

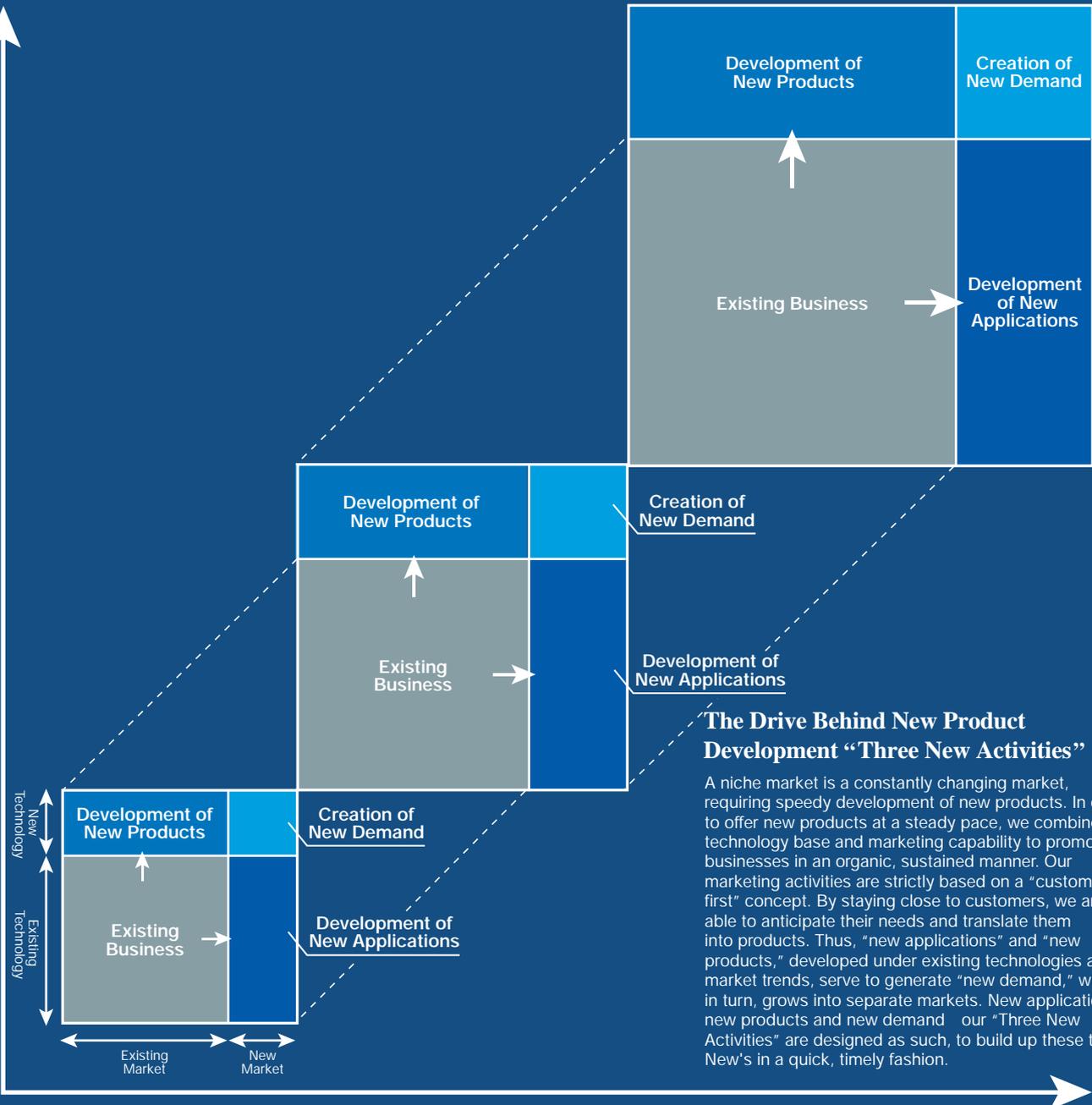
# Products and Technology

Necessity is the mother of invention

## A look inside the minds of our developers

The Nitto Denko is supplying the world with many “Global Niche Top” products developed with unique in-house technologies. Of course, while these products are superior in the terms of function, quality and cost, they are also designed to minimize their environmental impact, from the process of procurement through manufacture and delivery. Next, we would like to present the thoughts and opinions from some of our developers who labor to meet these demanding conditions and striving to realize more environmentally friendly products.

Technology



# Products and Technology 1

## Contributing to securing water resources for the world by using the reverse osmosis membrane technology, creating freshwater by filtering seawater



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### ● Main installation results

Location	Freshwater production capacity	
America (Tampa)	100,000m <sup>3</sup> /d	
Spain (Carboneras)	120,000m <sup>3</sup> /d	The largest facility in Europe (As of March 2004)
Cyprus (Larnaca)	54,000m <sup>3</sup> /d	
United Arab Emirates (Fujairah)	170,000m <sup>3</sup> /d	The largest facility in the world (As of March 2004)
Japan (Fukuoka)	50,000m <sup>3</sup> /d	The largest facility in Japan (As of March 2004) (Post-treatment deboration+ partial supply)
Japan (Okinawa)	40,000m <sup>3</sup> /d	(15,000m <sup>3</sup> /d+ partial supply)



All products undergo a desalination check prior to shipping

The seawater desalination plants that are exploiting “Reverse Osmosis Membranes” have gained attention globally because their ability to make pure water from seawater has the potential to rescue the world from the burgeoning demand for water. The reverse osmosis membrane technology is the fuel fanning the expectations that these “environmental plants” will turn the inexhaustible supply of seawater into the source of freshwater suitable for consumption, agriculture and industry.

