ECO REPORT 2002

NGK SPARK PLUGS | NTK TECHNICAL CERAMICS

NGK SPARK PLUG CO., LTD.

CONTENTS

Scope of this Report

This Report shows you wide variety of efforts by NGK SPARK PLUG CO., LTD to get rid of environmental burden during the fiscal year 2001 (April 2001 - March 2002).
The articles also introduce our affiliated companies obtaining the ISO 14001 authorization.

Message from the President

We, the citizens of this earth, have sometimes wasted its pure water, clean air and rich resources, taking them for granted. But resources are now rapidly running out and the burden on the environment is exceeding its self-purification capabilities. It is as if the earth was sounding an alarm by showing symptoms of crises such as depletion of the ozone layer, global warming, and extinction of species.

In order to protect and restore the global environment, both manufacturers and consumers must make a serious effort from their respective positions. In particular, corporate citizens must assume the responsibility of playing a key role.

Since most of our company's products are parts, it is more difficult to recognize their effect on the environment compared with final products. But we do know that our parts are contributing significantly to the evolution of environmentally friendly cars and electronic equipment, making us proud to be engaged in the preservation and improvement of the global environment. In 1974, we established a division responsible for environmental affairs. Since then we have been complying with not only standards required by law but also our self-control standards. We have obtained ISO 14001 certification, an international standard for environmental management systems, first at our head office/factory in 1999, and then at four factories collectively in 2000. Our affiliated companies are currently preparing to acquire the same certification.

Our efforts in 2001 based on the Environmental Action Schedule, including energy saving and reduction of wastes and substances posing a burden on the environment, produced positive results, although some exacting conditions do remain. Through our products we are also contributing to resource conservation by producing smaller and lighter plugs. The hard work we are carrying out in our factories to reduce and even eliminate harmful substances is showing steady progress. The functions of some of our products themselves directly protect the environment, such as our sensors which are aimed at cleaner exhaust gas and improved fuel consumption. We have also taken steps to save resources and provide lower electricity consumption in producing semiconductor components such as IC packages and filters used for PCs and mobile phones, which are becoming increasingly small-sized and highly-integrated year by year.

We hope this report has given you an idea of our hard work and achievements in 2001. Environmental preservation activities depend on each and every employee being motivated. We intend to continue contributing to society by conducting education and enlightenment through environmental conferences, our in-house magazine and other activities. We welcome your comments on this report.

Shigenobu Kanagawa

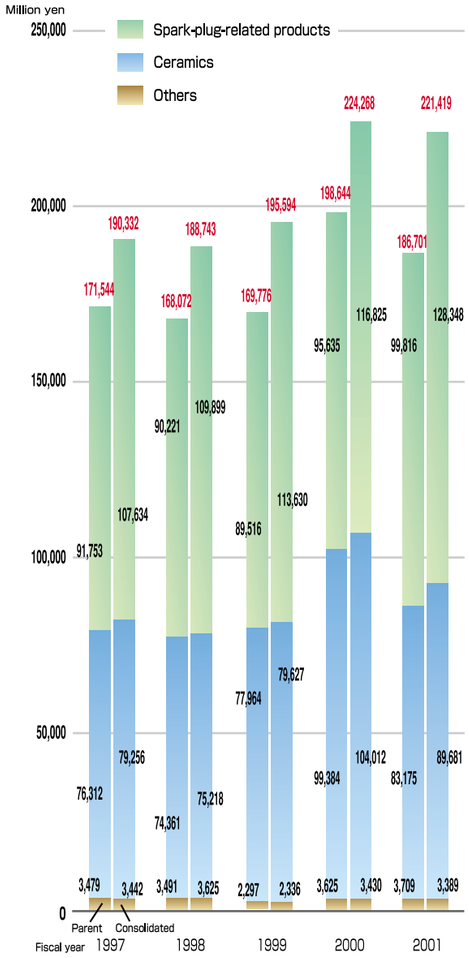
Shigenobu Kanagawa, President

Corporate profile as of June 30, 2002

Company Name: NGK Spark Plug Co., Ltd.
Head Office: 14-18 Takatsuji-cho, Mizuho-ku, Nagoya, Aichi Pref.
Founded: October 26, 1936
Capital: 47,869.27 million yen
Business: ①Manufacturing and selling spark plugs and related products for internal- combustion engines
②Manufacturing and selling new ceramics and applicable products

Number of Employees:	5,552
Head Office/Factory	1,056
Komaki Factory	2,905
Kagoshima-Miyanojo Factory	555
Ise Factory	445
Others	591

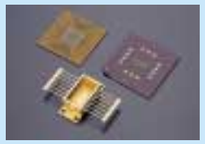
Progress in sales



Products supporting the world

Spark Plugs
These are essential parts for automobile engines. NGK Spark Plugs have developed together with the history of the company. We are now working hard on the design of environmentally friendly products that ensure stable efficiency, cleaner exhaust gas and energy conservation.

Sensors
We are developing and applying suitable sensors that help to conserve nature by making cleaner exhaust gas, saving resources and combatting global warming. Of course we also provide sensors to protect the comfort of our life.



Semiconductor Components
Our ceramic and organic packages meet the demands of semiconductor components that can support the evolution of the IT industry, while protecting the environment with their higher density, higher speed and smaller sizes.

Electric Components
Mobile phones are already necessities in today's world. Working inside them are our dielectric filters and antennas, essential for sending and receiving radio waves. Our enduring challenge is to achieve even clearer reception and lighter weight.

Cutting Tools
Our cutting tools are developed with our own special technology. The Ceramic Series are used for high-speed cutting of cast iron and heat resistant alloys, and the Cermet Series are used for semi-finishing and finishing of steel. All our cutting tools are highly evaluated by users.

Fine Ceramics
We provide a diversity of products that make use of the characteristics of new ceramics. The practical applications range from ultra-hard bearings to various artificial bones utilizing apatite hydroxide and zirconia, materials that are compatible with the human body.

Consideration for the environment

Technology supporting environmentally friendly products and the future of the earth

Seeking greater performance, comfort and cleanliness, our technology is always evolving in consideration of environmentally friendly production and the future of the earth.
Our wish is to deliver products that will satisfy our customers, while handing down this beautiful earth to following generations.
Looking one step ahead and never compromising, we are constantly facing the challenges of innovation.
Our aim has been, and will continue to be, the creation of new value.

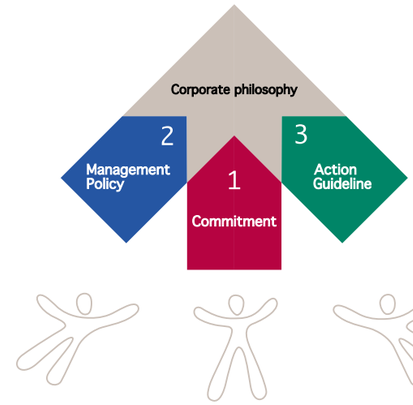
Corporate philosophy

Always be a propositional-type company to transmit new values to the world.

By bridging people with technology and maintaining global-scale thoughts and views, we will always seek what we should be.

Slogan

With established trust and confidence inside and outside the company, we aim to contribute to the people of the world by creating and offering new values for the future.



Management Policy
We offer a working environment in which each one of us is encouraged to make full use of his or her personality and capability. With all our power we are dedicated to pursue management based on trust and confidence.

Commitment
With full use of the most suitable technology and our accumulated experience, we continue striving to offer new values to people of the world.

Action Guideline
Ever onward!
Always mindful of what is the best course, we swiftly put it into action.

made in November 1996

The history of our environmental protection activities

1974. 02	Established a Safety and Environment Section (present Environment and Safety Dept.)
	Established a Safety and Sanitation Committee and an Environment Committee
1974. 03	Komaki Factory entered into a pollution prevention agreement with Komaki City
1980. 04	Kagoshima-Miyanojo Factory entered into a pollution prevention agreement with Miyanojo Town
	Established an Energy Conservation Expert Committee
1980. 11	Introduced a closed-system drainage facility for plating processes in Kagoshima- Miyanojo Factory
1993. 11	Ise Factory entered into a pollution prevention agreement with Ise City
1994. 04	Introduced a fully-closed-system drainage facility for production-use water in Ise Factory
1999. 04	Issued an "Environmental Declaration"
1999. 08	Head Office/Factory obtained ISO 14001 certification
1999. 10	Established a Wastes Expert Conference, Green Procurement Expert Conference and Chemical Materials Expert Conference
2000. 09	Issued the first edition of "ECO REPORT"
2000. 12	The entire company obtained ISO 14001 integrated certification
2001. 06	Held the first Environment Congress

