Market-Driven Technology Development

Ryuichi Komatsubara
Executive Officer
Senior Vice President,
Technology & Marketing

Tokyo Electron Product Strengths

The strength of our products and technologies lies in our commitment to our customers beginning with the product development stage. Semiconductor manufacturers aim to differentiate their products through differences in device design and in semiconductor manufacturing processes. To assist with this goal, we work with customers to develop manufacturing technologies, giving top priority to supplying our customers with equipment that closely suits their needs. Our customers have come to recognize the high performance, repeatability, and reliability of our equipment, and as a result, we hold the top market share globally for almost every piece of equipment we market.

Volume manufacturing using 90 nanometer design rules has begun in 2003. These new specifications require even greater control of heat and time in the lithography process than in the past. In response to these needs, we have given the new coater/developer Lithius™ add functions to improve process stability, for which volume manufacturing and delivery is scheduled for the start of 2004. We have embedded measurement devices and a variety of sensors into the equipment to provide feedback and feedforward functions to control processes. In addition, the high productivity for improved exposure equipment throughput is another important sales point. We are confident of maintaining our strong position in the coater/developer market for next-generation devices.

In thin-film formation, TELFORMULA™, a new type of thermal processing system that we began full-fledged sales of in the fiscal year ended March 2003, also offers many strong advantages. Featuring a hot-wall thermal furnace and a quick turnaround time due to the ability to process 25-wafer batches, has resulted in driving a new market for mini-batch furnaces. The system can provide more precise boundary control because it can make sequential runs incorporating different processing specifications. Our customers have rated its capabilities very highly.

Another unique thin-film formation system Trias™ SPA accomplishes high-quality nitridation and oxidation processes. It was developed in cooperation with Tohoku University with the support of the Ministry of Economy, Trade and Industry (formerly MITI). For 90 nanometer or less processes, damage to the wafer from plasma cannot be ignored. However, the highly unique antenna system embedded in this equipment enables the production of microwave plasma with extremely low electron energy of 3eV or less. Based on the high-density radicals that can be created using this microwave plasma, we plan to supply process solutions not only for gate nitridation process but also for oxide film formation, annealing, and a host of other processes. We anticipate that Trias™ SPA will become one of the core products of our thin-film formation business portfolio.

Requirements for Next-Generation Processes and Future Challenges

With every new generation of IC, semiconductor production equipment makers have boosted the value-added content of hardware, software, process recipes, and process integration. Looking at the needs of our customers over the past few years, the two main trends have been process development based on actual device designs and intelligent equipment with precision measurement devices embedded in the equipment or in the manufacturing line. In the sense that these needs require us to deepen the comprehensive commitment to our customers, which we have pursued since we began in the semiconductor production equipment business, I see the former trend as further broadening the scope of our involvement. With the latter trend, we have been developing these functions in our product lines for several years using business alliances, mergers and acquisitions, and other methods. As with Lithius™, the products we will be launching in future will have intelligent functions.

The surge in R&D costs of companies as chip shrinkage progresses is of some concern to all. Because

Albany NanoTech facility including 300mm and 200mm wafer R&D fab

they offer one method of alleviating these costs, projects and consortiums featuring collaboration by industry, government, and academia are growing in importance. In Japan, we are actively participating in the MIRAI and the HALCA projects, supplying equipment and personnel. Outside Japan, we have various research activities linked with International SEMATECH and IMEC. Recently, we decided to participate in the Albany NanoTech Project, an R&D program that makes use of the facilities of the University at Albany, State University of New York. This project, which was supported by the government of Japan, was praised highly as an example of how basic technology developed at a university can be combined with the application technologies of the private sector to yield excellent results. At the Second Conference on Promoting Industry-Academia-Government Collaboration, held on June 8, 2003 in Kyoto, Tokyo Electron received the Prime Minister's Award for its development of a practical application of Trias™ SPA.

We participate in these consortium activities not only to pursue innovative technologies that can achieve breakthroughs in next-generation processes, but also to achieve progress in efficiency and speed of our R&D activities and in the use of integration infrastructures.

