

Customers

Guided by the Corporate Philosophy, which puts customers first, the NGK Group considers the provision of products and services that contribute to a better social environment to be one of its most important missions in an effort to create quality from the customer's perspective.

Basic Approach

The NGK Group engages in the creation of quality from the customer's perspective by defining Quality Objectives each year in accordance with the Quality Policy based on the NGK Group Guidelines for Corporate Behavior.

Initiatives for Fiscal 2018

In fiscal 2017, we created an operations protocol (QRE-P*) which enables us to more effectively eliminate quality-related risks in all processes from product planning to mass production. Deployment in-house has been carried out using actual development projects, and through this we have begun improving developer awareness and knowledge.

At the same time, however, we have undertaken company-wide self-checks of all products within the NGK Group in order to ascertain whether we are fulfilling quality-related contractual provisions agreed upon with customers. These self-checks brought to light a non-conformity in delivery tests for insulators and other products sold by the Power Business Group, and we have taken steps to rectify this situation.

For fiscal 2018, we are supplementing our existing quality risk elimination activities with initiatives aimed at reviewing each department's quality assurance roles and overhauling their structure in order to strengthen quality compliance.

Quality Policy
 NGK is dedicated to quality and committed to providing valuable products and services that are trusted by our customers and respected by society.

Fiscal 2018 Quality Objective
 Overhaul and thoroughly reinforce quality assurance structures.

*QRE-P: Quality Risk Elimination Process

Quality Activity System

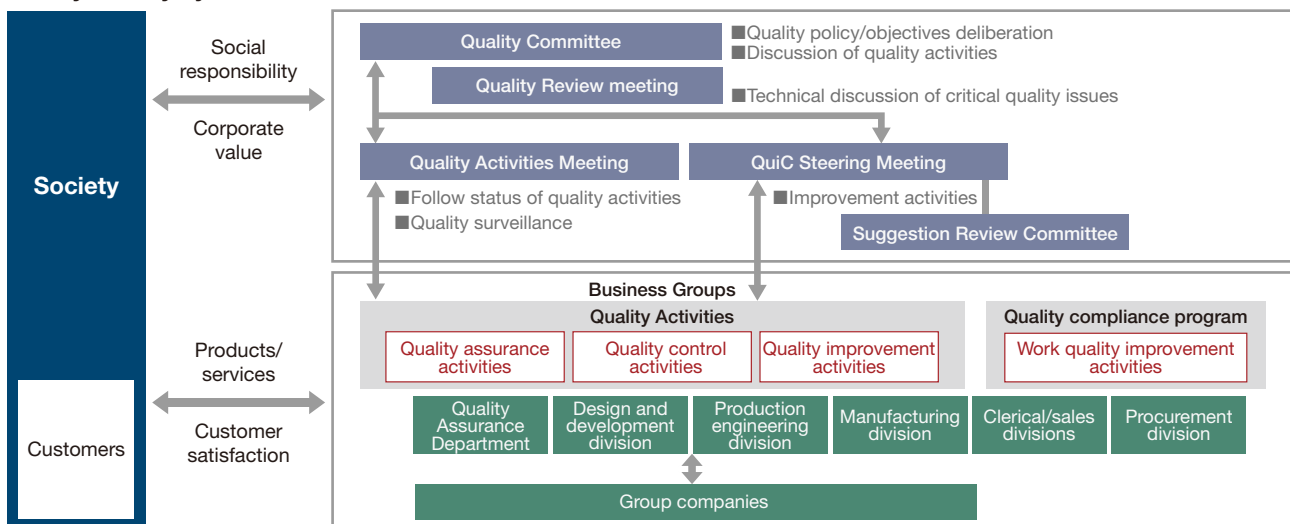
The NGK quality activity system consists of a company-wide system, led by the Quality Committee Chair, and business division internal activity systems, led by the heads of each business division. In terms of company-wide activities, the Quality Committee was established to function as a deliberative body assisting the Quality Committee Chair, while business division internal activity systems were put in place for each business line, creating appropriate quality systems for each. Quality assurance, quality control, quality improvements, and quality education activities are promoted by the acquisition of ISO 9001 or IATF 16949 certification.

In the event of a serious quality-related issue, the CSR Committee Chair and the Quality Committee Chair will discuss and cooperate in making a response. Technical issues are discussed at Quality Review meetings, as necessary, to plan countermeasures, and the Quality Committee Chair supervises execution of the measures at the responsible division. In the case of an external issue, the CSR Committee Chair will direct necessary arrangements to take an appropriate response without delay.

