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Intel celebrates new chip factory
Upgraded Chandler facility reopens

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Monorails zip overhead, carrying boxes of dinner-plate-size silicon wafers being processed into some of the latest types of computer chips.

Bunny-suited workers breathe air far cleaner than in the typical operating room as they monitor computer screens on 800 pieces of gleaming new manufacturing equipment.

Intel Corp. on Wednesday celebrated the reopening of its Chandler factory known as Fab 12, the semiconductor giant's first ambitious experiment in converting a fading wafer-fabrication plant into a cutting-edge computer-chip factory.

The effort took 15 months and \$2 billion, plus a massive training program that sent 800 workers to similar Intel plants in Oregon, New Mexico and Ireland for up to a year. The converted plant will produce the leading edge of Intel products, some of which will not be introduced until the first quarter of next year. It will add capacity as sales of those chips grow, and should be at full capacity by the end of 2006, said David Aires, co-plant manager.

The conversion was no worse than the typical problems homeowners encounter when remodeling, he said, and the results are a success.

"We took an existing facility that otherwise would have been at an end-of-life condition, and we were able to basically make it perform as well as our best new research facility," Aires said.

The converted plant is Intel's fifth worldwide to process silicon wafers that are 12 inches, or 300 millimeters, in diameter. Most other chipmaking plants are processing wafers 8 inches, or 200 millimeters, in diameter.

The difference translates into better yields and big savings.

When the larger wafers are sliced into computer chips, they yield 2 1/2 to five times the number of chips that the 8-inch wafers yield.

But they don't take 2 1/2 to five times the resources to produce, Aires said. The advanced fabs use 40 percent less water and energy than their older counterparts.

The converted fab also uses 65-nanometer technology, which essentially packs more and smaller transistors on each chip than the previous 180-nanometer technology did.

That gives computer manufacturers and other customers chips with more capability and more bang for their buck, Aires said. Fab 12 is Intel's second plant worldwide to use such technology, behind a plant in Oregon.

With bigger wafers came more automation. Workers no longer are allowed to carry boxes of wafers from machine to machine because a typical box of 25 12-inch wafers weighs 18 to 20 pounds. Monorails run overhead to carry boxes between machines, and software tracks where each box is in the production process and calculates how to avoid traffic jams.

"Automation has taken the manual labor part of the job away, so workers can focus more on the process and how to accomplish production goals," manufacturing systems engineer Stefan Radloff said.

Intel declines to disclose how many employees Fab 12 has now compared with before the conversion, though its total Arizona employment has risen to 10,100 people from 9,500 a year ago.

During Fab 12's shutdown, the floor was replaced, the ceiling was raised, and 30,000 square feet of labs was carved out of the clean room space.

The plant originally cost \$1.3 billion and opened in 1996. The conversion is expected to extend the plant's life for another seven to 10 years.

Analyst Joanne Itow of Phoenix-based Semico Research Corp. said the firm has debated what the semiconductor industry would do with its out-of-date fabs. She called it "a great sign" that Intel upgraded the fab and at a lower cost than building a new one.

Having five 300-millimeter plants puts Intel far ahead of any competition, Semico President Jim Feldhan said.

"They're two to five times ahead of everybody in terms of experience," he said.

Taiwan Semiconductor Manufacturing Co. Ltd. has two, Texas Instruments Inc. is building its second, and Advanced Micro Devices Inc. is building its first.