



Lithium-ion battery
inspection outlook

Global battery demand, critical failure points, and the rise of CT inspection

The battery market is in a period of unprecedented growth. Cell phones, toys, consumer electronics, electric vehicles, industrial equipment—it seems that everything these days is relying on the latest battery technology for power.

A combination of increased safety regulations, consumer pressure for lower costs on battery-powered products, and a rise in automation in battery production processes have put downward pressure on the battery industry to meet the rising demands of the market while keeping production costs to a minimum. And battery failure at any stage of the product lifecycle has become increasingly costly. Fortunately, new technologies in the world of non-destructive battery testing, such as CT inspection, hold the secret for many manufacturers. By detecting failures early to avoid downstream costs, manufacturers can stay ahead of the curve and ride this surge of upward growth.

This paper explores the growing size of the battery market and the real benefits battery manufacturers can achieve through non-destructive CT testing.

Global growth

Battery demand is rapidly growing worldwide. Experts forecast the battery market will grow at a compound annual growth rate (CAGR) of more than 12% from 2020–2025.¹ Discussion on battery demand is largely focused on three core industries: consumer electronics (smartphones, tablets/PCs, digital cameras, power tools, etc.), electronic transportation (i.e., electric vehicles), and electricity grids. While much attention traditionally has been placed on consumer electronics, it is the smallest of the main drivers of battery demand. Consumer electronics, which account for more than 20%

of the market today, will represent only a marginal share of the global battery market in 2030. Conversely, the electrification of transportation and the deployment of batteries in electricity grids will drive significantly more global demand in the future. By 2030, passenger cars will account for the largest share (60%) of global battery demand, followed by the commercial vehicle segment with 23%.² With heavy reliance on lithium-ion batteries, these industries are projected to grow the global lithium-ion market to over \$100 billion by 2025.³

“The demand for Li-ion batteries in the automobile industry is expected to increase in line with rise in demand for electric vehicles. These batteries have gained popularity among automobile manufacturers as they offer an alternative to nickel metal batteries used in electric vehicles, due to their small size and light weight.”³



Cost of battery failure

As the market expands, so does the expectation on battery performance. Savvy manufacturers and Original Equipment Manufacturers (OEMs) recognize that the failures are too damaging to a company's image and bottom line. In today's highly competitive environment, getting to market quickly and cost-effectively with a quality product is absolutely critical. Additional development cycles, expensive recalls, and the opportunity cost of lost resources in ruined batteries from destructive battery testing all add up. Recalls can range from merely pesky to downright damaging, with the price tag soaring into the hundreds of millions.

Benefits of CT inspection

Fortunately, there is a qualified technical inspection solution. With CT inspection, battery manufacturers now have powerful tools for advanced testing and to reduce costly failures. CT inspection goes beyond traditional methods of testing and offers a better, more comprehensive, and more reliable approach. All of this means failures can be detected much earlier in development cycles, reducing downstream cost implications. CT testing provides additional insights into the manufacturing process and opens the chance for batch testing while decreasing scan time and increasing throughput.