Starting in fiscal 2018, we have sought to address non-conformity issues in the delivery tests by codifying standardized rules that will further strengthen our quality compliance. In addition we have expanded quality-focused activities for "work quality" as well as "product quality".

In terms of organizational structure, we have made revisions to the members of the Quality Committee to ensure that quality activities are directly overseen by senior management, and, with regard to the Power Business Group and its compliance issue, we have assigned customer quality assurance duties to a quality assurance department, which is independent of the Business Group carrying out the business activities.

Quality Activity System



Enhancing the Elimination of Quality Risks Company-Wide

NGK Group Quality Activity Rules

The NGK Group promotes restructuring of its quality activities to respond more precisely to increasing and diversifying quality demands from customers in different target markets. In particular, quality activity rules have been formulated to eliminate quality risks in the market; we are promoting the establishment and improved efficacy of the rules.

Seeking Greater Effectiveness from Quality Activities and Innovation in Operational Procedures

In fiscal 2017, we began implementation of the Quality Risk Elimination Process (QRE-P), through which we can identify procedural innovations in product realization in order to eliminate risk while improving quality. QRE-P is a tool, created by the Quality Management Department based on insights gained from past quality activities, which provides specific risk awareness procedures to be followed instead of having to rely on the personal experience and skill level of individual employees. QRE-P has now been implemented for four existing products and four new products.

In fiscal 2018, departmental rules will be revised to incorporate those products for which QRE-P is being applied, while application of QRE-P to other products is also scheduled.

Four Rules for Quality Activities

○ Quality confirmation rule

Establish milestones, from development to start of production, and confirm conformance with six quality levels when production processes change.

○ DR function strengthening rule

Register DR plans with quality risks of medium or high level as important DR subjects with participation of DR reviewers. The Quality Management Department head holds company-wide DRs for cases with particularly high risk level.

○ Quality monitoring rule

Monitor and share information company-wide with respect to quality status changes or problems concerning products or markets. Manufacturing defects and customer complaints are shared company-wide every month through reports to the Quality Management Department, and the appropriateness of countermeasures is discussed.

○ Handling major customer complaints rule

In the event of a serious customer complaint, including a potential complaint, the situation is promptly reported to the Quality Committee Chair to formulate company-wide countermeasures.

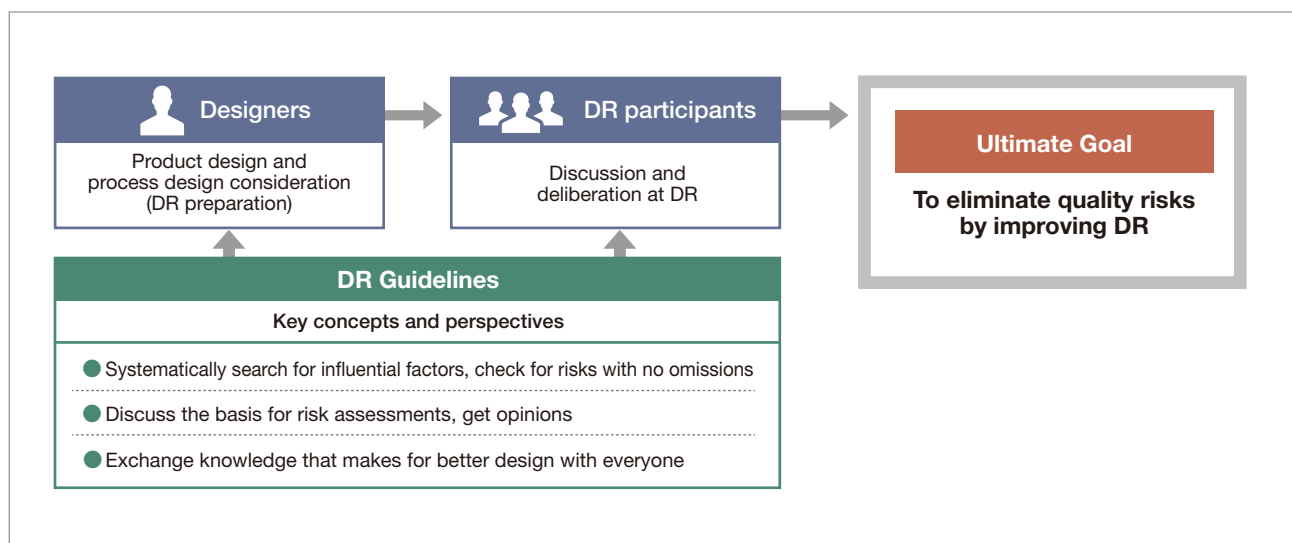
Activities to Enhance DR Functions

The increasing and diversifying quality demands from customers call for the integration of knowledge among various members, not only from the design division but also from the manufacturing and production engineering divisions, throughout the development process. For this reason, the Group considers the Design Review (DR) to be the most critical activity. DRs are conducted when development milestones are reached or when production processes change. Critical DRs are conducted by reviewers from throughout the company to support the elimination of risks.

