



BAUMA REPORT 2025

The Scottish Plant Owners Association



TABLE OF CONTENTS

Executive Summary _____ 3

purpose of the visit _____ 4

the pulse of bauma 2025 _____ 5

 Overview _____ 5

 Key Themes and Scottish Relevance _____ 5

technology that’s changing the game _____ 7

 Automation _____ 7

 Electrification _____ 7

 Digital Platforms _____ 8

 Simulation and Skills Technologies _____ 8

 Intelligent Monitoring _____ 9

standout exhibitors and demos _____ 10

OPPORTUNITIES FOR OUR MEMBERS _____ 11

RISKS, CHALLENGES & CONSIDERATIONS _____ 13

NEXT STEPS AND RECOMMENDATIONS _____ 15

EXECUTIVE SUMMARY

This report summarises key insights and outcomes from my visit to Bauma 2025, the world's leading trade fair for construction machinery, held in Munich, Germany. Attending on behalf of The Scottish Plant Owners Association (SPOA), the primary objective was to explore emerging technologies, global innovation trends, and future opportunities relevant to the UK plant and construction sector.

Bauma 2025 showcased a clear and accelerating shift toward digitalisation, automation, and sustainability. From fully autonomous construction machinery and electric-powered plant to AI-driven fleet management tools and immersive training simulators, the show reinforced that the future of our industry is not just coming – it is already here.

Conversations with manufacturers, innovators, and global industry leaders revealed a common narrative: smart technology is not optional but inevitable. The challenge now lies in how quickly and effectively businesses - particularly SMEs - can adapt and adopt.

This report highlights standout technologies and exhibitors, assesses their relevance to our members, and outlines tangible recommendations for how the trade association can support the sector in staying ahead of the curve. Bauma 2025 was not simply an exhibition - it was a window into what's next.

For our members, many of whom are navigating tightening margins, skill shortages, and increasing environmental pressures, this trip provided valuable intelligence. It ensures the association remains informed, proactive, and equipped to guide members through the coming technological shifts - ensuring no one is left behind as the industry evolves.

Gail McEwen
Vice President
13/05/2025

PURPOSE OF THE VISIT

To identify emerging technologies shaping the future of construction and plant. To represent the interests of the SPOA and its members at a global industry event. To gather insights that inform strategy, innovation and support across our sector.

Bauma 2025 presented an unmatched opportunity to explore the latest innovations in construction machinery, equipment automation, sustainability, and digital transformation. Attending on behalf of the association ensured our members had a presence at this influential event, allowing us to benchmark the UK industry against global developments and bring back valuable knowledge.



Komatsu Demonstration Area

The visit was driven by a commitment to stay informed, anticipate change, and identify where new technology can unlock value for members - whether through improved productivity, safer operations, or future-proofed training and skills.

THE PULSE OF BAUMA 2025

Overview

Bauma 2025 was not just a plant trade show – it was a declaration of where global construction is heading. With over 3,000 exhibitors and tens of thousands of attendees, the atmosphere across the sprawling exhibition grounds in Munich was charged with purpose, innovation, and bold thinking. The scale alone was impressive, but it was the clarity of direction that stood out most.

Key Themes and Scottish Relevance

Three dominant themes echoed throughout the halls and outdoor areas;

- Automation
- Sustainability
- Digital Integration

These weren't just buzzwords printed on banners, they were embedded in the machines, software platforms, and conversations taking place at every stand. Exhibitors weren't focused on minor upgrades, they were demonstrating complete shifts in how construction plant and processes could operate over the next 5-10 years.

TREND	Examples Seen at Bauma	Relevance to Scottish Plant sector
Automation	Autonomous plant, machine control for concrete kerb placement	Labour-saving, addresses skills shortages, improves health & safety
Electrification	Battery-powered excavators, hydrogen fuel cell machines	Supports decarbonisation targets
Digital Platforms	BIM integrations, AI fleet monitoring, remote diagnostics	Drives efficiency and better project planning
Skills and Simulation	VR operator simulators, remote control training kits	Modernises training appeals to new talent
Intelligent Machine Monitoring	Real-time density and compaction feedback, operator fatigue monitoring	Quality assurance on-site, improved health and safety.

Trends snapshot

The sheer number of electric and hybrid machines on display – including large-capacity excavators, compact loaders, and even cranes – was evidence that sustainability is now a front-line priority for original equipment manufacturers. Battery ranges are improving, and manufacturers are taking infrastructure challenges seriously, often offering mobile charging stations (including tethering) or integrated energy management systems as part of their solution.