Environmental principle

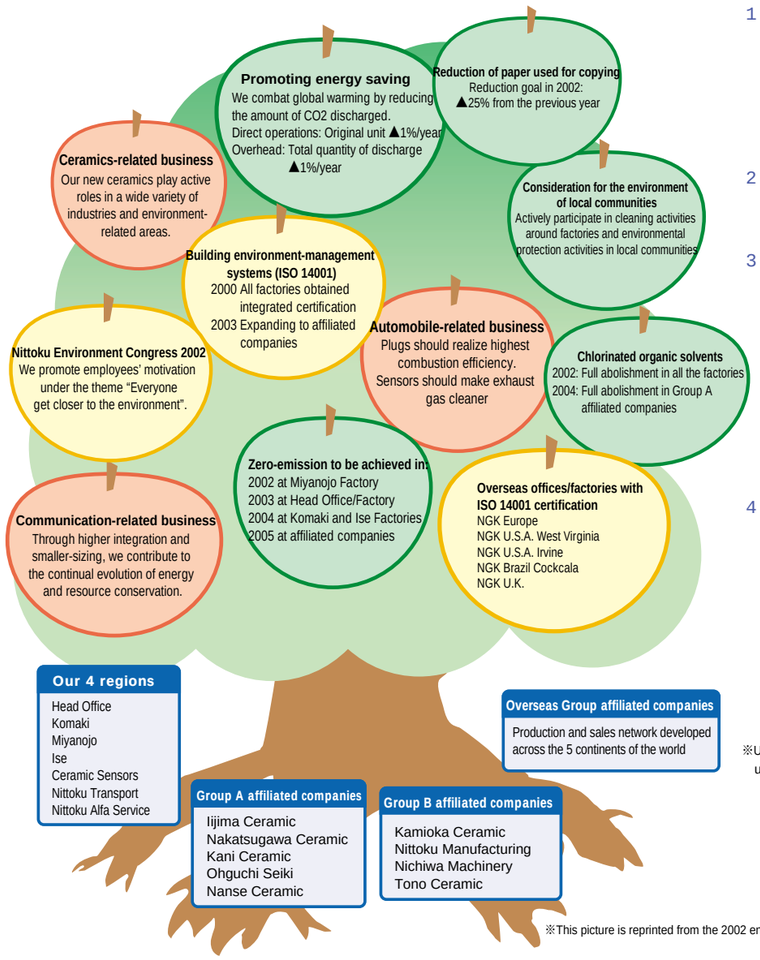
We believe corporate activities and environment protection should be connected and both working healthily.

As one of our key issues to live up to our principle of "being a propositional-type company always giving new value to the world", we are place great importance on the preservation of the global environment. Under the "NGK Spark Plug Co., Ltd. Environmental Declaration" made in 1999, we will rotate the PDCA cycle in our environment management system to promote continuous improvement.

Declaration for the environment (made in April 1999)

We aim to create new values through all our corporate activities such as development, manufacture and sales of NGK spark plugs and NTK new ceramics products as a company protecting the global environment and living in symbiosis with society.
In order to achieve this goal, we have compiled an environment action schedule based on our environment policy and will promote management that can be continuously developed and constant corporate activities in consideration of the preservation of the environment.

Environment preservation policy (revised in April 2000)



※This picture is reprinted from the 2002 environment poster for in-house enlightenment.

1 To accurately grasp the effect of corporate activity on the environment, set an environmental objectives and targets. These should be reviewed regularly for a continual improvement of the Environmental Management System (EMS) and performance for environmental preservation.
2 We will abide by laws, regulations, agreements and other demands we have agreed to concerning environmental preservation.
3 Priorities in environmental measures
   a. We will endeavor to prevent pollution in the air, soil and water.
   b. We will promote energy saving.
   c. In order to use resources efficiently, we will promote reusing and making good use of wastes.※
   d. We will endeavor to design and develop products with concern for the environment.
   e. We will have high concern for the environment of the local community.
4 In order to achieve this Environment Policy, we will make sure our employees know of this policy, and conduct environmental education as well as publicity to improve the level of recognition among our employees for environmental preservation. We will also ask related companies for their understanding and cooperation, as well as disclosing information outside the company.

※Updated from "recycling and reusing" into "making good use" in the 2000 verision.

We make an Environment Action Schedule every year in order to put our plans under the environment policy into actual practice. The table below shows our goals and achievements in 2001, and outlines the Action Schedule for and after 2002. Please see the related pages for details of each plan.

Action schedule for environment (made in April 2001)

Item	Action Schedule for 2001	Achievements in 2001	Evaluation	Environment Action Schedule for and after 2002	Related pages
Environmental Management System	To start to prepare for certification in 2002 at five domestic affiliated companies	After the start of preparations in September and October 2001, the system will begin operation in April 2002	😊	To build and operate EMS throughout the company based on ISO 14001. To obtain certification in major domestic affiliated companies by 2003.	6、7
Prevention of pollution in the air, soil and water	To reduce exhaust emission of all target gases by 20% (original unit) by 2005	Steps for 2001 have been taken for further review on their effects	😊	To perform thorough control and reduction of dangerous and harmful substances. To perform thorough control and reduction of discharge and movement of substances posing a burden on the environment (particularly those applicable to PRTR Law).	8、9
	To prepare for full abolishment of chlorinated organic solvents by the end of 2002	Head Office/Factory: Facilities introduced in March 2002 Komaki: Full abolishment achieved in May 2001 Miyanojo: Full abolishment achieved in February 2002 Ise: Full abolishment achieved in September 2001	😊	To fully abolish the use of chlorinated organic solvents by the end of 2002. To reduce the use of alternative solvents.	
Promoting energy saving	To reduce energy consumption by 1% (original unit, compared to 2000)	Target reached: Miyanojo Target not reached: Head Office, Komaki and Ise	😞 (※1)	To reduce total CO_2 discharge per original unit in direct production division by 1%/year. To reduce total CO_2 discharge in other divisions by 1%/year. (※2)	10、11
Reduction of waste and promoting recycling	To achieve these rates in buried/combusted garbage (compared to 1999) Head Office/Factory: 20% Komaki: 55% Miyanojo: 40% Ise: 70%	Head Office/Factory: 9.1% Komaki: 71.2% Miyanojo: 54.6% Ise: 70.0%	😐 (※3)	To promote reduction and good use of wastes. To achieve zero emission in all domestic factories by 2004 . (※4)	12、13
Products development with consideration for the environment	To review the raw materials for products and packaging to reduce the burden on the environment	In progress according to the Schedule (※5)	😊	To advance product development by evaluating the environmental burden and considering LCAs that contribute to environmental preservation.	14～17
Consideration for the environment of the local community	To implement cleaning activities around factories at least twice a year	Performed at least twice in the year, participated in activities conducted by government agencies	😊	To promote coexistence with society through environmental conservation. To participate in local community environmental conservation activities.	19

※1： Although Miyanojo reached its target, some development-related divisions at the other 3 factories could not save enough energy to balance a decrease in sales, resulting in the failure of the company as a whole to reach its target.
※2： The basis for the energy-saving action schedule for 2002 will be changed to CO_2-based targets (from petroleum-based targets in 2001). In order to make further progress and prepare for a change of standards to reduce total CO_2 discharge, indirectly related divisions such as office areas will have targets to reduce total CO_2 discharge in 2002.
※3： Although the Head Factory could not reach its target, the other 3 factories and the company as a whole succeeded.
※4： The time line to achieve zero emission in the four domestic factories will be targeted in 2004, which is one year earlier. The five domestic affiliated companies to obtain certification this year will have action targets of achieving zero emission by 2005.
※5： Some item numbers of spark plugs have completed small-sized and lightened designs and are currently in commercial production. We have determined substances to replace those posing a burden on the environment (hexachromium and lead).

😊 Achieved 😐 Partly achieved 😞 Not achieved

Based on the Environment Action Schedule shown above, each organization sets and exercises its own specific objectives and targets.

Environment management system

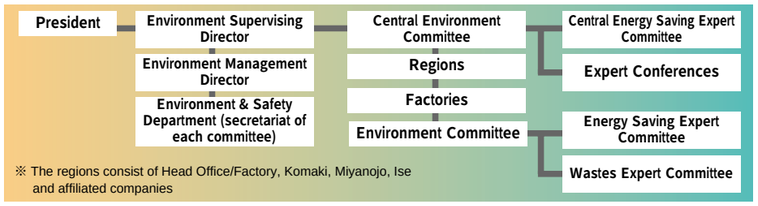
The entire our group is addressing environmental issues by setting unified goals and taking them as important management indicators.

The environment is a global-scale issue, and our behavior as corporate citizens and human beings is in question today. We regards environmental issues as challenges to be addressed by the entire group, which is why we are expanding our environmental management system to our domestic affiliated companies. Meanwhile, our affiliated companies overseas are pushing to obtain ISO 14001 certification. We will continue to promote its activities toward the fulfillment of ever higher goals.

Organization

For the purpose of promoting cross-organizational activities to preserve the global environment, we established a division in 1974 responsible for environment-related issues. At present we have an Environment Committee, which is a supervising organization responsible for preserving the global environment, as well as sub organizations called Expert Committees and Expert Conferences at the company's center and various sites, which are responsible for respective business fields. Within this structure, every department is engaged in environmental conservation activities to accomplish the environmental plans and targets in accordance with our Environment Policy.

■Environment Activities Promoting Organization



ISO 14001 certification

We are pressing to fulfil the requirements for ISO 14001 certification, an international standard for environmental management systems (EMS), in order to strengthen our management of environmental preservation activities and enhance the transparency of these activities by disclosing them to the public.
Our Head Office/Factory was the first to obtain certification in August 1999. The other three factories, Komaki, Kagoshima-Miyanojo and Ise, followed in December 2000, along with general certification for the whole company based on our common environment policy, manuals and standards.
Among our affiliated companies, three in Japan and five overseas have already obtained certification, and the other nine companies in Japan are aiming to obtain certification by 2003 to increase the number of certifiied sites within our group.