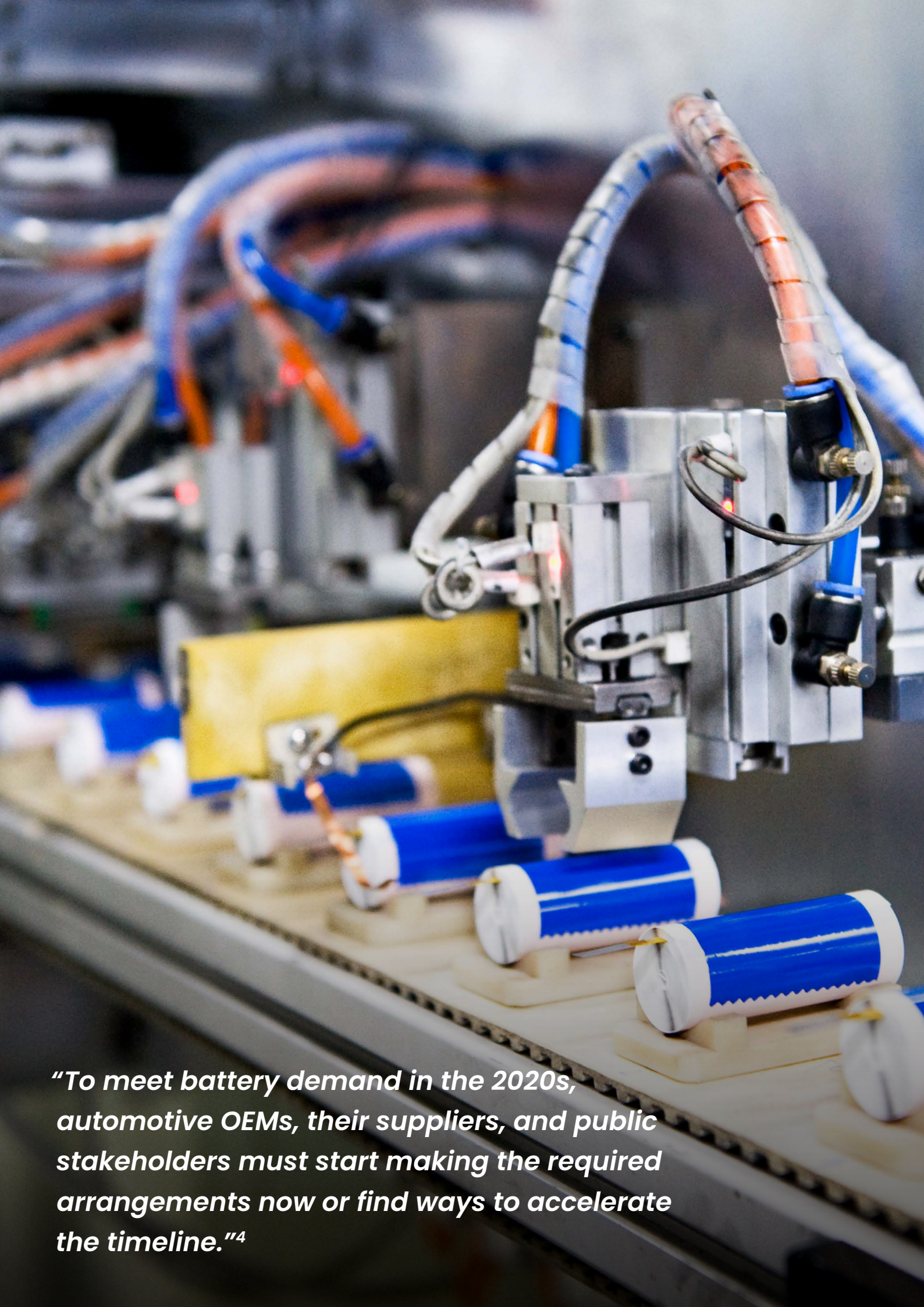
Deeper Insights

- Identify new failure modes and implement process changes to correct and detect them earlier
- Meet and exceed regulatory compliance mandates (and respond more quickly to changes)
- Gain more confidence in product integrity (avoiding costly recalls that damage reputation)