The DR Guidelines were created to promote DR discussions and to eliminate quality risks thoroughly. We are constantly enhancing the effectiveness of DRs through efforts to spread these guidelines, including education and reviews of each DR. In addition, we have prepared and are utilizing the DR evaluation indicators to encourage improvements by visualizing the progress of each division's level.

Furthermore, NGK organizes a company-wide DR (quality review meeting) for quality issues that are difficult to solve by one division. At this meeting, relevant engineers and experts from across the company discuss broad aspects of issues related to the reliability and safety of products.

We are also deploying the above-mentioned QRE-P approach to facilitate improvement at the pre-DR design level as well as to ensure more effective utilization of the organizational knowledge and experience from DRs.



Quality Activities at Overseas Production Bases

From their inception, overseas production bases have created quality systems appropriate to their situations and acquired ISO 9001 or IATF 16949 certification.

Monthly reports from each base regarding customer complaints and the status of manufacturing quality are discussed at quality activity meetings, enabling the entire NGK Group to evaluate the quality status in a timely manner. Moreover, quality activity rules and annual quality objectives are developed in an attempt to develop and enhance quality activities.

NGK Group Quality Activity Meeting Held at Overseas Plants

In fiscal 2017, the meeting was held at seven plants overseas. Discussions were held on the important subject of each plant to improve quality. Information was also provided on the situation of the NGK Group's quality activities.

Companies Visited

- NGK Metals (NMC)
- NGK-Locke Polymer Insulators (NLPI)
- NGK Ceramics USA (ACU)
- NGK Ceramics Mexico (ACM)
- NGK Energys Myanmar (NEM)
- FM Industries (FMI)
- NGK Ceramics Suzhou (ACC)



Quality activity meeting held at NGK-Locke Polymer Insulators

TOPIC

Quality Improvement Activities at Overseas Production Plants

During quality activity meetings held at overseas production plants, attendees are introduced to the NGK founder's philosophy as well as to predecessors' thoughts regarding quality. These meetings improve members' understanding of the NGK Group and help enhance motivation.

1. What is quality for NGK?



NGK Nagoya factory in 1929

After that, NGK pursued the uniformity of production. Therefore, we could realize the top quality insulators which the competitors could not follow.

This quality creates the base of our actual business.

Founder's Word
 "Even if the defect product is only one among 1,000 pieces for the company, the defect ratio is 100% for the user who bought it."

会社の立場から見れば千個つくって1個不良品がでたとしても、そのパーセンテージは0.1%にすぎないが、その1個の不良品を買ったユーザーの立場からすれば100%の不良品だ。



2nd president Magsamen Eizo

QuiC Activities to Improve Quality with Full Employee Participation

Since 2003, the NGK Group has held QuiC (Quality up innovation Challenge) quality improvement activities in which all employees participate. These activities consist of quality improvement activities by small groups and suggestions that strive to enhance the quality of products and work; the best practices are shared by the entire NGK Group. Every July, NGK holds a company-wide contest at its headquarters to highlight examples of outstanding improvement activities with the intent of horizontal expansion throughout the company.

The fiscal 2017 contest was held over two days, marking the first time that the manufacturing and non-manufacturing divisions' challenges were separated.

The non-manufacturing divisions' contest began with a keynote speech in the morning, followed in the afternoon by the introduction of seven non-manufacturing practices, including two Group companies in Japan. For the manufacturing divisions' contest, 13 practices were introduced, including three overseas plants and three Group companies in Japan. Around 600 NGK Group employees and executives attended the competition.