Digitalisation was equally dominant. From AI-powered fleet management platforms to machine control systems with real-time cloud syncing, the industry's focus has shifted to data-led decision-making. Manufacturers and software providers are clearly investing in operator training interfaces, remote diagnostics, and predictive maintenance tools – innovations that can bring major efficiency gains for UK contractors and plant hire firms. The atmosphere was not one of cautious experimentation but of confident transformation. Bauma 2025 delivered a clear message: **we are no longer preparing for the future – we are living it.** For our sector to stay competitive and forward-looking, we must not only pay attention to these trends but be ready to act on them.



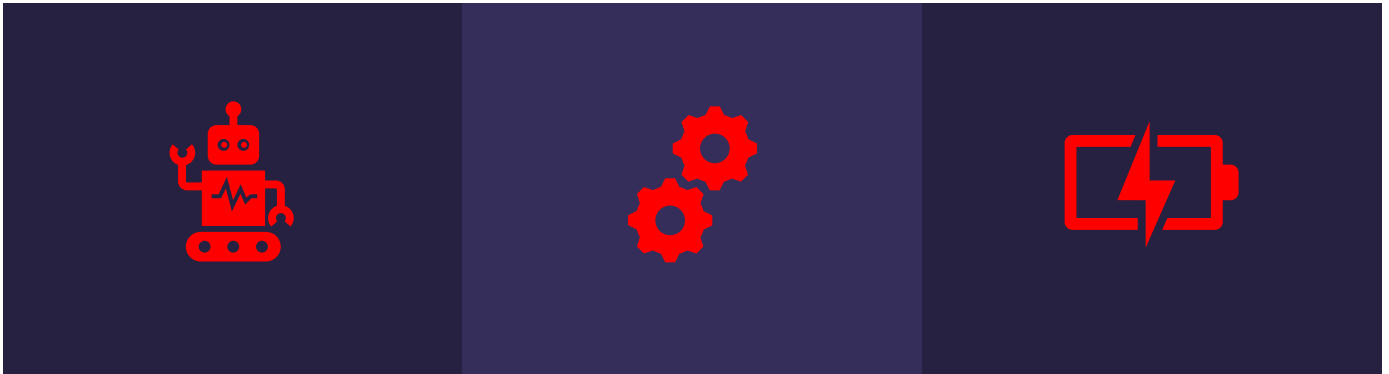
CAT D6 Electric Drive Dozer



LiReCon Remote system with machine control

TECHNOLOGY THAT'S CHANGING THE GAME

The future of construction plant isn't just coming - It's already here. From autonomous machines to electric machines, innovation is reshaping how we build.



Automation

Autonomous machines are stepping beyond prototypes. Real-world applications like driverless shovels and dumpers were centre stage. One of the most groundbreaking developments was remote operation: Plant operatives controlling machinery from hundreds of miles away. This not only boosts safety on hazardous sites, but also opens new opportunities for centralised plant operation, which presents a plethora of other benefits including improved mental health, improved communication and collaboration.

Electrification

Battery-electric and hydrogen-powered machines dominated the show floor.

Manufacturers like **Volvo CE**, **JCB**, **Komatsu**, **Caterpillar**, and **Wacker Neuson** showcased everything from compact electric diggers to mid-size loaders and telehandlers. **Volvo** led with its world's first electric hauler, while **JCB** pushed its hydrogen combustion engine. These zero-emission machines are backed by growing interest in site charging infrastructure and cleaner fuel alternatives like HVO.

Electrification is no longer a niche – it's rapidly becoming the new standard, especially in urban and low-emission zones.

Digital Platforms

Fleet managers now have dashboards that provide comprehensive insights; from fuel consumption to operator behaviour in real time. The integration of AI, IoT, and cloud platforms is unlocking smarter scheduling, predictive maintenance, and data-driven decisions.

At Bauma 2025, **digitalisation wasn't just a theme – it was everywhere**. Several manufacturers showcased embedded software and smart fleet tools designed to give plant owners and site managers greater visibility and control:

- **Trimble and Hexagon** demonstrated intuitive data tools for machine control and site positioning.
- **Epiroc** presented its Underground Manager 2.0, connecting drilling and tunnelling equipment in a unified system.
- **Hitachi CM Europe** showed off LANDCROS Connect, a platform for machine insights and analytics.

