High-Tech Industries: A Personal View

By Dick Yamashita

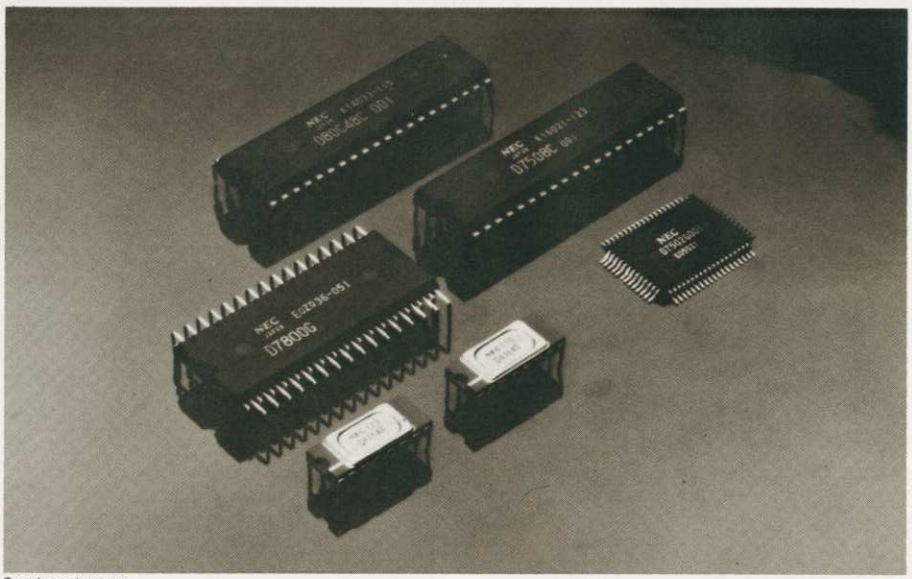
So much has been said and written about the U.S.-Japanese competition in high technology in the last few years that I can hardly expect to offer any profoundly new or definitive comments. But I hope my personal perspective, as one involved in the international arena of hi-tech industry, and particularly as I see things from the Japanese base, can at least provide interesting food for thought.

The semiconductor industry has become so important that it now represents a major issue not only for large electronic corporations but also for policy makers in several industrial countries.

This is because the size and growth rate of this business makes it increasingly attractive. Historically, world-wide consumption has increased at a compound rate of about 16% annually, reaching the value of $15 billion for the merchant market in 1982. The figure would be much larger if in-house production were included. This growth rate is expected to continue, even accelerate, through the rest of this decade with the increased expansion of electronics in all aspects of modern society.

A leading manufacturer must have "controlled access" to semiconductor technology as a condition for remaining in the forefront of technology and for survival. For instance, nearly all U.S. integrated circuit producers serve the computer market, at least to some extent. Some firms serve both captive and merchant markets, while others serve only the merchant market. In Japan and Europe, nearly all integrated circuit producers are vertically integrated firms and many of them also produce computers.

Based on a study conducted by the U.S. Department of Commerce, the U.S. computer industry is the largest single customer of the U.S. IC industry.



Semiconductors

Need for investment

According to that report, the growth of the multibillion-dollar IC market is directly related to expenditures for research and development and the advance of technology.

U.S. producers face the need to expand investment in plants and equipment in order to serve an increasing demand for ICs and to fund research needs for technology. Without the necessary U.S. investment, foreign producers are likely to increase capacity to supply the increasing demand, and U.S. producers are likely to lose world-wide market share.

The magnitude of the investment problem can be understood by the relationship between capital expenditures on plants and equipment and the value of industry shipments.

The availability of capital required to finance investment and the willingness of the producers to commit investment funds even during a turndown in the business cycle are important considerations for all countries. While the Americans stopped investing during the recession periods, the Japanese were always investing.

