

Silicon Wafer Manufacturing

Scott Walker



The invention of the personal computer, considered one of the most important inventions of the 20th century, is having an effect on our lives equal to, if not greater than, that of the electric light bulb, the telegraph, and the telephone.¹ However, its current influence on our daily lives in North America would not have been possible without the invention of both magnetic-core memory and the silicon semiconductor chip. Silicon semiconductors were invented by Robert Noyce, a physicist at the Fairchild Semiconductor Corporation, in Mountain View, California, in 1959.² This invention allowed an entire integrated circuit to be placed on a small silicone chip.

Since then, the silicon wafer has become one of the building blocks of the high-tech revolution. Silicon chips have allowed electronic devices, such as computers, to work at exceptional speed even with a reduced size. Built before the invention of the silicon chip, the first computer was slow, requiring 3 to 5 seconds to complete a multiplication problem. This computer, classified as a relay computer, was built in the 1930s and used rotating counter wheels and electromagnetic relays.² In 1942, John P. Eckert, John W. Mauchly, and their associates at the Moore School of Electrical Engineering of the University of Pennsylvania built one of the first electronic computers. This machine became known as ENIAC, for “Electrical Numerical Integrator And Calculator”. Although ENIAC was much faster, it used 18 000 standard vacuum tubes, occupied 167.3 m² (1800 sq ft) of floor space, and consumed about 180 000 W of electrical power.² By the late 1950s, computers were being made out of transistors, which were much smaller, less expensive, more reliable, and more efficient. However, it required the development of the silicon semiconductor integrated circuit before electronic devices could become both smaller and faster.

In the coming months, computer manufacturers will market microprocessors capable of 800 MHz cycle times. Only 10 years ago the fastest personal computers operated at a blistering 10 MHz. While these advances have definitely increased the speed of electronic communication and have presumably improved our efficiency in the workplace, our ability to enter data (by typing) has made the human element the rate-limiting step in this process.

References

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