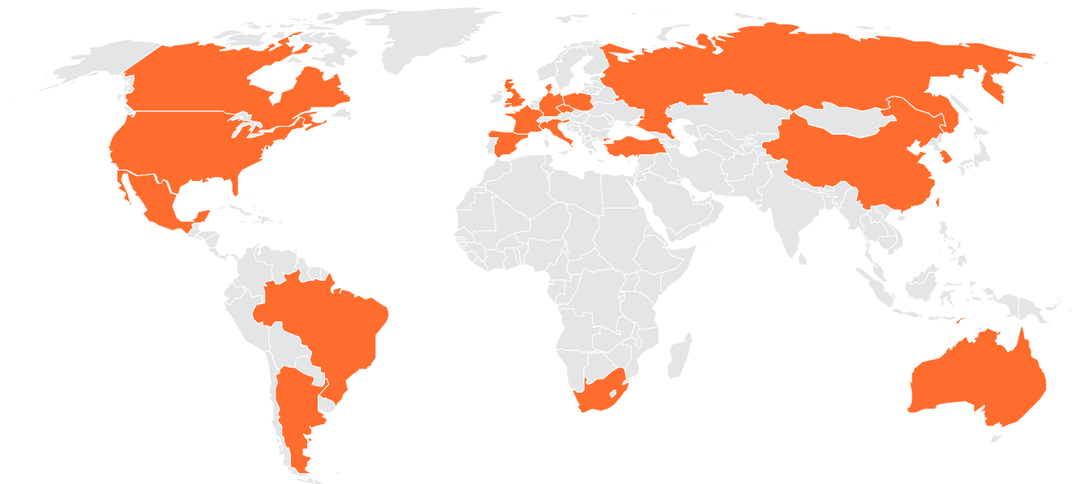
KUKA

Technology_**Magnetarc welding**

EN

A strong partner
With more than 200 Magnetarc welding machines installed in over 19 countries, we are the global market leader.



Over 40 years
of experience

KUKA presented the first Magnetarc welding machine in 1972. Since then, the technique has been continually improved and developed. The latest generation offers even greater process quality and an increase in output. Process control is assured by the optimized KUKA process monitoring and documentation system PCD. Productivity is increased by countless enhancements in the design, together with even longer maintenance and service intervals.

Magnetarc welding

In pressure welding with a magnetically impelled arc (also known as MIAB welding), tubular components with closed cross-sections are joined together. Unlike with rotational friction welding, it is also possible to weld rotationally non-symmetrical workpieces.

Advantages of the process

Top weld quality

- High-grade pressure weld structure
- Exact relative positioning of components
- Distortion-free and highly precise

Cost reduction / component optimization

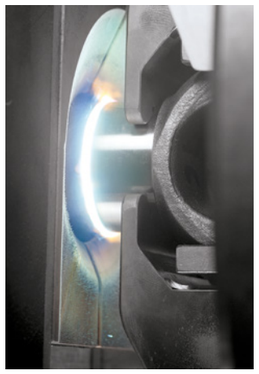
- Short welding times
- Thin wall thicknesses can be welded / optimal for lightweight construction
- Component geometries with a closed cross-section and various ferromagnetic materials possible

Green Technology

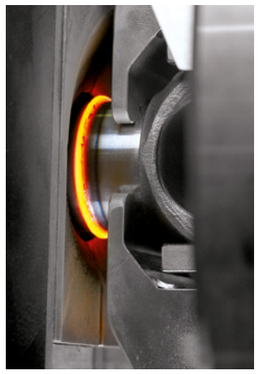
- Environmentally friendly process with low energy consumption
- No consumables such as filler wire
- No fume exposure

01 Contact of the parts and activation of the current

02 Arc ignition by retraction



03 Heating by controlled movement of the arc around the circumference



04 Joining of the components through forging

Extensive applications
in the automotive and metal industries

Today, Magnetarc welding from KUKA is used by numerous, renowned automotive manufacturers for drive train components. Axles, propshafts and drive shafts have to constantly withstand extremely high loads. Moreover, positioning accuracy assumes a particularly important role in the welding process. Here, Magnetarc welding technology is first choice. Manufacturers from the metal industry are also increasingly turning to this forging technique.

