Facing Tasks with a Bold Challenging Spirit.

Since its foundation in 1936, the NGK SPARK PLUG group has been exploring the possibilities of ceramics, thus contributing to social development. It has been making efforts to establish a good relationship with customers under our corporate philosophy of “participation of all employees” and “producing quality products”, which was the starting point of our skilled manufacturing (MONOZUKURI). NGK SPARK PLUG however, is now entering a period of great changes as it has continued to expand its business mainly focusing on automotive-related business over its 80-year history; technological innovation as seen in the field of electric vehicles, is rapidly advancing with unimaginable speed and changing the whole industry. In 2010, NGK SPARK PLUG started a long-term management plan called Nittoku Shinka-ron with an eye to our business 10 years from now. From the fiscal year ending March 2020, we will be entering a period of SHINKA (true value). Our company urgently needs to establish market-based business to keep contributing to society as an indispensable company. As a member company of the NGK SPARK PLUG group, we must open our path by our own effort. In today’s rapidly changing environment, each and every one of our employees will change ourselves with a “challenging spirit” and accomplish our tasks with a sense of crisis. We thank you in advance for your continued patronage and support for the NGK SPARK PLUG group.

Our new corporate message was conceived to celebrate our 80th anniversary.

IGNITE YOUR SPIRIT

~IGNITE YOUR drive, dreams and SPIRIT~

NGK SPARK PLUG has been a leader in manufacturing for 80 years.

Our desire is to live in a healthier and more beautiful world where all our dreams can come true.

Everyday, we continue to ignite the passion in our hearts and spark new ideas in our minds to focus on achieving our goals for the future.

Our mission is to continue to make the world a better place.

We will pursue future opportunities and improve NGK SPARK PLUG’s unique and advanced technologies.

Our diverse workforce will ignite our company to create new products and to be a leader in innovation.

We will enhance our competitive advantage by understanding and adapting to global changes.

Fueled and motivated by our own drive, NGK SPARK PLUG will continue to IGNITE YOUR SPIRIT, instill passion in your hearts, and deliver cutting edge solutions as a leading manufacturer in the world.

Shinichi Odo
Representative Director Chairman of the Board

Takeshi Kawai
President & Chief Operating Officer
“Real Value” to all our stakeholders.
NGK SPARK PLUG continues to evolve.

In 2010, NGK SPARK PLUG Group formulated a long-term management plan - NITTOKU SHINKA-RON (The Evolution of NGK SPARK PLUG). In this plan, we define the ideal image of NGK SPARK PLUG in 2020 as “a distinguished ‘Monozukuri’ company,” “a highly profitable company,” “a progressive company,” and “a human ‘assets’ company.” As a roadmap for realizing this plan, we have divided the plan into three 3-year phases: the 1st SHINKA (Delving), the 2nd SHINKA (Renovating), and the 3rd SHINKA (Evolving). The Group strives to steadily progress through these three phases toward the final goal of becoming a company that can offer “Real Value” to all our stakeholders.
CHALLENGE
Moving into the Next Field

What’s Next?

CHALLENGE

Toward energy, the environment, next-generation vehicles, and the medical field.
New challenges have already begun.

Our willingness to take on challenges in new fields is like an engine that drives our MITOKU SHINKA-ROH philosophy. We are developing products in the fields of energy, where hydrogen and other alternative sources are leading to increased diversification, and next-generation vehicles such as fuel cell cars. In the environment field, we are developing lead-free piezoelectric ceramics in anticipation of stricter regulations in countries throughout the world. Furthermore, we are also working on products in the medical field to meet the growing needs of an aging Japanese society. No matter what the arena, we create products using our core ceramics-based technology. We are also actively cultivating human resources to break new ground. NGK SPARK PLUG is boldly challenging new business domains by fully utilizing our accumulated technologies and manpower.

Accelerating innovation and building a new energy society.

Contributing to Hydrogen Based Society with Ceramics Technologies

SOFCs (Solid Oxide Fuel Cells) have the highest power generation efficiency among all types of fuel cells, and promise benefits such as compact size and low costs. NGK SPARK PLUG has developed an SOFC stack for use in home cogeneration systems. In addition to systems for household use, we are also working to develop business and industrial systems, and we are currently supplying planar-type cell stacks for Hitachi Zosen Corporation’s 20-kW class demonstration system.

TOPICS

Four companies in the Morimura group concluded a memorandum of understanding regarding the establishment of joint venture for SOFC.

Contributing to Hydrogen Based Society
with Ceramics Technologies

NORITAKE CO., LIMITED, TOTO LTD., NGK INSULATORS, LTD. and our company jointly concluded on a memorandum of understanding regarding the establishment of a joint venture for SOFC. We aim to realize immediate commercialization and contribute to solve energy and environmental problems by integrating the respective resources such as SOFC technology and know-how that each company has cultivated.
Non-flammable (Safe)

High energy density

Utilizable at high temperature

Cathode

Anode

Li+ ion conductive solid electrolyte

Li7La3Zr2O12 (LLZ) solid electrolyte

Laminated battery with oxide electrolyte

Tubular type Cell Stack

Pressurized Hybrid Power Generation System

Adoption of SOFC technology helps improve both energy and environmental problems

NGK SPARK PLUG has install and commend operation of a pressurized hybrid power generation system made by MITSUBISHI HITACHI POWER SYSTEMS, Ltd. (MHPS) that is affiliated with us. This system, which incorporates a solid oxide fuel cell (SOFC) stack developed by NGK SPARK PLUG, is being used as NEDO (New Energy and Industrial Technology Development Organization) verification project. We will continue to promote adoption of SOFC as a means of improving energy and environmental issues.

