How Vianode Increased Yield, Efficiency, and Confidence with Cellerate Automation

Summary

Vianode, a synthetic graphite manufacturer for lithium-ion batteries, wanted to overcome bottlenecks in manual coin cell assembly that were limiting R&D throughput and data reliability.

By implementing the CASS, Cellerate's automated cell assembly & sealing system, Vianode achieved an increase in lab output of 20-30% per year, improved the consistency and quality of data and significantly reduced technician training time.

These results not only demonstrate the real-world value of automation but also transformed Vianode's approach to lab resource allocation and data-driven decision making.

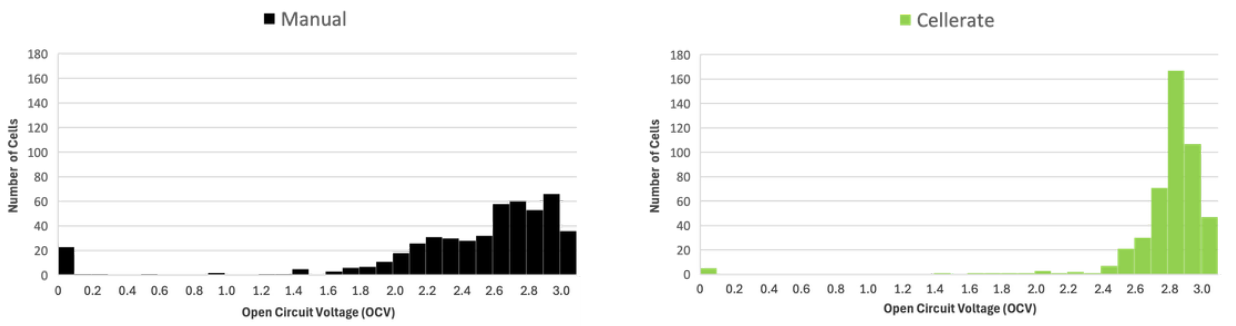

Figure 1: Data from 500 graphite half-cells assembled by hand and 467 assembled using the CASS shows OCV variability reduced by 67%.

About Vianode

Vianode is a Norwegian company specialising in the production of sustainable synthetic anode graphite for lithium-ion batteries. Their laboratory operations require the production of hundreds of high-quality coin cells each week to validate the material performance.

Prior to automation, the lab relied heavily on expert technicians to assemble cells manually. A process fraught with time pressures, inconsistency, and training challenges.

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The Challenge

Manual coin cell production at Vianode was both time-consuming and labour-intensive. Even with experienced staff, only around 79% of cells consistently fell within 1% of the batch average for key electrochemical metrics (Vianode's internal definition of a high-quality result). In similar labs, this figure is often closer to 60%.

With the team stretched thin and increasing pressure to validate more materials, the manual process became a bottleneck, both in terms of speed and reliability.

> ***"Cellerate helped Vianode stabilise and scale high-quality output, ensuring strong results weren't dependent on a handful of expert staff."***

Training new technicians to reach acceptable standards required weeks of hands-on effort, and once fully trained, assembling one batch of cells would still occupy a whole day in the glovebox. Variability between technicians also introduced significant inconsistencies, undermining the reliability of test data.

The Solution

To address these challenges, Vianode integrated the CASS into its laboratory. The system was configured for glovebox operation, and crucially, it was easy to train staff on.

> ***"Cellerate enabled us to test more materials, with fewer people, and more confidence in our data."***

The glovebox-compatible design of the CASS allowed Vianode to adopt full automation immediately, without needing to alter any lab infrastructure. This enabled them to scale quickly and capitalise on the system's full capabilities without delay.

The Results

The implementation of the CASS marked a turning point for Vianode's laboratory operations. By replacing manual tasks with precise, repeatable automation, the team saw improvements across every key performance indicator, from technician training time and cell yield to throughput, data consistency, and scalability. The following sections outline the measurable impact of automation on both lab productivity and scientific reliability.

ROI at a Glance

- 25–30 technician hours saved/week
- 20–30% increase in output with fewer staff
- Training cut from 12 months to 2 weeks
- Yield increase: 30%
- 67% reduction in variability

Based on internal figures provided by Vianode

Reduced Training Burden

Vianode estimated that manual assembly could take up to 12 months of hands-on experience before a technician could consistently build high-yield cells. With Cellerate, new staff reach strong performance after just two days, with more than 75% of cells achieving less than 1% variance in FCE. Within two weeks, they were fully autonomous. Crucially, performance was similar across interns and experienced technicians, with around 80% of cells achieving that same standard regardless of operator experience.