Improving the R&D Process and Achieving Greater Efficiency

Amid the growth in semiconductor applications for consumer products in the form of system on chip (SOC) devices, the life-cycle of products is getting extremely short. Because this situation also translates into a short development cycle for the device itself, and in turn, the development cycle of the production equipment, it has become a major industry issue. From the point of view of promoting process development, the establishment of the previously mentioned integration environment is vital in addressing the problem of shorter life-cycles. On the other hand, the development of the actual equipment is obviously also an issue. As a result of this dichotomy, we have been pursing the development of leading-edge technology that is not associated with development of business unit products through an independent R&D unit called Corporate Development. We are planning to relocate this R&D unit closer to the site of the development of actual products. In other words, we want the R&D unit to be able to contribute to our manufacturing units that are producing individual products. Moreover, we are going to reorganize our R&D structure into a horizontally linked organization built around such core technologies as thermal, plasma, vacuum, atmospheric pressure system, and process application. This structure replaces the previous vertical integration by technology system. Through these steps, we plan to achieve rapid sharing of a broad range of technological information, further speeding up our R&D process and improving its efficiency. These, I believe, are our top priorities for the future.

Prime Minister's Award for Trias™ SPA

Accelerated Manufacturing for Speed Up and Cost Reduction

Hisashi Shirahada
Executive Officer,
VP & General Manager,
Manufacturing

Tokyo Electron's manufacturing strength lies in its ability to adapt our equipment flexibly to a diverse range of requirements of customers. This capability keeps customers satisfied, raises their confidence in TEL and is a significant driver of corporate growth. Nevertheless, amid the current trend in applications of semiconductors to consumer appliances, demand for cost reductions in semiconductor production equipment from customers is increasing and the business cycle is getting shorter. We believe this trend will continue into the future. Therefore, we are proceeding to strengthen our manufacturing division by increasing speed and reducing costs.

Improving Operational Speed

To further improve our operations, we are aiming to reduce lead times from order to delivery to two months for new products and three months for existing products. We are also working to trim the start-up time from delivery to completion of installation to two weeks. The steps being taken to achieve those targets are improving the efficiency of capital and human resources, reforming manufacturing processes and standardizing equipment.

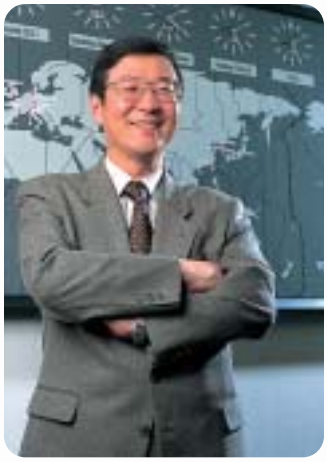
Specific measures to improve the efficiency of capital and human resources include speeding up processing and boosting efficiency by introducing a shift work system and operating our logistics system around the clock. To reform our manufacturing processes, we are targeting the shortening of the manufacturing time by using information technology (IT) tools to reorganize processes to include additional parallel processing. In our standardization efforts, we are working to avoid duplicating previous design work and shorten the manufacturing time for design and custom-order components by creating and making the best use of an open database containing all our past design data. Furthermore, we are designing standardization into the tools from the product concept stage for our new thermal processing equipment, coater/developers and other equipment. We are confident that these actions will contribute fundamental benefits to our operations.

Our cost reduction goals are a 30% cut in material and fabrication costs over a three-year period. Among the measures being taken to attain those results are a review of our procurement and design systems and reform of our logistics system. To improve our procurement system, we are increasing purchases of materials from China and Southeast Asian countries and cooperating with suppliers in examining methods to reduce costs of components and parts. To upgrade the design system, we are applying manufacturing management methods—value analysis (VA) and value engineering (VE)—to achieve results. The VA system enables us to cut costs by changing parts without affecting the performance of the product. And with new products in particular, we are pursing cost reductions by applying VE methods that optimize the balance between performance and cost beginning with the design stage. To raise the efficiency of our logistics system, we are actively developing a shared logistics system to replace the individual systems of business units.

