

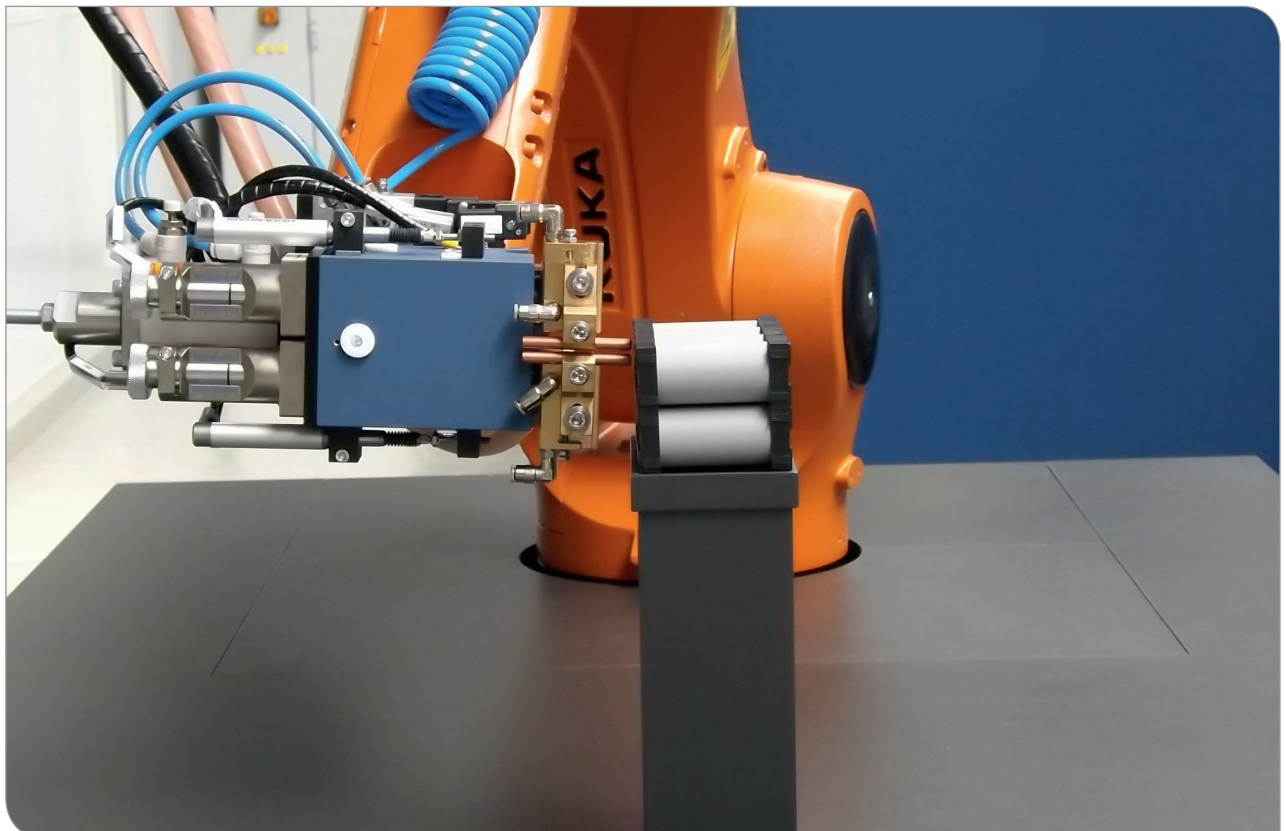
## Innovative battery pack assembly solution – a newly developed concept for stationary storage systems

Stationary storage plays a vital role in a future of energy systems with high shares of fluctuating renewable energy sources like solar and wind power. The development of reliable, economic and feasible storage systems therefore is necessary for reaching the optimistic energy scenarios for the upcoming 25 years in a wide range of “green energy” oriented countries.

Karlsruhe Institute of Technology (KIT) has been working for years on pioneering technologies in the field of stationary storage systems. Within this scope, KIT develops innovative manufacturing and assembly concepts for modular and scalable battery packs.