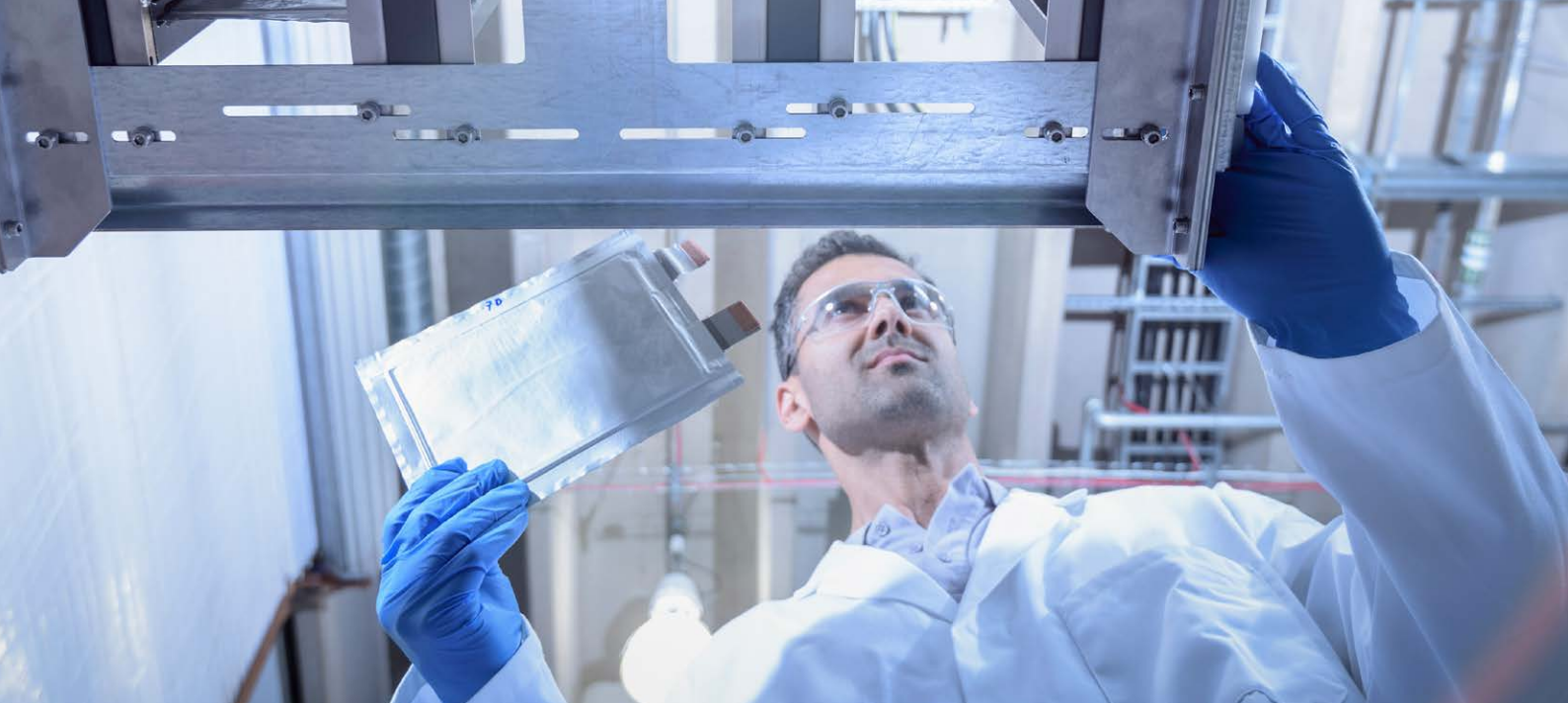


More Efficient

- Versatile machines allow for greater production flexibility, inspecting different types and sizes of batteries and defects on the same line
- Reduce changeover time/personnel to move large batteries around for inspections



“To meet battery demand in the 2020s, automotive OEMs, their suppliers, and public stakeholders must start making the required arrangements now or find ways to accelerate the timeline.”⁴



Making defects visible

Detecting anomalies present in battery components, battery cells, and ESS and EV modules is now easier than ever. With Lithium-ion battery defect recognition, battery manufacturers and users can inspect both known sources of defects as well as gain insights into new areas of possible concern. This ranges from classical regular anode/cathode overhang inspection for pouch and prismatic cells to new spot checks for items such as, foreign body material, gas bubbles, welding defects of electrodes, electrode cracks, and electrolyte filling. And with the prevalence of ever bigger ESS and EV modules, the necessity to inspect complete modules for resin filling, connections, cell alignment or dimensional accuracy becomes that much more important.

A promising future

As the battery market evolves and global demand skyrockets, the need for better, more innovative battery testing methods becomes even more critical. New technologies, such as CT inspection, are giving battery manufacturers the tools they need to meet the growing demand and stay ahead of the pack. The promise of better, more comprehensive battery inspection is here. Those that invest in such technologies are empowered to capitalize on incredible business growth over the next decade (and beyond).

Industrial application of X-Ray Computed Tomography allows for the most comprehensive inspection of Lithium-Ion batteries in the whole industry and is by far the tool of the future offering versatility and increasing performance year-over-year.

Referenzen

- ¹ Mordor Intelligence 2019
- ² World Economic Forum: "A Vision for a Sustainable Value Battery Chain in 2030" September 2019
- ³ Allied Market Research 2018
- ⁴ McKinsey "Recharging economies: The EV-battery manufacturing outlook for Europe" 2019

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