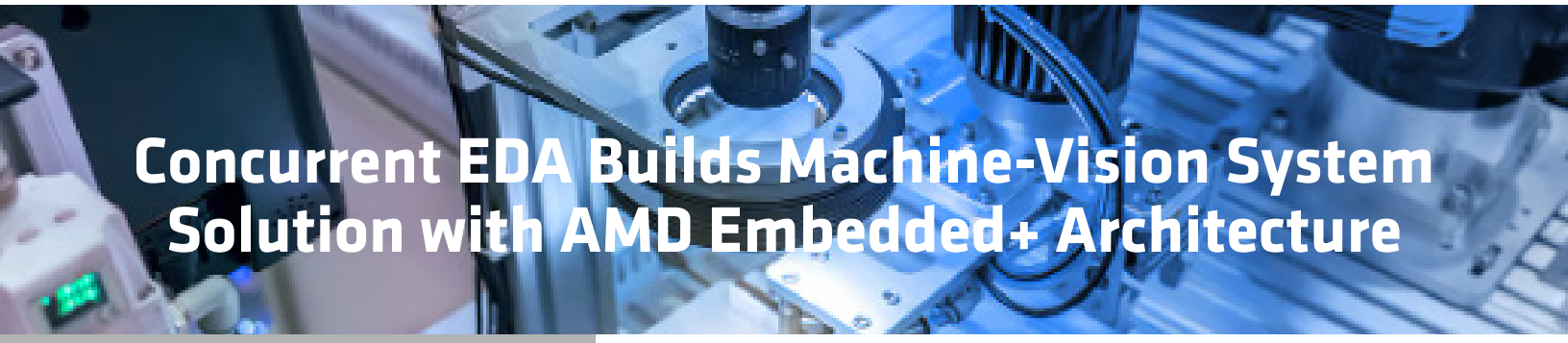


# Concurrent EDA Builds Machine-Vision System Solution with AMD Embedded+ Architecture

**CUSTOMER**

Concurrent EDA
Measurably Faster

**INDUSTRY**

Industrial

**CHALLENGES**

Concurrent EDA was looking to develop a new machine-vision embedded PC platform that can deliver high-performance processing capabilities while significantly reducing power consumption compared to standard PC-based solutions.

**SOLUTION**

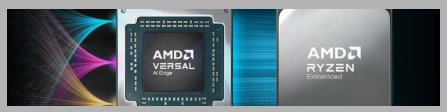
Concurrent EDA's Machine-Vision+ system leverages the Sapphire Edge+ VPR-4616- motherboard based on AMD Embedded+ architecture, resulting in enhanced performance while achieving a strategic reduction in power and size requirements.

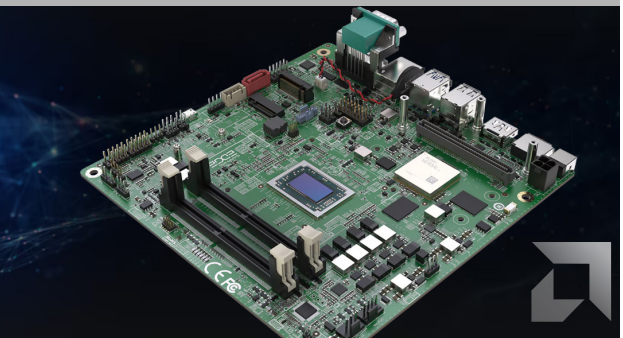
**RESULTS**

By leveraging the AMD Embedded+ architecture, Concurrent EDA succesfully addressed key challenges in the machine-vision space, delivering a powerful, efficient, and integrated solution.

**AMD TECHNOLOGY AT A GLANCE**

AMD Embedded+



## *AMD Embedded+ Solution Powers Machine-Vision+ System in a Compact Form-Factor with Visual Graphic Rendering Capabilities*

Concurrent EDA offers cutting-edge solutions that streamline and enhance component distribution, design services, and systems integration.

The company was looking to develop a new machine-vision PC that could deliver high-performance processing capabilities while significantly reducing power consumption, compared to traditional PC-based solutions. Leveraging Sapphire Technology's EDGE+ VPR-4616-MB mini-ITX motherboard, the first ODM solution based on the AMD Embedded+ architecture, Concurrent EDA built the Machine-Vision+ system that can interface directly with machine vision cameras.

### CHALLENGE

In the rapidly evolving machine-vision market, Concurrent EDA recognized several critical challenges. Traditional machine-vision systems, typically built on standard PCs with frame grabber PCIe(R) cards, consumed excessive power—often around 200W—and were not optimized for embedded systems. This led to inefficiencies and limitations in performance.

Customers faced challenges integrating multiple discrete components, including cameras, frame grabbers, PCs, and software. This complexity not only extended integration time but also increased costs. Moreover, existing solutions often lacked the necessary processing power for real-time image analysis, a crucial requirement for applications like defect detection in manufacturing.