These platforms are becoming standard for modern fleets, allowing managers to optimise operations, reduce costs and increase profitability, making companies more competitive in a rapidly evolving market.

Simulation and Skills Technologies

Bauma 2025 highlighted the importance of **simulation and virtual training** in the construction sector, enabling operators to enhance their skills in a controlled, risk-free environment. These innovations are transforming training practices, providing cost-effective ways to improve operator safety, proficiency, and overall productivity.

- **Tenstar Simulation**: Showcased its cutting-edge solutions designed to elevate operator safety and efficiency, offering realistic machine simulations for training in excavation, loading, and more, helping to enhance skill sets and efficiency in the field.
- **Mevea**: Pioneered real-time simulation with excavators fitted with electromechanical actuators, enabling the simulation of energy-efficient machinery in real-world scenarios.
- **CM Labs**: Partnered with elobau to demonstrate custom simulation tools for optimising skills training, resulting in improved ROI for fleet owners.
- **Construction Future Lab (CFLab)**: Created the VR Experience Zone at Bauma, allowing visitors to engage in immersive simulations focused on robotics, alternative drive technologies, and machine digitalisation.

These technologies are not only enhancing operator training but also driving **digital transformation in construction**, making workers safer and more skilled, while improving productivity across the board.

Intelligent Monitoring

Intelligent Monitoring also played a key role in improving training outcomes. Many exhibitors integrated real-time data from sensors and connected systems into their simulations, offering dynamic feedback during operator training. This data-driven approach allows operators to hone their skills while being monitored for safety, fatigue, and efficiency, ensuring that they are prepared for real-world, high-performance situations.

STANDOUT EXHIBITORS AND DEMOS

Bauma 2025 was a showcase of the latest in construction and plant technologies, with several exhibitors standing out for their innovative approaches and groundbreaking demonstrations. These companies demonstrated the future of the industry through live demos, cutting-edge machinery, and solutions designed to enhance efficiency, safety, and sustainability in the sector.

- **Caterpillar:** Displayed its autonomous fleet management systems, demonstrating how operators can remotely control and monitor a fleet of machines, reducing costs and enhancing safety. Additionally, Caterpillar's driver fatigue monitoring system uses in-cab cameras to monitor operator attention and alert them with an audio cue if signs of fatigue, such as eyes closing or lack of focus, are detected. This technology aims to reduce accidents caused by fatigue and improve overall site safety.
- **Liebherr:** Showcased their first ever battery powered electric crawler excavator and the **LiReCon** remote control system, highlighting their commitment to sustainable solutions and the shift towards electrification in heavy machinery.
- **Volvo CE:** Unveiled their world's first battery electric A30 articulated hauler of their size class, and highlighted its power and efficiency, along with their vision for reducing carbon footprints in construction.
- **Komatsu:** Presented their Smart Construction Platform, using real-time data to optimise jobsite operations and equipment utilisation, improving efficiency and reducing downtime.
- **Teleo:** Featured a live remote operation of their automation technology, where an operator remotely ran three autonomous trucks from their stand at Bauma on a site over 8000km away.
- **Doosan:** Demonstrated their Advanced Telematics System, which allows operators to monitor and track equipment performance in real time, improving maintenance schedules and operational efficiency.
- **Hexagon:** Focused on machine control solutions to enhance safety by providing real-time positioning and guidance for operators. Their system improves accuracy and reduces human error, allowing operators to work more safely in complex environments such as congested sites or areas with potential hazards. Hexagon's technology also includes automated safety alerts that help prevent collisions and mitigate the risk of accidents.

OPPORTUNITIES FOR OUR MEMBERS

Bauma 2025 has unveiled groundbreaking technologies and innovations that can significantly enhance the capabilities, competitiveness, and sustainability of our members in the plant sector. The developments presented at the show provide several key opportunities for our members to capitalise on, helping them stay ahead of industry trends, improve operational efficiency, and embrace sustainable practices.

Embracing Digital Transformation

With the rise of digital platforms for fleet management, telematics, and machine monitoring, our members have the opportunity to integrate these systems into their operations. These technologies offer valuable insights into equipment performance, usage, and maintenance, helping to optimise fleet management, reduce downtime, and improve profitability. By adopting digital solutions, members can also gain a competitive edge in the market, positioning themselves as leaders in innovation and efficiency.

