

Ore. growing into tech rival
State surpasses Ariz.; Intel's R&D focus is key to expansion
<http://www.azcentral.com/arizonarepublic/business/articles/0108oregon08.html#>

Jane Larson
The Arizona Republic
Jan. 8, 2006 12:00 AM

HILLSBORO, Ore. - The rain easily turns expanses of lawn lush and green, and misty clouds hide hills full of pine trees. Like the verdant landscape for which Oregon is famous, the computer-chipmaking industry has taken root and is thriving here, too.

The "Silicon Forest," with barely two-thirds the population of the "Silicon Desert," surpassed Arizona in 2003 as the nation's third-largest state for semiconductor manufacturing jobs. The world's biggest chip manufacturer, California-based Intel Corp., has grown from a few hundred employees at its Oregon outpost in the mid-1970s to become Oregon's largest private employer.

It may come as a surprise to those who think of Oregon mostly as a source of timber and cranberries. But starting in the 1990s, the state has gotten serious about cultivating a high-tech sector that rivals Arizona's.

"One of Oregon's best-kept secrets is that it is a great place to do business," Democratic Gov. Ted Kulongoski told analysts and reporters at a recent Intel summit, noting that the state also is home to Nike Inc., Columbia Sportswear Co. and Tektronix Inc. "Most of you think our reputation is generally one of livability, sustainability and progressive policies . . . But Oregon is also something else. I'm here to tell you: Oregon values the technology sector."

The biggest tech spurt in Oregon has come from Intel, which ranks ninth among Arizona employers with 10,100 employees at two campuses in Chandler.

In Oregon, Intel has three chip-making plants and 15,500 employees. Its Ronler Acres campus in Hillsboro, started in 1994, has become the company's largest and most complex site, with research into technologies still generations away; an experimental factory dedicated to developing the company's new manufacturing processes; and a more traditional high-volume manufacturing plant.

The site is so cutting edge that, of the 14 Intel manufacturing plants worldwide, Oregon is where new manufacturing technologies are developed and rolled out to Arizona, New Mexico and other locations. In 2004, when Intel trained 800 Chandler workers on making chips from the new 300 millimeter silicon wafers, Oregon was where most of them went.

Mixing researchers, developers and manufacturing technicians in one location has proved powerful. Skywalks connect Ronler Acres' research lab to its development factory and high-volume plant. That enables the various groups and Intel vendors to work side by side, screening new ideas, ramping them to the point where Intel knows it can produce good yields and then transferring the process to the high-volume factories.

"It's one of the most amazing facilities anywhere in the world, and the leading research, development and manufacturing site of any semiconductor company," Bob Baker, senior vice president and general manager of Intel's Technology and Manufacturing Group, told the summit. "It brings together the unique aspects of our path-finding, our research and development and our volume manufacturing capacity."

Job explosion

States prize high-tech companies for the high-paying jobs they bring and for the exports that bring fresh, outside money into the economy.

Oregon had just 8,800 chipmaking jobs in 1990 and ranked No. 8 among the states for semiconductor jobs, compared with Arizona's 29,400 jobs and No. 3 ranking, according to high-tech trade association AeA. But Oregon gained strength over the next 13 years. It added 17,500 jobs, for a 199 percent increase by 2003. Arizona lost 5,300, or 18 percent, of its chip jobs during that period.

The biggest factor: Job losses in the semiconductor industry during the 2001-02 downturn were more massive in Arizona than in Oregon.

The chip industry remains the largest segment of high tech in both states. In Oregon, some of the industry's growth has happened by chance, and some by design.

Oregon already had a development group when Intel decided to switch from the memory business to microprocessors in the mid-1980s, said Mark Bohr, an Intel senior fellow and director of process architecture and integration who has been with Intel Oregon since 1978.

The Oregon team had shown itself to be competent and innovative, so it was put in charge of microprocessors, he said. Success attracted more resources, more engineers and more factories, he said.

"Part of it is just history," Bohr said. "If you have something good growing, you're just going to water it, fertilize it and let it grow."

Top-notch workforce

In fact, Arizona isn't performing shabbily.

Its Intel factories are among the first outside Oregon to get the latest technology, and Intel plants in both states manufacture on both the mainstream and new sizes of silicon wafers.

Arizona also is the home base for Intel's research and development on semiconductor packages, the crucial component that allows a chip to communicate with the rest of a computer or electronic device.

Intel's Chandler operations will hire 1,000 workers for a third factory, under construction since last summer and due to begin production in the second half of 2007.

And although Motorola Inc. shut down its aging chip plant in Mesa and its ON Semiconductor Corp. spinoff endured heavy restructuring, others in Arizona's chip industry have held steady or grown slightly in recent years.