Concurrent EDA needed a flexible, scalable, and energy-efficient architecture that could handle the massive data throughput from advanced machine-vision cameras, while also providing the processing power for complex computer-vision algorithms.

### SOLUTION

To address these requirements, Concurrent EDA designed the Machine-Vision+ system with the Sapphire Edge+ VPR-4616-MB, the first ODM solution featuring the new AMD Embedded+ architecture. The VPR-4616-MB is a low-power Mini-ITX form factor motherboard offering a full suite of capabilities in as low as 30W of power while also available in a full system, including memory, storage, power supply, and chassis.

Validated by AMD, the Embedded+ solution combines AMD Ryzen™ Embedded processors with AMD Versal™ adaptive SoCs onto a single integrated board. This integration provides the flexibility needed for a variety of applications, allowing for customization and enhanced performance.

Working closely with AMD and Sapphire Technology, Concurrent EDA created the Machine-Vision+ system, a compact and low-power machine vision platform that integrates seamlessly with Concurrent EDA's camera and software solutions. The Machine-Vision Embedded+ system leverages the capabilities of AMD Ryzen Embedded processors to run standard machine vision software while the Versal adaptive SoCs handle high-speed data acquisition, pre-processing, and hardware acceleration of AI-based inspection algorithms.

Dr. Ray Hoare, CEO of Concurrent EDA, said, "AI enables image classification and can be used for a variety of machine-vision applications. For example, AI can be used for machine health monitoring to predict when a motor is about to fail. It can also be used to detect manufacturing defects in printed circuit boards."

"The AMD Embedded+ architecture combines the flexibility and determinism of FPGA I/O with programmable AI processing using PyTorch with Linux® on an AMD Ryzen x86 quad-core CPU," Hoare added. "This enables us to customize the AMD Embedded+ architecture for a host of applications in embedded and machine vision."

## RESULT

Concurrent EDA's Machine Vision+ system brings a significant improvement with its compact design, with power consumption under 50W. This power efficiency represents a remarkable up to 5X improvement over traditional systems, making it suitable for energy-sensitive environments without sacrificing performance.

"The implementation of AMD technology has led to substantial improvements for Concurrent EDA," Hoare said. "The new design achieved up to a 5X reduction in power consumption compared to the conventional 200W systems. This enhancement enables deployment in environments where energy efficiency is paramount. The Machine Vision+ system also simplifies the integration process for customers by combining all necessary components into one single solution, thereby reducing both complexity and integration time."

In terms of performance, the systems real-time processing capabilities enable high-resolution image analysis and immediate feedback for manufacturing processes. This advancement not only enhances product quality but also streamlines operations on the factory floor. The unique combination of x86 processing power and FPGA flexibility positions the Machine Vision+ system as a standout solution in the market.

"AMD is a customer-focused company with cutting-edge technology. Concurrent EDA has been collaborating with AMD for 18 years to help customers create high-performance electronics," Hoare added. "AMD has provided the tools and processing capacity to solve embedded machine-vision problems that were previously left to power-hungry servers."

Adrian Thompson, senior vice president of marketing at Sapphire Technology said that AMD has worked closely with Sapphire Technology to create the first Embedded+ platform. "Sapphire Technology has a long history of building embedded motherboards based on AMD embedded processors. Embedded+ combines an AMD embedded APU with an AMD Versal adaptive SoC on a single mini-ITX motherboard," Thompson said. "In addition, there are several I/O daughter cards available that enable a wide variety of sensor and camera inputs. This is what makes Embedded+ architecture so versatile and unique!"

**ABOUT CONCURRENT EDA**

Concurrent EDA is an emerging leader in the generation of electronic design automation and analysis tools for high-performance embedded systems. Its tools rapidly identify the bottlenecks in software applications and provide methods to maximize system performance. The company provides custom high-performance cameras, networks, FPGA modules, IP cores, and FPGA design services.

**ABOUT AMD EMBEDDED+ ARCHITECTURE**

The Embedded+ architecture brings together AMD's technology leadership in adaptive computing and x86 embedded processing solutions for a new class of seamlessly integrated, cost- and power-efficient solutions designed to complement a wide breadth of sensor functionalities. Embedded+ makes the most of rich sensor data with low latency, deterministic responsiveness leveraging FPGA and x86 processing engines on an integrated compute platform.

**ABOUT SAPPHIRE TECHNOLOGY**

SAPPHIRE Technology continbues to be a world leading manufacturer and global supplier of innovative graphics and mainboard proucts, delivering its AMD Radeon based products to the PC market addressing gaming and performance graphics hardware enthusiasts, as well as delivering an array of embedded technology solutions and commercial graphic products.

Performance and cost-savings claims are provided by Concurrent EDA and have not been independently verified by AMD. Performance and cost benefits are impacted by a variety of variables. Results herein are specific to Concurrent EDA and may not be typical GD-181.