### What are the main objectives?

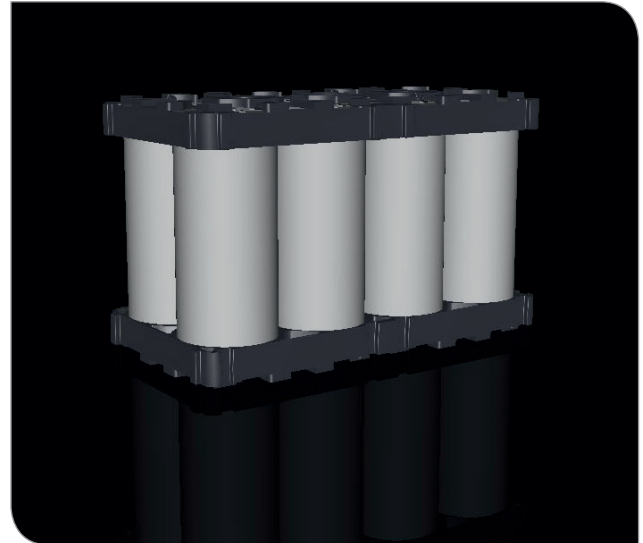
- **High performance** by ensuring a consistent process quality in production with a contact resistance less than  $0.2 \text{ m}\Omega$ .
- **Economic feasibility** by optimizing assembly processes with an overall welding time per battery pack with 8 cylindrical cells of less than one minute.
- **Production flexibility** to meet different application demands with a flexible assembly solution that can be adapted to different types of battery cells (e.g. 18650, 26650, prismatic hard case).



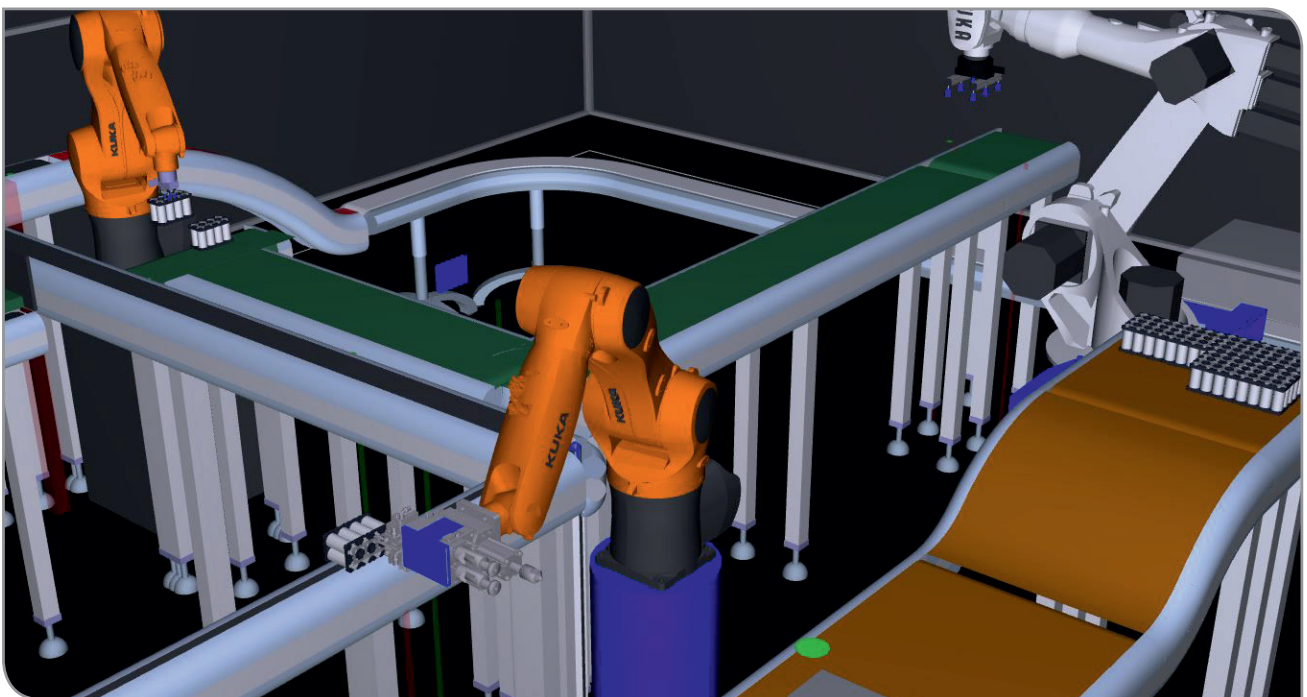
Resistance welding system for high-quality battery packs

To achieve these objectives, KIT has developed an automatic robot production line for battery pack assembly combining state-of-the-art technology with new assembly concepts. The production line is designed for cylindrical cells, but can be adapted to other cell types as well. It consists of a resistance welding system ensuring a reliable and consistent welding connection and thus a constant high quality of cell connection. For quality assurance, an inline process control is included with an automatic elimination of defect modules. The production line enables battery pack assembly at a high production speed with consistent high quality.

To meet the requirements of different applications, a flexible assembly of modular and scalable battery packs is possible. The modular design enables the assembly of battery modules of up to 2 kWh – thus interconnected, battery systems with higher capacities are possible.



Modular, scalable battery pack of cylindrical cells



Simulation of the KIT production line for battery pack assembly

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