Pieczolectric ceramics produce electrical charge (voltage) when external force is applied. Applying DC voltage causes the ceramics to expand or contract in response to the current polarity. Applying AC voltage causes vibrations to occur through repeated expansion and contraction. With this ability to convert electrical energy to mechanical energy and back again, piezoelectric ceramics are used in a wide range of fields, from home appliances to industrial equipment.

However, current piezoelectric ceramics contain large quantities of harmful lead, and there is ongoing need to develop practical, eco-friendly piezoelectric ceramics that do not contain lead. Our company is currently working on practical products and devices that use the lead-free piezoelectric ceramics that we have developed.

On the forefront of engineering an all solid-state battery through development of safer, higher-performance electrolytes

Whether for automotive use, such as in electric vehicles (EV), plug-in hybrid vehicles (PHEV), and hybrid vehicles (HV), or for consumer use, lithium-ion batteries are sweeping the world battery market. The competition to develop innovative next-generation batteries to succeed today’s lithium-ion battery has now spread across the world. Taking pride in our proprietary ceramic technologies, we are making full use of our element substitution and sintering technologies in advancing development of all solid-state batteries that offer high capacity and high power with greater compactness and reduced weight. We have developed a proprietary oxide solid electrolyte material that has achieved the highest level of ionic conductivity among oxide-based solid electrolytes. We continue to pursue further development of this technology for use in various fields including home appliances, mobile phones, and drones, as well as for secondary batteries used of personal mobility and other applications.

We became a partner of HAKUTO-R program, and aim to test solid-state battery technology on the moon.

HAKUTO-R is the world’s first private lunar exploration program consisting of multiple missions. It includes two lunar exploration missions: Mission1: a Moon orbit in mid-2020, and Mission 2: a Moon landing in mid-2021 with ispace’s lunar lander and rovers. In Mission2, Our company aim to first test solid-state battery technology on the moon in the world.
NGK SPARK PLUG has applied our ceramic technologies in developing and producing a line of artificial bone products designed to compensate for bone defects. Main products in this line include CERATITE®, a sintered bone material produced by sintering raw material closely resembling bone’s inorganic component, CERAPASTE®, a prosthetic bone material that can be freely formed in the shape of the bone defect which then hardens within the body, and CERAREBONE®, a substitute bone material that is absorbed within the body to replace bone, as well as zirconia femoral heads for artificial hip joint. Use in the medical field of each product is based on the bone defect and symptoms. In addition, we are expanding beyond our core ceramics technologies with development of artificial bones produced with plastics. Focusing on select materials and trusting in the power of the materials, we will continue to create and offer products that benefit society.

A variety of artificial bone products that makes patients smile

NGK SPARK PLUG has applied our ceramic technologies in developing and producing a line of artificial bone products designed to compensate for bone defects. Main products in this line include CERATITE®, a sintered bone material produced by sintering raw material closely resembling bone’s inorganic component, CERAPASTE®, a prosthetic bone material that can be freely formed in the shape of the bone defect which then hardens within the body, and CERAREBONE®, a substitute bone material that is absorbed within the body to replace bone, as well as zirconia femoral heads for artificial hip joint. Use in the medical field of each product is based on the bone defect and symptoms. In addition, we are expanding beyond our core ceramics technologies with development of artificial bones produced with plastics. Focusing on select materials and trusting in the power of the materials, we will continue to create and offer products that benefit society.

Transforming mobility through the power of technology and ideas

Fuel cell vehicles emit no CO₂ and are often recognized as the ultimate in eco-friendly transportation. Eliminating the safety risk associated with hydrogen leakage is a key priority. We have addressed this issue by developing sensors that detect hydrogen leaks using hydrogen’s uniquely high thermal conductivity. These sensors use a MEMS® element to achieve rapid startup and response, and incorporate temperature and humidity correction for high accuracy.

*MEMS micro Electro Mechanical Systems

Hydrogen Leak Detection Sensor is currently in production for FCV

MEMS micro heater enables fast start-up and quick response. With temperature and humidity compensations, high accuracy can be achieved.

Hydrogen Leak Detection Sensor

Contribute to the improvement of Quality Of Life (QOL) for patients with respiratory failure

For patients whose lung functions is impaired and unable to take in sufficient oxygen due to chronic obstructive pulmonary disease (COPD), interstitial pneumonia and other chronic respiratory diseases, their impaired lung functioning and inability to take in sufficient oxygen makes Home Oxygen Therapy (HOT) which high concentration of oxygen can be provided by oxygen concentrator at home based on prescription issued by doctors is indispensable. Our oxygen concentrator draws in air, which is composed of mixtures of approximately 20% oxygen and 80% nitrogen, and efficiently separates it into oxygen and nitrogen to generate highly concentrated oxygen. Incorporating an oxygen sensor based on our automotive sensor technologies, this unit is the first in the industry to feature greater security and safety with a function that uses illustrations in the LCD screen and voice guidance to inform the patient when the device is to be used. This product contributes to improve patients’ quality of life (QOL) and provides supports for home-based medical treatments.
Improving the world through innovation.

