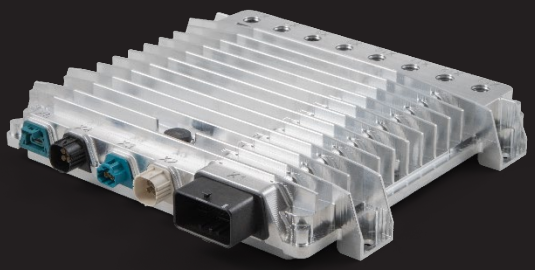
STW Powers HPX.ai-vision with AMD Zynq™ UltraScale+™ MPSoC

AI-enabled vision system built on AMD adaptive SoCs enables safe navigation in industrial vehicles



AMD × STW

EXECUTIVE SUMMARY

Sensor-Technik Wiedemann (STW), a leader in electronic solutions for mobile industrial vehicles, developed the HPX.ai-vision platform to meet the rising demand for flexible, safe, and intelligent machine vision in sectors such as agriculture, construction, mining, ground support, or general robotics. Leveraging the AMD Zynq™ UltraScale+™ MPSoC, STW designed a configurable, robust solution capable of integrating multiple vision systems and AI accelerators. This collaboration with AMD has empowered STW to address the challenges of rapidly evolving machine dimensions, autonomous functionalities, and strict safety requirements.

INTRODUCTION

Founded in Kaufbeuren, Germany, STW delivers comprehensive solutions ranging from onboard electronics to cloud-based telematics. The company provides OEMs with tools to build software-defined solutions, enabling constant updates, flexibility, and compliance with emerging cybersecurity and functional safety requirements. "Our goal is to always give OEMs the possibility to build complete parts of their working machines from the STW portfolio," said Christian Klausner, director of product management at STW.

TECHNICAL CHALLENGES

STW faced a unique challenge: how to deliver advanced machine vision for mobile industrial vehicles with flexible camera positions. Unlike cars, these machines often change size and shape in operation, unfolding implements or extending booms that shift their geometry. "Automotive solutions didn't fit our world," said Martin Weckerle, director of systems engineering at STW. "Our solution can literally double in length or height depending on attachments. That means a static four-camera setup won't work, we needed a configurable solution that could adapt instantly."

At the same time, customers demanded functional safety capabilities, from object detection to emergency braking. This required combining AI with deterministic, low-latency processing, a balancing act between innovation and compliance.

- **Environmental robustness:** Devices needed to operate from -40°C to +85°C (-40°F to +185°F), withstand vibration, and remain fully sealed against dust and water.
- **Customer-driven customization:** Low-volume, high-variation production required a platform that could adapt to many use cases without prohibitive costs.

INDUSTRY

Industrial

KEY TAKEAWAYS

- AMD Zynq™ UltraScale+™ MPSoC delivers flexibility, robustness and performance
- STW's HPX.ai-vision supports up to 8 configurable cameras
- Low-latency AI pipelines improve safety and autonomy readiness

CHALLENGES

STW needed a vision system that could adapt to mobile industrial equipment whose dimensions and configurations constantly change. Traditional fixed-camera automotive systems couldn't meet these demands. The solution also had to meet strict functional safety requirements, operate reliably in extreme environments, and provide a flexible base for small production series without driving costs too high.

SOLUTION

The HPX.ai-vision solution powered by AMD Zynq UltraScale+ MPSoC, enables multi-camera support, reconfigurable FPGA-based applications, and integrated AI acceleration.

RESULTS

STW enables OEMs to use one configurable solution across multiple machine types, reducing development costs while adding AI-powered safety features.

AMD TECHNOLOGY AT A GLANCE

AMD Zynq™ UltraScale+™ MPSoC

THE SOLUTION

To meet these demands, STW developed the HPX.ai-vision controller powered by the AMD Zynq™ UltraScale+™ MPSoC. The system integrates FPGA flexibility, a quad-core Arm processor, and AI acceleration to meet diverse and demanding use cases. "The AMD FPGA lets us reconfigure on the fly," said Weckerle. "One moment, the system is running stereo depth measurement. The next, it switches to surround view. That kind of versatility is critical for our customers."

> **"We needed a platform not just for our customers, but for ourselves. AMD gave us the flexibility to build once and scale everywhere," said Weckerle.**

According to Product Manager Christian Klausner, the solution also prepares OEMs for future autonomy. "AI and safety are still evolving, but as long as there's a driver, HPX.ai-vision works as an assistance system," he said. "And once regulations catch up, the platform is ready for autonomous operation."

Chart: Before vs After HPX AI Vision

Capability	Before (Legacy Systems)	After (HPX AI Vision + AMD)
Camera Support	Fixed (4–6 typical)	Flexible, up to 8 configurable
Latency	Higher, Ethernet-only	Ultra-low, FPGA-based MIPI input
Operating Range	Limited, active cooling	–40°C to +85°C, passively cooled
Flexibility	One function per controller	Multiple reconfigurable apps
AI Readiness	External only	Integrated FPGA + AI accelerator

IMPLEMENTATION STRATEGY

STW approached the HPX.ai-vision program with a clear objective: build a platform-first solution that could serve as a long-term foundation for multiple industries, rather than a single-purpose device. This required a strategy that balanced technical flexibility, safety compliance, and customer adaptability.

The first step was choosing AMD Zynq™ UltraScale+™ MPSoC as the core. With its combination of programmable logic and multicore processing, the chip provided the performance and flexibility required to support low-latency vision tasks while adapting to customer-specific use cases.

"When we identified the right processor for this kind of application, flexibility was the key," said Weckerle. "We live in a world of small series and customizations. Without a strong platform underneath, you'd have to start from scratch for every project, and that's simply not affordable."

STW then designed the platform around these guiding principles: modularity and configurability, safety and compliance, ruggedization, and a scalable AI pipeline.

RESULTS AND IMPACT

Collaboration with AMD extended beyond hardware. STW benefited from hands-on engineering and business case discussions with AMD teams, ensuring that the platform not only performed but aligned with market demands.

"We had excellent support defining use cases and business models," said Weckerle. "It wasn't just about the technical side; AMD worked with us to position the solution in a way that really met customer needs."

Through this strategy, STW was able to deliver a flexible, future-ready platform that has delivered measurable impact across industries. With enhanced safety through AI-driven obstacle detection and emergency braking, OEM adaptability enables manufacturers to deploy one platform across multiple machine types helping to reduce costs while avoiding one-off hardware redesigns.

To learn how AMD adaptive computing can power your next-generation AI and vision platforms, click here

ABOUT STW

Sensor-Technik Wiedemann (STW) is based in Kaufbeuren, Germany, founded in 1985. The company develops hardware, software, and connectivity solutions for the automation and digitalization of mobile machines. Its portfolio includes embedded control units, sensors, telematics modules, and supporting software toolchains, which are used by OEMs and medium-sized manufacturers in industries such as agriculture, construction, and transportation. STW also provides engineering services and collaborates with partners worldwide. The company emphasizes functional safety, system integration, and long-term reliability in its products, which are designed to operate in demanding environments.

ABOUT AMD

For more than 50 years AMD has driven innovation in high-performance computing, graphics, and visualization technologies. Billions of people, leading Fortune 500 businesses, and cutting-edge scientific research institutions around the world rely on AMD technology daily to improve how they live, work and play. AMD employees are focused on building leadership high-performance and adaptive products that push the boundaries of what is possible. For more information about how AMD is enabling today and inspiring tomorrow, visit the AMD (NASDAQ: AMD) website, blog, LinkedIn, and Twitter pages.