

Modular Battery Cell Processing and Assembly System



Challenge

A battery manufacturer needed an automated battery cell processing and assembly system that is scalable to various cell form factors and throughputs.

Solution

The production line used a modular, custom DFP architecture and consists of four processing stations with specific functions that can be configured based on product requirements and environmental constraints.



In Station 1, a four-layer web enters through tractor belts, sprockets, and reel drives. A four-up punch head punches electrodes onto the unibody skewers multiple times to create the stack. The bottom and top end plates are inserted along with the bumper, and the stack height is set. A final inspection of the cathode/anode offset is performed before the product advances to Station 2. In Station 2, two printers apply a paste/slurry to both sides of the electrode stack, which then moves through a drying process where two dryer stations dry the paste/slurry.

In Station 3, side constraints are inserted on both sides of the product. A side clamp, that vertically clamps both sides of the product at the same time, is installed and the product moves onto the oven for baking. Once complete, the side clamp fixture is removed, and the conveyor returns the fixture to the operator. Finally, the top and bottom parts are laser welded and the product undergoes a weld inspection to ensure the welds meet all criteria on both sides.

In Station 4, parts are loaded into the nest and tabs are torn out using a skewer pin that tears out a small number of tabs at a time. Cameras visually guide this process and conduct a pre- and post-process inspection. Anode and cathode busbars are inserted with vision guided assist from cameras. Tabs are bent and cameras identify the tab locations. Lasers then weld both the anode and cathode sides of the battery.



Result

The fully automated system processes, assembles, and inspects two battery cells every six seconds while running two identical lines.

About DWFritz Automation

Established in 1973, DWFritz Automation designs, builds, and supports engineer-to-order automation systems and high-speed, non-contact metrology products, in addition to providing world-class build-to-print manufacturing capabilities to clients.