Since our founding in 1936, our mainstay business of automotive parts for internal combustion engines, comprising spark plugs and oxygen sensors, has continued to grow. We are now coming up with new innovations making full use of core technologies that we have developed thus far. “Core technologies” refers to the combination of our central technologies in ceramics—used in fields demanding high reliability and durability—with metals and organics and other heterogeneous materials to create products that meet our customers’ needs. We have been applying these core technologies in the fields of environment and energy, next-generation vehicles, and medical care, three areas that have been designated as priority domains for new business. In addition, we are now actively seeking strong partners to join us in solving social problems that we cannot solve alone.

NGK SPARK PLUG has prioritized diversity as a crucial management strategy to revitalize the company, and we continue to move forward with initiatives to combine the capabilities and values of our diverse human resources. The first step, taken in 2013, was to improve working environment places throughout the company where women can play an active role. We were selected as one of the “Nadeshiko Brand” in 2019*1. As our other achievements, we selected as one of the “New Diversity Management Selection 100”*2, and “Aichi Josei Kagayaki Company” (Company Supporting Aichi Women’s Career Success)*3, and so on. In January 2018, our wholly-owned subsidiary Nittoku Smile Co., Ltd. was certified as a special subsidiary promoting employment of persons with disabilities.

We are continuing our efforts to create a pleasant working environment for those with disabilities as well. Another important issue accompanying diversity is that of health. To help promote health and productivity management and ensure sustainable development and growth of the Group, we have produced a “Health and Productivity Management Declaration” aimed at making NGK SPARK PLUG a company where all employees enjoy physical and mental health while working in a pleasant workplace environment, with the employees and their families having a greater awareness of their own health as well. In February 2019, we were again recognized as a “Certified Health and Productivity Management Organization (White 500)” by the Ministry of Economy, Trade and Industry and Nippon Kenko Kaigi, the sponsors of the program.*4 for three consecutive years.

*1 “Nadeshiko Brand” logo (selected by the Ministry of Economy, Trade and Industry)
*2 “New Diversity Management Selection 100” logo (selected by the Ministry of Economy, Trade and Industry)
*3 Aichi Prefecture’s “Aichi Josei Kagayaki Company” certification logo
*4 “Certified Health and Productivity Management Organization (White 500)” logo
From Morimura Gumi to NGK SPARK PLUG.

- **1876** Morimura Gumi founded in Tokyo by Ichizaemon Morimura VI and his brother Toyo. Toyo traveled to the United States and started a sundries retail business.
- **1878** Morimura Gumi switched to the wholesale business in New York.
- **1897** Morimura Gumi established a branch in New York, which later became Morimura Bros., Inc.
- **1904** Founded Nippon Toki Gomei Kaisha in Nagoya.
- **1914** Nippon Toki Gomei Kaisha succeeded in producing Japan’s first dinner set.
- **1919** Separated the Sanitary Ceramics Division of Nippon Toki Gomei Kaisha and established Toyo Toki Co., Ltd. Reorganized Nippon Toki Gomei Kaisha into Nippon Toki, Ltd.
- **1936** Hibiya Art China.
- **1937** Started manufacturing of NGK Spark Plugs.

NGK SPARK PLUG was founded in 1936. However, our roots can be traced back more than 140 years to the Morimura Gumi which was established in 1876 by Ichizaemon Morimura, the forefather of the Morimura Group. Our founding father Ichizaemon Morimura was an honest and passionate merchant. Determined to reclaim wealth which had flowed overseas, Ichizaemon embraced the challenge of foreign trade for the prosperity of Japan. Eventually, the Morimura Gumi began to manufacture ceramics and the Morimura Group was born, ultimately leading to the founding of numerous prominent companies including NGK SPARK PLUG.

**Honesty and passion**

On-time delivery of quality products at affordable prices. The sincerity of the Morimura Bros., Inc. was valued even in the foreign culture of the United States, building lasting relationships. At the time, Nippon Toki Gomei Kaisha was renamed Toyo Toki Co., Ltd. and expanded its activities.

**Customer satisfaction through quality products**

“We only sell products which are useful to customers.”

Magobe Okura, the first president of Nippon Toki Gomei Kaisha, emphasized the importance of quality products to customers.

**Uniform products through participation by all employees**

“Suppose that we produce only 1 defective product per 1,000 products. To the customer who purchases that 1 product, our defect rate is 100%.”

As business evolved from tableware to industrial products, we faced even stricter demands for product uniformity. In order to constantly realize the performance needs by customers and to eliminate discrepancy among products, Magoemon Ezoe expected a high level of discipline and sense of participation to produce quality products. Employees at all workplaces devoted themselves to manufacturing which fulfilled such expectations. Even today, the philosophy of producing quality products with participation by all employees is still alive at NGK SPARK PLUG.

