BATTwin

Flexible and scalable digital-twin platform for enhanced production efficiency and yield in battery cell production lines

Newsletter

2025 – Issue 2

BATTwin Project

BATTwin Project Releases Partners' Services Booklet

We are pleased to announce the release of the *BATTwin Partners & Services* booklet. This publication introduces each project partner, outlining their services and their role within the **BATTwin** initiative.

The booklet showcases the expertise and collaborative spirit driving the project forward, offering readers a clear overview of the consortium's strengths and contributions.

The booklet is now available for download via the BATTwin project website.

Funded by the European Union

Innovate UK

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UK Participants are supported by UK Research and Innovation (UKRI) under the UK government's Horizon Europe funding guarantee.

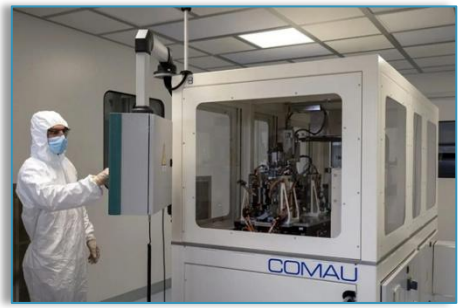
BATTwin Project Aligns with BATTERY2030 Initiative to Advance Sustainable Innovation

The **BATTwin** project joined the BATTERY2030 initiative, a collaborative effort uniting EU-funded research projects committed to accelerating the transition toward a sustainable energy future. Through this partnership, BATTwin will contribute to actions that support the European Green Deal, the UN Sustainable Development Goals, the European Action Plan on Batteries, and the Strategic Energy Technology (SET) Plan. To learn more about this inititive, follow this link.

Partners' News

Comau inaugurates dry room laboratory

Automation specialist Comau (BATTwin Partner) has set up a fully equipped dry room laboratory at its Italian headquarters in Grugliasco to refine and test its self-developed cell production systems, as well as test new machines for lithium-ion and lithium-metal cells. Read more following this link.



BATTwin Presented at the SP2025 during the Battery Ecosystem Summit organised by FULL-MAP

On October 9, 2025, the BATTwin project was proudly presented by Politecnico di Milano Assistant Professor Ozan Emre Demir during the SP2025 FULL-MAP Clustering Event, held online.
Organised by the FULL-MAP project in collaboration with the BATT4EU and BATTERY 2030+ initiatives, this workshop aimed to strengthen cross-project collaboration within Europe's battery research ecosystem. The event featured 11 European project presentations and roundtable discussions designed to identify synergies, avoid duplication, and define joint actions in key areas such as data standards, advanced characterisation, and the circular economy. By fostering dialogue across the European battery community, the session sought to build a cohesive network and co-develop future cooperations and impact.
The event was structured around three thematic sessions exploring synergies across the battery value chain:

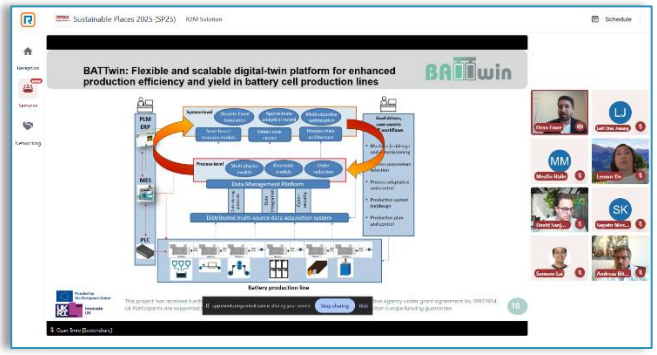
- Session 1 Platforms, Interfaces & Understanding Fundamentals
- Session 2 Safety, Smart Functionalities & Advanced Chemistries
- Session 3 Manufacturing, Digitalisation & Circularity

In his talk Ozan introduced BATTwin's innovative digital twin platform, designed to accelerate zero-defect battery manufacturing and support the efficient ramp-up of European gigafactories. The presentation highlighted how the platform integrates real-time process data, modelling, and advanced quality control to detect deviations early-on, reduce material waste, and optimize overall throughput in cell production at gigafactory scale.
Among the research and industrial questions the project aims to address are the following:

- What changes introduced at process level will impact the system's overall performance?
- How can we interconnect input & output parameters across the process-chain to formalize defect deviation and aggregation patterns?
- What is the impact of the process-level developments on system-level performance?

