KUKA

cell4_production manufacturing cells
_friction stir welding efficiently automated

KUKA FSW application module
_the module for joining non-ferrous metals

KUKA Friction Stir Welding (FSW) application modules offer system integrators and end customers maximum flexibility for joining non-ferrous metals with a low melting temperature and for mixed-material combinations such as aluminum and steel. Ideal for demanding material combinations for future-oriented markets, such as electromobility. For efficiency in top quality.

Highlights
FSW application module

- Use of specialized heavy-duty robots from the FORTEC ultra series for maximum process forces and highest rigidity
- Joining of 1D, 2D and complex 3D seams
- Suitable for the cost-effective joining of non-ferrous metals (aluminum up to 8 mm)
- Precise path accuracy of up to 0.5 mm achievable
- Large workspace, can be expanded by means of linear axes
- Low investment costs

KUKA FSW application module

_extremely flexible friction stir welding application for joining non-ferrous metals

Standard configuration / Process feature	FSW application module
Weld seam forms	1D, 2D and 3D
Control concept	Force-controlled Z axis Position-controlled X and Y axes
Safeguarded spaces	Multiple ranges programmable
Max. axial/radial force	10 kN / 4.8 kN
Recommended tool length	150 mm
Process monitoring	KUKA PCD 507 (optional)

Standard configuration / robot system	FSW application module
Robot type	FORTEC ultra KR 300 R2800-2 MT
Robot controller	KR C5 triplecab with KSS 8.7
Total system weight, approx.	3,435 kg

Standard configuration / Spindle	FSW application module
Spindle type	FSW 3 – 5 k
Sensor	3 shear force sensors for force measurement and control in the Z direction

With the new FSW robot variant from the KR FORTEC ultra family, KUKA sets a new benchmark for robot-based friction stir welding. The new KR 300 R2800-2 MT has been specifically developed for friction stir welding. Thanks to its dual-arm design, more powerful motors, and additional intermediate gearboxes, it achieves even higher rigidity than the KR 800 R2800. Compared to its predecessor, the KR 500 R2830 MT, the new model can handle up to 20% higher process forces, while maintaining high accuracy and offering a significantly larger working envelope. This makes the solution highly attractive when compared to expensive gantry systems and machining centers.

Various option packages can be selected, depending on the specific requirements on the friction stir welding applications

- PCD 507 and HMI Advanced:
  - 100% process monitoring and documentation with display on the HMI Advanced
- 6D sensor
  - Additional process data by measuring the process forces and torques in three directions
- Control of an additional auxiliary axis
  - KR C5 quadcab control cabinet for connection of additional positioner and linear axes
- Tooling kit »Rotating Shoulder« (pin and shoulder)
  - Tool with adjustable welding pin length for different workpiece thicknesses
- Tooling kit »Stationary Shoulder« (pin and shoulder)
  - Tool with stationary shoulder and rotating pin (lower heat input, reduced burring)
- KUKA Connectivity Box
  - Remote access to KUKA Remote Service and connectivity to the IoT platform KUKA iiQoT
- Safety PLC
  - For setting up simple cells with Emergency Stop and door interlock (R&D cells)
- Customer-specific designs on request

Target applications

- Battery housings for EV and HEV
- Housings for power electronics and heat exchangers
- Cooling systems for power electronics
- Casings for smartphones, tablets and operator panels

Features

- Integrated FSW spindle for force-controlled FSW process
- Process-specific extensions integrated into an additional technology cabinet
- 100% process monitoring with KUKA PCD 507

Basic components of the FSW application module

- Energy supply for FSW 3 spindle
- FORTEC ultra KR 300 R2800-2 MT robot
- FSW 3 spindle
- KR C5 controller with software-specific extensions
- KUKA smartPAD
- FSW technology cabinet with hydraulic and pneumatic components
- Spindle cooling

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