





Industrial Robots take on the Leisure Industry

Brett Green
General Sales Manager
KUKA UK

INDUSTRIAL ROBOTS FROM KUKA




KUKA – UK Head Quarters *Employees total 83* 






- ❑ Sales & Marketing
- ❑ Engineering & Design
- ❑ Manufacturing
- ❑ Demonstration
- ❑ Project Management
- ❑ Installation & Commissioning
- ❑ Training
- ❑ Service & Support

KUKA Welding Systems + Robot, Hereford Rise, Halesowen, West Midlands, B62 8AN Tel:0121 585-0800 Fax:0121 585 0900

Historic Development 

1976 – 1st production robot









1980: IR 600, IR 100, IR 200, IR 400

1990: IR 700, IR 300


2000: KR 6-350, KR 180 PA, KCP, KR C2


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Our innovations of the last 15 years 

1985	• First jointed-arm robot without parallelogram	
1996	• First WINDOWS@Realtime PC-based robot controller	
1998	• First long-range robot with a reach of 7 m • First heavy-duty robot with a payload of 350 kg	
1999	• First Internet remote diagnosis for robots	
2000	• Icon Editor, Soft PLC, KR 2000 ...	

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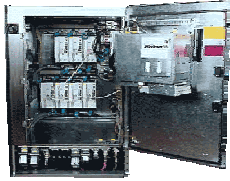
KUKA's Robot Range 



Low pay loads	Medium pay loads	High pay loads	Very high Pay loads	Special series
<ul style="list-style-type: none"> KR 3 KR 6/2 KR 15/2 KR 15 L6/2 	<ul style="list-style-type: none"> KR 30/2 KR 30 L15/2 KR 45/2 KR 60/2 KR30 K KR60 K 	<ul style="list-style-type: none"> KR 125/3 KR125 W/2 KR 150/3 KR 200/3 KR150 <small>Series 2000</small> KR180 <small>Series 2000</small> KR210 <small>Series 2000</small> K Variants <small>Series 2000</small> 	<ul style="list-style-type: none"> KR 350/2 KR500/2 	<ul style="list-style-type: none"> KR 60 P/2 KR 100 P/2 KR 180 PA KR 350 PA/2 KR500 570 PA/1 KR500 L480 PA/1 KR500 L420 PA/1 Linear Tracks

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KR C 1 & 2 Robot Controllers



- Standard PC with Windows 95™ interface
- 128 Mb RAM, CD-ROM, floppy & hard disk
- 4.3 Gb hard disk
- Connection to PC monitor
- Robust Vx-Works command processing
- Dynamic model

- Configurable
- Compact cabinet
- Easy to service
- Expandable any time



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The KUKA Control Panel (KCP)



- Microsoft Windows 95 interface
- Numeric keypad, keyboard & 6D mouse
- Key switch, E stop & safety switch
- Large 8" VGA colour display
- Ergonomic design

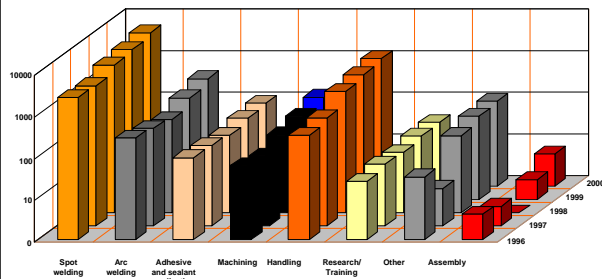


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Volumes by Application Areas



Total: approx. 35,000 by the year 2000



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Market Offer



Kuka is a leading global supplier of automation products, systems and services to automotive and general industry



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Application examples



Spot welding



Handling



Assembly



Fitting



Polishing



Loading



Palletizing



Machining

Applications KUKA Welding Systems • Robot, Hereford Rise, Halesowen, West Midlands, B62 8AN Tel:0121 585-0800 Fax:0121 585 0900

Synonymous with the Automotive Industry

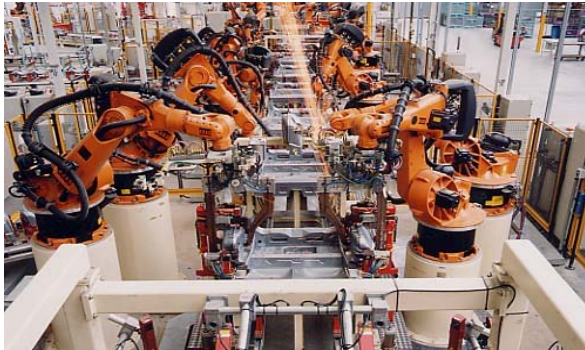


The 'Mini' production at BMW, Oxford.