■ISO 14001 certification status

	Office/Factory	Date of certification	Certifying organization
Head Office/Factory Region	Head Office/Factory	August 1999	TÜVRHEINLAND JAPAN
Komaki Region	Komaki Factory	December 2000	
Miyanojo Region	Kagoshima-Miyanojo Factory	December 2000	
Ise Region	Ise Factory	December 2000	
Affiliated companies in Japan	Nittoku Alfa Service Co., Ltd.	August 1999	
	Ceramic Sensors Co., Ltd.	December 2000	
	Nittoku Transport Co., Ltd.	December 2000	
	Iijima Ceramic Co., Ltd. Ohguchi Seiki Co., Ltd.	Expected to obtain certification in 2002	
	Nakatsugawa Ceramic Co., Ltd.		
	Nansei Ceramic Co., Ltd. Kani Ceramic Co., Ltd.		
	Kamioka Ceramic Co., Ltd. Nichiwa Machinery Co., Ltd.	Expected to obtain certification in 2003	
	Nittoku Manufacturing Co., Ltd. Tono Ceramic Co., Ltd.		
Affiliated companies overseas (certified companies only)	NGK USA Co., Ltd. WV Factory※	July 2000	TÜV RHEINLAND OF NORTH AMERICA
	NGK USA Co., Ltd. IRV Factory	August 2001	
	NGK Spark Plug Industries Europe S.A.	December 2001	ABS QUALITY EVALUTION INC.
	Special Pottery Europe S.A.	May 2000	AFAQ
	NGK Spark Plugs (U.K.) Ltd.	January 2002	BSI（British Standard Institute）

※ Sensor USA. Corp. WV Factory changed its name to NGK USA Co., Ltd. WV Factory as a result of a reorganization of affiliated companies in the USA

System audit

Under the ISO environmental management system, we conduct an in-house audit once a year and undergo a third-party audit every year to enhance our system. In-house audits are conducted according to our In-house Audit Checklists by 200 registered auditors elected within the company, who are divided into two-person teams. These auditors receive skill-maintenance training every year to maintain and enhance their auditing ability.
The numbers of problems found in the entire four regions in 2001 were two in third-party audits and 90 in in-house audits. The main problems were that some divisions that changed their production processes did not adequately examine environmental aspects or evaluate the impact on the environment. We have already taken corrective measures including company-wide expansion.

■Numbers of ISO 14001 auditors

ISO 14001 Deputy	5
ISO 14001 In-house	200


Third-party audit


In-house audit


Skill-maintenance training for in-house auditors

Our system for compliance with environment-related regulations

Most of the issues to be addressed under the Environment Action Schedule are subject to environment-related regulations. We have people legally qualified in these matters in each region to comply with such regulations. Please see pages 22-23 for this year's state of compliance.

Numbers in parentheses ( ) are legal requirements

			Head Office	Komaki	Kagoshima-Miyanojo	Ise	Total
No. of qualified people	Pollution prevention manager	Air	9 (2)	18 (2)	2 (2)	1 (1)	30 (7)
		Water	11 (0)	26 (4)	10 (2)	2 (0)	49 (6)
		Noise and vibration	23 (4)	21 (4)	11 (2)	1 (1)	56 (11)
	Working environment examiner		5 (0)	7 (0)	0 (0)	3 (0)	15 (0)
	Energy manager	Heat	3 (0)	6 (1)	3 (1)	0 (0)	12 (2)
		Electricity	5 (1)	1 (1)	4 (1)	2 (1)	12 (4)
	Specially controlled industrial waste manager		7 (1)	7 (1)	5 (1)	3 (1)	22 (4)
No. of breaches, penalties and lawsuits			0	0	0	0	0
No. of requests or claims from interested parties			0	1	0	0	1

We will endeavor to reduce and properly control exhaust and discharge of substances that pose a burden on the environment, and to promote their replacement by safer substances.

We are making every effort to ensure proper control and reduction of harmful substances and their replacement by safer substances, by setting self-restriction standards for handling substances that are dangerous or harmful to the natural environment, including the air, soil and water, as well as the working environment, including safety and sanitation. For example, we endeavor to replace, reduce or control the discharge of high-risk substances such as hexachromium, lead compounds and chlorinated organic solvents.

Building a control system for dangerous and harmful substances

We are furthering the control of chemical substances, replacement with safer substances and reduction of exhaust and discharge, by building a computer system to calculate standards for handling dangerous and harmful substances and quantities of substances posing a burden on the environment (PRTR substances). In addition, we have an in-house network that lets us browse up-to-date information on MSDS and makes it easy to check regulations and in-house rules associated with environment and safety. Defining substances that should be prohibited, reduced and controlled, our Chemical Substances Expert Committee preaches replacement with safer substances and proper handling of substances. The following table shows PRTR substances used in 2001, which decreased to 22 substances (from 23 in the previous year). Among them chlorinated organic solvents and hexachromium show sharp decrease.

Results of the PRTR survey: All factories (April 2001 - March 2002) ※1

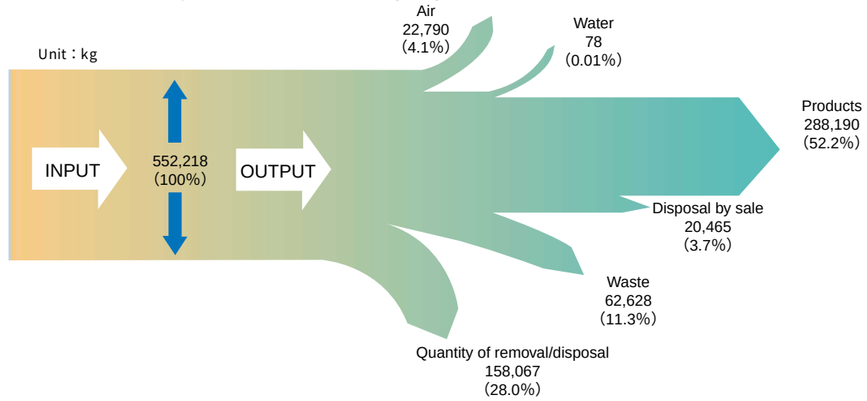
Unit: kg

Regulatory No.	Chemical Substances	Handling Offices/Factories (※2)	Quantity of exhaust/discharge			Quantity of exhaust/discharge (consumed)	Quantity removed/disposed		Quantity moved as waste			Quantity of movement to public drainage	Quantity handled: this year	Quantity handled: previous year	Evaluation
			Air	Water	Soil	Products	Supply	Incineration	Decomposition	Intermediate disposal	Reclamation	Recycling			
1	Zinc aqueous compound	H・K・M	0	8	0	29,472	0	0	0	3,596	0	0	0.1	33,077	29,844	↓
40	Ethyl benzene	H・K	326	0	0	0	0	0	2,790	3	0	0	0	3,119	2,520	↑
63	Xylene	H・K	1,784	0	0	0	0	0	22,958	7,344	0	17	0	32,103	39,657	↓
68	Chromium and trivalent chromium compounds	H・K・M	0	0	0	1,126	804	0	62	581	12	1,562	0	4,147	2,864	↑
69	Hexachromium compounds	H・M	0	0	0	33	0	0	2,080	0	0	0	0	2,113	57,160	↓
100	Cobalt and its compounds	H	0	0	0	1,943	256	0	0	45	110	16	0	2,370	3,304	↓
108	Inorganic cyanogen compounds	H・K・M	0	0	0	2,861	1,323	0	5,037	31	0	105	0	9,357	7,705	↑
144	Dichloropentafluoropropane	H	3,600	0	0	0	0	0	0	0	0	0	0	3,600	1,500	↑
200	Tetrachloroethlene	H	729	0	0	0	0	0	0	0	0	3,529	0	4,258	4,752	→
207	Bronze aqueous sodium chloride (except complex chloride)	K	0	28	0	22,940	0	0	0	1,403	4	0	0	24,375	26,288	→
211	Trichloroethylene	H・K・M・I	10,867	0	0	0	2,346	0	0	0	0	1,507	0	14,720	61,048	↓
227	Toluene	H・K・I	4,434	0	0	0	0	0	116,783	260	0	186	0	121,664	120,276	→
230	Lead and its compounds	H・K・I	0	0	0	63,404	5,333	0	0	828	830	20,527	0	90,922	131,010	↓
231	Nickel	H・M	0	0	0	151,724	10,309	0	0	0	0	0	0	162,033	180,104	↓
232	Nickel compounds	K	0	31	0	6,413	10	0	0	2,402	117	0	0	8,974	12,445	↓
299	Benzene	H・K	4	0	0	0	0	0	7,162	0	0	0	0	7,166	6,612	→
304	Boron and its compounds	K	883	12	0	7,015	0	0	0	406	116	17	0	8,448	11,254	↓
309	Poly(oxyethylene) nonylphenol ether	K	0	0	0	0	0	0	77	7,515	0	0	0	7,592	—	↑
310	Formaldehyde	K	6	0	0	1	21	0	34	3,358	0	0	0	3,420	3,071	↑
311	Manganese and its compounds	K	0	0	0	21	0	0	0	5,551	2	4	0	5,578	3,277	↑
314	Methacrylic acid	K	157	0	0	0	0	0	1,083	315	2	0	0	1,557	—	↑
346	Molybdenum and its compounds	K	0	0	0	1,237	63	0	0	71	256	0	0	1,627	2,615	↓
	Total		22,790	78	0	288,190	20,465	0	158,067	33,708	1,450	27,470	0.1	552,218	707,306	

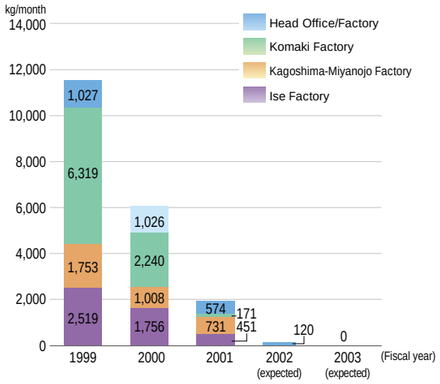
※1：parts shows substances of which more than 5 tons were handled in 2001 and were reported to government agencies as required under PRTR Law.
※2：H stands for Head Factory, K for Komaki Factory, M for Kagoshima-Miyanojo Factory and I for Ise Factory.

