

Episode 11

Great Leap Forward in Memory Business

The first half of the 1980's became a new golden age for Hitachi semiconductor group, after the first golden age in the first half of the 1970's of calculator LSI era. Hitachi has won the world's top position with cutting edge generation of all three memory product families; DRAM, SRAM, and EPROM. The family of new memory products not only became a driving force for the breakthrough of the semiconductor division but also became a big contributor for the performance of the whole Hitachi.

I distributed a memo entitled "My policy for the first half of 1980" addressed to the managers in my department right before starting the new fiscal term in March 1980, and conveyed a message on our future directions. Its main point was to designate 64K DRAM, 16K SRAM, and 32K EPROM as "Three Focused New Products", and to declare that we would aim at the world top in this series of products. In addition to concentrating the main force in my department to these three products, we further communicated this basic policy to R&D sectors (Laboratories and Device Development Center), manufacturing sector, and sales sector (both domestic and overseas), and requested for their support.

As a result of such prioritization, it became clear that the series of 64K DRAM and 16K SRAM became the top runners in the middle of 1981 as I already mentioned in the previous Episode.

In the case of the 32K EPROM, the reason for winning was, in short, to have adopted "two-sword fencing" strategy. In this generation, the industry standard of EPROM was not established, and the market was separated by Intel type and TI type. According to the report of Dataquest published in July 1981, the shipment volume of Q1 was 600,000 pieces for Intel, 560,000 for TI, and 500,000 for Hitachi. The three companies were competing in dead heat. Hitachi introduced two series of both Intel type and TI type, so it was accepted from wider customer bases, and it was confirmed that we were at the top at the end of the same year.

At our internal sales meeting in December 1981, it was reported from the marketing department that the three focused new products of memory became the world's top.

"Triple Crown of memory" was achieved after a little more than four years since the start of the Memory Design Group, and nearly two years since we decided the prioritization strategy in March 1980. It was an unforgettable achievement for everyone who had been engaged in the memory business.

However, it was rather afterward that the three focused new products yielded true fruits and contributed to the business performance, and they made a great leap forward over the next three years.

Let's see the pace in which Hitachi's memory business grew.

In 1977, when I was appointed as the head of Memory and Microprocessor Design Dept., annual sales volume of memory was about 3 billion yen, and it was in the red. Since Hitachi

semiconductors' total sales was about 60 billion yen, the share of memory was only 5%. In other words, I started as a manager of a minor design department.

At that time, the First Design Department (in charge of MOS LSI) was the largest, with over 200 members, and the Second Design Department (in charge of bipolar IC) had more than 100 members. On the other hand, our group was a household of 20 to 30 people, so it was too small to get the official name of "Department". It was finally recognized as the "Third Design Department" in 1978 when the annual sales reached 10 billion yen, and finally we could escape from the deficit.

In the 1980's, the three focused new products (64K DRAM, 16K SRAM, and 32K EPROM) started to contribute to the business, and the sales went up in skyrocketing pace.

In 1983, five years after reaching 10 billion yen, the sales volume increased by a factor of ten, and reached to the annual sales of 100 billion yen. It accounted for 30% of Hitachi semiconductor's total sales. In the next year of 1984, demand for memory rapidly increased. Supported by the hard work of the manufacturing and sales departments, sales rose nearly to 200 billion yen, accounting for 40% of the total semiconductor division. In just seven or eight years, minor design department grew into a major sector supporting Hitachi semiconductor's backbone. Everyone felt the intense "magical power" of memory products.

In the semiconductor business, fixed cost ratio is very high, so if the sales volume increases the profit will further increase. Inside the whole company, the Semiconductor Division became the most profitable division, and made the biggest contribution to the overall performance of Hitachi at this time. And at the center of Semiconductor Division were memory products.

As the presence of Hitachi semiconductors increased, especially in memory, I also received much attention both from inside and outside of the company. I had many chances of being invited to speeches at industrial forums and international conferences, as well as opportunities to receive interviews.

I would like to introduce some of such cases.

I received an invitation to speak at the semiconductor industry conference held in Phoenix, Arizona which was organized by Dataquest from 14th to 16th of October, 1981. Speakers included superstars like Intel's Robert Noyce, Motorola's Gary Zucker, AMD's Jerry Sanders, and so on. For me it was my first experience of making a speech at such a major overseas meeting, but I encouraged myself to accept it since I was the only person invited from Japan.

I gave a presentation under the title of "Some Aspects of Semiconductor Manufacturing in Japan", and I talked about unique things of Japan including semiconductor technology, manufacturing, and application, etc.