**Inherited Vision**

NGK SPARK PLUG was founded in 1936. However, our roots can be traced back more than 140 years to the Morimura Gumi which was established in 1876 by Ichizaemon Morimura, the forefather of the Morimura Group. Our founding father Ichizaemon Morimura was an honest and passionate merchant. Determined to reclaim wealth which had flowed overseas, Ichizaemon embraced the challenge of foreign trade for the prosperity of Japan. Eventually, the Morimura Gumi began to manufacture ceramics and the Morimura Group was born, ultimately leading to the founding of numerous prominent companies including NGK SPARK PLUG.
Since our founding in 1936 as a manufacturer of spark plugs, the history of our company has been one of technological innovation. The technology and expertise we accumulate in product development processes is reinvested in new applications, enabling us to grow into new fields of business. The manufacturing spirit that was built around our core ceramics technology is the DNA of our company, passed down from generation to generation. We continue to nurture and develop new technologies, so that we might build the businesses of the future.

Challenge creates future value.
NGK SPARK PLUG’s history is the one of challenging new field.
Corporate Philosophy

Realize our imagination. As a proposal-making corporation, we continue to offer new ideas and new values.

At NGK SPARK PLUG, we aim to contribute to people all over the world by linking people to technologies and delivering new values. As a truly global corporation, we want to build stronger ties not only with customers and communities, but the local and global environments. We are always working to make our corporate philosophy and our commitments a reality.

Three elements constitute our corporate philosophy.

1. 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 capabilities. With all our power we are dedicated to pursue management based on trust and confidence.

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

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

Slogan
With established trust and confidence inside and outside the company, we aim to contribute to the peoples of the world by creating and putting at their proposal new values for the future.

The Nittoku Way

We aim to provide real value as a company that is indispensable to the world.

The Nittoku Way refers to a set of philosophies that includes values that are shared by the entire Nittoku Group, and the actions based on those philosophies, as well as the manner in which those actions are carried out.

The Four Shared Values of the Nittoku Way
The Nittoku Way refers to the values of the NGK SPARK PLUG Group that all employees commit to sharing and passing down to the next generations.

<table>
<thead>
<tr>
<th>Shared Value</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Shisei-Shijnjitsu</td>
<td>Sincerely, do our very best.</td>
</tr>
<tr>
<td>Dokuritsu-Jiei</td>
<td>Believe in one's own ability, and take actions by oneself.</td>
</tr>
<tr>
<td>Shikai-Keitei</td>
<td>Unite efforts with the people of the world, and utilize each other's differences.</td>
</tr>
<tr>
<td>Soshi-Kantetsu</td>
<td>Have cherished desire, and carry it through till the end.</td>
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</tbody>
</table>
Growing dramatically through advanced technologies and superior qualities.

Our automotive components include spark plugs which hold the world’s largest market share. All of our components are highly acclaimed by automotive manufacturers across the globe. Our main strengths are advanced technological capabilities and outstanding qualities. Today, the automotive industry is in an era of a new innovation and a growth spurred by the development of next-generation vehicles and the rapidly accelerating motorization of emerging nations. Moving forward, NGK SPARK PLUG will use advanced technologies and superior qualities as leverage for developing new markets and entering new fields.
Ignition Coil for Gas Engine
This ignition coil has sufficient discharge characteristics and is highly reliable. NGK adopts a special out molding structure to ensure high reliability.

Ignition Coil for Aftermarket
This product converts the in-vehicle battery supply voltage into high voltage with appropriate timing and immediately for discharge of spark plugs.

Spark Plug Cap and Cable for Motorcycle and General-Purpose
This product suppresses electromagnetic interference generated by the engine’s ignition system. It includes motorcycle and general purpose spark plug caps as well as motorcycle racing cables, caps and cable. We also have power cables for motorcycles. These power cables deliver ultra low-resistance 0.5Ω/m (0.9Ω/m), along with superb ignitability and acceleration.

Spark Plug Cable for Automobile
NGK cables for automobiles are highly effective in suppressing electromagnetic interference generated by the engine’s ignition system. The coil-type resistor cables offer excellent conductivity, while the power cables exhibit an ultra-low resistance of 0.9Ω/m providing improved startability and acceleration with reduced spark energy loss.

Igniter Plug for Rocket
Igniter plug for rocket is installed in the combustion chamber near the supply ports of hydrogen and oxygen, therefore it uses silicon nitride insulator that can withstand thermal shock of combustion.

Igniter Plugs for Aircraft
This plug is designed with a high-purity aluminum insulator and a special alloy so that it can withstand high spark energy, high voltage, high temperature, and high-pressure gas.

Igniter Plug for Gas Turbine
These igniter plugs for gas turbines ignite with more than 100 times powerful spark compared with those for automobiles. This is because reliable startability and reliability are required for gas turbines that can be used by various fuels, such as city gas, light oil, heavy oil, and so on.

Harnessing the power of ceramics to make breakthroughs. New values for industries and daily lives.

By utilizing ionic conductance, thermal resistance, corrosion resistance, electric insulation, biocompatibility and other properties of ceramics, we develop products to enrich industries and daily lives. — These are the mission of the NTK brand. Our business covers a wide range of fields from sensors, electronic parts and cutting tools to bioceramics and lifestyle goods. We will continue to apply our acquired material technologies and process technologies in order to provide high value-added products which meet the needs of the times.
Breakthrough

Sensors and Plug-related Products

**OZAS®-S**
(Zirconia Exhaust Gas Oxygen Sensor)

OZAS®-S controls air-fuel ratio for exhaust gas clarification, as a central component of emission treatment systems. It generates 0 or 1V according to the oxygen concentration in exhaust gas. And it starts working quickly after engine start-up, even in cold weather conditions, thanks to its early activation capabilities.