↓ Reduced from previous year → Same level as previous year ↑ Increased from previous year

INPUT-OUTPUT diagram of PRTR substances (2001)



Full abolishment of chlorinated organic solvents



Subject to the prohibition of production of trichloroethane under Section 1.1.1 of the Montreal Protocol, we completed full abolishment by September 1995 and are carrying out a policy to fully abolish other chlorinated organic solvents including trichloroethylene by the end of 2002. To that end, each division is drawing up full-abolishment programs, reporting their progress including technical achievements to the Environment Committee, and extending their achievements to related divisions, affiliated companies and subcontractors.
In 2001, we achieved full abolishment at Komaki, Kagoshima-Miyanojo and Ise factories and 83% reduction in the company as a whole compared to 1999. The Head Factory is also expected to achieve full abolishment within the first half of 2002.

Status of handling PCB

A sign at a warehouse for PCB storage

Inside of a warehouse for PCB storage

In July 2001, the Special Measures Law Concerning Advancement Of Proper Disposal of Polychlorinated Biphenyl (Special Measures Law against PCB Waste) took effect. This law requires the status of PCB storage and disposal to be reported to local governments.
At NGK, high-voltage equipment using PCBs and ballast for fluorescent lights containing PCBs have been in safe keeping since 1975, under strict control to prevent leakage. The relevant offices and factories have now reported their storage status in accordance with the law.

We will endeavor to make efficient use of energy companywide in order to contribute to preservation of the global environment.

To reduce the quantity of CO_2 emissions, which are a major factor in global warming, and to utilize limited resources effectively, it is essential that we make more efficient use of energy to reduce the amount used. More specifically, we are conducting a number of energy-saving activities ranging from enforced light-out habits in everyday operations to improved production facility and indoor air conditioning. Starting from 2002, our energy-saving goals are defined by CO_2-based figures, in order to enhance awareness of energy conservation activities.

Energy-saving promotion activities

Regional Energy Saving Expert Committees

Central and Regional Energy Saving Expert Committees

These committees act under the Environment Committee to discuss and resolve energy-saving issues and support the activities of divisions.

- Managing the progress of fiscal energy-saving plans
- Emulation and development of successful in-house cases of energy-saving
- Regular energy saving patrol in all divisions
- Providing information and awareness activities concerning energy saving

Emulation and development of successful energy-saving cases

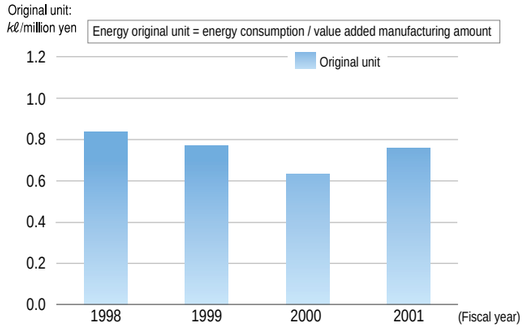
Poster to raise awareness of energy saving

Reduction of quantity of energy used

Main energy-saving operations

- Inverter operation of fans in air conditioning equipment in factories (Head Factory) 60,000 kwh/year
- Enabling primary pumps of absorption-type freezers to adjust their flow rate (Komaki Factory) 272,000 kwh/year
- Efficient operation of spray driers by combination of multiple units (Komaki Factory) 163,000 kwh/year
- Intermittent operation of mixers in tanks for raw materials (Komaki Factory) 127,000 kwh/year
- Reduction of wattage of mercury-arc lamps by keeping proper illumination 13,000 kwh/year
- Abolishment of high-pressure washing by improving products (Ise Factory) 288,000 kwh/year

Quantity of energy used (original unit)

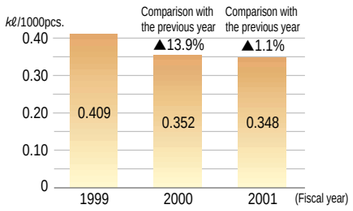


- Last year the overall energy original unit in four our factories worsened contrary to the decreasing trend until the previous year. This is because energy reduction rates in the facilities including air conditioning equipment did not keep pace with the decrease in the value added manufacturing amount.
- We have used the value added manufacturing amount calculated by subtracting the material costs and subcontract processing costs from the gross sales amount for the calculation of the energy original unit since 1998.

Examples (Ceramic Sensor Corp. in Komaki region)

In the past, our Project Team for Cost Reduction and Streamlining consisted of Production, Quality Control, Sensor Technology and Production Engineering Divisions. In 2000, the Environment Preserving Secretariat participated in the team to address energy saving to preserve the environment. As a result, we reduced energy consumption in original units by 13.9% in 2000 (for which we received an award) and 1.1% in 2001. We received the "Japan Central Region Minister of Economy and Industry Award" in the Energy Saving and Electricity section in February 2001 for our consistent new ideas and performance.

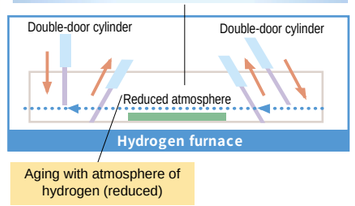
Quantity of energy consumption in original units



Hydrogen aging process

Treating plated materials by aging with atmosphere of hydrogen (reduced)

	Before improvement	After improvement
Treated quantity per sheath	200 pcs./sheath	400 pcs./sheath
Piece time	20 min/sheath 6 sec.	20 min/sheath 3 sec.

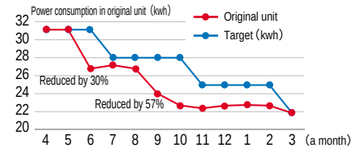


Effects

	P.T	kwh/Hr	pc/Hr	kwh/1000
Before improvement	6sec.	18.68	600	31.13
After improvement	3sec.	18.68	1200	15.56
Achievements	60% of all item numbers improved to 400 pcs./sheath.			21.79

Target: reduction by 30%, 9.3 kwh

Energy-saving effect achieved in 2000 by improved treatment ability in hydrogen aging



Electricity saving by spraying the chillers with water

1 Circle member : We would like to save electricity by spraying the cooling equipment with water.

2 Inspecting company : If you do that, silica will cake on the fins of the cooling coils. Silica cannot be removed so the coil fins themselves will become defective. We have never done this in the past.

3 Supervisor : I recommend the members try it first for themselves.

4 Result : The load factor on the compressor reduced. Silica did not cake.

Electricity reduction effect

2000 2 units	68,000kwh／year
2001 12 units	308,000kwh／year

Spray nozzle

Reduction of CO_2

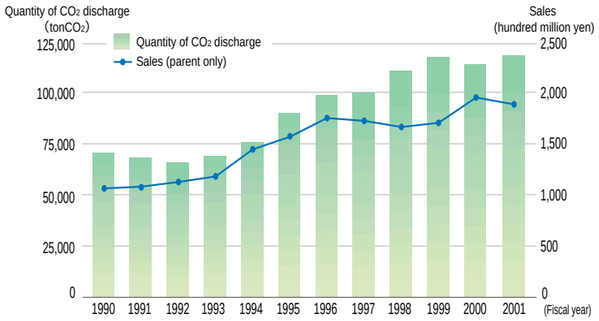
Energy-saving target for 2002

Production divisions
To reduce CO_2 discharge from energy consumption by 1% in original unit (from the previous year)

Other divisions
To reduce CO_2 discharge from energy consumption by 1% in total quantity (from the previous year)

All the employees will work together on energy saving to reach these targets.

Quantity of CO_2 discharge and sales



Reduction and good use of waste

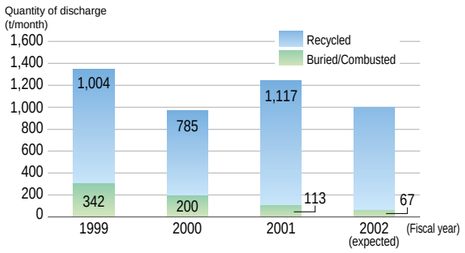
“If thrown away, it becomes garbage. If divided, it will become resources.” We continue challenging this view.

