New value created through close cooperation between development, manufacturing and sales

To meet the needs of top-class semiconductor manufacturers in Japan and overseas, which are enmeshed in intense competition, including over patent rights, in a global market marked by rapid technological innovation, it is extremely important to first firmly grasp customer needs and then to quickly provide results that satisfy those needs (speed of response). Conversely speaking, if systems are not created that can accomplish this, we have not built a close relationship with regional users in the true sense—this is the reason we established TOK Advanced Materials.

Customer requests (and projects) increasing daily is proof of trust

TOK Advanced Materials is working to deepen collaboration between development and sales divisions, focusing on, for example, where people in charge of sales and development divisions visit the customer as often as possible together and understand customer demands definitively. Satoshi Maemori, Team Leader of the Semiconductor Team, is someone who has directly experienced the astonishing effectiveness of these activities.

“This type of practice is commonplace in Japan, and even before the company was established, development personnel would be dispatched from Japan, and through TOK Korea based in Seoul we would provide equivalent levels of support (refer to “Product Development Flow”). However, at the time, this would involve bringing the work back to Japan, and it would take some time before samples could be submitted. Now though, we can do the same thing in a short period of time, which has enabled us to respond with speed and flexibility.”

“In addition, time spent directly meeting with the customer has increased dramatically, so we are able to discuss the details deeply through correlative confirmation, and our suggestions have been highly evaluated from the beginning of the development. This also has resulted in further accelerating the development.”

This close coordination between development and sales divisions, which is a regional-based system, has been steadily generating results, and recently, development from customers have been increasing by the day to the audible delight of the company’s personnel. Maemori explains: “This is itself proof that we are being increasingly trusted by customers. The motivation of the development team is also rising as they come to be depended on by some of the world’s top companies.”

Since its foundation, TOK has developed a large number of products that have earned the “world’s first” or “Japan’s first” label (refer to p.9, “History of TOK’s Business and Products”), and has contributed to the development of Japan’s semiconductor industry. In many cases, this was the result of meeting the customer’s expectation that TOK can get the job done. Some executives familiar with TOK at that time have said that they sense the same type of enthusiasm today at TOK Advanced Materials.

*The business operations of TOK Korea were transferred to TOK Advanced Materials in 2013.

Security System

We have established a robust security system that includes a stringent information management system and security company services to prevent leaks of technical information. Everyone entering the company, including employees, checks in at the front gate and goes through an additional security inspection at the entrance that includes checking belongings.

The entrance with aeroport-style security check.

All people entering the building have their bags thoroughly checked without exception.

Company-wide Strategy “Build close relationship with regional users”

About TOK Advanced Materials

Company policy: Inspire users through localization of cutting-edge products

Items produced: Photoresists for semiconductor manufacturing (KrF/ArF)

Certifications: ISO 9001, ISO 14001, ISO 50001

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Customers Seek Proposals from Suppliers to be Inspired Together

Through their daily sales activities, Sales Division personnel are also coming to directly experience being dependent on others, Kim Gi Tae, General Manager of the Sales Division and responsible for sales since his time at TOK Korea, is one person who has been more than a little surprised at how the reaction of customers has changed completely since the system was established that allows for a highly in-depth approach through coordination between development and sales.

"Korean semiconductor manufacturers strongly tend to prioritize local companies, so being a Korean company helps get our foot in the door. But the market is subject to extremely intense competition, so unless we make proposals that are more inspiring and impressive than our competition, customers won’t end up doing business with us. But even in this market it is extremely demanding, so proposals are only "inspiring" if, for example, when our products actually improve quality, reduce costs and thereby increase profits. This is also what deepens trust. If a company is simply not impressed, it walks away, but if it is, the company will do business with anyone. In this sense, it is very clear that we must be more inspiring."

On a daily basis, we experience directly the high expectations of customers and the fierceness of the competition in this country from the fact that requests come in successively from customers, to an extent not even seen in Japan. And the Manufacturing Division also feels that we don’t have to be satisfied with doing the same thing even for the same product that we have to raise inspection precision and increase speed, for example. We are always looking for new ideas to make improvements in manufacturing technologies, and are always ready to try new things," the plant General Manager Hirotaka Yamamoto explains.

TOK Advanced Materials and the Incheon Free Economic Zone

TOK Advanced Materials Co., Ltd is located in the Incheon Free Economic Zone (IFEZ) (Songdo district), which is comprised of the Songdo, Cheongna and Yeongjong districts, and includes the Incheon International Airport and Port of Incheon. IFEZ is home to a cluster of international companies that the Korean government expects those companies will help in its economic strategy centering on northeastern Asia, and in general foreign-affiliated companies with exceptional advanced technologies are invited to locate in the zone on a priority basis. Free corporate and economic activity by foreign investors is allowed and tax incentives are also provided. Moreover, the zone features high-quality government services and a highly convenient living environment.

