

# Spot welding of steel cabinets

## Starting point / Task definition

When Stähli, a manufacturer of steel cabinets, was confronted with downward pressure on prices due to competition, it became obvious that the company had to increase its productivity. This meant that automation of the welding processes was absolutely vital.

## Implementation / Solution



Today the steel cabinets are welded in a robotic cell. The system consists of a flexible spot welding/machining center with a KUKA KR 125 robot. Using the resistance spot welding process and a turntable, this six-axis robot produces locker cabinets. Each of the two halves of the turntable is fitted with a welding table, consisting of a 1,500 x 2,200 mm copper plate, and a universal template for the cabinets. Parts up to 2,200 mm high, 1,500 mm wide and 600 mm deep can be welded in the system. In order to be able to cover the entire product range using a single robot, KUKA equipped the KR 125, which already has a reach of over 2.4 m, with a 400 mm arm extension.

While it takes, on average, five minutes to load the elements that make up the cabinet, the robot cycle, in which approximately 75 spot welds are made, only lasts about 2.5 minutes. While the robot is welding at one table, workers remove the finished assembly from the second welding table and reload it. In a daily shift of 8.5 hours, the system produces approximately 100 cabinets. Programs for nearly 70 different models are currently stored in the robot controller. Additional variants can be programmed easily using the Windows interface of the KUKA Control Panel.

For the outside of the cabinets, the KR 125 uses an X gun. A copper plate positioned between the outer electrode and the panel being welded ensures that the spot welds are not subsequently visible from outside. The required strength is retained using this process. Corner connections are welded using a C gun, while a double C gun is used for the floor of the cabinet. The robot swivels the double C gun pneumatically in order to shorten the path to the next corner. In addition to these guns, a 650 mm double weld gun is used for tacking the rear panel. The tools are made to measure to ensure that the KR 125 has easy access to every corner of the cabinets, some of which are particularly hard to reach.

## System components / Scope of supply

- :: KUKA KR 125 robot
- :: PC-based robot controller, including control panel with Windows interface
- :: Weld guns
- :: Tool changing station
- :: Turntable
- :: A wide range of safety devices, such as fences, photo-electric barriers and a Plexiglas partition across the center of the turntable
- :: Robot programming
- :: Assembly
- :: Commissioning

Supplied by Soudomatic Hueni & Co, Forel, Switzerland.



Number of report:  
R 003

Industry:  
Metal products

Application:  
Welding  
Spot welding

Product:  
Robots  
High payloads (100-240 kg)  
Controller  
KR C (Robot Controller)

Implementation:  
01.06.1999

Customer:  
J. Staehli & Co. AG,  
Zurich, Switzerland

## Results / Success

### :: Increased productivity

Before we commissioned the robotic cell, Stähli used to spend an average of 24 minutes welding each cabinet. Today, the company needs at most eight minutes. The increases in productivity that have been achieved, which are also based on improved and more consistent quality and the elimination of non-productive times, mean that the user expects the system to have paid for itself within about four years.

### :: Rapid tool change

The cell is equipped with an automatic gun changing system. Since the guns are pneumatically operated and coupling is also carried out using compressed air, the system only requires this one medium. Furthermore, the controller is able to detect whether or not the robot has picked up the correct gun. The tools are all fitted with a flange where the water, air and electrical connections can be plugged in. When the gun is uncoupled, a pump attached to the robot arm sucks back the water used to cool the gun.

### :: High flexibility

The gun rack is designed for six tools, so two positions are currently unoccupied. This means that additional guns can be quickly retrofitted – an advantage in terms of system flexibility for new models of cabinet.

### :: Reduced capital outlay

Contrary to common practice, only the robot gripper is fitted with a transformer, and not each individual gun. The advantage for the customer is reduced capital outlay and a more compact design of the guns. Furthermore, a medium-frequency transformer was selected which is significantly smaller and lighter than a conventional one.

### :: Improved quality

The weld controller, which communicates with the robot controller, also works in the medium-frequency range. For the user, this means a marked improvement in quality, as the weld controller reacts significantly faster, thus guaranteeing a more precise weld process.

### :: Cost-effectiveness

The resistance spot welding process is less expensive than the use of adhesives or rivets and provides a more attractive finish than metal studs.



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