

Automation solutions for
the automotive industry



114 years of
manufacturing excellence



Interview
R&D



A reliable and innovative partner of automobile manufacturers since the dawn of assembly line automation

KUKA Systems is known throughout the automotive industry as a leading systems integrator and developer of automated technologies. The company has always had an association with automotive manufacturing, dating back to its founding in 1898 by Johann Josef Keller and Jakob Knappich in Augsburg, Germany, to manufacture, among other things, vehicle headlights. Through the decades, KUKA – the name is derived from the first letters of „Keller und Knappich“ Augsburg – has developed many manufacturing breakthroughs that have

made automobile production more efficient and improved the quality of the finished product. Many of these have occurred since the advent of assembly line automation, where KUKA's leadership in robotic applications has helped change how cars and trucks are constructed and assembled. With a global work force of over 3,600, our capabilities also cover virtually all tasks in the industrial processing of metallic and non-metallic materials. In recent years, KUKA Systems has leveraged its vast automotive expertise and extensive R&D capability to develop automated manufacturing processes for other industries, including aerospace, alternative energy and logistics and warehousing.

1936 KUKA embraces electrical resistance welding, constructing the first electrical spot welding gun in Germany.

1956 KUKA delivers the first multi-spot welding line to Volkswagen.

1972 KUKA unveils a new innovation, the magnetic arc welding machine.

1973 Known as FAMULUS, this is the first KUKA robot to have six electromechanically driven axes.

1991 KUKA launches a new assembly concept, transporting the vehicle body on the same pallet through all stages of production.

2002 KUKA Systems delivers the first high-strength steel press dies for vehicle side panels.

2010 KUKA Systems delivers a state of the art TwinAir engine assembly line for building 2-cylinder motors for Fiat.



Home of engineering and automation ideas - KUKA Systems Headquarters Augsburg

1978: The first KUKA industrial robots at Daimler-Benz.





Building an identity

During its first six decades, KUKA manufactured products as diverse as refuse collection vehicles, knitting machines and portable typewriters, but welding equipment was always a core competence. By the 1950s, KUKA was becoming known for developing advanced welding technologies for automobile production. Two decades later, KUKA became a world leader in developing industrial robots and automation systems.

The two separately managed entities operate independently in the market, which allows KUKA Systems to supply what each customer wants, be it an orange KUKA product or not.

Awards are the best customer testimonials Leading automakers single out KUKA Systems for honours

When a company like General Motors singles out KUKA Systems as a Supplier of the Year, it means more than an expression of satisfaction with a project's final outcome. It is recognition of the outstanding quality of the project planning, engineering and implementation. In the case of GM, it reflected KUKA Systems' ability to complete major assembly line upgrades without interrupting vehicle production, making optimal use of scheduled downtime complete the job to the customer's entire satisfaction. KUKA Systems has won many awards over the years. These are some of the more recent:

- 2012 Igus | vector award in gold for KUKA Cobra machine
- 2011 General Motors | Supplier of the Year for Body Shop Welding Lines
- 2009 Network of Automotive | Excellence Award for new Induflex welding process for fibre-reinforced plastics
- 2007 Daimler-Chrysler | Global Supplier Award
- 2007 Ford | World Excellence Award in gold



KUKA Systems builds every Jeep Wrangler Body-in-White

Every Jeep Wrangler built since 2006 on the road today is based on a Body-in-White manufactured by KUKA Systems at our wholly owned, state of the art, 335,000 sq ft facility in Toledo, Ohio. KUKA Toledo Production Operations (KTPO) is showcasing our world leadership in bodyshop technology. The plant has produced over 800,000 Wrangler bodies since its inception, and has been benchmarked as one of the most efficient Body-in-White manufacturing centers in North America. KTPO is one of four separately owned facilities performing assembly functions for the Wrangler in a supplier park layout at Chrysler Group's Toledo Assembly Plant.



KUKA Systems' products and services: Any vehicle manufacturing process or stage can be largely or fully automated.

Automation and innovation are critical to the automotive industry's future. KUKA Systems is committed to providing state of the art products and automation solutions for improving the efficiency of virtually all aspects of production, for the chassis, Body-in-White, engine, power train, and final assembly. That covers improving existing joining and injection processes – and developing entirely new ones for the increased use of lighter weight materials or combinations of materials needed to help the industry meet more stringent vehicle safety and fuel efficiency standards while producing vehicles that are aesthetically pleasing and enjoyable to drive.

Carmakers want quick-change flexibility to swing production on the same assembly line between different body styles and power trains. They need legacy facilities updated without interrupting manufacturing, and increasingly expect those upgrades to be done re-using as much content as possible. Where the same base model is produced at different plants, even on different continents, they expect little variance in quality. These challenge put a premium on having strong in-house engineering resources with full R&D support as well as a take-charge project planning and fulfillment capability, areas in which KUKA Systems excels.