Strength as a Manufacturer

In tandem with these measures, we are implementing the IT tool-based Total Cost Down Project at plants of Tokyo Electron AT and Tokyo Electron Kyushu. This system was first introduced with great success at Tokyo Electron Tohoku. In addition, to upgrade the design and manufacturing skills of individual engineers and the management capabilities of our project managers, we are reviewing our training and education system and our personnel performance evaluation system. Through these measures, we are committed to further boosting our strength as a manufacturer by ramping up the benefits of our improved speed and cost reduction actions.

Marketing Expertise as a Reliable Partner



Mitsuru Onozato
Executive Officer,
Senior Vice President,
Sales

Founded as a trading company, Tokyo Electron has developed its business by supplying customers in the electronics industry with required functions packaged with engineering and support services. In the semiconductor production equipment business, suppliers must instantly recognize the process needs of each customer and incorporate them into their products. We have achieved our strong position in the market based on a sales organization offering strong technical knowledge of the products and manufacturing processes. Our customer satisfaction policy is reflected in our market share, which is one of the largest worldwide, but it was also made evident during the fiscal year under review by the awards received from leading semiconductor manufacturers. To take one example, we have received Intel's Supplier Continuous Quality Improvement Award for three years running—a most encouraging award for the sales group manning the front lines of our relationships with customers.

Reinforcement of Marketing Power

As the costs of R&D and manufacturing steadily increase in the semiconductor industry, the number of business alliances among our customers is growing. As a result of these alliances, the loss of a business opportunity with one customer could possibly lead to the loss of another customer's business. To avoid these situations, our first priority is to reinforce the competitiveness of our products. To that end, we believe that the Company must not only carry out joint product development with customers—the key to business alliances—but also boost the marketing power of its sales force. For example, from the point of view of Tokyo Electron's role as a multi-product line vendor, individual salespeople must be knowledgeable about more than just one product. We believe that taking steps to instill in our salespeople a high degree of knowledge of our equipment and their related manufacturing processes contributes to a deepening of the relationship of trust with our customers.

Cost Reduction Challenges

We also recognize that the Company cannot achieve its overall goals for cost reduction, improved speed and improved financial performance without the cooperation and assistance of the sales force. Therefore, we are exerting efforts to reduce costs based on a small–but–efficient sales force and shortened equipment installation time, and are proactively working with other divisions to cut inventories.

China Market Promising in the Medium- to Long-Term

Among regional issues, we are strengthening our operations in China, which is a new and steadily expanding manufacturing base for semiconductor devices. Currently, the market is not demonstrating explosive growth due to regulations on advanced technology and various other factors. However, in the near future, we expect that it will expand substantially because of the low cost of infrastructure and labor. During the current fiscal year, we are in the process of constructing a new building in the Shanghai region to be used for demonstrations and stocking parts. While avoiding the many risks in the market, we plan to pursue sales activities as we do in other markets based on our customer first principle.

Tokyo Electron (Shanghai) Limited
New Headquarter Building

Global Support of Process Application Engineering

Jinzaburo Sakamoto
Executive Officer,
VP & General Manager,
Field Engineering

In the semiconductor production equipment business, customers expect high-process performance equipment and high-quality support services to be packaged together. By establishing a network of more than 40 bases in 12 countries around the globe to provide these high-quality support services, Tokyo Electron has built a strong relationship of trust with its customers through its pursuit of customer satisfaction.

Improvement of Support Services Capability

In recent years, our customers at semiconductor plants have raised the bar on their cost reduction, efficiency, and uptime goals; and consequently, they are demanding even higher levels of support from equipment suppliers. In particular, to provide support services for equipment used to manufacture ultra-miniaturized devices, it has become essential to have the capability for and knowledge of process application, not just knowledge of the hardware. For that reason, we are emphasizing process education to upgrade the skills of our engineers. Moreover, through the Internet (e-Business) we are supplying customers with real-time technical information resources. Specifically, our e-Support services provide information on equipment problems and their solutions, as well as on improvements and modifications. To enable customers to immediately deal with problems by themselves, we have added an e-Troubleshooting function into our equipment, and plan to implement training of customers for this function.