**ZFAS®-U**
(Universal A/F Heated Exhaust Gas Oxygen Sensor)

ZFAS®-U generates an output signal corresponding to the exhaust gas O2 concentration. It detects a wide range of air-to-fuel ratios for precise stoichiometric and lean burn control to keep exhaust clean. This high performance is realized by combining the sensor with XCU®-UA.

**OZAS®-S**
(Small Heaters type Oxygen Sensor for Motorcycles)

OZAS®-S and ZFAS®-S are sensors which have achieved smaller and lighter designs and high vibration resistance considering harsh environmental conditions for motorcycles.

**CTAS®-T**
(Wide Range Temperature Sensor)

Piezoelectric ceramic sensor for the detection of vibration caused by engine knocking. Knock sensors are used for ignition timing control that contributes to engine performance, fuel economy, and engine protection when feeding low octane fuel.

**ERAS®-K**
(Knock Sensor)

Piezoelectric ceramic sensor for the detection of vibration caused by engine knocking. Knock sensors are used for ignition timing control that contributes to engine performance, fuel economy, and engine protection when feeding low octane fuel.

**Glow Relay Unit (GRU)**

It is a controller that can stabilize plug temperature and improve emissions through PWM control when used together with fast-heating type glow plugs. It also has failure diagnosis function.

**Glow function Integrated Pressure Sensor (GIPS)**

The pressure sensor integrated inside the glow plug is able to measure combustion pressure in the engine. Improved exhaust gas emission, lower fuel consumption, compensation for value drop even with fuel and engine condition, and optimization of fuel injection based on combustion pressure signal.

**NCEM® compact multi-gas Measure system / PM/PN sensor**

NCEM is a compact and light exhaust gas measurement system block to detect the exhaust gas during on-road drive. It can measure PM10, PM2.5, NOx and O2, and measurement data can be performed in real time by installing directly in the exhaust gas line.

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**High Temperature Co-Fired Ceramic (HTCC) Packages and Substrates**

Developed with high performance ceramics, NTK HTCC packages and substrates realize highly reliable and durable semiconductor devices even in severe environments.

**NCEM® compact multi-gas Measure system / PM/PN sensor**

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**Packages for Image Sensors**

Image sensing is now absolutibility imperatives in our life. With its low thermal expansion, low dusting and mechanical shock stability, ceramic is an optimal packaging solution for image sensors.

**Flip Chip Packages for High Reliability ASIC**

High pin count & high routing density packages developed for devices used for aerospace/high-reliability applications.

**Ceramic Packages for Medical Applications**

Multilayer ceramic packages support various devices for medical applications such as medical analytic equipment and implant device.

**LED Packages**

NTK’s advanced ceramic material development capability and multilayer circuit board design flexibility supports LED’s two technical challenges, further improvement of luminous efficiency and brightness.

**Surface Mounted Packages for Electronic Devices**

NTK’s strictly controlled green sheets are laminated with high precision to contribute miniaturization of electronic devices such as Pressure Sensor, Infrared Sensor, Oscillator, RF filter and so on.

**Large-Scale Substrates for Wafer Testers**

The large scale ceramic substrate with high density routing and numerous pads geometry is designed for semiconductor wafer testing probe card. NTK’s well-established design capability and production system deliver quality product in short production time to support the fast-paced semiconductor industry.

**Durable Semiconductor Devices**

Durable semiconductor devices even in severe environments are supported by NTK HTCC packages and substrates. Its high performance makes it possible to use in various fields such as automotive control, medical analysis equipment and implant devices.

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**Cermet Grades**

NTK Cermet is a standard insert grade which is suitable for semi-finish and finish turning of steel, general steel (carbon/alloy steel), duralumin, cast iron, and ferrous cast iron. It is used in general steel (carbon/alloy steel), duralumin, cast iron, and ferrous cast iron. It is recommended for high speed and finish turning. This grade has excellent chip control and provides accurate holes. PVD coated Cermet has even better wear resistance.

**Micro Grain Carbide Grades**

NTK Micro Grain Carbides are standard plain grade, which are suitable for semi-finish and finish turning of general steel (carbon/alloy steel), duralumin, cast iron, and ferrous cast iron. It is used in general steel (carbon/alloy steel), duralumin, cast iron, and ferrous cast iron. It is recommended for high speed and finish turning. This grade has excellent chip control and provides accurate holes.

**Cubic Boron Nitride Grades**

NTK’s Cubic Boron Nitride (CBN) grades are suitable for semi-finish and finish turning of non-ferrous metals, such as aluminum, brass, and copper. This grade is used in a wide range of materials, including copper, stainless steel, and non-ferrous metals and materials for which machining is difficult.

**Throw-Away Drills**

NTK’s Throw-Away Drills are suitable for semi-finish and finish turning of steel, general steel (carbon/alloy steel), duralumin, cast iron, and ferrous cast iron. It is used in general steel (carbon/alloy steel), duralumin, cast iron, and ferrous cast iron. It is recommended for high speed and finish turning. This grade has excellent chip control and provides accurate holes.