In particular, I introduced small group activities that supported the high quality of Japanese products, trends in factory automation, and development of low power high-speed CMOS technology, etc. In addition, I also introduced "Bon Festival Dances" in summer, Athletic Meetings in autumn which made the basis of team work, and the New Year's first visits to shrines, and so on. After the speech, I received favorable comments like, "It was very interesting", probably partly because of its rarity.

This speech gave me opportunities to be invited as a speaker at major conferences held by InStat(US), Future Horizons(UK), and Semico Research(US), besides Dataquest, and those occasions were also good opportunities for me to expand the human network.

The next case is a keynote speech at IEDM (International Electron Device Meeting) in 1982. IEDM is one of the largest conferences centering around semiconductor devices and processes, and it is a great honor to be invited there. The conference was held in San Francisco from 13th to 15th of December, and I made a speech entitled "Automation in Semiconductor Manufacturing" under the joint name with Hiroto Nagatomo, who was in charge of production technology at Hitachi semiconductor.

It was in the period to launch the new technology products based on 3-micron design rule such as 64K DRAM and 16K SRAM, and Hitachi's technology which was at the world's top level was catching a lot of attention.

After talking about macro trends in the semiconductor industry, I mentioned about improvements in productivity and quality by means of automation, based on case examples of front end and back end processes. In addition, I presented my long-standing subjects about the yield improvement analysis method associated with miniaturization. And lastly, I introduced my bold image of automated factories in the future when integration level would become 1000 times, that is in 64M DRAM generation. As shown in the slide below, steps from design to manufacturing are fully automated.

Finally, I concluded my talks with a humorous expression that, "A sales robot carries 64 MDRAM heading towards customers, with a lot of sweats, in order not to miss the delivery time". There was a lot of ovation.

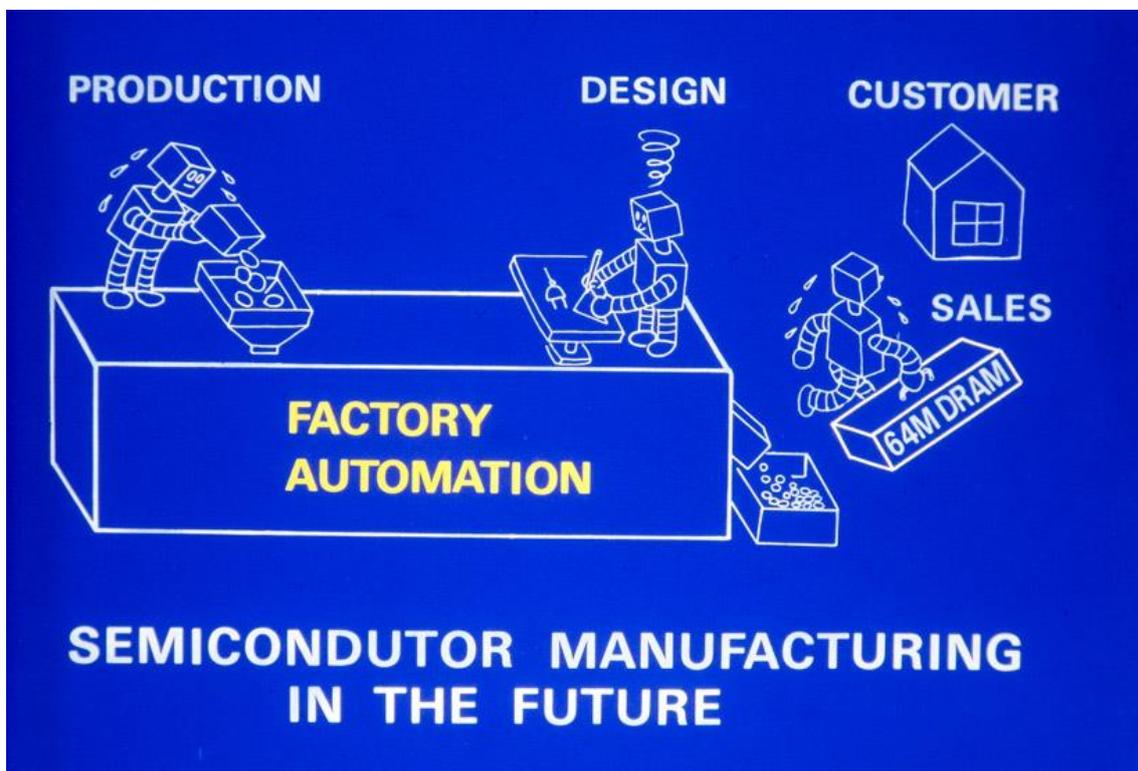


Fig. 11.1 The last slide used at IEDM showing the future image of semiconductor manufacturing (December, 1982)

A little while later from the meeting, I received a thank-you letter from the program chairman Michael Adler, in which very generous comment was written as follows:” --- In the case of your paper, in particular, I was told by many people it was one of the very best papers ever given at the IEDM. This was true both in substance and your well prepared and often humorous delivery. Many people were amazed at your understanding of American humor. ---”

I think that this was not simply a compliment to my speech, but rather an assessment and praise for Hitachi's semiconductor technology that was at the top of the world at that time.

