

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

Executive 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 Cellerate Cell Assembly & Sealing System (CASS), 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.

About Vianode

Vianode is a Norwegian company specializing 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.

Vianode



OCV Variability - Manual vs. Automated Assembly

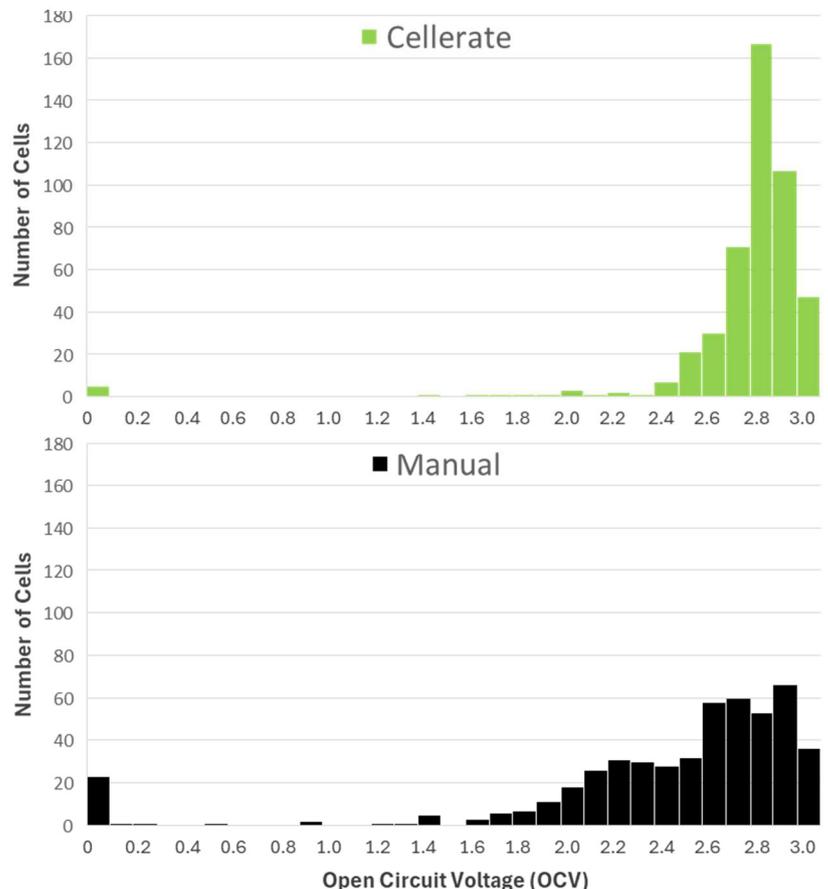


Figure 1 Data from 500 cells assembled by hand and 467 assembled using the CAS System shows OCV variability reduced by 67%.

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.

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

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

The Solution

To address these challenges, Vianode integrated the Cellerate CASS into their 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 Cellerate 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 Cellerate 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

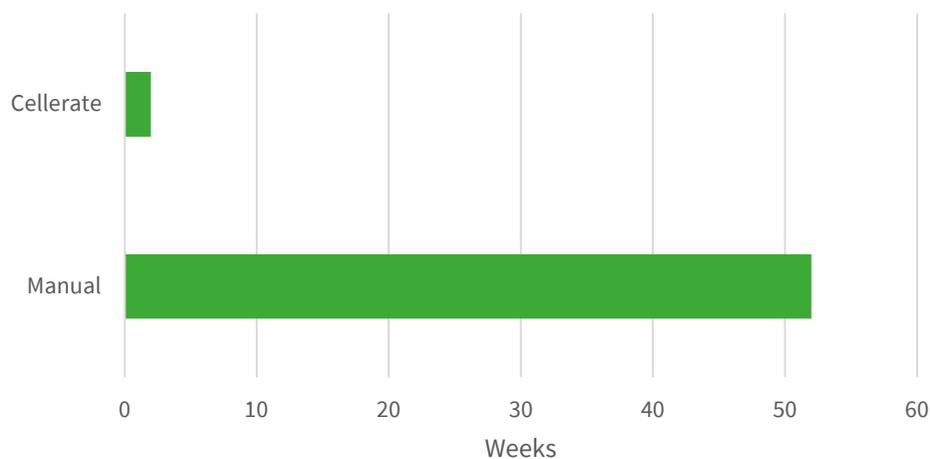
- ⇒ 25–30 technician hours saved/week
- ⇒ Training time cut from 12 months to 2 weeks
- ⇒ Yield increase: 60–79% → 85%
- ⇒ 67% reduction in variability
Based on internal figures provided by Vianode

Reduced Training Burden

With manual assembly, Vianode estimated that it could take up to 12 months of hands-on experience for a technician to consistently achieve high-yield cell builds. With Cellerate, new staff reach 75%+ success rates after just two days and become fully autonomous within two weeks.