We see the issue of garbage as being at the very core of environment activities, and have taken it seriously since these activities started. The basic way to know about garbage is to separate it: we are promoting programs to reduce and make good use of garbage based on this idea. In our efforts to achieve zero emission, we are trying make our activities more fun by using cartoons to explain the overall procedure from garbage separation to collection.

Achievements in 2001

As we increased production of semiconductor-related products in 2001, the total quantity of waste also increased by 27% from the previous year. However, our efforts to promote recycling achieved a valid usage rate of 91%, 3% higher than our target. Meanwhile, the quantity of buried/combusted garbage is decreasing year by year: it was more than 4,000 tons in 1999, but had fallen to 1,350 tons in 2001, one third of the original figure.

Quantity of waste



Zero-emission goals for and after 2002

Since manufactured products and waste vary from factory to factory, we set time lines to achieve zero-emission at each one. As the valid usage rates significantly improved at the other three factories excluding the head factory, we reset the targeted year for zero-emission achievement from 2005 to 2004 at Komaki and Ise Factories.

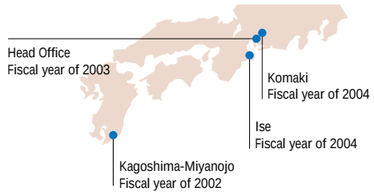
In the future, among the 3 R's (reducing, reusing and recycling) of waste we will focus on “reducing” as the most desirable, by promoting programs closer to our operations such as improvement of design and processing techniques, quality, and yield.

Our definition of zero-emission

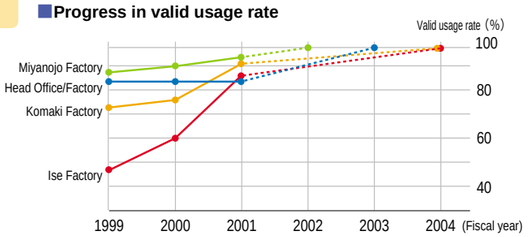
In our company, zero-emission is defined as the reduction of combusted/buried waste, including both industrial and general wastes, to a valid usage rate of at least 98%. The reason why we regard 98% as the “zero” line is that excessive energy consumption would be required to pursue absolute zero in general garbage such as cigarette butts, tea leaves and so on.

The valid usage rate applies to a consolidation of “reusing” and “recycling” areas.

Target year for zero-emission achievement

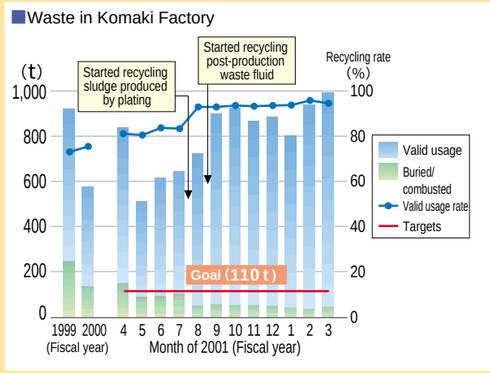


Progress in valid usage rate



Goals and achievements in main challenges in 2001

Example 1: Recycling post-production waste fluid and sludge



After Komaki Factory increased its production of semiconductor-related products as one of its main areas, post-production waste fluid and sludge also increased. We have now, however, succeeded in recycling both by collecting the metal constituent of waste and processing sludge into materials for road foundation. Accordingly, in spite of the increase in total quantity of discharge, we have reduced the quantity of buried/combusted waste significantly more than targeted.

Example 2: Introducton of a bio-type waste disposer

By factory/type	Date of introduction	Weight of perishable garbage	Weight after in-house treatment	Use of treated garbage
Kagoshima-Miyanojo/compost type	May, 1997	100	20	Utilizing as manure for green plants
Komaki/compost type	July, 2001	280	25	Testing to utilize as manure for green plants
Ise/dry type	February 2002	73	18	Utilizing as manure for green plants
Total	Fiscal year of 2001	81tons	10tons	Reduced by 71 tons
	Fiscal year of 2002 (expected)	114tons	16tons	Reduced by 98 tons

“Gomitaro”, a bio-type waste disposer in Komaki Factory

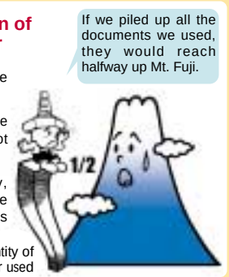
The Kagoshima-Miyanojo Factory introduced a machine in 1997 to treat perishable garbage produced from the canteen. This machine was also introduced at our Komaki and Ise Factories in 2001, achieving reductions of up to 71 tons per year in the whole company. We utilize treated garbage as manure for green plants at our factories.

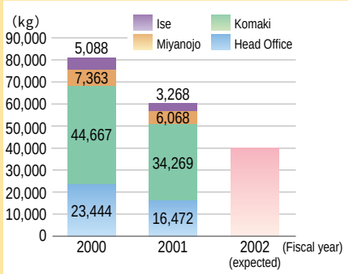
Example 3: Curtailment of the copy paper use (an example of “reducing”)

Our recycle rate of waste paper is 95%. However, the quantity of paper used in the company in a year amounts to 80 tons, 18 million sheets of A4 paper: This is equivalent to a surprising 300 sheets of A4 paper per employee being used every month (results from 2000). In 2001, we initiated company-wide paper reduction, and managed to use 25% less than the previous year. We aim to lower this figure to 25% in 2002 (equivalent to up to 50% less than the quantity used in 2000).

Guidelines for reduction of photocopying paper

- In-house communication should be made via computer, not on paper.
- Materials at meetings should be displayed on a PC or projector, not distributed on paper.
- When photocopying is necessary, double-sided copying or using the reverse side of used documents should be encouraged.





Product development which considerd environment

Technology aims of an eco-friendly product and the earth.

Although many of our products are small functional parts, the final products can only work properly if each of these parts performs well. We will continue to promote our development system that aims to help improve the global environment.

A feature article in the November 2001 issue of our in-house gazette “Nittoku” included a survey with the question, “What is the eco-friendly product which you consider?”. The products listed below are those that obtained the highest positions in our “environmentally friendly list” as a result of the survey. The result shows that sensor-related products received a particularly high evaluation.
Some of the products recognized as environmentally friendly in this survey will be introduced directly by their respective developers.

Main products on the Nittoku Environmentally Friendly List

Automobile-related products

Iridium IX plug
Adopts an iridium alloy with a high melting point at the center electrode. Realizes excellent combustion efficiency and low fuel-consumption rates.

Glow Plug
Meet the requirements of strict exhaust gas regulations in diesel engines. Reduce the unburned portion of gas.

Plug Cap and Power Cable
Control radio wave noise produced in the ignition system of the engine. Reduce loss of spark energy

Oxygen Sensor
High reliability sensors that maintain durability even under severe conditions in engines such as high temperature.

Multi-range Air Fuel Ratio Sensor
This is a leading-edge oxygen sensor that can detect all ratios from rich to lean.

Knock Sensor
Detecting knocking vibration of the engine with piezo-electric ceramics, these sensors contribute to lower fuel consumption.

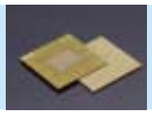
Air Quality Sensor
This sensor is used in car air-conditioner switching systems, to automatically switch between internal circulation and outside air induction modes.

Misfire Detection Unit
Detecting misfire by measuring the damping time of the plug voltage after sparking, this device contributes to reduced fuel consumption.

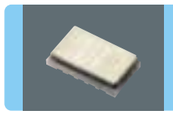
Quick Glow System
Improving the starting capability of diesel engines at low temperatures, this system ensures almost the same starting capability as that of gasoline cars.

Communication-related products

Crystal Device and SAW Filter Package
Small-sized thin packages. Built into the surface of communication equipment, we are making them increasingly smaller and lighter.



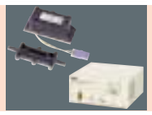
Organic Build-up Substrates
Based on our unique technology, these packages support small-sizing and higher-integration of communication-related products.



Antenna Switch Module
Low loss and high damping. Supports the miniaturization, weight reduction, shortening and high-density equipping of mobile terminals.

Ceramics-related products

Sensor And Detector For Environment
These products conserve energy by measuring things like temperature, humidity and wind flow, and using these blessings of nature for air-conditioning.



Ozonizer/Ionizer
With the strong oxidizing power of ozone, ozonizers are used to purify and deodorize water and the air without using chemicals. Ionizers resolve mold, germs and odors with power of ion.

Bioceramics
The various kinds of artificial bones we have developed using apatite hydroxide and zirconia materials are compatible with the human body.

Cutting Tools
Through the utilization of the dry-cutting method which removes the need for oil, our cutting tools prevent environment pollution caused by scattered oil.

Spark Plug Division ● Iridium Plug

Makoto Sugimoto

In general, it is recommended that spark plugs are replaced every 20,000 km in cars and every 10,000km in light vehicles. However, there are maintenance-free spark plugs (no replacement required) available based on the current average life of a vehicle. These spark plugs are called iridium plugs. They use iridium alloy at the head of their center electrode and a platinum alloy at the outer electrodes, and the reduced electrode wear means much better durability. With a thinner center electrode, they also provide superior ignition, starting and acceleration.