Qualitycheck for Tools & Dies manufacturing



KTPO has a worker/robot ratio of 1:1. Of its 245 robots, 68 perform materials handling, 166 welding tasks and 11 roller hemming.

KUKA Systems' competences extend from bumper to bumper

01 Engineering

Today's increasingly complex assembly line projects require a solid engineering foundation to meet the customer's performance goals and assure effective project management. Our multi-disciplinary engineering group uses the latest design tools and virtual prototyping to produce the optimal setup, then supports the installation process to ensure the software and hardware integrate and perform as planned.

02 Tools & Dies making

KUKA Systems' Tools & Dies Business Unit can design and manufacture high precision forming and cutting tools for individual processes or system solutions, for all levels of complexity and for cutting a wide range of different metals. We develop comprehensive proposals that give our customers confidence about their tooling investments.

03 Chassis and power train

Cylinder heads, axles, transmissions, even engines and the entire power train and chassis. KUKA Systems designs and implements turnkey assembly systems for any part of chassis/power train production – from standalone solutions to complex, fully automated manufacturing lines.

04 Body structures

Simply put, KUKA Systems is the brand name in car-body production worldwide. That's true whether an automaker wants a static magnetarc welding machine, a robot framing, welding, hemming or brazing station like our ground-breaking ROBO SCAN remote laser welding unit, or a turnkey installation of a semi- or fully automated Body-in-White assembly line. Our technology is unsurpassed as is our expertise in all facets of Body-in-White production. Our goal is helping customers produce the perfect body every time. And we are world leaders in flexibility. Production lines can be designed to accommodate up to eight often very different variants of the same model.

KUKA Systems' competences extend from bumper to bumper

05 Bonding, sealing and finishing

KUKA Systems has been a leader in automatic bonding and sealing stations for a quarter century. Automatic application of adhesives and sealants delivers uniform quality, utmost precision and speed and easily adjusted seam geometries. We offer a wide range of bonding and sealing solutions including new injectable systems. Our SAM technology lets automakers switch to a robotically-applied acrylate acoustic vehicle sound-damping compound, doing away with bitumen or butyl mats that have to be manually cut and fit. And our HRK system for applying wax-based corrosion protection makes it possible to cover a larger area in less time than ever.

06 Final assembly

Bolting, joining of the vehicle body and chassis, window installation, measuring, inspection and assembly are just some of the final assembly functions that can be automated. This includes challenging steps like window installations or marrying the body and power train. These tasks can be performed by robots with great precision, efficiency and maximum flexibility, and can be integrated with other automated systems, machines or human operations in a manufacturing line designed by our engineers and project managers.



KUKA Systems robotic station using proprietary SAM technology to apply acoustic sound-damping compound to a car body during final Body-in-White assembly.





Interview with Dr. Johann Haertl,
Head of development and process engineering
KUKA Systems GmbH

Tomorrow's needs!

KUKA Systems makes a major investment each year in research and development. What resources do you have for R&D, not just at headquarters in Augsburg, Germany but around the world?

Our R&D focuses directly on technology solutions and body structures important to our customers. We operate full scale R&D facilities, called TechCenters, at our major subsidiaries – in the US and China. However, the main driver of our R&D work is still our R&D center in Augsburg which coordinates activities with our global research operations.

What role do your automotive customers play in determining which projects to pursue?

The needs of our OEM customers drive our feasibility studies and development projects as well as our efforts to further improve our existing technologies. With such a strong focus on the needs of automotive manufacturers, our TechCenters recognize future trends at a very early stage.

Is there technology sharing with the other industries the company serves?

Indeed, technology transfers are part of our business success. Think of it as a closed loop: Many technologies we develop for automobile manufacturing are adapted and improved subsequently for use in general industry. Then, based on their performance in general industry, these technologies are further refined and applied to the next automotive installation. It works extremely well for all concerned.

KUKA Systems has pioneered in joining different body materials? What are the current trends in the automotive sector?

We are in touch with tomorrow's needs by developing new joining technologies for lightweight structures – particularly aluminum and fiber-composites. For example, we have made resistance spot welding a reliable joining technology to securely bond aluminum panels. Our patented RoboSpin is an important breakthrough, transforming spot wel-

ding into a continuous-path process with continuous robot motion, reducing repositioning times between spot welds and optimizing the welding process. We continue to see a rising use of aluminum in high-volume models, where automakers also are incorporating more high-strength steel. This favors more laser technology in Body-in-White production. In the premium segment, the trend is towards carbon composites. Here, we can apply some of the special expertise we have developed for aerospace manufacturing.