Hitachi's advanced memory products not only secured the world's top position in terms of technology but also made a great contribution to business performance of the whole company. Since I was at the center of the stage, I was given credit of the success of memory products, and gained favorable popularity from inside and outside of the company. We had really smooth sailing at the time.

At such a time, a Weekly Magazine published an article with a big headline on the candidate for the next president of Hitachi. As shown in the picture below, the title of the article was “Guessing the President after 10 Years” followed by the heading “Makimoto is leading the race to the top of Hitachi; a company with 83,000 employees”. It was truly a surprise as a bolt out of the blue for me. In the article there was a detailed description of my personality as well as my career and achievement.

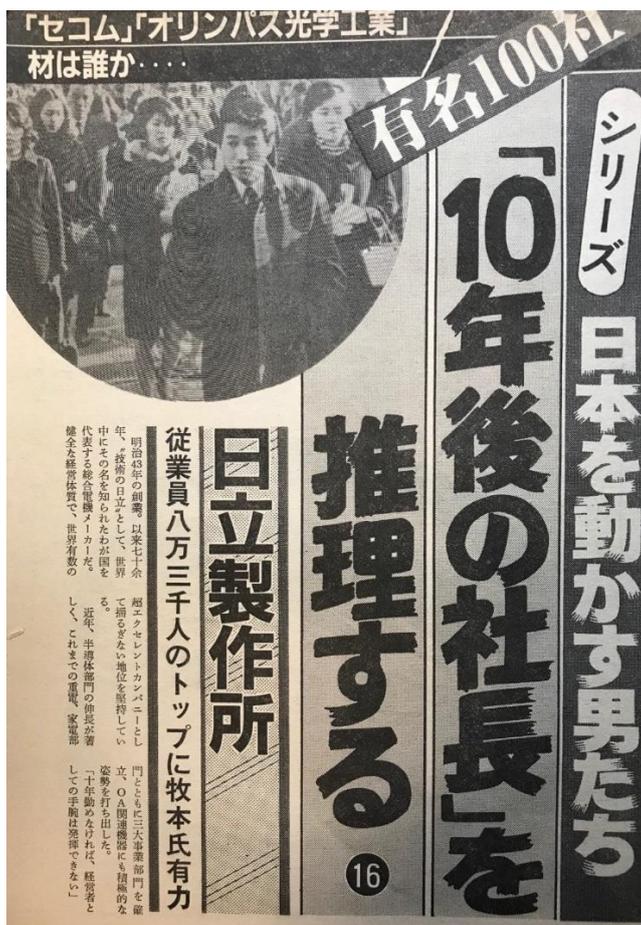


Fig. 11.2 An article of the Weekly Magazine “Sankei” regarding next candidates of Hitachi (December 20, 1984)

It seemed that many people in the company read this, and I received comments from various people. Although they were generally favorable comments, a big senior gave me an advice from a totally different viewpoint.

“I also have thought until now that there could be a possibility for you to become the president, but since you have now become a “sticking up nail”, it will be more likely to be beaten from now. Hitachi is essentially a heavy electricity company after all. People in the semiconductor are like aliens from their viewpoint. I think you better forget about this article and behave yourself with a lot of care.”

For me, of course, this article ended up as a “phantom president candidate”. And the truth of the seniors' words that "Hitachi is a heavy electricity company after all" would gradually become clearer later.

In addition, for the honor of this Weekly Magazine, their expectation considerably proved right, since the name of Etsuhiko Shoyama (former Hitachi President and Chairman) was listed as the second candidate for the president after me.

Looking back from now, 1984 was the year when the world semiconductor market reached its peak, and it was one of the best years of my life.

However, lights are usually followed by shadows, and good things never last long. In the following year of 1985, we would fall into a big downturn like hell.

Note: The original version of this article was first published, in Japanese, on the Semiconductor Industry News (Sangyo Times Co., Ltd.) from July 12, 2006 to January 9, 2008.