【How to identify iridium plugs】
You can easily identify whether or not iridium is used in our spark plugs by looking at their item numbers. Item numbers starting with “I”, such as ITR4A15, ITR6F13 and IFR5J11, are long-life plugs and use iridium alloy for the center electrode and platinum alloy for the outer electrodes. Item numbers with “I” or “IX” at the end of the number or before the hyphen that represents gaps, such as KR7AI and BKR6EIX-11, are not maintenance-free type because they do not use platinum alloy in the outer electrodes.

Head part

Iridium plug

Sensor Division ● Air Quality Sensor

Toshiya Matsuoka

An air quality sensor is, as its name suggests, a sensor that monitors the quality of the air.
This sensor is installed in the air-conditioning system of a car in order to monitor the air outside.
Air-conditioning systems that include this sensor have a mechanism by which an “outside air induction mode” works to allow outside air into the car if the air is relatively clean, or an “inner circulation mode” works to prevent polluted air from entering the car.
By reacting to CO or NOx emissions from gasoline and diesel cars, the sensors help prevent not only harmful gases but also odors from entering.
Air quality sensors fulfill the role of guarding the air inside cars.
We have many other environment-detecting sensors available, contributing as watchers to global environment.

Air quality sensor

Semiconductor Components Division ● Crystal Device and SAW Filter Package

The mobile phones used by most people carry small components called crystal vibrators or SAW filters. Many of our ceramic packages are used. The parts play important roles such as identifying the precise source of radio waves or picking up the object signal from the tremendous number of signals around. As mobile phones become smaller, lighter and multi-functioned, these parts are also rapidly becoming small-sized. For example, the cubic volume of packages for SAW filters used for RF have diminished to one fifth (1/5) in the last five years.

Shinji Maehara

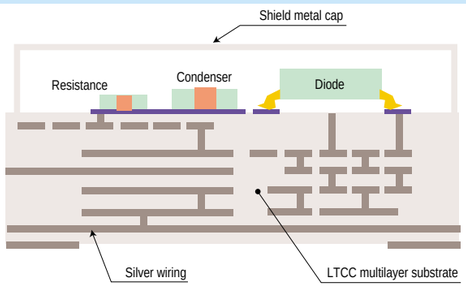
Packages for crystal devices and SAW filters

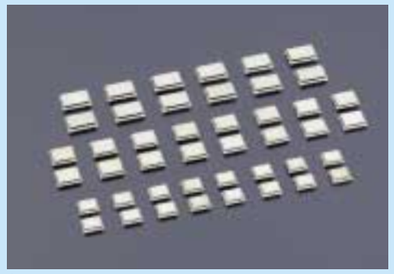
Electronic Components Division ● Antenna Switch Module

There is a reason why mobile phones are becoming increasingly lighter. It is because the components inside are getting smaller even though their performance is actually improving. An antenna switch module is one such component used in dual-band mobile phones. It is a plate-shaped component less than 1 cm long with the capability to 1 separate frequencies received from the antenna, 2 switch between the Send and Receive modules, and 3 cut noise from the power amplifier. While such components are getting smaller and therefore saving resources, their performance remains impeccable.

Toshitaka Hayakawa

■Sectional view of an antenna switch module





Antenna switch module

Fine Ceramics Division ● Bio ceramics

The prefix “bio-” brings to mind microbes naturally breaking down organic compounds, but the bioceramics produced at our Fine Ceramics Division are very different from this general image, as they are used for the human body. They include zirconia, a material that replaces metal in artificial bone heads in hip joints. Zirconia reduces abrasion and improves durability, lasting over 10 years without replacement. This product is not only kind to the environment but also to human beings. Bioceramic products are used inside the human body, and so they must be highly compatible with the body so that patients are not aware of the foreign object inside them.

Kentaro Fujikawa

Bioceramics

Zirconia head

Cutting Tool Division ● Cutting Tools

The main roles of the cutting oil in the cutting process are lubrication and cooling. In low-speed processing with typical conventional materials such as carbide alloy, we use 100% pure oil to grease the cutting surfaces. In high-speed processing, on the other hand, we use an emulsified cutting oil, as shown in the photograph, which is a mixture of rust-preventive oil and water, because we need to cool the cutting tools when we cut surfaces.
In the current climate of rising awareness on environmental issues, cutting tools made of alumina ceramics and silicon nitride ceramics and cermet cutting tools are coming into the spotlight. Ceramic-made cutting tools can process cast iron and cermet cutting tools can process steel, both by dry cutting, a method of cutting without using oil. Dry cutting is possible with these cutting tools because they can still maintain their life-span without cutting oil, and the cut surfaces do not become rough. This cutting method is easy on the environment for several reasons: first, we do not have the expense of oil. Next, the total cost and energy consumption is significantly less because we do not need pumps for circulating oil, coolers for cooling oil, or devices for filtering grinded powder that may enter the oil during the cutting process. Test calculations estimate that not using cutting oil can reduce costs by 15% and energy consumption by 25%. Removing cutting oil that is destined to be disposed of eventually is a significant contribution to preservation of the environment.

Hiroshi Usui

Education and awareness activities

We aim to fully utilize every employee's motivation in order to continue our environmental preservation activities.

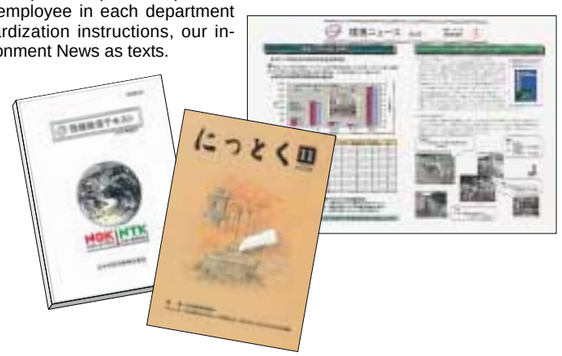
Separation of garbage deserves the expression, “Environment preservation starts with the separation of garbage, and ends in the separation of garbage”. Although separating garbage seems such a small thing, we have to do it properly before we can do anything important for the environment. We practice re-separation of improperly separated garbage at our Recycle Center by gathering people from those departments responsible for the garbage. We believe this is a useful measure for employee education.

Promotion of environmental education

We regard the following three activities as the keystones of our education.

- We always seek to collect new external information such as environment-related regulations and introduction of management techniques, and implement education accordingly.
- In order to continuously manage our EMS, we conduct education to maintain and improve the skills of our in-house auditors, as we place a special emphasis on in-house audits.
- We educate every single employee in each department every month using standardization instructions, our in-house magazine and Environment News as texts.

Re-separation of garbage



Enlightenment activities

We held the first Environment Congress on June 14, 2001. At the congress each factory presented examples of their activities such as waste reduction, energy-saving activities, and so on. Superior examples for improving the environment received commendations from the President. We also held an exhibition where we displayed diagrams showing examples of improvement, prize-winning environmental slogans collected from employees, materials purchased under the Green Procurement policy, and so on. This event provided an opportunity for meaningful study and communication.

The blue-ribbon environment slogan

“ Keep our rivers, air, and future clean ”

The blue-ribbon environment slogan author
Fine Ceramics Division
Katsuhiko Horii

An improvement case report

The exhibition at the Environment Congress

Consideration for environment of local communities

Do you practice the eco-friendly thing in the familiar place?

Our factories practice voluntary cleaning activities for the sake of the local communities who always kindly support us. We also participate in events and activities conducted by local government agencies and other organizations, where we collect local information on environmental issues and so on, and promote communication to maintain our principles of harmonious co-existence.

Local cleaning activities

The first thing that we see during the cleaning activities is discarded cigarette butts. Of course some of them may be thrown away by our employees, since these butts are found in the neighborhoods of our factories. Regardless of who is throwing it away, it should make adults feel ashamed before their children.

■Head Office/Factory

March 2002

June 2001
Participated in “Clean Campaign Nagoya 2001”

September 2001
Conducted cleaning activities around the factory

March 2002
Conducted cleaning activities around the factory

■Kagoshima-Miyanojo Factory

October 2001

July 2001
Conducted cleaning activities around the factory

October 2001
Conducted cleaning activities around the factory

March 2003
New employees conducted cleaning activities

■Komaki Factory

September 2001

April 2001
Participated in cleaning activities on Mt. Komaki

September 2001
Conducted cleaning activities around the factory

October 2001
Participated in cleaning activities in Komaki City

■Ise Factory

August 2001

August 2001
Conducted cleaning activities in neighboring towns

Every month
Conducted cleaning activities around the main gate

Participating in the Environmental Partnership Organizing Club (EPOC)

We participated as an inaugural member of the club when it was formed in February 2000. At present the club has 310 member companies. Businesses from different industries come together to share information on environmental and other issues, and to deepen their knowledge through various Expert Conferences and factory visits. To keep up with the IT age, the club has opened up its information to the public through its website.

●http://www.epoc.gr.jp

Our Komaki Factory hosted an environment workshop and visit on March 15, 2002, inviting 32 representatives from the members of EPOC. One of the questions asked after visiting was why we separated waste into more than 100 categories. We replied that it was in order to reclaim the waste as resources.

A drainage treatment facility

Recycle Center

Environmental accounting

We will endeavor to systematically and continuously calculate the cost and effect of environment preservation.