A top-notch workforce is key in both states.

Where Arizona tends to have quantity, though, Oregon is tilted toward quality. Though Arizona leads with its share of engineers per 10,000 workers, an indicator of a state's design and manufacturing capacity, Oregon leads with its share of recent Ph.D.s in science and engineering, who bring current technical knowledge into the economy.

Both states have residents who swear by the great weather and quality of life, which allow companies like Intel to attract and keep talent. In Oregon, that means backpacking in a choice of terrain from rainforests to deserts, Bohr said, while skiing and beaches are just a few hours away.

Government help

Taxes, government regulation and the availability of land have been key, too.

Oregon initiated its Strategic Investment Program in 1993, which allows counties to negotiate with companies to cap property taxes in exchange for high-tech investments and community-service fees.

Intel signed its fourth SIP in 2005, which calls for the company to invest up to \$25 billion over 15 years.

Oregon, with its reputation for stricter environmental and land-use regulations, has started working with industry to streamline the permitting process and shorten the time needed to develop industrial sites.

Both states have tech-friendly Democratic governors who have pushed to help expand the sector.

"I want to make Oregon the innovation state," Kulongoski said. "I want Oregon's economy to be driven by innovation, so as to attract and retain the best and the brightest, to both support the growth of existing companies like Intel and to create opportunities for anyone with an idea and the determination to build a business or begin a career."

Arizona offers its export-oriented manufacturers foreign trade zones, which cut their state real and personal property taxes by 80 percent.

The state took another major step last summer when lawmakers approved and Gov. Janet Napolitano signed a manufacturing-friendly alternative for calculating corporate state income taxes. The "sales tax factor" legislation allows Intel and other manufacturers to use a tax formula weighted more heavily toward their minimal sales in the state than toward their hefty payrolls or capital investments.

Oregon and 16 other states already use similar formulas.

Education race

Both states still worry about shoring up their kindergarten-through-12th-grade education systems. Arizona, though, has the edge when it comes to engineering schools, the graduates of which feed the industry in both states.

Arizona State University ranked in the top 50 engineering grad schools, according to U.S. News & World Report, while Oregon State University's program falls in the 80s and Portland State University has yet to make the list.

"We're a fairly young engineering school," said Pamela Miller, director of external relations at Portland State. Recent hirings from the Oregon Graduate Institute and an \$8 million gift from a high-tech alum give the school hope of cracking the list next year, she said.

Education and training will become even more important in the newer, more advanced factories.

Intel's cutting-edge plants have twice as many Ph.D.s as its mainstream plants, to tackle the more difficult problems that arise, Chandler co-plant manager Steve Megli told the Oregon summit.

Oregon also has developed an edge in key measures of innovation, an important source of future high-tech growth. Oregonians, both inside and outside Intel, are more prolific in winning patents than Arizonans. Former Intel employees in Oregon started companies including Sequent Computer Systems Inc., acquired by IBM Corp. in 1999, and Lattice Semiconductor Corp., a 1,000-employee chipmaker.

Arizona companies founded by former Intel employees tend to still be small, such as 40-employee chip developer Corrent Corp. in Phoenix.

Investment boost

Both states remain second-tier for venture capital investments. But Oregon logged a 186 percent increase in funding for up-and-coming companies from 1998 to 2004 while Arizona saw its investments fall 52 percent, according to PricewaterhouseCoopers' MoneyTree Survey.

Both states worry about attracting additional high-tech investment in the face of global competition. Just last month, Intel announced it would spend \$3.5 billion on a new fab in Israel, aided by \$525 million in financial incentives from that country. Intel also announced a \$1 billion, multiyear investment for research and development and venture capital in India and opened the first of two chip assembly-and-test plants in China.

While Oregon can brag of Intel's jewel of a campus and elite workforce, Arizona should be able to retain and even foster the chip industry here, said Joanne Itow, director of manufacturing at Phoenix-based Semico Research Corp.

The state has done well in attracting Intel's manufacturing capacity, she said, and it has the foundations to develop its own niche.

Research by Intel and Chandler-based Amkor Technology Inc. on chip packaging could become even more important as companies push for smaller chips with higher performance and less heat, she said.

And Dutch equipment-maker ASML, which has its U.S. headquarters in Tempe, is a leader in a new type of lithography developed for more-advanced chips.

"We need to make sure the companies we do have here continue to grow and utilize us as their advantage," Itow said. "We have to make sure they're as innovative and successful as possible."

Reach the reporter at jane.larson@arizonarepublic.com or (602) 444-8280.