Sustainability and Electrification

The increasing shift toward zero-emission machinery and electric equipment is an exciting development for our members. Manufacturers like Volvo, Liebherr, and Komatsu are already leading the way with electric machinery that reduces environmental impact. Our members have the opportunity to integrate electric or hybrid machines into their fleets, which not only contributes to reducing carbon footprints but also aligns with the growing demand for sustainable practices in construction. Electrification can also result in lower operational costs, including fuel savings and maintenance expenses.

Improved Safety with Advanced Machine Control and Monitoring

Bauma 2025 demonstrated cutting-edge solutions for machine control and safety technologies. Our members can leverage these innovations, such as Hexagon's machine control systems and Caterpillar's driver fatigue monitoring system, to enhance operator safety and minimise accidents. These technologies improve precision, reduce human error, and help prevent fatigue-related incidents, leading to safer work environments and fewer disruptions. Implementing such systems can also improve site efficiency and potentially reduce insurance costs for businesses.

Adoption of Robotics and Autonomous Systems

Bauma 2025 showcased significant advancements in autonomous systems and remote operations, offering our members exciting opportunities to enhance operational efficiency and reduce on-site risks. Manufacturers like Caterpillar and Komatsu are leading the way with autonomous machinery that can operate independently, reducing the need for constant operator intervention. These systems are particularly useful for tasks in hazardous environments or areas with limited access, allowing machines to operate with precision while minimising human exposure to risk.

In addition, remote operation technologies were featured prominently at Bauma, allowing operators to control machinery from distant locations, potentially even from different countries via secure, high-tech systems. This shift enables businesses to utilise skilled operators more efficiently, reducing labour costs and increasing flexibility. It also helps overcome challenges such as labour shortages, providing access to a broader pool of operators who can manage equipment from anywhere.

By adopting autonomous and remote operation technologies, our members can improve site productivity, reduce costs associated with labour, and enhance safety by removing operators from potentially dangerous environments. These systems also support the transition to more sustainable operations, as they can optimise machine performance and energy usage, further improving the overall environmental footprint of projects.

5. Investing in Simulation and Skills Development

The SPOA has already made significant investments in simulation technologies, with the Tensar simulator and Trailer, providing our members with access to cutting-edge tools for training and recruitment. This system allows our members to showcase real-world scenarios to potential recruits in a safe and immersive environment. This is particularly valuable for recruitment days and school events, where the goal is to engage the next generation and inspire interest in the plant sector.

Bauma 2025 highlighted that simulation technologies are not only excellent for improving the skills of existing operators but also serve as a powerful tool for attracting young talent into the industry. As these technologies make training more accessible, engaging, and realistic, they offer an exciting way to introduce students and job seekers to the plant sector's opportunities.

By leveraging this technology, our members can enhance their recruitment efforts, bridge skills gaps, and build a pipeline of skilled workers who are ready to meet the evolving needs of the sector. It also ensures that our industry remains competitive by nurturing a highly trained and adaptable workforce.

RISKS, CHALLENGES & CONSIDERATIONS

While the innovations and technologies showcased at Bauma 2025 offer exciting opportunities, there are also risks and challenges that our members must consider as they look to integrate these advancements into their operations. Being mindful of these factors will help our members make informed decisions, mitigate potential downsides, and navigate the evolving landscape of the plant sector.

1. Cost of Implementation and Maintenance

One of the primary considerations for our members will be the initial cost of adopting advanced technologies such as autonomous systems, electric machinery, and machine control platforms. While these systems offer long-term savings and efficiency, the upfront investment can be significant. Additionally, there are ongoing costs associated with maintenance, upgrades, and staff training to ensure these technologies are fully integrated and operational. Members should carefully assess their budgets and explore options for financing or gradual implementation to minimise financial strain.

2. Workforce Transition and Skill Gaps

As new technologies are introduced, there may be concerns about how the existing workforce will transition to using autonomous or remote-operated machinery, and digital platforms. Operators and technicians may need extensive retraining to effectively use new equipment and systems. There is also the potential for skills gaps as the industry shifts toward more specialised roles. While simulation and training technologies can address these challenges, it is essential that companies invest in upskilling their workforce to avoid disruption and ensure their teams are prepared for the technological changes ahead.