We have been practicing environmental accounting in accordance with the guidelines of the Ministry of the Environment since 1999. As usual, this report covers four factories consisting of the Head Office/Factory and the Komaki, Miyanojo and Ise Factories, but does not include affiliated companies.
The reporting period is from April 2001 to March 2002.

■Environment preservation costs

Unit: Million Yen

Classification		Main efforts	Investment	Expense
	Pollution prevention cost	Preventing air pollution, water pollution and noise	474	1,063
	Global environment preservation cost	Preventing global warming / Saving energy	8	132
	Resource circulation cost	Efficient use of resources / Treatment and disposal of industrial waste	30	537
Costs within the business area			512	1,732
Upstream & downstream cost		Recycling products, etc. / Increased costs accruing from Green Procurement	0	5
Management activity cost		Training employees on environmental issues / Building up and managing EMS	7	392
R&D cost		Research and development of products contributing to environment preservation	815	5,745
Social activity cost		Protecting nature / Expanding green areas / Environment related advertising	0	109
Environmental damage correction cost		Compensation for soil pollution, damage to nature, etc.	0	17
Total			1,334	8,000

■Effects of environment preservation

Unit: Million Yen

Specific effects				Environmental preservation effect		
				Results in 2001	Comparison with 2000	Economic effect
Costs within the business area	Effects on resources used for business activities	Preventing global warming		118,197t-CO_2	＋4,594t-CO_2	※1 ▲ 67
		Use of water		1,725,438t	※2 ▲ 171,861t	—
		Quantity of paper used (A4 sheets)		60,077kg	▲ 20,485kg	▲ 25
	Effects on environmental burden and waste discharged from business activities	Emissions into the air (PRTR substances)		22,790kg	※3 ▲ 40,482kg	—
		Discharge to water (PRTR substances)		78kg	▲ 58kg	—
		Discharge of waste, etc.		14,764t	※4 ＋3,187t	
		Break down	Quantity reclaimed as resources	13,406t	＋4,229t	▲ 125
			Quantity buried/combusted	1,357t	▲ 1,044t（▲ 43%）	
Total						▲ 217

※1：This economic effect was created by introducing a cogeneration system into the Miyanojo Factory.
※2：We promoted the recycling of water, mainly in the plating process. Recycled water accounted for 36% of the total water used in 2001 (up from 28% in the previous year).
※3：The sharp decrease in discharged quantity was achieved as a result of changing from chlorinated organic solvents and hexachromium to other substances.
※4：The increase in waste was caused by enhanced production. However, we reduced the buried/combusted quantity by 43% from the previous year.

We calculate environmental costs by allocating an actual amount of direct capital investment and expenses according to certain criteria in our accounting rules. As for the economic effect, we do not take deemed effect into account. We need to examine our evaluation of the relation between our environmental activities, their effect on the environment, and the economical effects from various aspects. We will continue to examine and review these factors in accordance with the latest guidelines from the Ministry of the Environment.

Green Procurement

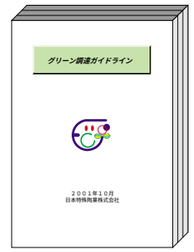
We will try to minimize the impact our purchased materials have on the environment, and actively request our partners and suppliers to take cooperative action.

We promote environmental conservation through our “Green Procurement”, which is defined below.
We must ensure the following when purchasing goods, services or raw materials:

① Only purchase if absolutely necessary
② Where possible, purchase things that are less harmful to the environment
③ Where possible, purchase things from partners (suppliers) who are positive about environment preservation

Requests to partners/suppliers

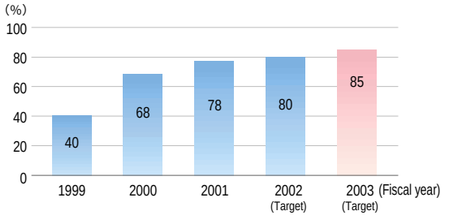
In 2001 we performed an “Environment Conditions Survey” covering about 270 major partners and suppliers to find out their corporate attitudes toward environmental issues and to ask them for cooperation. In October 2001, we established and distributed our “Green Procurement Guidelines” that set out all our requests to our partners and suppliers, and then held a conference inviting about 170 companies. We plan to expand the number of companies covered so as to further lighten the burden on the environment together with our partners/suppliers.



Encouraging use of “eco” stationery

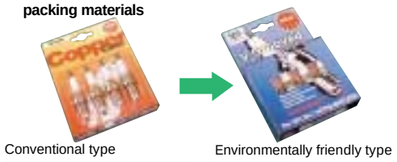
When we buy office stationery and other daily necessaries used in the company, we select “eco goods” that are less harmful to the environment. Our “eco” goods purchase rate in 2001 was 78%, up 10% from the previous year. We will further increase this purchase ratio and the quality of “eco” goods, including switching to goods whose consumable parts are replaceable or refillable.

■An example of an environmentally friendly container



Consideration for the environment with packing materials for our products

■Example of environmentally friendly packing materials



Conventional type　　Environmentally friendly type

With the full enforcement of the “Containers and Packages Recycling Law” in April 2001, not only companies but also society as a whole became more aware of containers and packaging of products. Since many of our products are delivered directly to manufacturers as parts for their products, not including spark plugs which are sold to distributors as replaceable parts, we usually use trays and commuter boxes instead of individual packaging. In order to improve these containers and packaging materials from an environmental point of view, we issued guideline which produced the following results:

Area of effort	Forms of containers and packaging		Action plans
	Conventional type	Environmentally friendly type	
Semiconductor packaging	Plastic trays for shipment made of vinyl chloride	Switched to PET or PS-materials that are also alternative materials	1st step: We have already switched materials for new packaging. 2nd step: We are requesting our major customers to change the materials of their vinyl-chloride trays. 3rd step: We plan to extend our request to our other customers gradually.
Spark plugs	Blistered bags made of paper and vinyl chloride	Switched to blistered bags made of paper and PET	Blistered bags using PET will replace vinyl chloride for a while.
		Switched to suspended-type paper bags	Adopted in products for Europe Adoption in products for domestic market under consideration

Environment measurement data by factory

Environmental preservation achievements (April 2001 ～ March 2002)

Head Office/Factory

Address: 14-18 Takatsuji-cho, Mizuho-ku, Nagoya, Aichi Pref.
Founded: October, 1936
Scope of business: Manufacture and sales of spark plugs and products for engines
Number of employees 1056

Factory Chief:
Atsuhiro Chinari

Comment
As our factory is located in an urban area, we take special care to control the effect (particularly noise) on the surrounding area and keep it within our self-regulation values.

Classification	Item		Regulation value by law	Self-regulation value	Max	Min	Average
Air	Particles of soot	(mg/Nm³)	150	120	8	0.2	3.1
	NOx	(ppm)	180	144	45	29	36.3
	SOx	(Nm³/year)	—	—	—	—	—
Water	pH		5.0～9.0	5.7～8.7	7.1	5.1	6.7
	SS	(mg/ℓ)	600	480	130	10	55.8
	BOD	(mg/ℓ)	600	480	120	4.8	38.0
	n-hexane	(mg/ℓ)	30	24	(※) 29	＜0.5	8.0
	Cyan	(mg/ℓ)	1	0.8	＜0.1	＜0.1	＜0.1
	Total chromium	(mg/ℓ)	2	1.6	0.17	＜0.04	0.06
	Hexachromium	(mg/ℓ)	0.5	0.4	0.09	＜0.04	＜0.04
	Bronze	(mg/ℓ)	3	—	—	—	—
	Zinc	(mg/ℓ)	5	4	0.94	0.05	0.3
	Lead	(mg/ℓ)	0.1	0.08	0.04	＜0.02	＜0.02
	Nitrogen	(mg/ℓ)	240	192	17	1.8	12
	Phosphorus	(mg/ℓ)	32	25.6	3.2	0.28	1.4
	Colon Bacillus	(pcs/cm³)	—	—	—	—	—
Noise	Daytime	dB	70	68	66.1	51.9	59.0

※The cause of n-hexane exceeding the self-regulation value was a flier washed in the kitchen of our canteen. After making certain of wiping off oil before washing, the recorded value stayed within our self-regulation value.
All the other items remained within our self-regulation values.

Komaki Factory

Address: 2808, Iwasaki, Komaki, Aichi Pref.
Founded: April, 1962
Scope of business: Manufacture of spark plugs and products for engines
Manufacture and sales of new ceramics and other applied products
Number of employees 2905

Factory Chief:
Hiroshi Tanaka

Comment
As the company's largest production plant, this site has a significant impact on the environment. We already meet our self-regulation values, but are not satisfied with just that and are making an effort to further reduce the burden on the environment.

