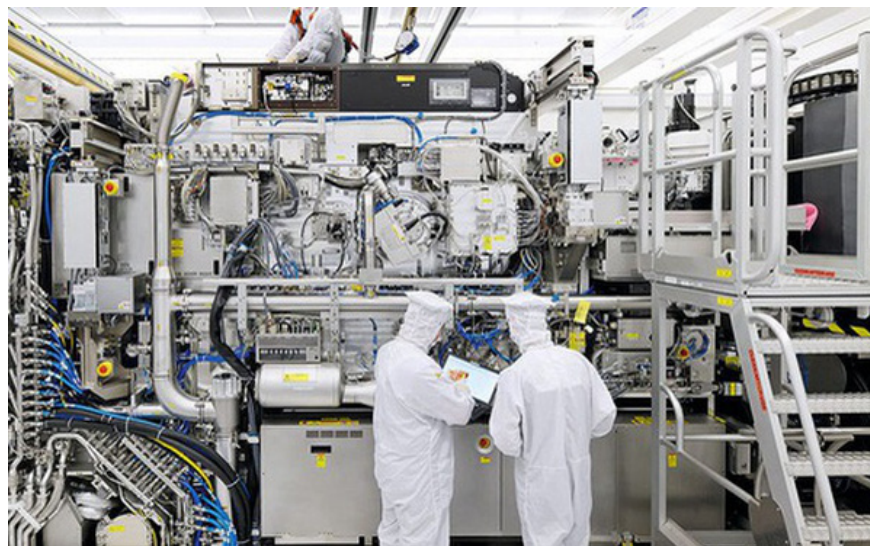


It is not Intel, Samsung or Apple, Google, the little-known Dutch company that is the sole monopoly of the most important role in the global technology supply chain.

A small unknown company in the Netherlands is playing an extremely important role in the global technology industry.

When asked what is the center of the digital economy, the answer of many people will be Silicon Valley, where there are Apple, Google, Facebook and many attractive startups. Or some will just point to the area around Seattle, where Amazon and Microsoft are based. Some even think it is Shenzhen, the technology center of China.

Few mention the peaceful suburbs on the edge of Eindhoven, the fifth largest city in the Netherlands. But that is where the headquarters of ASML - the only company in the world that produces the most advanced equipment, is particularly important for the modern chip industry. It can be compared like this: if the chips help the world operate, ASML is the hub pin, a vital element of the global technology industry.



One of the most important stages of the chip manufacturing process is the creation of extremely small etchings - just a few tens of millionths of the width of a human hair - on the surface of the semiconductor, from which so the electrodes as well as the gateways control the flow of electricity through them. ASML is not the only company in the world that currently produces photolithographic machines to do that. It has to compete with

Japan's Canon and Nikon, but the company's market share has nearly doubled since 2005, to 62%.

In addition, ASML alone can use ultraviolet light (euv) with a wavelength of only 13.5 nanometers. The shorter wavelength will allow smaller components to be attached - crucial for chipmakers trying to chase Moore's law, the law that says every 2 years the number of components possible attached to a certain area the semiconductor surface will double. The world's top three chip makers - Intel of America, Samsung of South Korea and TSMC of Taiwan - are now dependent on ASML technology, while the rest of the tech world depends on them.

In 2019, ASML's revenue grew 8%, to 11.8 billion euros (\$ 13.2 billion), despite the world's semiconductor chip industry entering a recession. Although euv devices accounted for only 26 of the 229 photolithographic units the company sold last year, they contributed one third of revenue. ASML expects that the ratio will increase to 3/4 in 2025, in the context of other companies are making progress.

Because neither Canon nor Nikon pursued euv technology, investors concluded that ASML enjoyed a monopoly advantage for a while. Since 2010, the company's market capitalization has increased 10-fold, to 114 billion euros. Last year alone, the number doubled. Currently ASML has a higher market capitalization than Airbus, Siemens or Volkswagen. Stock prices also suffered the same fate as industry peers when the pandemic rocked global stock markets, but the company's long-term prospects were bright. P / E ratio of this stock is 32 times, twice higher than P / E ratio of the biggest customers.

Things don't always go smoothly for ASML. The company was founded in 1984, initially as a joint venture between electronics giant Philips and chip maker ASM International. Initially, a small number of employees worked on the premises at Philips' Eindhoven. Jos Benschop, ASML's chief technology officer, remembers the early troubles. The first products became obsolete soon after launch, and it was difficult to find customers. Philips, even at the time of financial difficulties, helped ASML a lot. In addition the company also receives subsidies from the Dutch government and the predecessor of the European Union.

In 1995, the company listed shares in New York and Amsterdam. Shortly thereafter, ASML bet that ultraviolet photolithography technology will be the future of chip manufacturing. Big chip companies started using their machines around 2007. They were disappointed many times, and so did shareholders when ASML realized that the technology was too difficult to use. The first models were sent to IMEC research institute in Belgium in 2006, but it was not until 2018 that commercial customers could start using the technology.

Previous generation devices used lasers to produce direct light. But as the wavelength shortened, it became many times more difficult, and ASML machines could handle it.

Machines that weigh 180 tons and are as big as a double-decker bus can be compared to a bible supply chain bible in the electronics industry. ASML has about 5,000 suppliers. Carl Zeiss, a German optical company, helps "beautify" the lenses. VDL, a Dutch company, provides supporting robot arms. The light source comes from Cymer, an American company that ASML acquired in 2013.

ASML is just one of hundreds of companies that supply components to chip makers. But its role was so important that Intel, Samsung and TSMC all poured money into its R&D department in return for a stake.

Not only customers and investors are aware of ASML's monopoly position. So are politicians. Euv photolithography technology is on the list of technologies used in both military and civilian. China is anxious to develop its own technology - the effort that the US is trying to quell. In 2018, ASML received orders for a photolithography machine from a Chinese customer, but under US pressure the Dutch government has not granted ASML an export license.

ASML may hate being prevented from accessing China - the world's largest market. In the long term, not being able to enter China will threaten ASML's dominant position. Last April, ASML claimed six employees, including several Chinese nationals, had stolen trade secrets from their US offices since 2015, though it did not confirm suspicion that the case was connected. Chinese government.

However, now China needs ASML rather than ASML needs China. Of all the requests from suppliers, ASML technology is the hardest to copy, according to Pierre Ferragu, technology analyst at New Street Research. Malcolm Penn, an expert at Future Horizons, said it took at least a decade for China to catch up with current ASML technology, and by then ASML had improved a lot. The Dutch company is currently working on a new photolithography machine with better lenses that can handle more semiconductor surfaces every hour. As planned, these machines will be shipped in 2023, and this time ASML hopes there will be no event that will cause them to delay.

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