In general, components with the following properties can be joined:

- Closed geometry
- Conductive and fusible materials
- Tubular cross-sections
- Wall thicknesses from 0.7 mm to 6 mm (greater wall thicknesses on request)

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01 Semi-independent suspension (steel / cast iron) for a 4×4 SUV **02** Steel propshaft for an off-road vehicle **03** Pre-assembled steel propshaft for a car **04** Valve housing cover **05** Pressure vessel **06** Exhaust component **07** Spring retainer **08** Seat frame **09** Pressure vessel

Wide variety of material combinations

	Cast steel, high-temperature cast steel	Ductile cast iron	Spring steel and free-cutting steel	High-speed steel	Cold work steel (unalloyed and alloyed)	Case-hardened and nitrided steel	High-alloy steel (ferritic and austenitic)	Unalloyed structural steel
Unalloyed structural steel	✓	✓	✓	✓	✓	✓	✓	✓
High-alloy steels (ferritic and austenitic)	✓	✓	✓	✓	✓	✓	✓	
Case-hardened and nitrided steel	✓	✓	✓	✓	✓	✓		
Cold work steel (unalloyed and alloyed)	✓	✓	✓	✓	✓			
High-speed steel	✓	✓	✓					
Spring steel and free-cutting steel	✓	✓	✓					
Ductile cast iron	✓	✓					✓	Weldability confirmed
Cast steel, high-temperature cast steel	✓						✓	Weldability possible

The main advantages of KUKA Magnetarc welding machines

Leading by experience
KUKA Industries not only builds the machines, but is also a practical user of Magnetarc technology as a contract manufacturer. This enables important findings to be directly incorporated into the development of new machines and processes.

Maximum cost reduction
The state-of-the-art Magnetarc welding process makes it possible to limit use of expensive material to those points that are relevant for the component.

Top weld quality
Avoid unnecessary problems – opt for a production process in which every component is validated.

Maximum flexibility
Whether a single-head, double-head or vertical machine. We offer you the ideal solution for every component.

Component optimization
The automotive industry demands solutions that reduce weight – welding paves the way for the mobility of the future.

Maximum ergonomics
The use of intuitive touchscreen operation and the ergonomically designed working area make work faster and more effective.

KUKA Industries supplies you with a machine perfectly tailored to your needs

KUKA Industries offers you customized, cost-effective solutions with high process reliability and a forge force from 20 to 600 kN in a single or double-head design. Our portfolio also includes special applications with a vertical machine design.

	Single-head machines	Double-head machines
Small (up to 5 t)	 MA 5	
Small (up to 6 t)		 MA 6D
Medium (5 – 60 t)	 MA 8 MA 60V	
Medium (6 – 15 t)		 MA 8D, MA 15D

Range of KUKA Magnetarc welding machines

KUKA technology paying off
Technology highlights

Today, high-tech machines must meet customer demand for increasingly shorter cycle times, higher quality requirements, the welding of new component combinations and full traceability.

Machine technology

- Wear-free, split high-tech coils allow for time-saving loading and unloading of components
- Quick conversion to different components thanks to precision clamping equipment with changeover devices
- Maximum stiffness and precision in the slide guideway thanks to preloaded, play-free rolling-contact bearings
- Quick compensation of fixture and component tolerances thanks to clamping fixture with adjusting plate
- Significant maintenance advantages through long-term lubrication of precision guides
- High-precision joining through HNC-controlled process axis

Design / ergonomics / energy efficiency

- Ergonomic working area
- Optimized design for best noise and light protection
- Reduced footprint through the integration of hydraulic equipment into the machine
- Simple and intuitive touchscreen operation

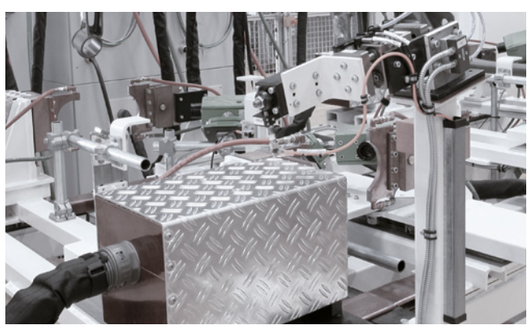
Options

- Annealing station for post-weld heat treatment
- Component labeling
- Energy meter
- Automation solutions

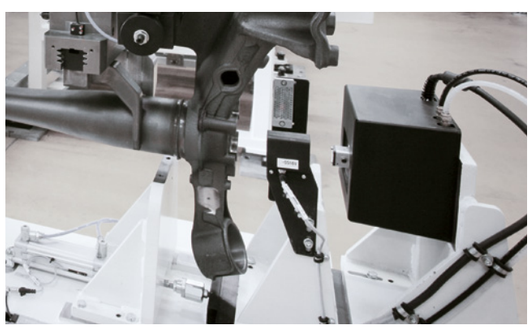
New KUKA power source technology – MagnetAr 620A