Classification	Item		Regulation value by law	Self-regulation value	Max	Min	Average
Air	Particles of soot	(mg/Nm³)	200	160	41	＜2	6
	NOx	(ppm)	200	160	110	＜2	61
	SOx	(Nm³/year)	—	—	—	—	—
Water	pH		6.0～8.0	6.2～7.8	7.8	6.8	7.2
	SS	(mg/ℓ)	30	24	11	＜1	4.6
	BOD	(mg/ℓ)	25	20	17	0.7	6
	n-hexane	(mg/ℓ)	5	4	＜1	＜1	＜1
	Cyan	(mg/ℓ)	0.5	0.4	＜0.1	＜0.1	＜0.1
	Total chromium	(mg/ℓ)	1	0.8	＜0.04	＜0.04	＜0.04
	Hexachromium	(mg/ℓ)	0.2	0.16	＜0.04	＜0.04	＜0.04
	Bronze	(mg/ℓ)	1	0.8	0.09	0.01	0.06
	Zinc	(mg/ℓ)	3	2.4	1.7	0.01	0.63
	Lead	(mg/ℓ)	0.1	0.08	＜0.02	＜0.02	＜0.02
	Nitrogen	(mg/ℓ)	120	30	17	2.7	8.5
	Phosphorus	(mg/ℓ)	16	4	0.59	0.2	0.36
	Colon Bacillus	(pcs/cm³)	—	—	—	—	—
Noise	Daytime	dB	70	68	59	51	54.9

※We give precedence to values defined by city government protocol rather than by the law. Values defined by the law are applied if an item is not covered by the above protocol.
All the items remained within our self-regulation values.

(Complaints against noise)
We were requested by neighboring residents to reduce the noise we were making. Although we were already in compliance with legal regulation values and our self-regulation values, we satisfied the request by installing acoustic walls, covers and soundproofing devices (silencers). Since taking these steps, we have been operating without any problems.

Kagoshima-Miyanojo Factory

Address: 2238-1, Tahara, Miyanojo-cho, Satsuma-gun, Kagoshima Pref.
Founded: April, 1974
Scope of business: Manufacture and sales of spark plugs
Number of employees 555

Factory Chief:
Yasuo Kimura

Comment
To be the world's No. 1 plug factory, we are also taking firm action to achieve energy conservation and zero emission.

Classification	Item		Regulation value by law (※1)	Self-regulation value	Max	Min	Average
Air	Particles of soot	(mg/Nm³)	300	240	10	10	10
	NOx	(ppm)	180	144	74	74	74
	SOx	(Nm³/year)	—	—	—	—	—
Water	pH		6.0～8.0	6.5～7.8	7.8	7.3	7.5
	SS	(mg/ℓ)	35	28	11	4	6.5
	BOD	(mg/ℓ)	20	16	(※2) 17	4	9.6
	n-hexane	(mg/ℓ)	5	4	＜2.5	＜2.5	＜2.5
	Cyan	(mg/ℓ)	1	0.8	＜0.05	＜0.05	＜0.05
	Total chromium	(mg/ℓ)	—	—	—	—	—
	Hexachromium	(mg/ℓ)	0.5	0.4	＜0.05	＜0.05	＜0.05
	Bronze	(mg/ℓ)	3	2.4	＜0.05	＜0.05	＜0.05
	Zinc	(mg/ℓ)	3	2.4	0.07	0.05	0.06
	Lead	(mg/ℓ)	0.1	0.08	＜0.01	＜0.01	＜0.01
	Nitrogen	(mg/ℓ)	—	—	—	—	—
	Phosphorus	(mg/ℓ)	—	—	—	—	—
	Colon Bacillus	(pcs/cm³)	3000	2400	1800	0	223
Noise	Daytime	dB	65	60	51	47	48.7

※1：We give precedence to values defined by town government protocol rather than by the law. Values defined by the law are applied if an item is not covered by the above protocol.
※2：The cause of the BOD value exceeding the self-regulation value was water draining from single-type septic tanks. These were replaced with combined septic tanks by January 2002, bringing the BOD value within our self-regulation value.
All the other items remained within our self-regulation values.

Ise Factory

Address: 871-6, Hosokoshi, Enza-cho, Ise-shi, Mie Pref.
Founded: April, 1994
Scope of business: Design and manufacture of electronic components
Manufacture of semiconductor components
Number of employees 445

Factory Chief:
Masanori Nakashima

Comment
We have achieved our long-term plan to fully abolish chlorinated organic solvents. This is a great contribution not only to the global environment but also to our operating environment.

Classification	Item		Regulation value by law (※)	Self-regulation value	Max	Min	Average
Air	Particles of soot	(mg/Nm³)	250	10	—	—	—
	NOx	(ppm)	180	90	—	—	—
	SOx	(Nm³/year)	—	—	—	—	—
Water	pH		5.8～8.6	6.0～8.4	7.7	6.4	7.2
	SS	(mg/ℓ)	90	45	5.5	＜1	2.3
	BOD	(mg/ℓ)	25	20	13.8	1.8	5.2
	n-hexane	(mg/ℓ)	10	5	＜0.5	＜0.5	＜0.5
	Cyan	(mg/ℓ)	—	—	—	—	—
	Total chromium	(mg/ℓ)	—	—	—	—	—
	Hexachromium	(mg/ℓ)	—	—	—	—	—
	Bronze	(mg/ℓ)	—	—	—	—	—
	Zinc	(mg/ℓ)	—	—	—	—	—
	Lead	(mg/ℓ)	—	—	—	—	—
	Nitrogen	(mg/ℓ)	120	60	22.8	5.3	12.2
	Phosphorus	(mg/ℓ)	16	8	2.9	0.6	1.6
	Colon Bacillus	(pcs/cm³)	3000	1000	0	0	0
Noise	Daytime	dB	60	58	54.6	48.7	50.8

※We give precedence to values defined by city government protocol rather than by the law. Values defined by the law are applied if an item is not covered by the above protocol.

All the items remained within our self-regulation values.

Work safety and hygiene

The happiest thing is to be able to work hard in good physical and mental health.

Our safety management system's principle is “respect for human life”, and its objectives are “to prevent disaster” and “to ensure safe working conditions”. Safety does not mean no disasters, it means no danger. We believe that constant preventive measures are as important in safety management as they are in environment preservation.

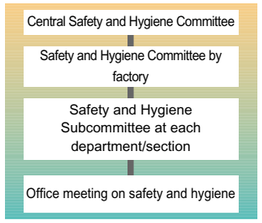
Safety and hygiene

“Leave home cheerfully and go home safely”. In our company, all the employees appreciate the importance of such a natural thing. We take all kinds of safety and hygiene action at all offices and factories in accordance with our “Safety and Hygiene Fundamental Policy” with the aim of eliminating disasters and danger.
Moreover, in order to ensure safe and comfortable workplaces, we implement regular in-house patrols and all employees participate in office meetings held twice a year in each section to actively discuss and improve our working environment.

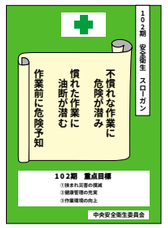
Fundamental Safety and Hygiene Policy

- The objectives of safety and hygiene management activities are to manage risk and to take preventive measures against industrial accidents.
- In order to eradicate industrial accidents and prevent disease, all the managers and supervisors including the President shall keep the safety and hygiene management activities running smoothly, and all the employees shall work together to build comfortable and safe workplaces by promoting effective activities in accordance with the principles of safety and hygiene.
- At the same time, all employees shall consider safety and hygiene as their own issue, comply with basic rules, practice “anticipatory” safety and hygiene activities, and make an effort to maintain or improve their own health.

■**Safety and hygiene management system**

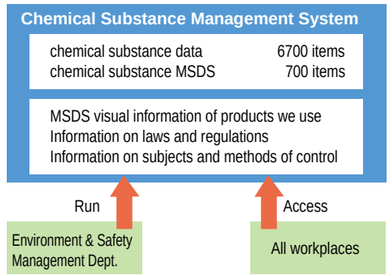


Safety and hygiene patrol



Handling chemical substances kind to human beings via an MSDS

Proper control and reduction of substances harmful to the environment is an important theme for human health as well as for environment preservation. In order to securely handle these and all other kinds of chemical substances, we are building up a database for an MSDS. We have already registered about 3,000 substances, and are making use of this data on our intranet to control the processes of their handling, storage and disposal.



Conclusion

Activities associated with environmental issues are closely related to local communities. Once a problem arises, it can grow into a serious social problem. Therefore, in promoting our activities, we should not address environmental issues with conceptual or psychological theories. Instead, we must fully understand these problems, raise general awareness, and see them as being our own problems. In order to improve the environment, just like our production processes, reducing waste is a key factor. That is to say, the 3 R's, or reducing, reusing and recycling, can help us to improve productivity. I believe it is important to move firmly and steadily forward with a middle-to-long term outlook.
The company as a whole has already acquired ISO certification for quality from the same third-party authorizing agency. The whole company also obtained environmental ISO certification in 2000. The Environment Committees and Expert Committees help our factories share information and spread it horizontally to all divisions, enabling us to implement activities smoothly companywide. At present our affiliated companies are also working towards obtaining integrated certification. While making effective use of our environmental preservation systems, we will also take action to improve our production processes and product development giving consideration to the environment, in accordance with our action schedule.
ECO REPORT 2002 reports the results achieved through these efforts. We intend to continue to promote environment conservation by reviewing and examining our activities with a fresh eye. I hope you will read our future reports to find out more about our environmental preservation activities.

Executive Vice President
Chief Environment Administrator
Seiji Haga

Thank you for reading through our “ECO REPORT 2002”. In order to help us improve future reports, we ask you to please fill in and return the questionnaire enclosed. Please see the back cover for contact information including the url of our website.

Please kindly send your completed questionnaire sheet to:

FAX 81−52−872−5942

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