

# Welding of aluminum vehicle bodies

## Starting point / Task definition

Given the interlinked operations of supplier plants of the AIXAM MEGA Group, of which CARmetal is a member, the company has to provide a specified number of body frames per day. For this reason, and due to rising production volume, the car manufacturer wanted to invest in a state-of-the-art robotic cell. Short cycle times, achieved by means of a high acceleration capacity, precise handling and continuous availability were seen as the keys to obtaining the necessary increased efficiency. The future two-shift operation and the planned doubling of the production rate also had to be taken into account in the design of the cell.

## Implementation / Solution



CARmetal decided in favor of two KUKA KR 30 L15 robots, which replaced four manual welding stations. The robots weld aluminum frames using the pulsed MIG welding process, welding seams which are from four to twelve centimeters long. Prior to this, other processing cells manufacture the various subassemblies, for example the underbody and the side panels, which are then transferred to the robotic cell, where they are welded together to form the frame. For this purpose, operators place the subassemblies on manufacturing frames, where they are located in the correct position by pneumatic hold-down clamps. The final process steps are quality control and painting.

The KR 30 L15 robots are installed on top of an imaginary line which divides the robotic cell down the middle into two processing sides. On each of the two sides, which can be separated from the robots by means of metal roller shutters, are two DKP two-axis positioners. On each side, each robot welds the material which is held by its subordinate DKP. This means that each of the robots can carry out welding on a separate frame on one side while the DKPs on the other side are being unloaded and reloaded manually.

Since each of the KR 30 L15s is equipped with six axes, and the individual DKPs have two axes for rotary and tilting motions, each of the robot controllers has to precisely coordinate the motions of ten axes, while at the same time preventing the robots from colliding with each other in their confined working space. In addition, the robot controllers send the appropriate signals to the welding controller, which subsequently controls the welding process by adjusting the electric current and the gas supply.

## System components / Scope of supply

- :: Two KUKA KR 30 L15 robots
- :: Two PC-based KUKA robot controllers, including control panel with familiar Windows interface
- :: Simulation with RobCAD software to test the accessibility of all points on the body. This also applies to the motion sequences of the robot wrist with the welding torch in confined conditions. Moreover, RobCAD was used to simulate the interaction between the robots and the rotary and tilting axes of the DKPs.
- :: Robot programming
- :: Commissioning



Number of report:  
R 007

Industry:  
Automotive suppliers

Application:  
Welding

Product:  
Robots  
Low payloads (3-16 kg)  
Controller  
KR C (Robot Controller)

Implementation:  
01.09.1998

Customer:  
CARmetal, Chanas,  
Frankreich

## ■ Results / Success

### :: Short cycle time

In the design of the robotic cell, an extremely short cycle time was of central importance. The robots are able to achieve the required quick cycles thanks to their high acceleration values.

### :: Higher quality

The precision with which the robots operate ensures high weld quality. And thanks to their long reach, they can also get to all of the points to be welded.

### :: High availability

Since the design of the robotic cell does not include any provisions for alternative manual handling in the event of a malfunction, the availability of the robots is a top priority. Therefore the fact that KUKA Roboter works together in Germany with major companies such as Audi, Daimler-Chrysler and VW created the necessary conditions for a collaboration based on trust.

### :: Rapid payback

Since it can be anticipated that this conversion will lead to significantly increased efficiency, CARmetal expects that the robotic cell will pay for itself very quickly.

### :: High level of safety

The safety curtains between the processing sides of the robotic cell can only be opened when the sensors installed between the KR 30 L15s indicate that the robots are stopped in their space-saving parking position.



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