- Top weld quality through controlled energy input
- Modular expansion possible for higher power ratings
- Plug & Play: simple exchange of the power source by the customer possible
- Weight reduction by up to 85 %*
- Full integration into the machine and machine operator control
- Reduction of the energy requirement by approx. 20 %*
- Remote maintenance and diagnosis via KUKA RemoteService

* Compared with the predecessor weld power source



Annealing station for post-weld heat treatment



Component labeling

Magnetarc welding

Revolutionary control technology and process monitoring made by KUKA

Designed for Industrie 4.0

To meet the future requirements of Industrie 4.0, the entire control concept has been re-engineered. Besides a new control architecture, operator control has also been redesigned with due consideration of latest ergonomic aspects. While machine operators used to have separate user interfaces for the PLC and PCD (Process Control and Documentation), these have been integrated into a new, uniform KUKA operator control system. The benefits: intuitive operation with new additional functions and reduced training effort!

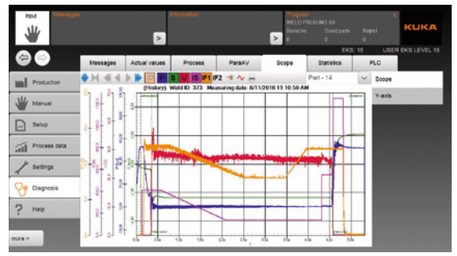
Features

- Intuitive touchscreen operation with uniform KUKA operating concept
- Control in the millisecond range enables highly dynamic adjustment of the process parameters in real time
- Minimization of length tolerances by adapting the parameters on the basis of cross-section measurements (optional)
- Numerical parameter monitoring with graphical curve trace
- Graphical and tabular display of parameters in different views
- Component and product data management
- Intelligent user administration with identification chip (EKS)
- User group and language settings
- Diverse system diagnostic functions
- Comprehensive statistics for quality analysis with export function
- Online help / online operating instructions
- Internet-based KUKA RemoteService

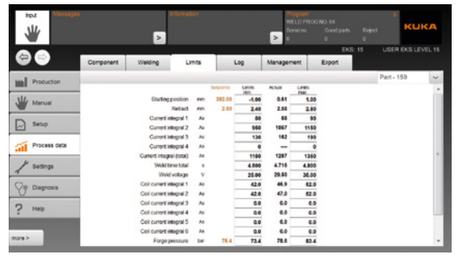
Benefits

All process data from the KUKA PCD (Process Control and Documentation) are numerically and graphically monitored and electronically archived. These data are thus available for further analysis (for example, in Cloud systems). International communication standards, such as OPC UA* and personal electronic key systems (EKS**), form the basis for the implementation of Industrie 4.0 and increase productivity while ensuring traceable quality and data transparency.

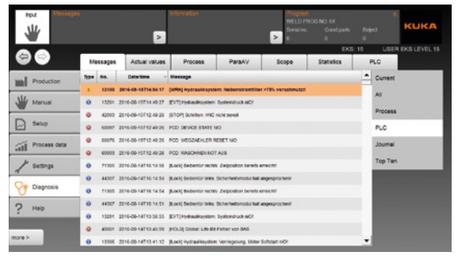
* OPC UA = Open Platform Communications Unified Architecture
** EKS = Electronic-Key-System



