

## Synopsys and Kyocera

DesignWare Processor IP Contributes to Kyocera's First-Pass Silicon Success for On-Demand Super Resolution Image Processing SoC

***“To develop the TASKalfa 3554ci series of multifunctional devices, we needed to deliver innovative AI functions that meet the needs of our customers within a limited time. By adopting the ARC EV Processor, we efficiently developed optimal AI functions and brought the product to market quickly.”***

### Business

Kyocera Document Solutions Inc. is a global leading provider of total document solutions based in Osaka, Japan. The company's portfolio includes reliable and eco-friendly MFPs and printers, as well as business applications and consultative services which enable customers to optimize and manage their document workflow, reaching new heights of efficiency. With professional expertise and a culture of empathetic partnership, the objective of the company is to help organizations put knowledge to work to drive change.

### Challenges

- Develop an MFP SoC with innovative AI functions that surpass user expectations
- Reduce development time and cost with extensibility for future AI models
- Minimize SoC power while providing high-performance AI features

### DesignWare IP Solutions

- ARC® EV Processor IP
- ARC MetaWare® EV Development Toolkit

### Benefits

- Enabled continuous software updates of AI functions due to programmable solution
- High-performance processing capabilities with low power and cost points
- Accelerated development of first-in-its-class MFP SoC despite challenging design and achieved first-pass silicon success
- Received excellent support from a knowledgeable and responsive local technical support team

***“Only Synopsys DesignWare ARC EV Processor IP and tools met our performance, extensibility, and gate size requirements.”***

~Michihiro Okada, Kyocera Document Solutions Inc.

## Overview

To create the TASKalfa 3554ci MFPs, Kyocera develops SoCs that leverage new image processors and incorporate unique functionalities, while meeting cost, power and time-to-market requirements. With limited in-house expertise on emerging AI models, Kyocera needed to partner with an IP provider that could offer technical and market proficiency throughout the process. Kyocera chose Synopsys as their IP solutions provider due to their long, productive relationship as well as the results of benchmarks showing superiority over competing solutions.

## High-Quality DesignWare IP Solutions

For their AI-enabled MFP, Kyocera selected Synopsys DesignWare® ARC EV Processor IP and ARC MetaWare EV Development Toolkit. “For our application, the ARC EV Processors offer very high performance, a relatively small memory size, and extensibility” said Michihiro Okada, General Manager of the Software Development Division at Kyocera Document Solutions Inc. The ARC EV Processors are fully programmable and configurable IP cores that are optimized for embedded vision applications, combining the flexibility of software solutions with the low cost and low power consumption of hardware. For fast, accurate execution of convolutional neural networks (CNNs), Kyocera integrated the EV Processor’s optional high-performance CNN engine.

The MetaWare EV Development Toolkit includes the MetaWare Neural Network (NN) Compiler that analyzes neural networks trained using popular frameworks like Tensorflow and Pytorch, and automatically generates the executable for Synopsys’ programmable CNN engine. For maximum flexibility and future-proofing, the tool can also distribute computations between the vision CPU and CNN engine to support new and emerging neural network algorithms as well as customer-specific CNN layers. “We found the MetaWare EV Development Toolkit is very useful for new application development,” said Okada.

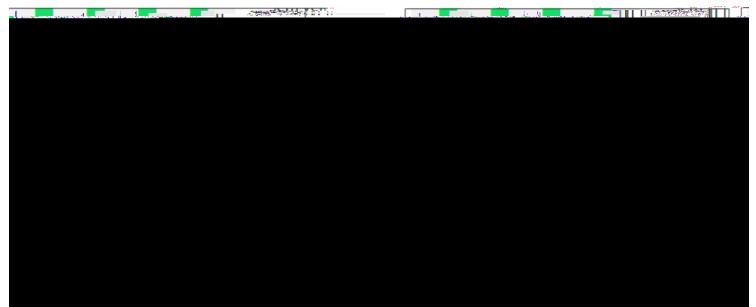
“The control software that we had verified in advance on ARC EV implemented in the Synopsys HAPS Prototyping System worked with almost no additional modification needed,” said Okada.



Kyocera TASKalfa 3554ci  
Multifunction Product



Kyocera's MFP TASKalfa 3554ci series uses the ARC EV processor for vision applications to convert low resolution images to higher resolutions than the original and print beautifully.



Kyocera's MFP TASKalfa 3554ci series, which uses an ARC EV processor, recognizes handwritten characters and emphasizes only those parts for easy-to-read printing while maintaining the original text quality. Also, if the background is a white document, you can overwrite the handwritten part with white to make it invisible.

***“We give a ‘5 Star Rating’ to Synopsys Technical Support and R&D teams. Their responses are quick and accurate. The R&D team was especially flexible in adjusting***

## Expert and Responsive Technical Support

Kyocera utilized Synopsys’ responsive, worldwide support team to incorporate innovative AI capabilities. “The Synopsys technical support and R&D teams augmented our own engineering teams,” said Okada. “They shared their deep expertise in AI applications to support our vision of a world-class MFP.”

“We have started development on our next MFP SoC. Due to our success with DesignWare ARC EV Processors, we are considering the EV71 processor IP with DNN option for that project as well,” said Okada.