The TOK Advanced Materials complex includes an R&D building with head office functions and production building with both buildings being connected by a corridor. IFEZ offers a pleasant and environmentally friendly city. The TOK Advanced Materials complex is itself designed for environmental sensitivity and good views, and the R&D building features a rooftop garden that functions as a break space for employees.

Making steady progress in manufacturing technologies for cutting-edge photoresists

After completing a postgraduate mechanical engineering degree, I worked as an engineer for about five years at a Korean semiconductor manufacturer where I was involved in manufacturing semiconductor devices using TOK photoresists. Then I worked at a chemicals manufacturer before joining TOK Advanced Materials where I work today. At my first company, and my second as well, TOK’s photoresists were referred to as excellent, so I was very interested in them even then. When I learned that TOK was recruiting engineers, I thought that working at a company with such high technical capabilities would help me further develop my own career, so I applied.

I’m currently in the Quality Control Division and my job is related to inspection. I have around six years of experience in the industry, but when I first started this job I was immediately surprised at the large number of inspection items for cutting-edge photoresists and how strict the requirements were. At the same time, I found out just how deep this field is and this made me want to dive in that much deeper. I’m currently motivated by steadily building my skills, but in the future I want to establish new inspection methods, etc. in line with user process characteristics and together with my colleagues contribute to the company.

Quality Control Team

Lee Eun Ha

Sample inspection using cutting-edge analysis equipment

Final product testing for confirming photoresist characteristics involves the process of actually coating and exposing the photoresist on a wafer at our facility and then inspecting and assuring its performance. TOK Advanced Materials is outfitted with cutting-edge analysis equipment, and stringent product inspections are conducted for each manufacturing process; joint work is also sometimes conducted with the customer.
TOK Distinctive history of TOK localization just beginning

Vice President Jun Jang has high expectations for the new value distinctive to TOK Advanced Materials that will arise alongside with the Japanese-style “monozukuri” culture.

“Construction of the Songdo International Business District will continue through 2020 and there are plans to further expand the zone. It’s not only a production and development site for cutting-edge companies but also features ultra-high-rise hotels, shopping malls and other large commercial complexes, as well as high-end residential areas, which still currently only dot the landscape, but we believe in the Songdo’s potential as an emerging and progressive Korean city with new values.

For TOK Advanced Materials, the earliest possible establishment of “Japanese-style “monozukuri” with its emphasis on detailed observation at the frontline level, is an urgent necessity. To the extent possible in the future, we want to begin hearing constructive suggestions on trying new things from the company’s frontline operators.

“TOK Advanced Materials recruited employees, including management level employees, from Korea, primarily people with experience in the semiconductor industry, from the time of the company’s founding in 2013 to the end of the fiscal year to be able to hit the ground running. Since then, we have set our sights on the long-term development of capable personnel, including new graduates, by hiring in Incheon and from the surrounding region without regard for professional experience, which has helped to increase employment opportunities locally. Personnel systems and welfare and benefit programs have been established, and the company offers a high level of wages and benefits compared to the overall manufacturing industry in Incheon, so on average every job applicant with a one in six chance of landing the job.

With regulations on the management of chemical substances becoming more stringent in recent years in Korea, and with customer audits establishing environmental and safety standards beyond legal requirements, TOK Advanced Materials has established an Industrial Safety And Health Committee to develop safety and health activities, while incorporating feedback from employees, and maintain a long-term record of zero accidents. The company’s rating in fiscal 2014 customer audits was higher than the industry average.

According to the company, the company’s rating in fiscal 2014 customer audits was higher than the industry average. Also, in Korea, with its relatively small workplace compared to the workplace, there is a culture of encouraging friendships at the workplace and discussing job-related concerns and the like, so we hold company-wide athletic events and departmental training trips, and also provide assistance with expenses for dinners and other gatherings organized by employees.

As we conduct a variety of measures aimed at this kind of localization, we are also enhancing training programs, including Japanese language training, with a view to overseas training as a part of the goal of developing global personnel.

Voice

Focusing on development of global personnel while conducting various measures aimed at localization

Team Leader, HR & Administration Team Kim Byung Chul

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We conclude that the high-level integration of semiconductor devices is the result of the progress of optical lithography, including photoresists.

The miniaturization of optical lithography (improving the resolution of exposure equipment) has been realized to date by shortening the wavelength of light sources that are used, including g-line (436nm), i-line (365nm), the ArF excimer laser (193nm), and the KrF excimer laser (157nm). The exposure rule is determined by the cross-section of a sliced hair. The width of the wiring is the process rule.

Mechanism of the exposure equipment

The process rule of the 400x, the world’s first CPU which was announced by Intel Corporation in the United States in 1971, is 10μm (micrometers). The process rule of the Haswell CPU that Intel commenced shipping in 2013 is 22nm (nanometers).

Over these forty-something years, the process rule has shrunk by a factor of approximately 454 to 1, and the number of transistors formed has increased by approximately 600,000 times.

*One nanometer is one-millionth of a millimeter

The width of the wiring is the process rule.