3. Data Security and Privacy

As plant operations become more digitised and connected through technologies like AI fleet monitoring, telemetry systems, and cloud-based platforms, the volume of data being collected and shared increases significantly. This raises important questions around data security and privacy. Our members must ensure that they have strong cybersecurity measures in place to protect sensitive operational data and comply with relevant regulations. Additionally, they should consider how to handle data ownership, particularly if they are using third-party software or platforms for fleet management or machine control.

4. Integration with Existing Systems

For many members, integrating new technologies into their existing infrastructure and workflow could present challenges. Compatibility between new autonomous machinery, digital platforms, and legacy systems must be carefully evaluated. The lack of seamless integration could lead to inefficiencies, delays, or errors in operations. Members should seek out solutions that offer flexibility and interoperability to ensure that new technologies can be smoothly integrated with existing tools and systems.

5. Regulatory and Safety Compliance

As the plant sector adopts more advanced technologies, it is essential for members to stay up-to-date with regulatory changes related to safety, emissions, and machinery standards. For example, autonomous machines and remote operations may require additional safety protocols and legal considerations. Members should ensure that they are fully compliant with local regulations and industry standards before integrating these technologies into their operations. This may include obtaining certifications, undergoing safety audits, or implementing new safety measures to meet evolving legal requirements.

6. Public Perception and Workforce Impact

While automation and advanced machinery bring significant advantages, there may be concerns from the public and workforce about the impact on jobs. The fear of job displacement due to automation is a valid concern in some sectors, and plant operators may face scrutiny for adopting technologies that reduce manual labour. It is important for our members to communicate the positive impact of these technologies on safety, efficiency, and environmental sustainability; while also ensuring they provide opportunities for their workforce to grow and evolve in the changing landscape.

NEXT STEPS AND RECOMMENDATIONS

In light of the opportunities and challenges highlighted at Bauma 2025, the SPOA is committed to supporting members in their journey towards digital transformation. To ensure that our members are fully equipped to embrace these advancements, we will focus on the following next steps:

Academic Research on Digital Transformation

The SPOA will focus on academic research aimed at providing our members with a clear understanding of what is involved in digital transformation and how they can successfully navigate this shift. This research will explore key areas such as data integration, machine learning, AI applications, and cloud-based systems, ensuring that our members are well-informed about the latest trends and best practices. By collaborating with academic institutions and industry experts, we aim to provide members with valuable insights and case studies that illustrate how digital transformation can be effectively implemented in the plant sector.

Development of a Digital Integration Plan

A critical next step for our members will be the development of a wider digital integration plan that aligns with their business objectives and operational goals. The SPOA will assist members in mapping out their digital transformation journey, including systems integration, training needs, and equipment upgrades. This plan will help members prioritise their investments in technology, ensuring they take a strategic approach to digital adoption and avoid unnecessary costs. We will also explore options for funding, grants, and partnerships to support the successful implementation of digital systems across the sector.

Training and Upskilling Initiatives

To complement the adoption of new technologies, we will continue to support training and upskilling initiatives for our members. As part of our digital transformation efforts, we will offer online webinars, simulation-based training, and workshops focused on the digital tools and systems featured at Bauma 2025. These initiatives will ensure that members' workforce is equipped with the necessary skills to operate and manage advanced technologies, from autonomous machinery to AI-driven fleet management systems.

Exploration of Collaborative Industry Partnerships

As the plant sector undergoes rapid digital transformation, it will be important for our members to collaborate with other stakeholders in the industry, including technology providers, equipment manufacturers, and government bodies. The SPOA will facilitate discussions around collaborative partnerships that promote knowledge sharing, innovation, and best practices. By working together, we can help shape the future of the industry and ensure that our members are at the forefront of digital advancements.

Implementation of Pilot Programs and Case Studies

To help members better understand the practical benefits of digital transformation, we will encourage the implementation of pilot programs within their operations. These small-scale trials will allow members to test new technologies and processes in real-world settings, helping them identify challenges and refine their approach before committing to full-scale implementation. The SPOA will gather and share case studies from these pilot programs to illustrate the tangible benefits and challenges of adopting digital technologies in the plant sector.

Continuous Monitoring of Industry Trends

Digital transformation is a rapidly evolving field, and the SPOA will maintain a focus on monitoring industry trends to ensure that our members stay ahead of the curve. We will provide regular updates on new technologies, regulatory changes, and market developments that could impact digital adoption in the plant sector. Additionally, we will offer forums and events where members can exchange insights and learn from each other's experiences in implementing digital solutions.