- How can diverse tools be integrated into a single, coherent platform while managing distributed, heterogeneous data and unique workflows?

By answering these questions, BATTwin advances the European battery sector toward fully digitalised, high-yield, and sustainable manufacturing, ultimately contributing directly to the Battery 2030+ vision, strengthening Europe's industrial competitiveness, fostering data-driven innovation, and enabling a sustainable battery value chain.



BATTwin Showcases Digital Battery Passport Innovation at Maritime Battery Forum

On 18 November 2025, BATTwin joined the Maritime Battery Forum's Working Group on the EU Battery Passport for Maritime Batteries to present its pioneering approach to the Digital Battery Passport (DBP).

Representing the project, Giacomo Grosa, Project Manager & Battery Regulation Developer at Bureau Veritas Group, outlined how BATTwin is mapping regulatory requirements and embedding them into its advanced data management platform. This methodology ensures transparent, traceable, and regulation-aligned data flows across the battery value chain.

The presentation demonstrated how BATTwin's architecture supports the digital transformation of battery systems, with particular relevance to the fast-evolving maritime sector. By aligning compliance with innovation and sustainability, the project is helping shape the next generation of maritime batteries.

BATTwin Consortium Advances Digital Twin Platform Development in Torino

On **19–20 November 2025**, the BATTwin consortium convened at **Comau's premises in Torino, Italy** for a two-day meeting dedicated to reviewing progress and charting the next steps toward delivering the project's **digital twin platform for battery systems**.

The gathering brought together representatives from all partner organizations, who shared recent achievements across the work packages. Highlights included:

- **Modelling methodologies** refined to capture battery system complexity
- **Data workflows** strengthened for transparency and efficiency
- **Platform architecture** advanced to support a comprehensive digital twin

Beyond technical discussions, the consortium aligned on upcoming milestones that will drive BATTwin into its next phase of development.

BATTwin Showcases Digital Models at Battery Innovation Days 2025

The **BATTwin** consortium proudly took part in the ***Battery Innovation Days 2025***, held on 2–3 December in Graz, Austria. This flagship event gathered more than 600 industry leaders, researchers, and policymakers to explore the future of European battery innovation.

Representatives *Prof. Marcello Colledani* (**POLIMI,** Project Coordinator), *Prof. Darek Ceglarek* (**WMG**), and *Research Fellow Gergely Horváth* (**SZTAKI**) presented **BATTwin'**s multi-scale digital models for battery cell production. Their work spans from the micro-level—such as electrode formation—to the macro-scale, demonstrating how integrated modelling can optimise manufacturing processes.

Through its participation, **BATTwin** reinforced its commitment to collaboration with European stakeholders and to driving the development of next-generation battery technologies. The consortium continues to position itself at the forefront of the digitalisation and optimisation of battery manufacturing.

BATTwin partners publications

Several papers have been published during the first two years of the project, showcasing the depth and diversity of our collaborative work. You can explore these publications on the project website (publications page).

