



Powering E-Bikes and Battery Energy Storage Systems with Cell-Formation Solution

Organization

- Leading e-bike and cell and battery manufacturer

Challenges

- Reliable cell formation solution to handle production ramp-up
- Ability to reuse existing pouch cell formation fixtures

Solutions

- BT2202A Charge-Discharge Chassis 400 VAC 3-Phase
- BT2204B Charge-Discharge Modules

Results

- Reduction in manufacturing footprint by 60 percent; creating space availability for manufacturing line expansion
- Reduction of net energy consumption by 30 percent
- Regeneration of energy onto the grid during cell discharge

The industry news around e-mobility is fueling not just the electric car market, but the electric bike (e-bike) market as well. E-bikes encompass mobility vehicles like the bicycle, scooter, or motorcycle with an integrated electric motor for propulsion.

According to [Allied Market Research](#), the global e-bike market size was valued at \$16.34 billion in 2017 and is expected to reach \$23.83 billion by 2025. This increase represents a compound annual growth rate (CAGR) of 4.9 percent from 2018 to 2025.

A leading cell and battery contract manufacturer specializing in e-bike manufacturing was getting ready to expand its production capacity as orders started to increase with the market momentum. It soon ran into some challenges, and a quick and dependable solution was necessary to keep production and delivery schedules on track.

The Key Issues

The manufacturer had been using their cell formation systems for over a decade, making mostly 6 Ah and 25 Ah lithium-ion (Li-Ion) cells for e-bikes and energy storage systems (ESS). With the rapid growth in the e-bike market, the solution had to meet pressing production schedules, and more importantly, ensure conformance to new safety and performance standards. The solution had to address three key areas:

1. **Onsite support** - the manufacturer's original supplier for cell and battery charge-discharge electronics could not provide adequate on-site support. To complicate matters, it went out of business recently.
2. **Configurability** - the manufacturer was struggling to use its old solution, which was difficult to configure and adapt for new higher-density cells and batteries. It also had to comply with new and more stringent safety specifications.
3. **Scalability** - the manufacturer had to contain the unit cost of the cells while upgrading and retrofitting its existing production lines with better cell-formation equipment. The company wanted to reuse its existing fixtures as this would help to reduce expenses.



The Solution

The manufacturer evaluated four cell formation solutions, including three from other providers. The Keysight BT2200 charge-discharge platform with the BT2202A chassis and BT2204B charge-discharge modules was a natural choice for these reasons:

- Compatible connectivity with the manufacturer's existing pouch cell fixtures
- Ability to reuse its existing fixtures, saving substantial capital costs
- Compact form factor; two chassis per system
- Support for up to 8 charge-discharge modules, each with 32 physical channels capable of ± 6.25 A charge-discharge and 6 V cell formation
- Easily configurable to support up to 200 A in anticipation of producing much higher-capacity cells
- Flexibility to define and monitor various parameters during the individual sequence



Keysight BT2200 platform can support up to 8 charge-discharge modules

The Results

The manufacturer implemented this solution to integrate into their retrofit schedule and quickly upgraded the production line. The engineers were pleasantly surprised to learn they now have the flexibility to configure multiple tests concurrently. They can also easily include new test parameters to remove defective cells early in the cell formation process without disrupting the rest of the cells under formation and test.

The manufacturer was also pleased with the efficiency benefits of the BT2200 platform. The platform has highly efficient AC power regeneration capabilities, which recycles electricity back to the grid during the cell discharge process, thereby reducing net energy consumption. Recycling lowered their operating and cooling costs by 30 percent as the equipment generated less heat because of the power generation capabilities. And, since the BT2200 form factor is 60 percent smaller than their existing system, the manufacturer now has free production floor space for any future line capacity expansion required to meet production ramp-up demands.



Accurate measurements with 4-wire connections for power and sense to cells

For more information, visit www.keysight.com/find/BT2200.