**Indexable End Mills & Solid Carbide End Mills**

NTK’s Indexable End Mills provide superior performance in tool life and material surface finish compared with solid end mills. Our new Solid Carbide End Mills are suitable for semi-finish and finish turning applications. The sharpness of these tools reduces burrs, produces remarkable surface finishes, and provides excellent tool life.

**Cutter to Machine Aluminum**

For processing of aluminum parts at machining centers (CNC), NCK has developed a special aluminum grade to machine aluminum components at high speeds and low cutting forces. This grade is suitable for semi-finish and finish turning of aluminum, as well as high-strength aluminum alloys.

**Bi-Directional Chuck**

This chuck is suitable for semi-finish and finish turning of steel, general steel (carbon/alloy steel), duralumin, cast iron, and ferrous cast iron. It is used in general steel (carbon/alloy steel), duralumin, cast iron, and ferrous cast iron. It is recommended for high speed and finish turning. This grade has excellent chip control and provides accurate holes.

**Electro-Static Chuck**

These chucks are suitable for semi-finish and finish turning of steel, general steel (carbon/alloy steel), duralumin, cast iron, and ferrous cast iron. They are used in general steel (carbon/alloy steel), duralumin, cast iron, and ferrous cast iron. It is recommended for high speed and finish turning. This grade has excellent chip control and provides accurate holes.

**Vacuum Chuck**

This chuck is suitable for semi-finish and finish turning of steel, general steel (carbon/alloy steel), duralumin, cast iron, and ferrous cast iron. It is used in general steel (carbon/alloy steel), duralumin, cast iron, and ferrous cast iron. It is recommended for high speed and finish turning. This grade has excellent chip control and provides accurate holes.

**Ultrasonic Transducers**

Uses a Langevin structure which efficiently generates ultrasonic vibrations. The transducer is clamped with a bolt to improve durability. Can be used in various fields including medical equipment and industrial equipment.

**Piezo Electric Element**

PZT-based piezoelectric ceramic has a variety of New Type, I and B. These ceramics are used in a wide range of products such as acoustic wave, diagnostic equipment, and more. They are used in various fields including medical equipment and industrial equipment.
What’s Next?

RESPONSIBILITY

Research and Development

For our lifestyles, future generation and the global environment, our technologies continue to evolve.

With the purpose of research and development at NGK SPARK PLUG being to “discover social needs and express them in concrete form,” we are progressing with advanced and highly varied research, including research into elemental technologies to development of new materials and process technologies. We have been focusing particularly in recent years on fuel cell batteries, hydrogen products, and other innovative technologies to help us find solutions to our environmental problems. With the next generation in mind, we are promoting research and development of fuel cell batteries, hydrogen products, nanotechnology, biotechnology, and other technologies expected to help the environment.

RESPONSIBILITY

Quality Control • Employee Education

The assurance of quality is the proof of a global brand.

The quality control system that underpins safety and reliability is both the manufacturer’s responsibility and the assurance of its brand. NGK SPARK PLUG has acquired certification in the global standard ISO 9000’s for quality management systems in all of our fields of operations and ISO/TS 16949 certification in the automotive field, and we will continue with our plans for certification at our sites overseas as well. We have established a system based on the concept that “quality must be built in a process from development to production.” This system and our thorough inspections realize total quality management not only in products but also in delivery and service. Adopting the view that “MONOZUKURI Education & Training Center” we are also placing emphasis on human resources development.

RESPONSIBILITY

Monozukuri

“Go a Step Further in Manufacturing.” Our leading-edge, high-quality products are based on this spirit.

Providing our customers with superior quality products when they need them requires highly-reliable production engineering. Since our beginnings of a company, we have worked to incorporate labor-saving and automated processes, continually reducing cycle times. Now and in the future, we aim to “Go a Step Further in Manufacturing” to increase the quality of our “people, products and system.” Additionally, we are taking the “quality first” approach further yet with construction of a global optimized production system capable of providing a consistent standard of quality, regardless of which of our global production sites are used.
NGK SPARK PLUG has been promoting CSR* activities to be a company loved and trusted by all people in the world. *Corporate Social Responsibility

Through the understanding and support of customers in countries throughout the world, we have grown into a global corporation which provides optimal products with the ultimate quality. At local subsidiaries, our entire group joins together and acts based on the CSR policy to participate a variety of social contribution activities in order to interact with the local community and build a comfortable society.

Coastal Clean-up Activities
NGK Spark Plug Middle East FZE
Our employees are engaged in coastal clean-up activities.

Factory Tour
CS Nakatsuigawa Co., Ltd.
We received a visit from nearby school teachers, showed our manufacturing processes, and explained our policies and efforts.

Local Road Clean-up Activities
NGK Spark Plug (U.S.A.), Inc.
Our West Virginia Plant participated in the Adopt-A-Highway program, became a foster parent of the River Bend (a part of the West Virginia State highway) in front of our West Virginia Plant, and were engaged in clean-up and flower/tree planting activities.

Engineering Skill Training in a Technical College
Siam NGK Spark Plug Co., Ltd.
We provided engineering skill training to a technical college in Chonburi Province.