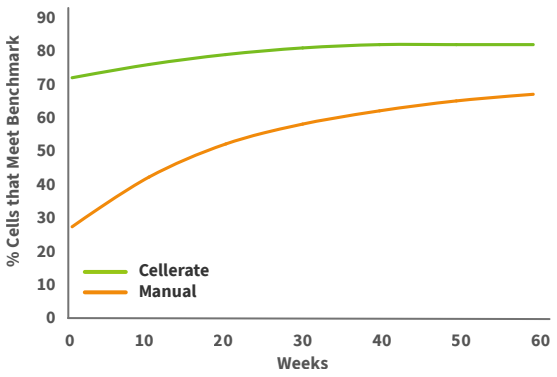

Figure 2: Technician progression measured by the percentage of cells with <1% variation.

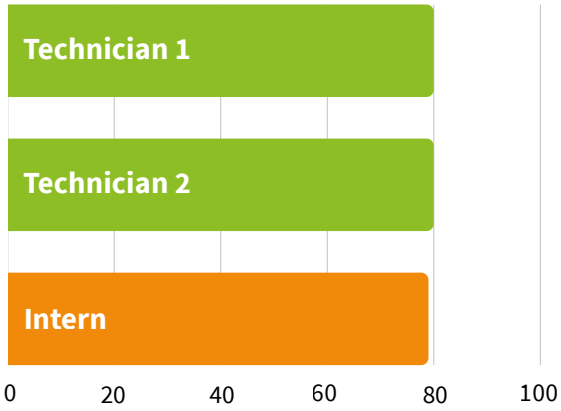

Figure 3: Cell consistency across experienced technicians and a newly trained intern, measured as the percentage of cells within 1% of the batch mean.

"With manual assembly, it could take up to a year of training to exceed 70% of cells meeting Vianode's quality standard. With CASS, new users surpassed 75% after just 2 days."

This reduction in training time translates directly into faster productivity attainment, saving an estimated £20,000–£30,000 per technician in opportunity cost, based on reduced downtime and faster onboarding.

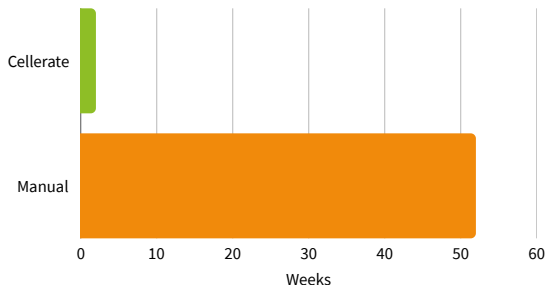

Figure 4: Weeks training needed for new staff when doing manual vs. automated cell assembly

"Basic operations can be taught in about an hour. Full autonomy [for advanced operation] takes around two weeks."

Increased Throughput

The introduction of the CASS enabled a 20–30% annual increase in output, achieved with fewer staff. Previously, assembling 50 cells would take a technician an entire day in the glovebox.

Now, the team spends just 1.5 hours preparing trays and initiating an unattended run that can produce up to 100 cells. This shift not only doubled daily throughput but also freed up staff for more valuable activities, contributing to sustained year-on-year growth. Coin cell output increased from 4,122 to 6,907 per year while technician headcount reduced from 10 to 4.

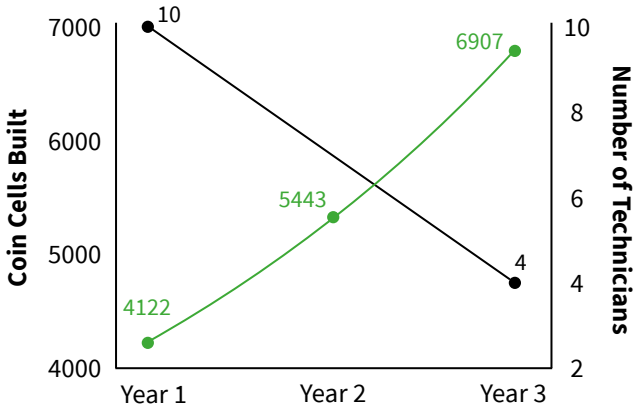

Figure 5: Number of coin cells built annually vs. number of technicians in the lab since introducing the CASS.

"Coin cell output increased by 68% while technician headcount fell 60%."

Improved Yield & Reduced Redundancy

While some labs define 'good cells' as those that simply avoid shorts or obvious failures, a threshold which Vianode exceeds in over 95% of cases, Vianode's standard is stricter: less than 1% variation between cells within a batch.

By this benchmark, Cellerate has raised yields from 79% up to over 85%, even across less experienced users. This improvement demonstrates how automation can raise a lab's performance beyond even expert manual capabilities.