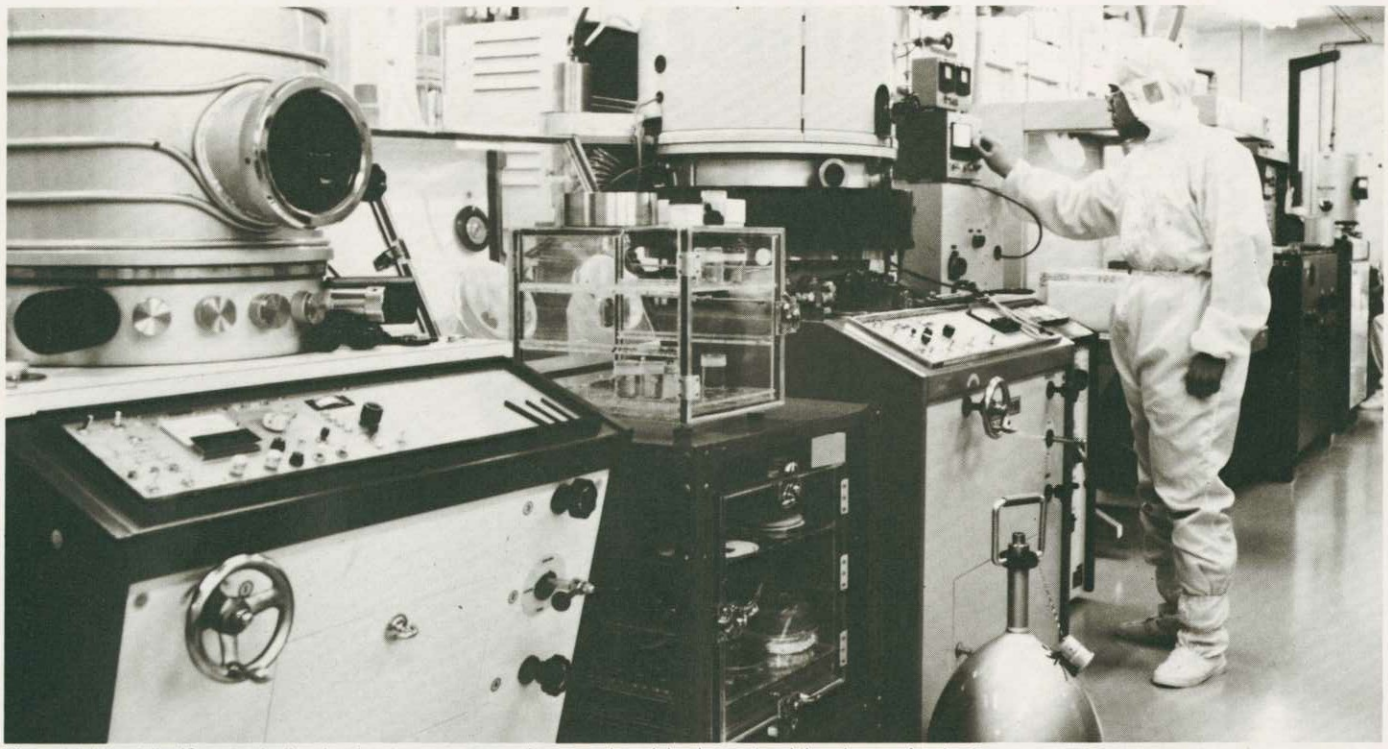
For example, the inability or unwillingness of U.S. manufacturers to invest sufficiently after the 1974–75 recession and an underestimation of market demand are, according to U.S. industry sources, the main causes of the U.S. industry's current capacity problems. These sources argue that the present capacity limitation is a factor in providing foreign producers with the opportunity to broaden their customer base and to serve markets which U.S. producers are unable to serve.

The large investment needed to support future U.S. growth will have a different effect on large producers than on small producers.

In the past seven years, the United States lost some ground in its share of world supply (down from 64% in 1975 to 56% in 1982) while its share of world consumption has remained stable in the 42% range.

Tough competition

The American industry remains by far the largest in the world and is still overall the most advanced technologically, but Japan has emerged as a strong competitor.



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Japan's market size is 30% of world consumption. Japan has made a fantastic jump of 13 points in share of world supply from 19% to 32%. Japan has also made spectacular progress in technology and manufacturing techniques. Furthermore, Japanese investment in R&D and in capacity expansion are so great that further strides will be made in the years to come.

As for Europe, unfortunately, in the last seven years, it has lost momentum, according to Pasquale Pistorio, chief executive officer of SGS-ATES (Italian high technology company), who spoke at a recent dinner meeting of the Semiconductor Equipment and Materials Institute (SEMI) in Zurich. This decline was both due to the serious economic crisis, that affected Europe more than the other industrial regions, also leading to revaluation of the dollar vis-à-vis all European currencies, and to the delayed effect of lack of action in the preceding decade. Pistorio said that Europe has lost its momentum as a leader in high technology because of its "nonaction" in the 1960s and early 1970s.

In terms of world semiconductor consumption, Europe dropped from 23% in 1975 to 20% in 1982, and in terms of supply, Europe dropped from 17% to 11% in 1980.

The large cost of necessary growth is more easily financed by large producers from internally generated funds. With their large share of the market, large firms will have a higher equipment utilization rate, which will tend to make the large firms more investment efficient. Small- and medium-sized producers are likely to be more dependent on external sources of funds to finance growth and with a smaller market share and a lower equipment utilization rate, they tend to be less investment efficient. Thus, consolidations and mergers with end-product producers can be expected as investment demand grows and competition increases. In the United States, the venture capital industry plays a vital role in enabling small- and medium-sized companies to compete.

Consumer electronics

As for Japan, the nation's continued strength in the electronics industry will be one result of emphasizing consumer electronics. Japanese manufacturers' strong commitment to product and process R&D and their aggressiveness in commercializing new products, coupled with sustained support of high-risk and delayed-return investments, have helped them attain the leading position they now hold in consumer electronics.

The recent effort by General Electric to join forces with Hitachi in the consumer electronics field may be a good example of the technological lead Japanese firms have attained.

Japan will be a strong competitor for a couple of reasons: 1) its well-integrated and highly responsive pyramid of subcontracting enterprises, and 2) its production process development (automation) and the related adjustments in product designs that contribute to cost-effective, high-quality production.

In conclusion, the United States still retains broad leadership in computer hardware and software production and technology. But, the Japanese have begun to close the gap in several sectors. Japanese producers have products that match or exceed the capabilities of U.S. major producers in such sectors as large-scale processors, magnetic disk storage, and printers. Japan has begun a 10-year R&D program to produce a fifth generation computer system with which they hope to leapfrog the United States.

While large main frame production is dominated by relatively few large companies, many smaller companies have entered the smaller personal computer market.

The next several years will be crucial test years for Japanese electronics firms, and the U.S. market is where they will be tested to determine which will survive. ●

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