

M I C R O P R O C E S S O R

www.MPRonline.com

THE INSIDER'S GUIDE TO MICROPROCESSOR HARDWARE

ARM EXTENDS ITS REACH

Artisan Acquisition Vastly Expands ARM's Semiconductor IP Portfolio

By Tom R. Halfhill {9/7/04-01}

Business analysts and investors are still debating whether ARM's whopping \$913 million acquisition of Artisan Components makes financial sense, but from a technology standpoint, it launches ARM into a whole new realm. Among other things, it erases all doubt

that ARM is becoming a start-to-finish provider of semiconductor intellectual property (IP), not just a vendor of embedded microprocessor cores.

In truth, ARM has been reaching beyond processors for years. In the late 1990s, ARM's AMBA on-chip bus standard, PrimeCell soft IP, and PrimeXsys design platform signaled a strategic move toward a more holistic approach to system-on-chip (SoC) integration. In June of this year, ARM expanded its PrimeCell portfolio with new AXI system-level components, including a configurable on-chip interconnect fabric and memory controllers. ARM's OptimoDE configurable data engine, also announced this summer, is aimed squarely at embedded applications that need more processing power than an ARM core alone can deliver. (See *MPR 6/7/04-01*, "ARM's Configurable OptimoDE.") And on August 16, ARM announced its acquisition of Axy Design Automation, a vendor of system-level design tools and models.

ARM's acquisition of Artisan, announced August 23, is a much bigger step. In fact, it looks like a bet-the-company proposition. Financially, the acquisition is so large it's practically a merger. It vastly expands the scope of ARM's business by adding a wealth of physical library IP, including embedded memories, peripheral cores, system-interface physical-layer (PHY) components, and standard-cell libraries for digital, analog, and mixed-signal ICs. Artisan has more than 1,200 customers and partners, including some of ARM's competitors, such as ARC International, MIPS Technologies, Sonics, SuperH, Tensilica, and TriMedia. (ARM says the acquisition

won't alter those relationships.) When the deal is complete, ARM will have at least 1,200 employees worldwide.

The reason ARM is following this course seems obvious: SoC design is becoming enormously complex at all levels. Verification time may exceed original design time, and the penalty for mistakes is exorbitant. If ARM can unify its huge new portfolio, the company can become the Wal-Mart of semiconductor IP—a one-stop shop for customers building SoCs. Customers could license their processor cores, data engines, memories, peripherals, PHYs, on-chip interconnects, standard-cell porting libraries, mixed-signal components, and even some design tools from ARM. Ideally, customers wouldn't have to worry if all that IP works together coherently, and they wouldn't have to negotiate several contracts with multiple vendors. Even the final step to manufacturing would be simplified, because ARM and Artisan have close relationships with the most popular foundries.

In addition, the deal strengthens ARM's grasp on another growing problem: power consumption. Artisan has valuable engineering experience with power optimization and current-leakage management in deep-submicron fabrication processes. Indeed, Artisan developed the low-power cell libraries behind the Intelligent Energy Management (IEM) technology created by ARM and National Semiconductor. (See *MPR 1/21/03-01*, "Analog and CPU Wizards Reduce Digital Power.") Now united, ARM and Artisan can work together even more closely on transistor-level power solutions.

For More Information

- ARM's announcement:
www.arm.com/news/6015.html
- Artisan's announcement:
<http://investor.artisan.com/phoenix.zhtml?c=112233&p=irol-newsArticle&ID=605874&highlight=>

ARM Departs From the Competition

Note that ARM is veering away from the strategies pursued by its erstwhile closest competitors. ARC International once tried to become a one-stop shop for SoC designers, offering peripheral IP and system software in addition to configurable-processor cores. Under increasing financial pressure since going public in 2000, ARC lacked the resources to successfully execute the strategy. In July, ARC announced the sale of its peripheral IP to Transdimension and began consolidating around a strategy more centered on processors, albeit with continued focus on vertical applications.

MIPS remains a processor-centric company and has concentrated on successfully restoring its profitability in the past year. The MIPS architecture is popular enough to support a large ecosystem of related tools and IP from independent vendors, allowing the company to focus on processors. Tensilica is also processor-centric, although it's edging a little further in the direction of design automation, mainly at the processor level. SuperH and TriMedia have pulled back from processor-IP licensing and have been reabsorbed by parent companies Hitachi and Philips Semiconductor, respectively. Other former ARM competitors, Lexra and PicoTurbo, have gone out of business.

The only processor-IP rival that overshadows ARM after the Artisan deal is IBM Microelectronics. IBM, too, has a vast IP portfolio that encompasses processors, peripherals, memories, on-chip interconnects, mixed-signal components, tools, and standard-cell libraries. In addition, IBM is a chip vendor—not just a processor-IP vendor—and a foundry with extensive ASIC design services and first-class fabrication technology. IBM's foundry also happens to be one of Artisan's biggest customers, having licensed Artisan's memories, standard cells, and I/O components for 180-nanometer, 130nm, and 90nm fabrication processes.

However, two differences keep IBM at arm's length from ARM. First, IBM's licensable PowerPC cores aren't in the same low-power category as ARM's processor cores. Second, most of IBM's IP is available only to IBM's own ASIC customers that use IBM as their foundry. Unlike ARM, IBM hasn't designed most of its IP for portability to other foundries and design flows, although IBM is moving toward a more open licensing model. (See *MPR 4/26/04-02*, "IBM Loosens Up CPU Licensing.")

ARM's acquisitive mood suggests more changes to come. Earlier this year, ARM even tried to enter the chip business, at least in a small way. In January, ARM announced it would acquire Triscend, a small microcontroller vendor, only to be outbid at the last moment by Xilinx. (See *MPR 3/15/04-02*, "Xilinx Reconfigures Triscend.") Despite that setback, ARM is still looking for ways to lure microcontroller users away from 8- and 16-bit chips. As ARM continues to expand the scope of its business and IBM moves deeper into the waters of IP licensing, the two companies seem destined to become closer competitors. ♦

To subscribe to Microprocessor Report, phone 480.609.4551 or visit www.MDRonline.com