

Customer-oriented R&D



U.S.

Europe

Close to Customers,
Close to the Future.

Japan

East
Asia

South
Asia

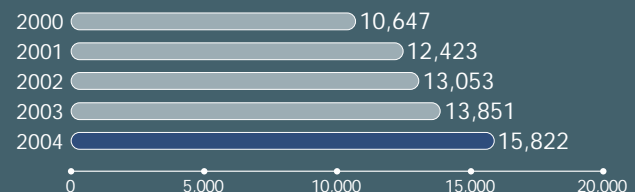
Management of Technology (MOT) in Practice

Each of our business divisions has its own R&D department which engages in R&D associated with its operations. At the same time, head office has established an organization consisting of Core Technology Center, Adhesive Tape Research Center, Production Engineering Development Center and Reliability Evaluation Center to take responsibility for R&D on company-wide themes. The entity responsible for bringing together and managing these in-company R&D resources is called the Integrated Technology Strategy Meeting. The Chief Technology Officer (CTO) who chairs this meeting is selected by the directors in charge. As of the end of May 2004, our President served in this position concurrently, strengthening the direct link between the meeting's decisions and managerial judgments. More specifically, this facilitates decisions on whether to launch new products on the market and allows the necessary management resources to be channeled

accordingly. Quintessential "technomarketing" of this sort is one of the strengths of Nitto Denko's MOT.

In line with the globalization of the R&D sector, we have extended the purview of the Integrated Technology Strategy Meeting globally to establish a framework that will facilitate quick decisions and actions concerning the development of technologies sought by the world's markets.

R&D Expenses (Millions of yen)



Basic R&D Policies

Close relationships with our customers are the basis of our R&D, which means we engage in needs-oriented R&D driven by listening carefully to our customers. Our Marketing, Technology and Planning divisions come together in a product development process that considers issues from all angles and engages in repeated trial manufacture. However, customers' needs are not always obvious. There are many cases where issues that have not yet developed into needs require breakthroughs to resolve problems or involve investigations into the vaguely perceived possibilities of new products. To respond to these potential needs, we sometimes use concepts derived from seed technologies in tackling the development of new products. Since this often leads to development work where neither the market nor the target customers are clearly defined, we use a process of repeated trial and error to create actual test pieces which we then propose to customers. Based on their responses, we work towards perfecting new products by following a process of progressive improvements. Whether we work on needs-oriented R&D or seeds-oriented R&D, the fact remains that our ultimate goal is to satisfy our customers and our markets.

Globalization of R&D

The Nitto Denko Group is committed to establishing a "One-NITTO" culture through a full-scale globalization strategy designed to enable the entire group to function as a single company that is capable of consistent business judgments anywhere and at any time. In doing so, we are well aware of the importance of internationalizing our R&D as well as our production activities. In July 2003, we established an R&D center in the Malaysian capital Kuala Lumpur. We are also working on the development of R&D bases in the North American, European, East and South Asia blocs with a view to making the most of the characteristics and resources of each region. By shrinking the distance between production and development in this way, we are ensuring the global propagation of our "Three-New Activities". At the same time, we are proactively networking and concluding tie-ups with companies, universities and research institutions around the world to create synergies and develop and produce products that offer powerful global competitiveness, thereby realizing globalization in the true sense of the word.

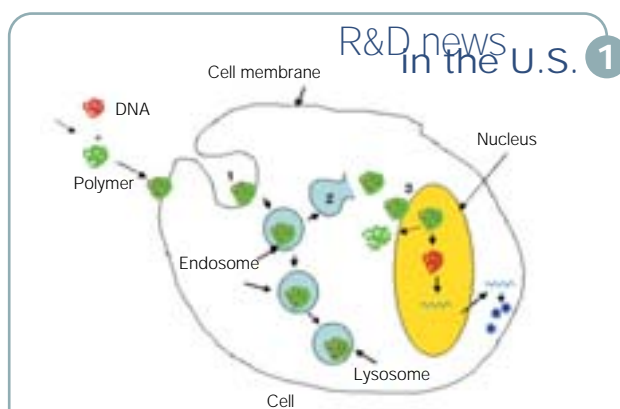
**Close to Customers,
Close to the Future.**

in the U.S.

In the United States, we are engaged in sales and marketing activities in all business domains centered on composite and sealing materials for automobiles. We are putting special effort into the biomembrane business, and in 2003, became the monopoly suppliers of reverse osmosis membranes to America's largest seawater desalination plant, which realized the lowest distillation costs in history. We also secured a strong foothold in the healthcare sector through our acquisition of a transdermal therapeutic patch manufacturer. In R&D, Nitto Denko Technical Corporation is working at the forefront of optical and bio- (genetic-) related materials with a view to creating new products and new businesses originating in the United States.



