

How UKBIC Delivers 95% Design-Prediction Accuracy Before a Single Trial

Transforming complex battery development into a streamlined, traceable, scalable process.



The UK Battery Industrialisation Centre (UKBIC) is the UK's national manufacturing development facility, created to bridge the gap between laboratory innovation and full-scale commercial battery production. As a government-funded, open-access organisation, UKBIC provides the equipment, expertise and industrial environment needed to help companies validate new chemistries, scale manufacturing processes and build confidence before committing to major capital investment. It plays a critical role in supporting the UK's domestic supply-chain resilience in battery production.

The organisation's mission is to ensure the UK captures commercial value from its battery R&D and accelerates progress toward the next era of electrification. While UKBIC is funded through the UK Government's Battery Innovation Programme, commercial industry partners pay for the development, scale-up and validation services they use.

Challenge: Digital Foundation for Fast, Accurate Traceable Innovation

In 2021, UKBIC opened as an operational, customer-ready national facility. From the outset, UKBIC faced the complexity of supporting multiple customers, chemistries and cell formats, each requiring rapid design iteration, precise validation and full traceability. As a greenfield site, the organisation needed a digital foundation capable of managing fast-moving pilot programmes, ensuring design accuracy, and maintaining a single source of truth across engineering, production and quality.

"What works in the lab doesn't automatically translate into scalable, repeatable manufacturing, and that's the gap we fill," said Shrinath Ganesh, Senior CAD Engineer for UKBIC. "We knew we needed a structured approach to design. In the beginning, design documents were shared informally through email, spreadsheets and SharePoint with no defined design-freeze point. We knew we needed to manage design changes efficiently and effectively to keep up with customer demand."

The engineering team also needed a way to validate complex battery designs, such as cylindrical winding models and pouch-cell layer stacks, before committing to physical trials. UKBIC primarily uses its digital design environment to model cylindrical cells, pouch cells, and emerging tabless formats, creating detailed representations that determine electrode lengths, overlaps, pitch changes, and radial expansion before any physical trials begin.

"We needed an integrated design-to-manufacturing environment that could link our precise, parametric battery modelling with controlled lifecycle and BOM management, creating a continuous digital thread that would keep engineering, quality and production,"

added Ganesh. "We needed to ensure every design decision is traceable, validated and ready for the shop floor."

Solution: Parametric Modelling, Structured Workflows, Seamless Validation

To achieve this, UKBIC implemented Creo for advanced battery design and Windchill as its enterprise PLM backbone. The company partnered with PDSVISION for the implementation and ongoing optimisation of the design and PLM environment, relying on their expertise to configure workflows, resolve system issues and ensure a smooth, reliable setup across projects.

For parametric winding, UKBIC used Creo's Engineering Notebook to calculate electrode lengths, pitch, overlap zones and radial expansion, including the 4% growth that occurs during battery operation from electrode expansion and contraction.

PDSVISION

Partner Spotlight

PDSVISION is a global engineering and PLM solutions partner that helps organizations optimize their product development environments through expert implementation, configuration and ongoing support. Combining deep technical knowledge with hands-on industry experience, PDSVISION enables teams to streamline workflows, improve data quality and maximise the value of their digital design and lifecycle-management tools.

Likewise, Windchill provides the structured workflows, lifecycle states and BOM management needed to coordinate engineering, quality, logistics and production so everything runs from a single source of truth.

"Creo lets us visually validate the entire coil pack before we ever touch the production line," said Ganesh. "It gives us production readiness upfront. And Windchill gives us that single source of truth. Every drawing, every revision, every decision is captured and traceable."

UKBIC's engineers rely on Creo's advanced parametric simulation capabilities, such as notebook-driven winding models and variable-pitch coil simulations, to predict coil behaviour across different winding segments with high accuracy. Once validated, these designs are handed to process engineering teams, who translate the specifications into process sheets, control plans and equipment parameters for coating, calendaring, mixing and formation, without relying on additional machine-design tools within the CAD environment.