For labs operating at more typical manual yields of around 60%, the potential gains are even more significant. Adopting the CASS could cut experimental redundancy by up to 29% per test condition. And for high-performing teams like Vianode's, the greater value lies in consistency. The reliable outcomes across batches and users mean fewer cells can be made, freeing up time and resources to test more materials or advance projects more quickly

"Improved yield allows more materials to be tested with fewer resources"

Workflow Efficiency

Manual assembly used to consume an entire working day. With the CASS, setup takes less than 2 hours, followed by 6 hours of unattended operation, saving 5–6 hours per batch. With a new batch every day, that's around 25–30 hours of technician time saved per week.

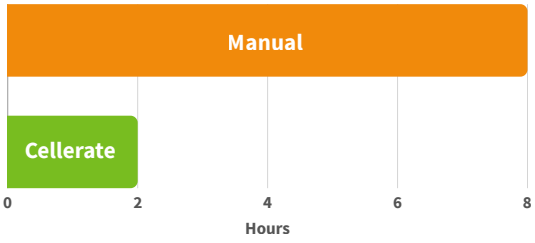

Figure 6: Time taken with manual cell assembly vs. Cellerate cell assembly

The Data

The CASS produced consistent, high-quality data across operators and builds, reinforcing the benefits of automation. To assess consistency across users, Vianode tested 135 cells assembled by eight different technicians across 25 batches. Despite varying skill levels, all batches showed extremely low variance - first charge efficiency (FCE) standard deviation was 0.1% and NRMSD on the 3rd discharge specific capacity was 0.3%. This level of uniformity not only confirms ease of use but also ensures that experimental outcomes are driven by material performance, not operator error.

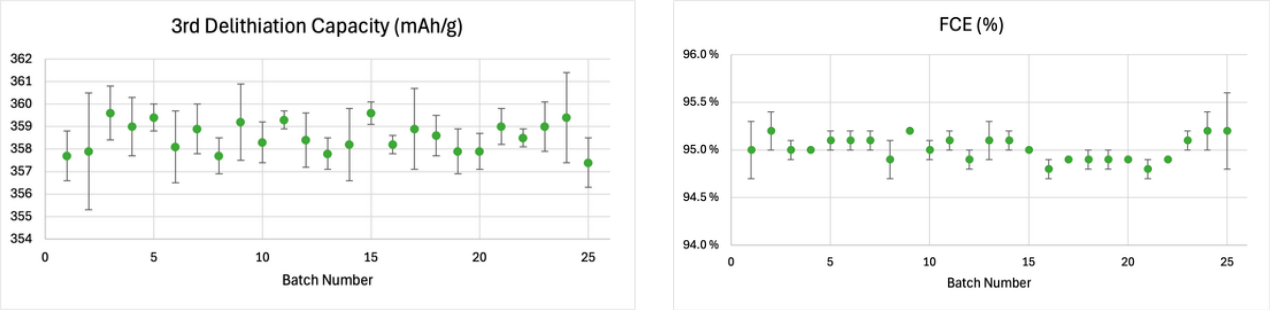

Figure 7: Average capacity and first charge efficiency across 25 batches of coin cells; average standard deviations are 0.3% and 0.1% respectively.

In parallel, Vianode compared 500 cells built manually to 467 built using the CASS. As shown in Figure 1, the automated system reduced open circuit voltage (OCV) variability by 67% and achieved a failure rate below 2%, a compelling demonstration of its repeatability and process control.

Estimated Return on Investment

Vianode's implementation of the CASS has proven measurable savings in time, labour, and training costs:

- Coin cell output increased by 68% while technician headcount fell 60%.
- Cellerate consistently delivers >85% of batches with less than 1% variation between cells (Vianode's internal benchmark). This enables more reliable results with fewer cells.
- 25–30 technician hours saved per week, based on replacing a full day of manual assembly with a 2-hour setup and unattended run.
- Training time was reduced from 12 months to 2 weeks, enabling faster onboarding and increased team flexibility.
- Performance remained consistent across operators, with ~80% of cells achieving <1% variance in FCE regardless of experience level.
- 67% reduction in OCV variability, supporting higher-quality data and more confident decision-making.

These estimates are based on Vianode's reported experience, included here to illustrate potential ROI for comparable lab environments.

Conclusion

The CASS delivered measurable and consistent improvements across Vianode's battery R&D processes. These included higher cell yields, reduced variance, significantly shorter training times, and reduced technician involvement in manual tasks. The ability to scale production and maintain quality across different users has reshaped how the Vianode team works.

"Cellerate has streamlined operations and made our workflow more efficient."

Vianode's experience shows how automation isn't just about efficiency, it's about enabling teams to do more, faster, with greater confidence.

Following the success of this first automation step, the Vianode team is now exploring further integration opportunities to extend the benefits of automation across more parts of the battery development process.

"Cellerate provides a platform Vianode can build on, enabling future expansion in output without relying on additional headcount."

To learn more about how automation can improve your cell assembly consistency, visit cellerate.co.uk