The reverse osmosis membrane that we invented produces freshwater by using pressure to filter seawater through a semipermeable membrane which is difficult for salt content to pass through and is the key device in the seawater purification technology today. Our seawater desalting membrane was first commercialized in 1987, and we have subsequently struggled to improve its functionality. Since establishing the plant which is capable of processing 10,000 m<sup>3</sup> of water per day in 1997 in Chatan Town, Okinawa Prefecture, our seawater desalination plants have been adopted around the world. As of March 2004, we have achieved a level totaling some 1 million m<sup>3</sup> of freshwater generation per day.

When establishing seawater desalination plants, we have to do things in the environmentally-friendly way. For instance, if we discharge the untreated post-filtration water, concentrated seawater (with a salinity level of 6%), into the sea, it could cause the negative impacts on marine ecosystems. Therefore, in Okinawa, we have made sure to return the salinity of water to its typical of seawater (roughly 3.5%) before discharging it.

In the future, we aim to contribute to the environmental conservation through a new proposal that will boost the energy saving of plants by improving the function of reverse osmosis membranes as well as devising a method to avoid the use of condensing agents to remove microorganisms found in seawater at any phase in the process.



The Nitto Denko Group seawater desalting membranes are producing about 1 million m<sup>3</sup> of desalinated freshwater each day

(right) **Masato Shirai**  
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## Products and Technology 2

### “Putting the environment first”, our firm commitment to making a non-organic solvent adhesive

Toluene and other organic solvents are used in industrial processes, but in recent years, it has been pointed out that these are harmful both to humans and ecosystems, and there has been a call for curbs on their use. At Nitto Denko, we have embarked on an initiative to stop using organic solvents in manufacturing processes and began work on a non-organic solvent since the early 1970s. Today, we are still aggressively pursuing this organic-solvent-free project.

At Nitto Denko, we have put “the environment first” and made a firm commitment to pushing ahead with our project to develop non-organic solvent products. Currently, we offer the lineup of non-organic solvent style products, such as the surface protection film used to preserve the surface of metal plates and the tape for binding wiring in automobiles (wire housing) as well as the double-coated tape used for construction. In the construction sector in particular, our double-coated organic-solvent-free tape has been thrust into the industry spotlight due to efforts to tackle “sick house” syndrome and the attendant need to cut the use of volatile organic compounds (VOC). However, simply making the product of organic-solvent-free will not win the world’s acceptance. The product has to pack enough value to please customers. For this reason, we have designed our non-organic solvent adhesives in the way that suppresses the occurrence of static electricity and adheres solidly to myriad materials.

In addition, we are committed to taking a multifaceted approach in developing products that are environmentally benign through considerations such as manufacturing technologies that trim CO<sub>2</sub> emissions and producing goods that are easy to recycle or reuse.



Low-level VOC emitting double-coated tapes



Non-halogen non-organic solvent wire harness tape



Surface protection tape incorporating water dispersion adhesive

# Products and Technology 3

## Development of medical products, easy on people and the environment

A drug patch that allows medicine to be absorbed via the skin, known as a transdermal drug delivery product, offers merits not found in conventional oral medicines or injectable solutions and as a result is being focused on as a promising new method of administering medication.

Here, we would like to introduce some of our efforts in the sector of medical products development.

At Nitto Denko, based on adhesive tape technologies, we moved ahead of the rest of the world in the late 1970s by pushing the development efforts of a systemic tape and, in 1984, succeeded in producing the so-called "stick-on heart medication" – The first transdermal patch for ischemic heart disease in Japan.

Subsequently, we have released a transdermal patch for local anesthesia and a transdermal therapeutic patch for asthma and today own the largest share of the systemic patch market.

Our products have applied technologies developed in-house – such as the controlled release system of medicament and the keratin protection system using oil-based gel adhesives – to realize the sustained effect, low skin irritation and patches that can be reapplied. Stick-on patches avoid the pain of injections, minimize the risks of accidentally ingesting the wrong medicine or overdosing and are highly convenient pharmaceutical products for everyone, but notably for children and the elderly. For these reasons, the public expects much of these patches, and the market is expanding.

Also, at Nitto Denko, we have developed pheromone tapes and agrochemicals using entomogeneous fungi into products which apply our controlled release technique of medicament. These have been the focus of attention as promising products with the potential of preventing environmental degradation from pesticides. (Please see page 27)

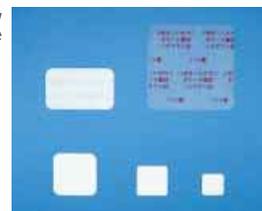
Once the health of the global environment or people is compromised, it takes the immense amount of effort to return it to its original state. For this reason, in the future, we want to strengthen our ability of the product development that is based on the preventive medical care approach and the environmental conservation.



Technology to evaluate how gentle something is on the skin is also important



A transdermal drug delivery product that is easy on people



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