

World's first 300mm NOR fabrication plant opens

By Dian Schaffhauser, Computerworld
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(Computerworld) With the opening this week of a new fabrication plant and the announcement of an ever-shrinking flash footprint, Spansion Inc. expects to maintain its dominating role in NOR memory, at least for the foreseeable future.

Spansion says its wafer plant is the world's first 300mm NOR manufacturing facility and is integral to its strategy to produce flash memory cards. This is also the first factory constructed by Spansion since becoming an independent company when it was formed from the combined assets of Advanced Micro Devices Inc. and Fujitsu Ltd.

The company said it began production using 65-nanometer design process technology on 300mm wafers for nonvolatile memory at its SP1 facility in northern Japan. Spansion expects to manufacture 45nm products sometime next year and achieve 32nm and 25nm production beyond that. One nanometer is one-billionth of a meter, meaning that the wires on 65nm design chips are far slimmer than a human hair.

A major theme of the company's current product road map is the introduction in 2008 of MirrorBit Eclipse, an underlying architecture that "makes it a much simpler process to produce wafers," according to Bob Okunski, director of investment relations. Eclipse combines multiple memory technologies on a single die. "Cell phone designs are moving from being exclusively NOR and DRAM or NAND and DRAM to being a mix of NOR, NAND and DRAM," explained Jim Handy, an analyst at Objective Analysis who attended the plant opening. "Eclipse is intended to be a way to tap into this migration of the cell phones while keeping most of the revenue in Spansion's pockets."

Eclipse builds on Spansion's MirrorBit, a memory design scheme that eliminates floating-gate technology in favor of what Okunski calls a "simpler" approach, whereby the wafer cells are plainer, flatter and smoother. That reduces the tendency of cross-talk between cells in the nodes as the technology gets smaller. "By being able to lock the charge into the cell," said Okunski, "it allows us to take MirrorBit to lower nodes without having any issues with quality."

The MirrorBit line has exploded from representing 14% of Spansion's revenue in early 2005 to close to 70% by mid-2007, Okunski said.

MirrorBit is "hugely important," Handy pointed out, because it enables the manufacturer to produce wafer products with a lower cost structure, which in turn makes it a more efficient competitor. "There are a number of companies that have tried getting into that and have had a problem with it," Handy said.

Likewise, he said, "Spansion has gotten into 300mm ahead of everybody else." Yet he considers ramp-up to full production of the 300mm 65nm wafers slow at the new plant: It's expected to increase from the current 1,000 wafers per week to 20,000 wafers per month by the end of 2008. He predicted that the Silicon Valley-based firm will be able to "chop 30%" out of its manufacturing costs by moving from 200mm to 300mm wafer production. "If they can pass some of that cost [savings] to customers, then the customers should be very delighted," he said.

Okunski said the company expects to invest \$1.2 billion over the next three years to reach capacity, but it will hold off on building out the entire facility "at this point." Doing so in the future -- "depending on demand," he said -- could double the output.

The new operation shares a wall -- as well as 900 employees -- with Spansion's JV3 operation, which produces 110nm MirrorBit products.

But what's more important, said Handy, is that the building uses state-of-the-art techniques to make its clean room more flexible, "so they can expand it whenever they need to."

For example, he said, there are fewer walls separating clean room operations. Rather than following traditional fab practices of maintaining the clean room area at Class 1 (in which a single particle is allowed per cubic meter of air), the service area at Class 100 and access to the service area at Class 1,000, the wafers are managed inside "airtight pods of very highly clean air."

"The only areas that are ultraclean are the insides of machines and the insides of the pods that move the wafers in and out," said Handy. "If they say, 'Gee, we could squeeze one more piece of equipment if we moved everything here to the left by 6 inches,' then they can do that."

But cost containment can take Spansion only so far. Looming on the horizon is Samsung Corp., which, according to market intelligence firm iSuppli Corp., had only 13% of the NOR flash market share compared with Spansion's 32% in the first half of 2007. According to Handy, Samsung has announced its intention "to be No. 1 in NOR by 2009 or 2010. If they follow through with that, they're going to be giving everyone in the market a run for their money, because they have the wherewithal to take prices lower than anybody else."