Company Introduction to Nearby Junior High-Schools
Miyanojo Plant
We sent our employees to nearby junior high schools as teachers to explain our company and our business, as well as to provide advice required at the time of career decision.

Walking Race Event
Ceramica e Velas de Ignicao NGK do Brasil Ltda.
We held a 5-km and 10-km walking race event to promote the health of people and our employees living in the area.

NGK SPARK PLUG constantly values our connection with local residents who support our corporate activities. To show our appreciation, we provide support for cultural and sports activities. In 2012, we were selected as a partner corporation for naming rights to the Nagoya Citizens Auditorium, one of Nagoya’s foremost cultural facilities. Since 2013, we have sponsored annual musical events at this auditorium. The shows are aimed for families and are free of charge. We have issued invitations to the performance for families impacted by the Great East Japan Earthquake, as well as for local elementary school students, kindergarten children, children from care facilities in Aichi Prefecture and others. As a member of local society, our company will continue to support the cultural arts in the future.

Cheering on women runners as a sponsor of the Marathon Festival Nagoya, Aichi.

NGK SPARK PLUG is a bronze sponsor of the Marathon Festival Nagoya, Aichi, held by the city of Nagoya. Our company, which holds up an active role for women as a management principle, is proactively working to increase diversity, including by adopting a system to support various ways for our women employees to work. We’ve been sponsoring the Marathon Festival since 2015 because we want to support women striving to achieve something and to help invigorate local communities. NGK SPARK PLUG will have a company booth at the Marathon Expo, to be held in the Nagoya Dome, where we support the runners with an oxygen concentrator that refreshes the body and spirit.
Company Profile

Company Name: NGK SPARK PLUGS CO., LTD.

Establishment: October 26, 1936

Headquarters: 1-18, Takatsujicho, Mutoboku-ku, Nagoya 467-8525

Employees: Non-consolidated: 5,767 as of March 2019


Home page: https://www.ngkins.co.jp

Company History

1936 NGK Spark Plug Co., Ltd. was established with a capital of 1,000,000 yen.
1937 Started the manufacture of NGK spark plugs.
1949 Started the manufacture of NTK technical ceramics. Listed on both Tokyo and Nagoya stock exchanges.
1958 Started the manufacture of ceramic cutting tools and inserts. Started the manufacture of copper-coated wide range spark plugs.
1959 Established Ceramicos e Velas de Ignicao, NGK do Brasil Ltda.
1961 Established Nittoku Seiko Industry Co., Ltd.
1962 Started the operation of Komaki Factory. Aichi prefecture
1966 Started NGK Spark Plugs (U.S.A.), Inc. (Sales company)
1967 Started the manufacture of ceramic IC packages.
1973 Established NGK Spark Plug Malaysia Berhad. Started the manufacture of temperature sensors for automobile.
1974 Established Nichiryo Kiki Co., Ltd. Started the operation of Kagoshima-Miyanojo Factory. (Kagoshima prefecture)
Established Nittoku Unyu Co., Ltd.
1975 Established NGK Spark Plugs (U.K.), Ltd.
1976 Established NGK Spark Plugs MFG. (E.S.A.), Inc. (Manufacturing company)
1979 Established Balbus NGK del Ecuador Co., Ltda. Established NGK Spark Plug (Deutschland) GmbH (the present NGK Spark Plug Europe GmbH)
1980 Established NGK Spark Plug (Australia) Pty. Ltd. Started the manufacture of quick glow system (QGS).
1984 NGK Spark Plug (MPAC, U.S.A.), Inc. changed its corporate name to NGK Spark Plug (E.S.A.), Inc. by merging with NGK Spark Plugs (U.S.A.), Inc. and NTK Ceramics (U.S.A.), Inc. Established Kani Ceramic Co., Ltd.
Established Taiwan NGK Spark Plug Co., Ltd.
1985 Started the manufacture of glow plugs ceramic type.
1989 Invested in V Portugal Industry Co., Ltd. (Korea)
1990 Established NGK Spark Plug Industries Europe S.A.S. (France) Started the operation of European Technical Center. Started the manufacture of bis ceramic.
1991 Total number of production of NGK spark plugs exceeded 5 billion units.
1992 Established Balbus NGK de Mexico S.A. de C.V.
1993 Started the operation of Brazil Technical Center. Established NGK Spark Plug (Philippines), Inc.
Established Nittoku Seiko Industry Co., Ltd.
1994 Started the operation of Ise Factory. Mie prefecture
Established NGK Spark Plugs MFG. (E.S.A.), Inc. Established NTK Technical Ceramic Co., Ltd.
1995 Established NGK Spark Plugs (U.K.), Ltd.
1996 Started the operation of U.S.A. Technical Center.
1997 Started the manufacture of NGK “Iridium” plugs.
Started the operation of Komaki Technical Center. Started the manufacture of ceramic IC packages.
2000 Started the manufacture of NGK “Iridium IX” plugs.
2001 Established NGK Spark Plugs Singapore Pte Ltd. Started the manufacture of oxygen concentrator for home oxygen therapy. Started the operation of Komaki-RBD Center. Established Nantou Ceramic Co., Ltd.
2002 Restructured former NGK Spark Plugs (E.S.A.), Inc. and NGK Spark Plugs MFG. (U.S.A.), Inc. Established newly NGK Spark Plugs (E.S.A.), Inc. and NTK Technologies, Inc. according to the product market. Established NGK Spark Plug Middle East FZE.
2003 Established NGK Spark Plug (Shanghai) Co., Ltd.
Established NTK Technical Ceramic Co., Ltd.
2004 Started the manufacture of new high-temperature ceramic glaze plugs.
2005 Established NGK Spark Plugs (Thailand) Co., Ltd. Established the manufacture of hydroxyapatite cement.
2006 Established NGK Spark Plugs (India) Pvt. Ltd.
Total number of domestic production of NGK plugs reached 10 billion units.
2007 Established NGK Spark Plugs SA Pte Ltd.
2008 Established NGK Spark Plugs (Philippines), Inc.
2009 Nakajima Ceramic Co., Ltd. changed its corporate name to NTK Ceramic Co., Ltd. by merging with Kani Ceramic Co., Ltd. and Ise Ceramic Co., Ltd.
2011 Established Changhui NGK Spark Plug Co., Ltd.
2012 Established NGK Spark Plugs Taishan Co., Ltd.
2013 Capital and Business Alliance with Eastern Co., Ltd.
Established Nantou Ceramic Co., Ltd. changed its corporate name to SparkTec WNS Co., Ltd.
Established LLC NGK Spark Plugs (Europe) Ltd.
Established SparkTec (Thailand) Co., Ltd.
Established Nittoku Denki Co., Ltd.
2014 Started the operation of SparkTec TONDO Co., Ltd.
Niko Headquarters Plant.
2015 Acquired 100% ownership of Nihon Ceramic Co., Ltd.
Acquisition of all the shares relating to Wells Vehicle Electronics business.
2016 Nittoku Seiko Industry Co., Ltd. changed its corporate name to SparkTec WNS Co., Ltd.
Established the operation of SparkTec WNS Co., Ltd.
Headquarters Plant.
Nihon Ceramics Co., Ltd. changed its corporate name to NTK Ceramics Co., Ltd.
Established CS Nakajima Ceramic Co., Ltd.
Established NTK Ceramic Co., Ltd.
2017 SparkTec (Thailand) Co., Ltd. changed its corporate name to NGK SPARK PLUGS (THAILAND) CO., LTD.
Established Nittoku Smile Co., Ltd.
2018 Established Sharing FACTORY Co., Ltd. Acquired 100% ownership of CARF Inc.