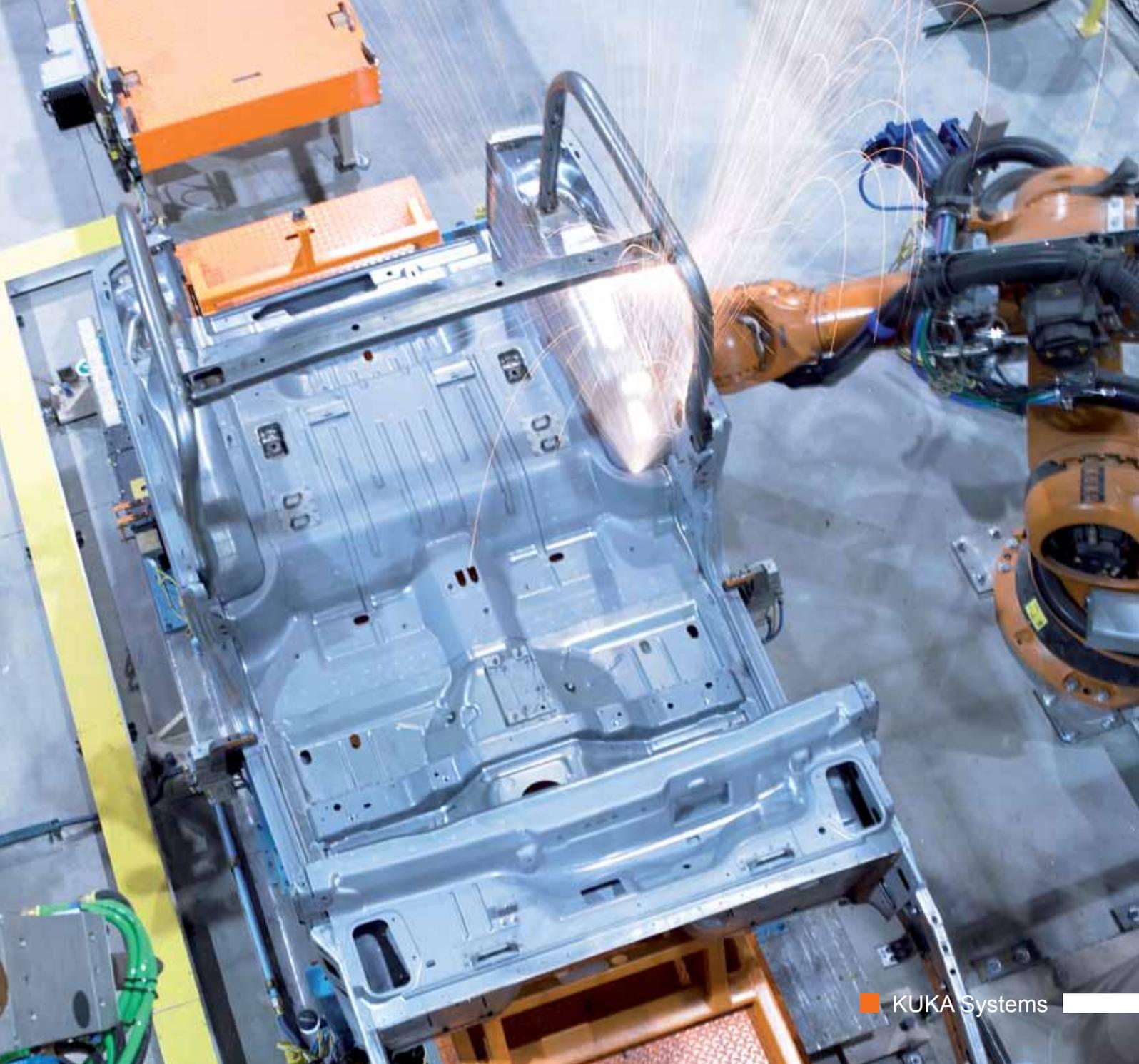
And for future plant design?

KUKA Systems is taking an active role in developing „Green Car Body Production“ intended to improve energy efficiency. Future vehicle production facilities will have a smaller environmental footprint, something our OEM customers are committed to achieving.

NEWS

- ▶ **New major order for China.** KUKA Systems wins major order to build car body and parts assembly systems in China. (July, 2012)
- ▶ **Welding machine orders.** KUKA Systems receives several orders for specialty magnetarc and friction welding machines from major automakers and parts suppliers. (July, 2012)
- ▶ **New multi-million euro order from Volvo.** KUKA Systems will build and install new assembly line at Volvo Car Corp's Gothenburg plant. (Feb 2012)

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 KUKA Systems

Contact information

KUKA Systems GmbH
Headquarters
Bluecherstrasse 144
86165 Augsburg | Germany
Phone + 49 821 797-0
Fax + 49 821 797-1991
automotive@kuka.de
www.kuka-systems.com

KUKA Systems – International
Belgium | Brazil | China | France | Germany | India
Mexico | Romania | Russia | Slowenia | UK | USA

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