By resolving manufacturability questions in the model rather than on the shop floor, UKBIC ensures that each design will run successfully on its pilot and flexible production lines, reducing waste, shortening development cycles, and giving customers confidence that their concepts will scale. The integration between Creo and Windchill then ensures seamless handover between engineers and across teams.

"I went on holiday and simply handed over the top-level BOM number," Ganesh said. "My colleague logged into Windchill, saw exactly what was in work or released, and picked things up instantly. That's the power of having everything in one controlled system."



Having an integrated digital environment that connects design, data and manufacturing gives us the confidence to move faster, make better decisions, and scale new technologies with far less risk."

Shrinath Ganesh, Senior CAD Engineer, UK Battery Industrialisation Centre

Results: Delivering 95% Prediction Accuracy and Cutting Validation Time by 75%

The impact of Creo and Windchill has been transformative for UKBIC's speed, accuracy and ability to support customers at scale.

The winding model alone reduced design-validation time from four weeks to less than one, cutting design validation time by three-quarters. Windchill's structured workflows have eliminated version confusion and improved collaboration across the business.

"It's a massive saving in customer waiting time and overall project cost," said Ganesh. "Ninety-five percent of the time, our design predictions are valid before we even run a trial. Windchill ensures every change is reviewed and approved. Each manufactured cell carries a serial label with the part number and revision level. It's improved our traceability, design quality and confidence."

For customers scaling from thousands to tens of thousands of cells, this traceability is essential. The digital foundation also supports sustainability and circular-economy initiatives.

"Windchill and ERP integration gives us full supplier and material traceability," said Ganesh "It helps with our recycling decisions and carbon-footprint assessments. Having an integrated digital environment that connects design, data and manufacturing gives us the confidence to move faster, make better decisions, and scale new technologies with far less risk. It means every idea can be validated, traced and industrialized with the speed and precision this sector demands."

Looking Ahead: A Flexible Digital Platform for Next-Generation Cell Technologies

As battery technologies evolve and regulatory expectations rise, UKBIC is expanding its capabilities with next generation cell formats and flexible pilot line manufacturing. The organisation is preparing to launch tabless cylindrical cell capability to create new benchmark cells for UK industry and helping to reduce the UK's reliance on overseas manufacturing and materials.

"Our digital foundation means we can adapt quickly, support innovation at pace, and continue strengthening the UK's competitive position in the global battery ecosystem," added Ganesh. "The goal is faster iteration, more parametric automation, and even greater accuracy between CAD prediction and real-world performance. With Creo and Windchill, we're already well on that journey."

Customer Overview | UKBIC

Industry	Advanced Manufacturing
Headquarters	Coventry
Employees	145
PTC Products	Windchill, Creo
Website	www.ukbic.co.uk

Benefits

- **Reduced Design Validation Time** – Cut from four weeks to less than one (75% reduction) through accurate parametric winding and layer stack modelling.
- **Higher Prediction Accuracy** – Achieved around 95% accuracy in digital design predictions before physical trials, giving customers confidence in scale up.
- **Improved Manufacturability Upfront** – Resolved issues in the model rather than on the shop floor, reducing waste and ensuring designs run successfully on pilot lines.
- **Single Source of Truth Across the Business** – Structured workflows and controlled BOMs eliminated version confusion and informal document sharing.
- **Enhanced Traceability and Quality Control** – Every drawing, revision and decision is captured, reviewed and approved through lifecycle management.
- **Streamlined Engineering Handover & Cross Functional Collaboration** – Clear lifecycle states and a shared controlled data environment allow engineering, quality, logistics and production teams to pick up work instantly and operate in sync.
- **Scalable Support for Customer Growth** – Serialised part number and revision tracking enables customers to scale from thousands to tens of thousands of cells.
- **Strengthened Sustainability and Circularity** – Full supplier and material traceability supports recycling decisions and carbon footprint assessments.
- **Increased Operational Efficiency and Reduced Project Costs** – Driven by faster iteration, fewer errors and earlier parameter freeze.
- **Accelerated Industrialisation Cycles on a Robust Digital Foundation** – Future proof platform to support more chemistries, formats and customers with greater speed, precision and adaptability to next generation technologies.