KUKA robots support
Fronius in the development of welding processes

Fronius invests in new robots from KUKA for its own research and development.

For decades now, Fronius has exerted a significant influence on the progress achieved in welding technology, and is regarded as a global technological leader. In robotic welding too, about 30% of the power sources used worldwide are supplied by Fronius. To continue to play this dominant role in the world market, the company opened a new Research and Development Center in Thalheim (Upper Austria) at the end of 2011, involving investments in products including the latest generation of KUKA robots – especially for the further development of CMT, CMT Twin and TIG plasma welding processes.
Starting point / Task definition:

The new facilities in Thalheim were equipped with the latest, ground-breaking technology in order to develop the welding technology of tomorrow and beyond. For example, new and suitable robotic solutions were sought for applications such as automated welding using the CMT, CMT Twin and TIG plasma processes.

Implementation / Solution:

A specific decision was taken to use the KR 16-2 robot type in further development of the CMT Twin process. With CMT Twin, Fronius combines two independently operating arc welding procedures into one process. The new two-wire solution enables users to employ two cold-metal transfer (CMT) processes or to combine a CMT process and a pulsed gas metal arc welding (GMAW) process into one system, based on the following configuration: two power sources, one torch and two contact tubes insulated from one another. The new process technology ensures an extremely stable arc from the start of welding through to filling the end crater. This makes it possible to weld thin sheets at high speed with little spatter as well as deep penetration, with optimum wetting to sidewalls.

Development work on the TIG plasma process at Fronius uses the smaller, six-axis KR 5 arc HW. In spite of the slower welding speed and lower deposition efficiency of the TIG process (note: compared to MIG/MAG), it undoubtedly guarantees the highest possible quality and thus remains the first choice for many applications in which utmost quality is called for, such as in pipeline or pressure vessel
construction. The concentrated, stable arc ensures a level weld without spatter or slag. In turn, plasma welding offers decisive advantages especially with sheets and other components with thicker walls. Plasma welding is basically similar to the TIG process, meaning that this process can be used with a modular attachment for digital gas control and arc control with any digital Fronius TIG power source. This new, highly compact robot solution from Fronius and KUKA, which also employs a hollow-wrist design, now affords the unique luxury of allowing both processes to be used in one system. Plasma is used in applications in which through-welding in a single pass is not possible with TIG. In practice, changing between the two processes is extremely simple. It does not involve a time-consuming exchange of dress packages, but only the torch head. The open architecture of the KUKA KR C4 controller played a highly significant role in implementing this solution. The objective of welding robotics is to offer the customer a self-contained system in which both the robot and the welding system are easy to operate, with rapid start-up.

**System components:**

The use of the KR 16-2 robot type in further development of the CMT Twin process has numerous advantages. The versatility and flexibility of this robot mean it can also demonstrate its advantages during welding. Another strength is its low unladen weight, which makes it highly dynamic and allows fast cycle times to be achieved.

Programming, configuring, loading, testing, diagnosing, modifying, archiving.

The new KUKA.WorkVisual planning tool combines all the steps in a project into one software environment with a uniform interface and menu system, and what is more it can be used as a universal programming environment. This means all the steps from planning through to implementation dovetail seamlessly with one another. In addition, the scope of functions of the robot can be expanded by additional, application-specific software packages. The KUKA.ArcTech welding software used at Fronius allows the system to be programmed in only a few steps, so it can be taken into operation rapidly.

For a series of tests involving the classic CMT process, Fronius selected the KUKA KR 16 arc HW, it being a specialist in welding with a hollow-wrist design. Its 58 mm opening in the arm and wrist allows all commonly used hollow-wrist dress packages to be routed in the protective interior of the arm.
Results / Benefits:

In partnership with Fronius, KUKA offers systems that are optimally matched and pre-configured for one another. KUKA robots and the Fronius welding system blend into a perfect unit, guaranteeing fast readiness for use and simple operation.

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