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Synonymous with the Automotive Industry



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KUKA steps into the Movie Industry



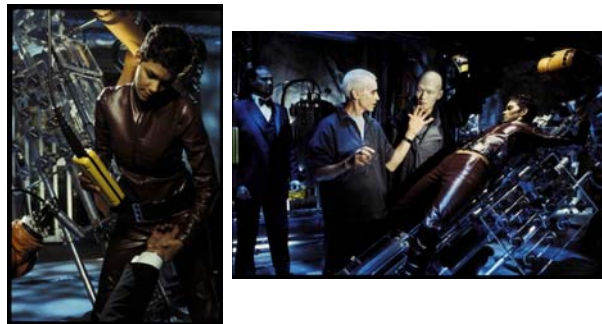
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Die Another Day....



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KUKA Robots – “the best supporting actor..”



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KUKA in the Leisure Industry



KUKA launches the world's first passenger carrying robot.....



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ROBOCOASTER™



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ROBOCOASTER™ KUKA



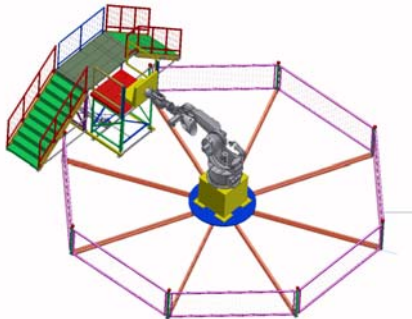
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In action...the 'Leisure Industry' show at NEC KUKA



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What makes a RoboCoaster



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What makes a RoboCoaster



- Pay load: 500/420/340 kg
- Supplementary load: 50 kg
- Reach: 2826/3076/3326 mm
- Repeatability: $\pm 0.3\text{ mm}$
- Weight: 2350/2370/2385 kg
- Mounting: floor, ceiling

KUKA KR 500
The world's largest-payload jointed-arm robot !!



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What makes a RoboCoaster



- Modular drive technology based on standard LENZE products
- Electronic, bus-based safety concept - ESC
- Revised and enhanced cabinet design with improved individual components

KUKA KR C2 Controller

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The 'Gondola'...



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Development of the RoboCoaster



- Original idea dates back a number of years.
- 'Tomorrow's World Live' exhibition at Earls Court – KUKA KR350/2 with Ford Fiesta mounted.
- KUKA develop the KR500 – payload of 500kg possible at the wrist.
- The functionality of the KRC2 controller is much improved.

2000

the RoboCoaster development begins

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Ride dynamics...



- **Benefits of a robotic ride is that it can be essentially 'freely programmable'**
 - passenger can choose the ride-profile they wish
 - Gentle, Fun, Fast, Turbo, and Extreme
 - wider demographic appeal – profile to suit all preferences
- **All 'G' forces are calculated to give the maximum safe limit to passengers in all positions.**
- **Extreme ride generates up to 4.5 +G and 1.5 -G !!**
- **Motion profiles selected through 'trial & error'**
 - what feels good, what looks good,

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The road to Certification



A robotic amusement ride is a lot more than just attaching a seat to a high-payload industrial robot !!

TUV, the German certification body, were faced with a dilemma of their own:

- new materials research
- understanding the nature of the technology in the context of an amusement ride.

Required holistic approach for a number of inter-related disciplines across a number of non-related industries !!

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The road to Certification



New Approaches for:

- dynamic needs of the robot
- safety systems and passenger restraints
- variable endurance limits for passenger comfort
- ride dynamic appeal
- visual impressions

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The road to Certification



The TUV had developed a unified standard for the design and manufacture of fairground rides, the DIN 4112

- All safety critical parts to be verified by means of FEM (*Finite Element Method*) for endurance and crash strength.
- Non-Destructive Radiographic Examinations
- Surface Crack Inspection
- Materials Certification
- Collision – mechanical buffer stops ensure the robot cannot collide with any objects.

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The road to Certification



Motion Control:

- Using KUKA's industry proven PC-based robot controller (with a range of software-driven monitoring functions to enable reliable operation and diagnostics) to control the robot arm and system peripherals.
- Key safety elements, such as the **retractable platform** (passenger access device) and the **swivel unit** (passenger safety harness release and communication link to the gondola) are also sequenced and monitored by the robot controller.

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The road to Certification



Safety Control:

- The robot controller does not perform any intrinsic safety functions!
- Independent safety monitoring circuits and passive safety measures running in parallel to the robot controls.
- Failsafe control architecture ensures that the access platform cannot be extended nor the swivel unit opened when the RoboCoaster drives are active.
- All safety elements are monitored and interlocked to safety category 4.

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The road to Certification



Software Control:

- Acceleration monitoring ensures the prescribed limits are not exceeded.
- Hard-coded machine data ensures that only qualified personnel can alter the machine data and parameters.
- Dedicated brake-release configuration

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Buy one today



- The KUKA RoboCoaster is now fully available.
- Current success with medium sized 'Family Entertainment Centres' right up to the large 'American style' Theme Parks.

ROBOCOASTER™

The Rollercoaster in a box !!

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KUKA
WORKING IDEAS