Intel

Intel Corporation, the world's leading manufacturer of semiconductors (an essential component of most consumer electronics), is Oregon's top private employer with a work force of approximately 15,500 in 2008. The company, whose headquarters is in Santa Clara, California, has facilities in nine other states and nine foreign countries, but its largest operating site is Oregon. Intel has seven plants in the state, all in Washington County. With such a formidable presence, Intel's position in the Oregon economy is significant. Its payroll is $1.5 billion annually, and its yearly economic impact on Oregon is about $9 billion. Little wonder that it is at the epicenter of the "Silicon Forest," the popular name for Oregon's high technology community, located primarily in western Washington County.

Intel's move to Oregon came as a result of its innovative yet practical nature. The firm was founded in 1968 by three scientists, Robert Noyce, Andrew Grove, and Gordon Moore, in the heart of the Santa Clara Valley, California, where the most advanced firms in the high tech industry were located, as well as Stanford University. They chose the name Intel, said Noyce, merely because it sounded "sexy."

Its first task was the development of a superior data storage device or computer memory. In only two years, Intel developed the 1103 memory chip, a silicon and polysilicon device far superior to any other ceramic device then on the market. Within five years of its founding, Intel went from sales of $3000 to $66 million. It was positioned for even greater growth in the future.

With the 1103 in development, work began on design of chips for a high-performance calculator. This research eventuated in the microprocessor, a memory device with a central processing unit (CPU) chip at its heart. This tiny new computer of 1/6 x 1/8-inch dimensions with more memory than the first electronic computer, ENIAC, was only slowly accepted by the industry. But Intel's leaders saw it as a major innovation to catapult the company to greater success. Consequently, they planned a move to a larger facility. By 1974, they realized they would have to leave the crowded Santa Clara Valley for a location outside California, where the company could grow as needed.

Washington County, Oregon, provided the best opportunity for expansion for the rising company. A ninety-minute flight away from the Bay Area headquarters, suppliers, and key customers, it was well within the 2-hour radius planners had drawn on a map to consider possible locations. Moreover, it had abundant and cheap energy and water. Land also was cheap in Washington County, far less expensive than in most of the rest of the country at the time, and construction costs were similarly low. The local work force was stable and relatively well educated. Finally, the initial location in Aloha was near Portland, an urban area offering social and cultural amenities for the professionals the company wanted to attract.

Intel's arrival in Oregon had a salutary effect on the state's budding high tech industry. The local pioneering companies in this sector, Tektronix and Electro Scientific Industries (ESI), had a small but important footprint, and Tektronix was a major employer. But Tektronix preferred to manufacture its own components, whereas Intel was dependent on trusted suppliers. Because of those relationships, Intel's presence in Oregon drew many suppliers to be near their best customer. The firm was thus instrumental in helping to build an "infrastructure," the supporting and peripheral companies—from materials providers to public relations firms—that serviced the big manufacturing concerns in high tech. This was critical to attracting other similar firms into the state.

The products that Tektronix (oscilloscopes) and ESI (impedance bridges) produced were used in small and isolated areas of electronics, while Intel, (with its key product—the silicon chip) was at the heart of the industry. Nearly every

important electronics product required these devices, and Intel's reputation for quality and innovation lent an aura of credibility to the state's ambition to develop the industry into a key part of the economy.

Critical to the growth of Intel in Oregon was the move of the iAPX432 microprocessor development team from Santa Clara to Aloha. Although Aloha was slated to be only a manufacturing facility, Intel decided that some engineering groups should also move, because of the difficulty of retaining key people in the highly mobile world of the Silicon Valley, where "job-hopping" was routine. The 432 team was the first to come north. The 432 proved to be a radical departure in microprocessor architecture, putting the Portland area at the forefront of innovation in the field. The 432 was a commercial failure, but proved to be the source of key features of the later Pentium processor, also developed in the Oregon's Silicon Forest. This development became the company's greatest success.

Entering the new century, Intel in Oregon was a highly diversified presence with about 18 percent of the company's global work force. Between 1996 and 1998, Intel Oregon generated more patents than any other location in the company, and between 1979 and 1999, it outpaced California operations in average annual patent growth by 27 to 17 percent, suggesting the shift in the importance of the Portland area operations to the firm as a whole. In 2004, the Oregon operations generated 662 patents, leading all others in the state by a wide margin.

The impact of Intel on Oregon can be measured not just in terms of the company's output. Intel has also been the catalyst for many other high tech businesses. Over the last forty years, Intel has been connected—as venture funder or as incubator of entrepreneurs—to about 40 start-ups, including such companies as RadiSys, Ncube, and Lattice Semiconductor. Tektronix in the 1970s and ‘80s generated more start-ups, but those who left severed their ties, to the detriment of the company. Intel tended to retain people with good ideas because of excellent equity ownership policies for innovation and the firm's nurturing of internal ventures. The impact of the Intel-related ventures is significant in the small Silicon Forest high-tech neighborhood.

Intel's founders' decision to migrate to Oregon has proved to be a boon not only to the company, but to the high-tech community, and to the economy.

Written by Craig Wollner

Further Reading:

Dodds, Gordon B. and Craig E. Wollner, *The Silicon Forest: High Tech in the Portland Area, 1945-1986*. Portland: Oregon HIstorical Society Press, 1990.

Mayer, Heike. "Taking Root in the Silicon Forest: The Role of High Technology Firms as Surrogate Universities in Portland, Oregon." Portland State University Ph. D. Dissertation, 2003.

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