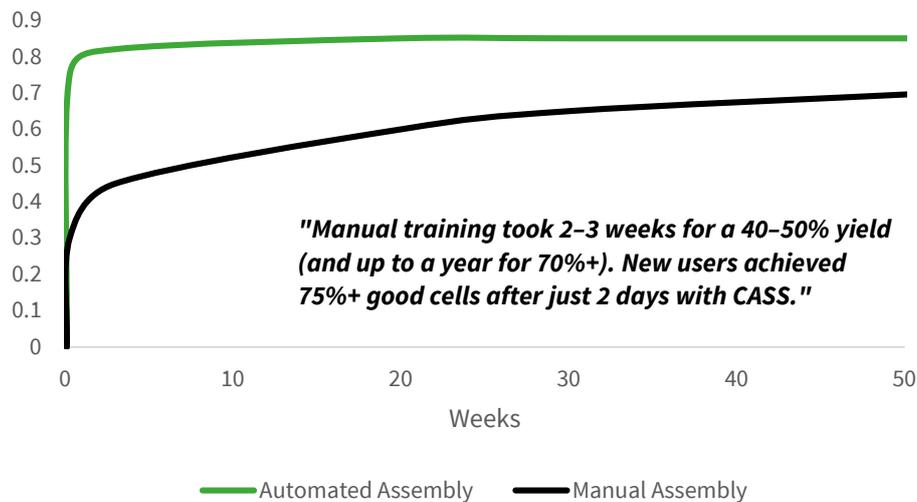
“Basic operations can be taught in about an hour. Full autonomy [for advanced operation] takes around two weeks.”

Manual vs Automated Training Time



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.

Cell Data Quality vs. Technician Experience



Increased Throughput

The introduction of 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.

"Lab throughput increased by 20–30% per year despite fewer staff"

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.

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.

“Consistency across 8 technicians means quality isn’t bottlenecked by individual expertise.”

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.

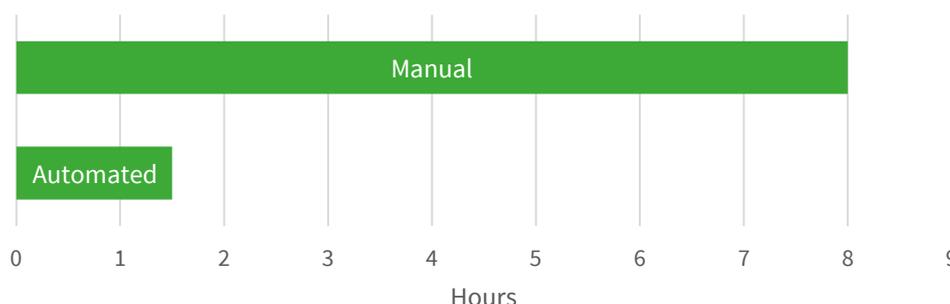
For labs operating at more typical manual yields of around 60%, the potential gains are even more significant. Adopting Cellerate’s system could cut experimental redundancy by up to 29% per test condition. And for high-performing teams like Vianode’s, the greater value lies in consistency. The reliable 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 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.

Cut Staff Time Spent on Cell Assembly by Over 80%



The Data

The Cellerate CASS produced consistent, high-quality data across operators and builds, reinforcing the benefits of automation.

To assess consistency across users, Vianode tested 127 cells assembled by eight different technicians. Despite varying skill levels, all batches showed extremely low variance: standard deviations in both specific capacity and first cycle efficiency (FCE) remained around 0.2–0.3%. This level of uniformity not only confirms ease of use but also ensures that experimental outcomes are driven by material performance, not operator error.

Table 1 Standard deviation in specific capacity and first charge efficiency across five representative batches. Vianode defines a batch as high-quality when the majority of cells fall within 1% of the batch average. The table shows standard deviation across cells - a measure of how tightly clustered each batch is.

Batch	Number of Cells	Standard Deviation in Specific Capacity	Standard Deviation in First Cycle Efficiency
Graphite #1	10	0.23%	0.27%
Graphite #2	8	0.22%	0.18%
Graphite #3	39	0.33%	0.21%
Graphite #4	58	0.32%	0.32%
Graphite #5	12	0.23%	0.32%

In parallel, Vianode compared 500 cells built manually to 467 built using 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 Cellerate CASS has proved measurable savings in time, labour, and training costs:

- 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 reduced from 12 months to 2 weeks, enabling faster onboarding and increased team flexibility.
- 20–30% increase in lab output per year, achieved with fewer staff.
- Cellerate consistently delivers >85% of batches with less than 1% variation between cells – Vianode's internal definition of a 'good' batch. This enables more reliable results with fewer cells.
- 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 www.cellerate.co.uk