Nitto Denko Technical's new headquarter building
(Planning to be completed during fiscal 2005)



Developed the World's First Biodegradable Gene Carrier — an Essential Element of Gene Therapy

Gene carriers work by delivering genes into cells and are essential for gene therapy and clarifying genetic functions. Nitto Denko has drawn on its technological expertise in the area of advanced polymer materials to develop the world's first biodegradable gene carrier. In addition to offering greater efficiency than traditional methods in delivering genes into cells, this carrier is also safer because it does not use viruses for transporting the genes and, being biodegradable, exhibits extremely low toxicity. Nitto Denko will continue utilizing its biopolymer technologies to develop new technologies and bio-materials and put them to use in new product applications.

R&D news in the U.S. 2

Developed a Photosensitive Polyimide Material for Optical Waveguide in Cooperation with the University of Arizona

The advent of the age of broadband and the spread of optical communications have led to rising demand for low-cost, highly reliable optical waveguide materials that will transmit optical signals efficiently. In a joint program with a research team from the University of Arizona, we recently succeeded in developing a photosensitive polyimide material that can be used in waveguides. The new photosensitive polyimide material offers a number of superior characteristics, including high transparency at optical communications wavelengths, world-beating low propagation loss, and excellent solder heat resistance. We have high expectations that it will find wide applications in the next generation of communications devices and optical circuit materials.

in Europe

The Nitto Denko Group's European operations range widely from the west to the north and east, and cover production and sales activities aimed at various markets, centered on bonding and joining materials for automobiles and FPCs (flexible printed circuits) for cellular phones. While we pursue our own product development activities in the area of automobile- and adhesive tape-related products, we are also searching for partners in R&D. Looking ahead, we shall continue to put more effort into creating technologies and products that originate in Europe by streamlining our R&D bases there and focusing on sectors where Europe is traditionally strong, such as synthetic chemicals and pharmaceuticals.

in China & East Asia

In rapidly-growing China and other countries and regions of East Asia, the Nitto Denko Group provides support for various sectors of the manufacturing industry. In addition to adhesive tape, it supplies related parts for cellular phones, electronics and automobiles, supporting customer demands for the promotion of local procurement. For example, it supplies optical films for LCDs in Korea, and offers a line-up of key products such as membranes for drinking water, tapes and optical films for LCDs in China. We have started construction work on a new plant in Gumi City, Korea, which will strengthen our production capacity when it is completed in 2005. We have also established a base for the production of reverse osmosis membranes in Shanghai to cope with growth in China's membrane market, which is expanding at 20-30% per annum. In addition to engaging in product development close to our markets, we are actively promoting personnel exchanges in the R&D sector by among other things inviting top class technical workers from China to Japan.

in South Asia & Oceania

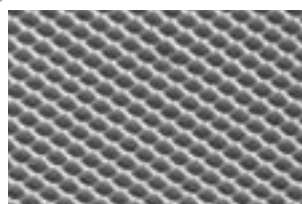
The Nitto Denko Group has established manufacturing and sales bases throughout South Asia and Oceania, in countries like Thailand, Indonesia, Malaysia, Singapore, the Philippines, Vietnam and Australia. Initially, our initial objective was to support Japanese companies that were advancing into the area, but we are now active in production and sales activities aimed at local Asian as well as Japanese and global companies and markets. Our main focus is on R&D that will provide a base for these endeavors. The inauguration of our R&D Center in Malaysia is evidence of our commitment.

R&D news in South Asia

R&D Center in Malaysia Operates Around-the-clock

In July 2003, we set up our R&D center in the Malaysian capital Kuala Lumpur. R&D work on semiconductor encapsulation materials that was originally handled by research centers in Japan was transferred to the new center, which operates around-the-clock. The localization of the R&D sector had lagged behind that of the Production sector, but the recent transfer will do much to further accelerate development work.

in Japan



R&D news in Japan

Contributes to Smaller Digital Cameras and Brighter LCD Devices through Development of High Refractive Index Optical Polymer

The 21st century is sometimes referred to as the "Century of Light." As large-size LCDs and plasma displays compete to improve luminous efficiency, the focus turns towards light control technology that promotes higher luminance and lower power consumption. This in turn means that the optical polymers used in important components such as light emitting and light receiving elements require higher refractive indices. At the end of 2003, Nitto Denko developed a thermosetting polymer that raises the refractive index by 15% compared with conventional products. In fact, the refractive index of 1.76 is the highest in the world. In addition to increasing the luminance of LCD devices, the new product has made it easier to increase the sensitivity or definition of the CCDs used in digital cameras, thus facilitating the design of more compact models.