



Case Study

Intel® IOP331 I/O Processor based on Intel XScale® Technology
Digital Printers and Press
Controllers for Variable Information
Digital Printing



Creo Masters the Variable Data Intrinsic to On-Demand Digital Printing

Challenge	Increase the performance of Spire* color servers to keep pace with today's faster printers and presses. For large format files used in on-demand digital printing, the required performance improvements include increased throughput, faster memory processing, larger memory cache, and more efficient board design.
Solution	The highly integrated Intel® IOP331 I/O processor met all of Creo's performance criteria. It runs on high-performance, low-power Intel® XScale® technology to deliver a completely integrated system-on-chip for fast embedded processing.
Benefits	The entire processor is optimized for speed—core frequency, memory access, internal bus and access to peripherals using a powerful PCI-X bus. With important features integrated onto the processor—including the DDR memory controller and the PCI-X bridge—the IOP331 also helps Creo save valuable board space and keep development costs low.

Solution Summary

Traditionally employed as the power centers of storage solutions, Intel® I/O processors deliver the right features and performance for many embedded applications as well, where high performance is a must. This case study explains how Creo—one of the world's largest manufacturers of pre-press equipment—embedded the powerful Intel® IOP331 I/O processor based on Intel XScale® Technology into its premium line of Spire* color servers that drive Xerox DocuColor* digital printers and presses.

Background: The Demands of Digital Printing

One of the fastest growing areas in the print industry is on-demand digital printing. Fueled to a large extent by the direct marketing industry and transactional services, the process known as “variable information” printing enables output of highly personalized content that varies from one item to the next.

When digital printer manufacturers go looking for color servers to drive their presses, they consider several parameters including productivity (workflow), color and image quality, and whether the solution can fully support variable information printing.

Both customers and the industry are looking for complete solutions that can deliver the optimum combination of speed and quality.

The Challenge: Performance

As on-demand digital printing catches on, customers expect increasingly better quality output and faster printing. To these demands they add increasingly varied content, straining the color servers that drive the digital presses.

For Creo, this means that its patented workflow technology requires a computing platform that delivers ever-higher performance. Leading the industry are Creo's Spire color servers that drive Xerox DocuColor digital printers and presses. To bring the Spire products to

About Spire* Color Servers

Spire color servers are designed specifically for on-demand digital printing and are built exclusively for the Xerox DocuColor* product line, which includes digital color printers, combination printer/copiers and digital color presses. Versatile Spire color servers can handle a wide range of print projects, such as catalogs, flyers, long-run variable information jobs and presentations. The servers feature a simplified user interface combined with extremely fast RIPing.

All products in the line of Creo color servers feature the same design and operational logic, independent of the print engine. The entire workflow is controlled from within the queue system, providing all the information required by the operator.

Ready-to-print files can be sent to multiple print engines, and RIPing can be performed while printing. This eliminates possible "cycle-down" between successive ready-to-print jobs on sheet-fed print engines, and there is no delay between the printing of one job and the next.

Spire color servers include the Creo variable information solution for element-based printing. Text, graphics, pictures, or page backgrounds are RIPed just once, regardless of whether they are used once, many times, or on every page of the job.

the next level of performance, Creo needed to design a computing platform with a PCI-X to PCI-X bridge, a Double Data Rate (DDR) SDRAM interface and a robust embedded processor.

"We needed DDR performance in order to implement a fast host-to-memory and memory read DMA," explains Benjamin Shimshoni, Marketing Manager, Creo Print-on-Demand Systems Group. "The embedded processor is also a system requirement for engine control and communications function interface."

Equally important are design efficiencies that shorten time-to-market and keep costs low. Creo controls costs by using an "off-the-shelf" embedded processor to help minimize design work, which also serves to speed development time.

The Solution: Integration

The highly integrated Intel IOP331 I/O processor met all of Creo's performance and design requirements. With an onboard DDR memory controller and PCI-X to PCI-X bridge, the IOP331 saves Creo valuable board space while optimizing performance in demanding digital color printing applications.

Creo's patented workflow technology ensures speedy, efficient handling of large, variable print jobs. Its performance is maximized by the Intel IOP331 I/O processor, which is embedded on the board that manages data flow and feeds data to the printer.

In variable information printing—the specialty of Creo Spire servers and the DocuColor printers and presses—the volume of data flowing through these boards can grow exponentially as page and document quantities increase. Creo finds that the Intel IOP331 I/O processor has enough power—up to 2.7 Gbytes/second internal

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Marketing Manager
Creo Print-on-Demand Systems Group

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Creo Print-on-Demand Systems Group

throughput—to drive even the fastest machines today, keeping pace with printers that output up to 110 pages per minute.

Creo delivered its latest generation of Spire color servers on-time and on-budget—crediting the Intel IOP331 I/O processor for helping the company to achieve both metrics. “Board space was really important, and the integrated design of the Intel chip enabled our design on a PCI-type board,” explains Shimshoni. “That saved us development time and made our design more cost-effective.” What’s more, beta testing of the IOP331 coincided with Creo’s development cycle for design and testing efficiencies, and faster time-to-market.

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Benefits

Development support is invaluable. Intel’s engineering support teams and third-party developer network enable speedy, cost-effective design and development of today’s most advanced solutions—from networking and communications to embedded designs. For Creo, the beta process delivered invaluable support that was key to the on-time/on-budget success metric.

Integration provides big savings. Creo evaluated several high-throughput processors, but only the Intel

IOP331 I/O processor integrated the PCI-X to PCI-X bridge right onto the chip. This integration saved Creo valuable board space and reduced BOM and development costs. Many of Intel’s high-performance processors use integrated designs, leading the industry in combined performance and cost-effective development.

Intel XScale technology extends design

options. When migrating from previous generations of Intel IOPs, Intel XScale technology simplifies porting and design. The core technology also enables easier integration between processors—combining multiple Intel XScale processors for optimum performance (IOP + graphic interface, for example). Creo ported their design from an earlier Intel I/O processor, again saving development time and cost.

About the Intel® IOP331 I/O Processor

The Intel® IOP331 is a highly integrated I/O system on a chip for I/O-intensive storage, networking, communications, and embedded applications. It features an 800 MHz CPU, high-performance internal bus, dual-ported memory controller, a high-bandwidth PCI-X to PCI-X Bridge, and an improved interrupt controller. By integrating these components—including the bridge—the IOP331 saves board space and reduces system BOM cost.

The IOP331 is built on high-performance, low-power Intel XScale® technology. It integrates Intel® Super-Pipelined RISC Technology with 7-stage integer/8-stage memory super-pipelined core and 32 Kbyte data and instruction caches. The internal bus operates at 333 MHz and offers internal bandwidth of up to 2.7 Gbytes/second.

The IOP331 provides ultra-fast memory transactions due to its Double Data Rate (DDR) SDRAM dual-ported memory controller that supports up to 2 GB of DDR 333 MHz memory or 1 GB of DDRII 400 MHz memory. The new dual-ported memory controller provides both a direct port from the CPU to memory (core port) and a port from the ATU/internal bus to memory (internal bus port). This allows both CPU memory accesses and data movement to and from the internal bus, providing high overall system performance.

For more information:

About Creo:

www.creo.com

www.creo.com/spire

About Intel® I/O processors:

www.intel.com/design/iio/iop331.htm

<http://developer.intel.com/design/iio/>

About Intel XScale® technology:

<http://developer.intel.com/design/intelxscale/index.htm>

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