Graphical curve trace for actual values

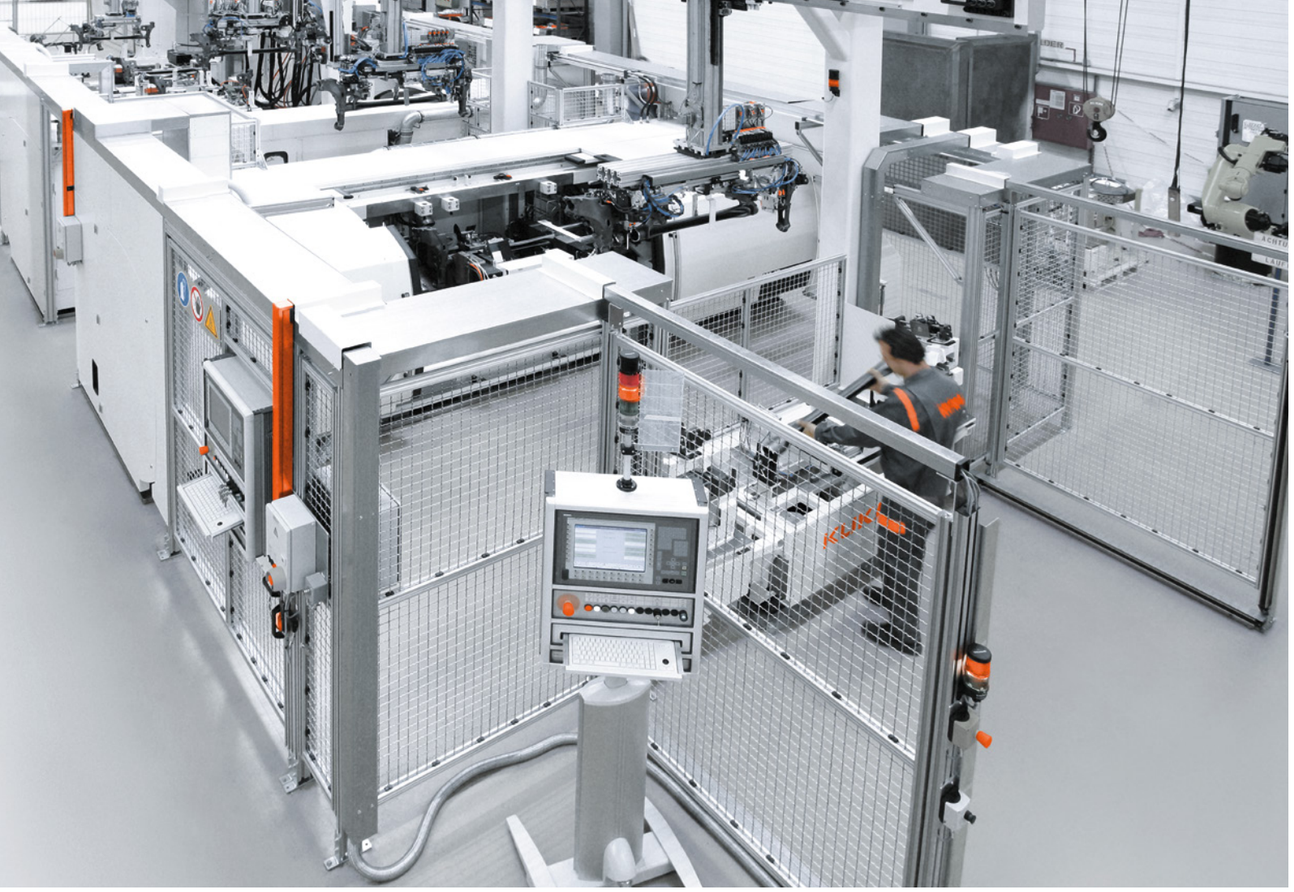


Numerical parameter monitoring



Diagnostic messages

Statistics



From the machine to the system
KUKA Industries is prepared for Industrie 4.0

Even higher productivity can be achieved if the Magnetarc welding machines are fully integrated into your production network. This requires open interfaces and intelligent control. As a manufacturer of flexible systems for automated production, KUKA Industries has the experience and expertise to develop and implement cost-effective complete solutions with high process reliability. With their easily accessible working area and the network capability of the controller, the machines offer ideal conditions for the new era of Industrie 4.0.

We offer

- Full or partial automation with linear axes for component feed and/or removal
- Robotic automation for component handling
- Fully automated solution integrated into the specific production workflow using modern 3D process simulation

KUKA Industries – Your global partner from engineering to service

Long before the first workpiece passes through your application, we support you with our know-how.

Consultation, planning, engineering, implementation all the way through to complete customer service – all around the globe. We know what you need and have the right solution ready for you. One of the ways we ensure this is through our unique KUKA TechCenter. Our engineers carry out feasibility studies and test the practicability of innovative concepts.

Of course, the best kind of service is the kind you don't need to waste any words about because everything functions perfectly. KUKA Industries offers you exactly this kind of service – and it doesn't just start with maintenance and end with spare parts: from process and system training to comprehensive concepts for supplying and stocking spare and wearing parts, not forgetting maintenance, servicing, telediagnostics and hotline support.

We can also take care of the complete manufacturing operation for you – from process validation to manufacture of prototypes and small-batch production – in multi-shift operation at our site in Augsburg (Germany).

We can be found locally all over the world:

Argentina
Australia
Austria
Belgium
Brazil
Canada
Chile
China
Czech Republic
Germany
Hungary
France
Great Britain
India
Italy
Japan
Korea
Malaysia
Mexico
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USA

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