Consolidated Sales Trends

Sales by Business Group (Consolidated)

Financial Highlights

Net Sales 425,013 Million yen
Operating Income 58,672 Million yen
Ordinary Income 69,545 Million yen
Net Income 42,813 Million yen
Total Assets 328,970 Million yen
Net Assets 401,683 Million yen
Net Income per Share (Basic) 205.58 Yen
Equity Ratio 83.5
Return on Equity 10.9
The NGK SPARK PLUG Group meets demands through its global network.

Global business developments now require the world’s most optimized production systems. Using our links with local corporations all around the world, NGK SPARK PLUG is establishing production systems that achieve globally-optimized production to furnish products of consistently high quality, no matter where in the world they are supplied from. We are also engaged in full-fledged development of production and sales networks geared towards BRICs and other new markets.
Our nationwide network responds to the diverse needs of our customers.

With four production sites in Japan, we have established a system that enables us to deliver high-quality products, swiftly and reliably. We have also positioned branches and sales offices in major cities throughout Japan, providing total support to meet our customer’s need.

Domestic Network

Plants

- Headquarters & Nagoya Plant
  14-18, Takatsuki-cho, Mizuho-ku, Nagoya, Aichi 467-8525

- Komaki Plant
  2808, Iwasaki, Komaki, Aichi 485-8510
  [Phone] 81-568-76-1211 / [Fax] 81-568-76-1299

- Miyanojo Plant
  2238-1, Tabaru, Satsuma-cho, Satsuma-gun, Kagoshima 895-1802

- Sapporo Sales Office
  1-2-11, Daikan, Utsunomiya, Tochigi 320-0867

Sales Branch Offices

- Tokyo Branch
  Koman Bldg. 1F, 2-5-7 Koman, Minato-ku, Tokyo 108-8601
  [Phone] 81-3-6872-1001,1002,1003
  [Fax] 81-3-6872-1008,1009,1010

- Atsugi Liaison Office
  Miawamachi Bldg. 1F, 1-10 Miawamachi, Saitama, Saitama 338-0014
  [Phone] 81-46-295-5990

- Nagano Sales Office
  Kamitomichi Bldg. 1F, 3-10-30, Tarumi-cho, Suita, Osaka 564-0062
  [Phone] 81-6-6368-3360,3361
  [Fax] 81-6-6368-3362

- Sendai Sales Office
  Sapporo Fukoku Building Bldg. 1F, 1-2-3, Kita 4-Heihi, Chuo-ku, Sapporo 060-0804
  [Phone] 81-11-804-6900
  [Fax] 81-11-804-6901

- Hiroshima Liaison Office
  Miharaeki Parking Building 1F, 1-7-7, Minami-ku, Hiroshima 730-0003
  [Phone] 81-82-244-2421,2422,2414
  [Fax] 81-82-244-2423