

Engineering Smarter: How Liebherr Earthmoving Transformed Product Development to Drive Innovation and Scale

Liebherr Earthmoving modernized its product development, breaking down silos, improving traceability, and laying the foundation for scalable innovation through a connected digital thread.

Liebherr Earthmoving is a core division of Liebherr-International AG, specializing in high-performance construction machinery engineered for durability, precision, and efficiency. Its product portfolio includes hydraulic excavators, wheel loaders, crawler dozers and loaders, articulated dump trucks, telescopic handlers, and pipelayers - each designed to meet demanding site conditions across industries such as construction, mining, and infrastructure.

With manufacturing sites in Germany, France, Austria, and beyond, Liebherr Earthmoving combines decades of engineering expertise with cutting-edge technologies such as semi-automatic machine control systems, digital assistance features, and alternative drive concepts. The division is a driving force behind Liebherr's commitment to innovation, sustainability, and operational excellence in earthmoving applications.

The earthmoving industry plays a pivotal role in global infrastructure development, encompassing a wide range of heavy-duty equipment used for excavation, grading, and material transport across construction, mining, agriculture, and landscaping sectors. It remains indispensable to shaping the foundations of modern civilization, powering progress from the ground up.

As industry pressures, such as labor shortages, rising costs and intensifying competition, continue to mount, the company recognized the need to modernize its development processes to maintain its leadership position and high levels of customer service delivery.

Challenge: Disconnected and unsustainable

Liebherr's traditional development workflows were hardware-centric, with software managed in parallel but disconnected systems. The company faced a series of compounding challenges.

Disconnected data across systems led to inefficiencies and rework, burdening downstream teams with redundant tasks and slowing overall progress. Manual processes, once manageable, became increasingly unsustainable in the face of persistent labor shortages, relying heavily on internal knowledge and informal workflows that were difficult to scale or replicate.

Fragmented systems also limited traceability, making it harder to maintain visibility across the product lifecycle. This lack of integration introduced risk and hindered the company's ability to innovate quickly and confidently. Meanwhile, global competition and rising customer expectations intensified pressure to deliver smarter, more reliable machines at speed. Operational inefficiencies further strained resources, threatening profit margins and making it difficult to scale without significant cost increases.

"Liebherr machines are built for heavy-duty work, but as time and cost pressures mount, intelligence and efficiency have become just as critical as strength," said Ramona Adam-Heinrich, Project Manager for PLM Software and Parameter Management, Liebherr Earthmoving Technology.

"As a business, we needed to break free from siloed, hardware-centric development. With disconnected systems, manual processes, and limited traceability slowing innovation and

straining our resources, we knew we needed to unify our workflows, accelerate delivery, and build smarter machines at scale,” she added.

Solution: From silos to synergy

To address these challenges, Liebherr embarked on a phased transformation to unify its product development ecosystem and break down its departmental silos. The company adopted a robust product lifecycle management (PLM) strategy, anchored by Windchill and complemented by Creo for CAD integration.

“Modernizing our development workflows was a strategic imperative,” said Adam-Heinrich. “By connecting systems and eliminating silos, we’re creating a unified, trustworthy data foundation - one that empowers us to deliver smarter, higher-quality machines that meet rising customer expectations.”

Liebherr also strengthened configuration and change management by centralizing hardware data and formalizing change processes. This ensured greater consistency, improved traceability, and reduced the risk of errors across teams and projects.

Next, Liebherr integrated its CAD and PLM systems, connecting design data directly to the Windchill PLM platform. This eliminated silos, reduced rework, and enhanced collaboration between engineering and downstream functions.

Finally, the company established ALM readiness, laying the foundation for future software integration with Codebeamer. This move positioned Liebherr to enable a fully connected digital thread, bridging hardware and software development for smarter, more agile product delivery.

Results: Smarter machines, stronger teams

Liebherr’s transformation delivered measurable improvements across the organization. Unified data systems enhanced traceability, giving hardware and software teams greater visibility throughout the development process.

Integrated workflows reduced rework and accelerated development cycles, while a single source of truth strengthened collaboration across functions. Automation and synchronized data flows improved operational efficiency, reducing reliance on manual processes and tribal knowledge.

“Windchill and Codebeamer are expected to help us shift from fragmented development to a unified, scalable ecosystem,” added Adam-Heinrich. “We expect to gain the visibility, control and agility to innovate faster and deliver smarter machines with confidence. Our teams are expected to collaborate more effectively. Rework is expected to drop and change processes will likely become streamlined and reliable. We anticipate gaining full traceability across our hardware and software. That should mean fewer errors, faster decisions, and a stronger foundation for continuous improvement.”

A connected digital thread is expected to reinforce quality assurance, ensuring product integrity and boosting customer satisfaction. Most importantly, the new foundation will enable scalable growth and continuous innovation without adding complexity or overhead.

“This transformation is set to be a game-changer for us,” said Adam-Heinrich. “By unifying our data and streamlining workflows, we expect to improve traceability, reduce rework, and strengthen collaboration across our teams. The connected digital thread is expected to boost product quality. It will give us the agility to scale and innovate without adding complexity. That’s real value for our customers and for our business.”

Looking Ahead: Engineering an agile future

Liebherr is preparing to expand its use of Codebeamer to manage software and requirements, further strengthening its digital thread. This forward-looking strategy positions the company to meet its customer demands with agility and precision.

“Expanding our use of Codebeamer is more than a technical upgrade; it’s a strategic move to unify our hardware and software development,” said Adam-Heinrich. “By strengthening our digital thread, we’ll be able to respond to customer demands with greater agility, precision, and confidence. It’s about building machines that are not only powerful but intelligently engineered for the future.”

Results

- **Unified Data Foundation** - Centralized product data across hardware and software teams, eliminating silos and improving consistency.
- **Improved Traceability** - Enhanced visibility throughout the product lifecycle, reducing risk and enabling faster, more confident decision-making.
- **Reduced Rework** - Integrated workflows minimizing duplication and streamlined development cycles.
- **Strengthened Collaboration** - A single source of truth empowers cross-functional teams to work more efficiently and align around shared goals.
- **Operational Efficiency** - Automation and synchronized data flows reduced reliance on manual processes and tribal knowledge.
- **Robust Change Management** - Formalized processes ensure reliable configuration control and reduced errors across engineering teams.
- **Quality Assurance** – A connected digital thread is expected to reinforce product integrity and elevate customer satisfaction.
- **Scalable Innovation** – The new foundation is expected to support future growth and continuous innovation without increasing overhead or complexity.
- **CAD-PLM Integration** - Seamless connection between design data and lifecycle management improved engineering productivity and downstream alignment.

"This transformation has been a game-changer. By unifying our data and streamlining workflows, we’ve improved traceability, reduced rework, and strengthened collaboration across our teams.”

- Ramona Adam-Heinrich, Project Manager for PLM Software and Parameter Management, Liebherr Earthmoving Technology

Company Overview

Industry - Heavy Equipment Manufacturing

Employees - 9,539

Turnover - €2.657 billion

Website - www.liebherr.com

PTC Products - Windchill, Creo, Codebeamer