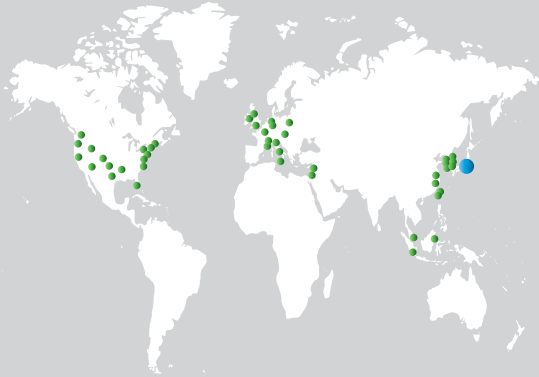
Service as a Profit Center

In addition to earning a profit on our hardware and achieving cost reduction, we are also establishing a new business model that converts our service department into a profit center. For several years, we have offered optional services for an additional charge to further enhance the level of customer satisfaction with our equipment under the name of TEL Service Advantage (TSA). At a customer's request, we provide support services after business hours, emergency on-site support and quick start-up services. In addition to being highly rated by our customers, TSA contributes to higher operating rates and productivity. In the future, we will push forward with the establishment of a business model based on the active discovery of and response to customer support service needs that is positive for both TEL and our customers. This model will create income for Tokyo Electron by supplying value to customers in the form of greater customer satisfaction and value-added content.

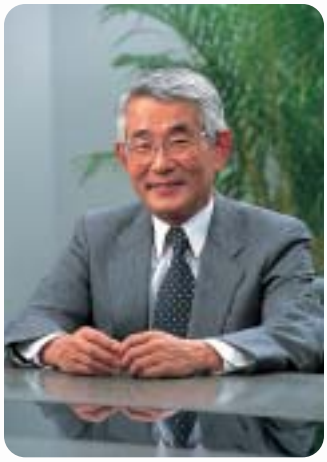
Contribution to Operational Improvement

From the standpoint of cost reduction, we will pursue multi-product support services where one person can serve as a field engineer for multiple types of equipment. We will also seek cost reductions by strengthening our business agreements with partner companies, working to achieve more effective use of our engineers, and improving the efficiency of our logistics systems. We are also taking steps to reduce and optimize our parts inventories on a global level introducing a stricter management structure in coordination with our sales group and plants.

Global Support Network



Asset Management to Generate Extra Cash Flow



Mamoru Hara
Executive Officer,
Executive Vice President,
Administration

In the semiconductor production equipment business, it takes several months to install and adjust equipment after it is delivered to the customer. Taking into account the payment terms of the customer, recovery of expenses can take some time. This problem is compounded by the fact that we pay suppliers on much shorter terms in consideration of the guarantee they provide on merchandise. As a result, our working capital tends to be negative when business is in an upturn and positive during periods of adjustment. Indeed, for the Company to continue to build corporate value, it is essential to improve cash flow by creating profits and reducing working capital.

Improving the Balance Sheet and Cash Flow

To reinforce our balance sheet and our cash flow, we are aiming to shorten the collection period for trade notes and accounts receivable and the inventory turnover ratio by 30% within two years. To achieve these goals, the entire company is working to shorten start-up times and reduce trade notes, accounts receivable and inventory. As indicated by the key word "speed up" used by Executive Officer, Mr. Shirahada in his explanation, we are shortening the installation time through integrated reform of design, manufacturing, and service. To reduce trade notes and accounts receivable, the sales and service departments are partnering with the administration department to decrease receivables for accounts where customers have not yet completed the inspection and acceptance process. These efforts are in addition to shortening start-up times. To decrease our parts and components inventories, we plan to increase the efficiency of our global logistics system. This is being accomplished through integration and other measures to enable us to decrease the stock of parts kept at customers' semiconductor plants for support services. Moreover, we will strictly control inventories that were lent to customers for evaluation with target amounts in each business unit.

Based on these measures, we expect to achieve an improvement in cash flow of several tens of billions of yen, as well as gaining benefits from reducing our interest-bearing debt and interest burden. In addition to improving our profit structure through the reduction of fixed expenses, we intend to strengthen our balance sheet and cash flow by ramping up these efforts over the long term. The ultimate goal of these efforts is to continue to build corporate value.

Receivables & Inventory Turnover Period