The paper: "A novel Zero-Defect Manufacturing approach for defect reduction in battery production" (Ozan Emre Demir; Marcello Colledani; Gergely Horváth; Donia Marzogui; Konstantina Giakoumi). This paper has been published as part of a special issue of the **58th CIRP Conference on Manufacturing Systems**

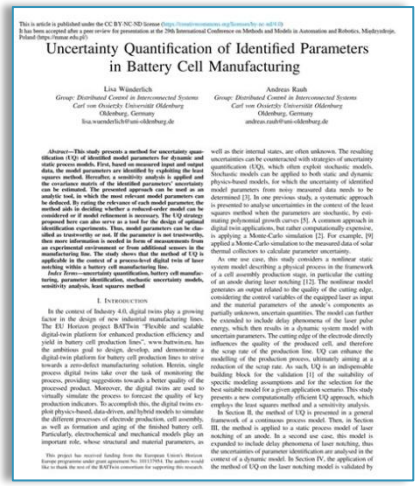

ScienceDirect

Proceedings of the 58th CIRP Conference on Manufacturing Systems 2025

A novel Zero-Defect Manufacturing approach for defect reduction in battery production

Ozan Emre Demir *,a, Marcello Colledani (1) a, Gergely Horváth b, Donia Marzoguia c, Konstantina Giakoumi c

The paper: "Uncertainty Quantification of Identified Parameters in Battery Cell Manufacturing" (Lisa Wünderlich; Andreas Rauh). This paper was presented at the **29th International Conference on Methods and Models in Automation and Robotics**.


Uncertainty Quantification of Identified Parameters in Battery Cell Manufacturing

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The paper "Weighted Over-the-Air Federated Learning " (S. M. Azimi-Abarghouyi, L. Tassiulas, C. Fischione), presented at the **IEEE International Conference on Machine Learning for Communication and Networking (ICMLCN),** Barcelona, Spain.

The paper "Multi-Layer Hierarchical Federated Learning with Quantization" (S. M. Azimi-Abarghouy ; C. Fischione).

Weighted Over-the-Air Federated Learning

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Multi-Layer Hierarchical Federated Learning with Quantization

Seyed Mohammad Azimi-Abarghouyi, *Member, IEEE*, and Carlo Fischione, *Fellow, IEEE*

Future events

Advanced Battery Manufacturing Workshop | 16–17 April 2026

The **BATTwin** project, together with the **AM4BAT** project (*Gen. 4b Solid State Li-ion Battery by Additive Manufacturing*) and its sister project **BatCAT** (*Battery Cell Assembly Twin*), is co-organising the Advanced Battery Manufacturing Workshop. The event will take place at **Homerton College,** Cambridge (UK) on **16–17 April 2026** and will be held in a hybrid format.
For more information, including registration, please visit the Events page at the Project website, following this link.

Event co-organised and supported by:

AM4BAT
Gen. 4b Solid State Li-ion battery by additive manufacturing

BatCAT
Battery Cell Assembly Twin

BATTwin at ICMRE 2026

BATTwin will be proudly represented at the **12th IEEE International Conference on Mechatronics and Robotics Engineering (ICMRE)**, taking place in Oldenburg from **2–4 March 2026**. Partners from the University of Oldenburg, **Prof. Dr.-Ing. habil. Andreas Rauh** and **Lisa Wünderlich**, will present two papers:

- *Control-Oriented Modeling of Electrode Material for Mechanical Notching and Stacking Processes in Battery Manufacturing*
- *Disturbance Estimation for the Control of Web Tension in Electrode Calendering*

These contributions highlight BATTwin's role in advancing innovative approaches to battery manufacturing and process control.

Participation in the World Digital Product Passport Summit

We are pleased to announce that **BATTwin** will be participating in the **World Digital Product Passport (DPP) Summit**, taking place in **Berlin, Germany, on 26–27 March 2026**.
Our partners from **Bureau Veritas Italia** will represent the project at this international event, which brings together industry leaders, policymakers, and innovators to discuss the future of digital product passports.
The summit will highlight practical strategies for DPP deployment across the value chain, including:

- Innovative data standards and secure cross-border systems
- Streamlined compliance processes and circular economy initiatives
- Greater supply chain transparency and lifecycle traceability
- Collaboration across sectors to reduce environmental impact, build consumer trust, and unlock new business value

To read more about this event, follow this link.

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