Fiscal 2017 suggestion activity participation rate	
Manufacturing divisions	98%
Non-manufacturing divisions	93%
Number of suggestions	Approx. 38,000



Among non-manufacturing practices, the President's Special Award was presented to the Quality Management Department in recognition of autonomous activities it has undertaken



Among manufacturing practices, the Metal Manufacturing Department received its first-ever award for its analytical approach to eliminating customer issues, which was developed from a theory derived from ample data

Offering Award Recipients an Opportunity to Visit Overseas Sites

From the end of October to the beginning of November, four fiscal 2016 QuiC Outstanding Proposal Commendation recipients and two fiscal 2017 QuiC Grand Prize recipients visited NGK Ceramics Polska (Poland). At the company, the visitors and the local employees took training to be aware of risks for improvement and exchanged opinions.

This program is organized to provide participants with a firsthand opportunity to observe plants in other countries and talk with local and expatriate employees, thereby helping them better understand the importance of the mother factory as well as encouraging self-development. It is also expected to inspire workers at host companies to increase their quality awareness and motivation for engaging in improvement activities, thus accelerating the overall efforts of the Group.

In December, another six fiscal 2016 Outstanding Proposal Commendation recipients and eight fiscal 2017 Excellence Award and Special Award recipients visited Okinawa to attend a nationwide QC Circle Conference and participate in discussion sessions.



Training at NGK Ceramics Polska

Expanding Improvement Activities to Overseas Production Bases

The NGK Group is working to expand improvement activities to overseas production bases.

In October 2017, several NGK employees, as part of their overseas training, visited NGK Ceramics Polska (Poland), and they used this opportunity to introduce NGK's QuiC activities as well as to survey the activity level of improvement activities.

Strengthening Quality Education

Within the NGK Group, quality-related education and training is focused on equipping employees with knowledge and skills that are applicable to their actual jobs so that they can better address the specific needs of customers. Towards that end, we offer more practical programs where issues that are most relevant to participants addressed. And the programs began being deployed throughout NGK Group.

In addition, we are augmenting our Quality Management System (QMS) training with the aim of facilitating operational systemic improvements.

Main Practical Programs Strengthened in Fiscal 2017

Program name	Number of days and participants	Objective
Quality Basic II	70 days; 46 (all technical personnel in their third year since joining the company)	Learn and practice problem-solving using quality engineering methods
QC Training for Group Companies	NAC 7 days; 11 young factory employees	Use problem-solving procedures to facilitate issue awareness; practice and learn resolution methods
QMS/ISO Training	Basic: 1 day; 44 (4 from Group companies)	Learn the basic standards and requirements of quality control
	Applied: 3 days; 77 (27 from Group companies)	Enhance auditing effectiveness and certify in-house auditors
Preventive Action Training	Classroom lectures and issue examination and discussion: 6 days; 25 (3 from Group companies)	Understand basic approaches to preventive action and recurrence prevention; understand risk examination procedures Perform risk examination using actual issues faced by course participants
	Development project risk examination: 6 days; 8	Use actual development projects to perform risk identification and examination of response measures
Method of Creation and Learning from Failure	4 days; 35	Improve analysis and development skills to learn from failure and apply for the future

Strengthening Quality Management System (QMS) Training

1. Participation open to all personnel

In 2017, a basic course intended for beginners which introduces and explains QMS standards was developed and is being widely promoted throughout the NGK Group, including research and development departments, to foster a greater focus on quality starting from the design phase.

2. Enhancement of internal auditing capability

Training content has been improved by narrowing down the training objectives to produce a reliable increase in auditing capability.

In 2017, participants received training in risk auditing, focusing specifically on the 4Ms (manpower, materials, methods, machinery) that are involved in the process.

63 Employees Pass Self-Maintenance Expert Test (Grade 1: 31 Employees, Grade 2: 32 Employees)

Sixty-three manufacturing division and engineering center employees who are engaged in NGK's voluntary maintenance activities passed the Self-Maintenance Expert Test (Japan Institute of Plant Maintenance) conducted in October (Grade 1: 31 employees, Grade 2: 32 employees). This qualification is given to those who possess a broad range of knowledge and skills necessary concerning quality management, safety, and machinery maintenance, and are certified to have the ability of planning and implementing voluntary maintenance activities and giving instruction. NGK will continue to encourage employees to acquire such qualifications in order to improve quality management capabilities at manufacturing sites.

Strengthening Quality Education at Overseas Production Bases

We work to strengthen quality education at overseas production bases.

In fiscal 2017, NGK made use of the overseas training period to educate overseas members about NGK's stance and approach to loss, as well as to engage in dialogue with local improvement teams about the importance of applying the three "actuals" (visiting the actual location, inspecting the actual items, learning the actual situation) and adhering to the two "fundamentals" (fundamental rules and fundamental principles) of addressing chronic quality-related issues.

